RANGE COMPATIBLE USE ZONES STUDY MARINE CORPS BASE HAWAII

PU'ULOA RANGE TRAINING FACILITY, 'EWA BEACH, HI



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0	Degree
III MEF	III Marine Expeditionary Force
AAV	Amphibious Assault Vehicle
ADNL	A-Weighted Day-Night Average Sound Level
ADP	Area Development Plan
AGL	Above Ground Level
AICUZ	Air Installations Compatible Use Zones
ALZ	Administrative Landing Zone
ANSI	American National Standards Institute
APZ	Accident Potential Zone
ARTCC	Air Route Traffic Control Center
ASP	Ammunition Storage Point
ATC	Air Traffic Control
BASH	Bird/Wildlife Aircraft Strike Hazards
BNOISE2	Blast Noise Version 2
BO	Base Order
BP	Battle Position
CAMA	Coastal Area Management Act
CAS	Close Air Support
CFA	Controlled Firing Area
CFR	Code Of Federal Regulations
CIP	Capital Improvement Program
CMP	Combat Marksmanshin
CPLO	Community Plans And Liaison Officer
COR	Close Quarters Battle
CQB CV	Calendar Vear
CT	Clear Zone
	Decibels
	A Weighted Desihels
	A-weighted Deciders
	Dev Night Average Sound Level
	United States Department Of Defense
	Department Of Defense Identification Code
DODIC	United States Department Of The Nexus
DON	Denser Zene
	Danger Zone
EA	Environmental Assessment
EFV	Expeditionary Fighting vehicle
EIS	Environmental Impact Statement
EMI	Electromagnetic Interference
EO	Executive Order
EIA	Engineer Training Area
EIJ	Extra-lerritorial Jurisdictions
FAA	Federal Aviation Administration
FAC	Forward Area Controller
FOB	Forward Operating Base
FY	Fiscal Year
GEA	Government and External Affairs
GIS	Geographic Information System
GP	Gun Position
HE	High-Explosive

List of Acronyms and Abbreviations

HUD	United States Department Of Housing And Urban Development		
Hz	Hertz		
IP	Initial Points		
JLUS	Joint Land Use Study		
KD	Known Distance		
LAV	Light Armored Vehicle		
Lmax	Maximum Sound Level		
MAC	Military Operations in Urban Terrain Assault Course		
MAG	Marine Aircraft Group		
MAGTE	Marine Air/Ground Task Force		
Marine Corns	United States Marine Corps		
MARSOC	Marine Forces Special Operations Command		
MCAS	Marine Corns Air Station		
MCAS	Marine Corps All Station		
MCDU	Marine Corps Base		
МСВН	Marine Corps Base Hawan		
MCO MCOLE	Marine Corps Order		
MCOLF	Marine Corps Outlying Landing Field		
MCTAB	Marine Corps Training Area Bellows		
MEU	Marine Expeditionary Unit		
MILCON	Military Construction		
mm	Millimeter		
MOA	Military Operations Area		
MOUT	Military Operations In Urban Terrain		
MP	Mortar Position		
MSA	Metropolitan Statistical Area		
MSL	Mean Sea Level		
MTR	Military Training Route		
MWR	Morale, Welfare, And Recreation		
NATO	North Atlantic Treaty Organization		
Navy	United States Department of the Navy		
NEPA	National Environmental Policy Act		
NLR	Noise- Level Reduction		
NSFS	Naval Surface Fire Support		
OEA	Office Of Economic Adjustment		
OLF	Outlying Landing Field		
OPNAVINST	Chief Of Naval Operations Instruction		
ORM	Operational Risk Management		
PAO	Public Affairs Officer		
PDR	Purchase Of Development Rights		
PHNDSA	Pearl Harbor Naval Defensive Sea Area		
PDZ	Parachute Dron Zone		
PRTF	Pu'uloa Range Training Facility		
RA	Restricted Area		
RAICUZ	Range Air Installations Compatible Use Zone		
RAICUZ PCUZ	Pange Compatible Use Zone		
RCUZ PCZ	Range Compatibility Zono		
NCL	Range Company Lone		
KTWISS DMTV	Range racinty Management Support System		
	Kange Ivianagers 1 001KIT		
	KOTOCCTATE NOISE MODEL		
KIA	Kange and Iraining Area		
SARNAM	Small Arms Range Noise Assessment Model Version 2		

SAT	Stationary Armor Target
SDZ	Surface Danger Zone
SEL	Sound Exposure Level
SFCP	Shore Fire Control Party
SOC	Special Operations Capable
SOP	Standard Operating Procedure
SOUM	Safety Of Use Memorandum
SRR	Special Range Request
SUA	Special Use Airspace
TDR	Transfer Of Development Rights
TECOM	Training And Education Command
TLZ	Tactical Landing Zone
TOW	Tube-Launched, Optically Tracked, Wire-Guided
U.S.	United States
U.S.C.	United States Code
UCAS	Urban Close Air Support
USAPHC	United States Army Public Health Command
VCP	Vehicle Check Point
VFR	Visual Flight Rules
WDZ	Weapon Danger Zone

EXECUTIVE SUMMARY

This Range Compatible Use Zones (RCUZ) Study for Pu'uloa Range Training Facility (PRTF) Marine Corps Base Hawaii (MCBH), O'ahu, Hawaii, promotes compatibility between existing and proposed land uses and military live-fire training operations carried out at the installation. Incompatible development surrounding PRTF can restrict training operations due to public safety and welfare hazards, thus obstructing the mission of the installation.

The purpose of this RCUZ Study is to determine where current and projected training operations may limit land uses and to suggest strategies to promote compatible development, allowing the potential of the land to be realized without hampering current or future training operations or exposing the public or installation personnel to unnecessary annoyance or risk.

This RCUZ Study uses noise and safety analyses to identify where current or projected military training operations can affect human health and safety or cause community annoyance due to noise levels associated with training at the installation. Using standard United States (U.S.) Department of Defense (DoD) computer-based models and operations data from MCBH, noise zones and range compatibility zones (RCZs) were identified in accordance with Marine Corps Order (MCO) 3550.13, *Marine Corps Installations Range Compatible Use Zones (RCUZ) Program.*

While the RCUZ program can include operations in the air and at sea, the operations at PRTF include just small-arms training on a known-distance range. The PRTF RCUZ Study analyzed operations to determine areas of current and future incompatibility in relation to potential noise and safety impacts from range training operations. Current operations, as well as prospective operations estimated between now and 2030, were analyzed and modeled to develop noise zones and RCZs for noise and safety impacts, respectively.

This specific document applies to the noise zones and RCZs developed for MCBH at PRTF which were then superimposed over local land use data to identify areas of current and potential future incompatibilities. A number of areas were identified as having land uses that may be incompatible. Offinstallation areas of potential incompatibilities include:

- Residential areas to the east in Military Zoning within Noise Zone III
- Civilian Residential areas to the west within Noise Zone II
- Civilian Recreation areas to the west within Noise Zone II
- Federal Residential areas to the east in Military Zoning within Noise Zone II
- Civilian Recreation areas to the east within Noise Zone II

In addition, projected land uses for the areas surrounding MCBH at PRTF show the potential for more incompatible land uses to develop at low, medium, or high densities within off-Base RCUZ areas that may be impacted by noise from training operations.

It is recommended that MCBH and Honolulu County utilize the results of this study to continue their long history of collaboration to maintain the viability of the installation while minimizing encroachment. Specific suggested measures and strategies for mitigating noise and safety impacts on incompatible land uses and precluding future incompatible development are identified in Section 7 of this RCUZ Study. Key recommendations include the following:

- Encourage compatible land use zoning and development and implement noise level reduction measures, both on and off the installation;
- Incorporate RCUZ Study results and recommendations into MCBH Master Planning documents;
- Encourage the use of noise and safety disclosure statements in off-installation real estate transactions;
- Disseminate RCUZ information to banking and financial institutions that provide loans for real estate acquisition and development; and
- Disseminate relevant information about MCBH training operations to the local government officials, businesses, and the public.

1 INTRODUCTION

1.1 BACKGROUND

In 1998, the United States (U.S.) Department of the Navy (DON; *also* Navy) instituted the Range Air Installations Compatible Use Zones (RAICUZ) program to protect public health, safety, and welfare, and to prevent encroachment from degrading the operational capability of air-to-ground ranges. RAICUZ studies primarily focus on air-to-ground ordnance training; however, because U.S. Marine Corps (Marine Corps) ranges typically conduct both air-to-ground, ground-to-ground, and ground-to-air live-fire combat training, the Marine Corps expanded the RAICUZ concept to encompass both types of live-fire training and developed the Range Compatible Use Zones (RCUZ) program.

The RCUZ program encourages mutual coordination between range installations and neighboring communities to increase public awareness of the importance of range operations and the need to address mission requirements and associated noise and risk factors. As the communities that surround a range grow and develop, the Marine Corps has the responsibility to communicate with local governments regarding land use planning, zoning, and mission impacts. To be most effective, the RCUZ program requires that the installation command collaborate with nearby communities, as well as federal, state, regional, and local agencies, to prevent incompatible development both within and adjacent to the installation.

Marine Corps Base Hawaii (MCBH) includes the Pu'uloa Range Training Facility (PRTF) and is a geographically separate facility and will be carried forward separately within this document. Further, PRTF does not contain any artillery or mortar firing positions, a high hazard impact area, training airspace, or an airfield. Therefore, these types of training will not be carried forward for this location.

1.2 RCUZ UPDATE

Every Marine Corps installation with a live-fire training component must complete an RCUZ Study. This document represents the first approved RCUZ Study for MCBH.

This study has been prepared in consideration of operational levels and range development that will occur through the next 10 years at PRTF.

1.2.1 Purpose and Need

Under Marine Corps Order (MCO) 11011.23A, installation Commanders are required to establish an Encroachment Control program to prevent incompatible development of land adjacent to military operational training ranges. RCUZ studies provide the basis for the installation's Encroachment Control program.

The purpose of the RCUZ program is to help local communities identify land uses that are compatible, as well as incompatible, with noise zones and Range Compatibility Zones (RCZs) associated with military aviation range and/or military ground range operations. RCUZ studies analyze community development trends, land use tools, and mission requirements at a military operational range to develop recommended strategies that will protect the long-term viability of the range, while maintaining a high degree of public safety. RCUZ recommendations are based on the impacts of noise, safety considerations, and economic considerations related to public funds and local economic sustainability.

1.2.2 RCUZ Study Objectives

The main objective of the RCUZ program is to promote compatible land use within the range environs, both on-base and off-base, in order to:

- Minimize public exposure to hazards and noise associated with operations in Marine Corps range and training areas (RTAs);
- Protect DON investments by safeguarding current and potential operational capabilities of the RTAs, and protect the public health, safety, and welfare;
- Promote compatible land use within the RCZs, to the extent practicable;
- Inform the public about the RCUZ program and seek cooperative efforts to minimize encroachment; and
- Establish and foster working relationships between the Commanding Officer and appropriate federal, state, and local agencies and stakeholders to contribute to mutual communication regarding proposed actions that could affect public health, safety, and welfare, as well as operational and training capabilities and compatible land use recommendations.

1.2.3 Document Organization

Chapter 1 of this RCUZ Study includes an installation and programmatic overview, and identifies the roles and responsibility for implementing the RCUZ program. Chapter 2 provides a description of the ranges and airspace that comprise the training area, and Chapter 3 describes the operations and training activities that occur at the installation. Chapters 4 presents the updated RCZs and noise zones. In Chapter 5, the RCZs and noise zones are compared to land uses within the surrounding community to identify current and future potential areas of incompatibility. Recommendations for achieving compatible land use in the future are outlined in Chapter 6, and a list of references used in this RCUZ Study is provided in Chapter 7.

1.3 LOCATION

MCBH facilities on O'ahu include MCBH Kaneohe Bay, MCBH Camp Smith, Marine Corps Training Area Bellows (MCTAB), and PRTF. This document specifically addresses the PRTF, which is located on the south-central shore of O'ahu, west of the Pearl Harbor entrance channel, between the Kapilina residential area (formerly Iroquois Point Family Housing) to the Range's east, and the off-Base residential community of 'Ewa Beach to the west of the Range (Figure 1-1). The existing facility includes six firing ranges, barracks, and classrooms used annually by more than 4,000 Marines from MCBH Kaneohe Bay to meet annual qualification and sustainment training requirements with a variety of small caliber weapons. The range also is the site used for Marine sniper training.

The ocean area directly adjacent to the PRTF shoreline is located within the 5-mile Pearl Harbor Naval Defensive Sea Area (PHNDSA). The 165-acre range extends along about 3,000 feet of sandy shoreline, and consists of six small-caliber ranges (pistols, rifles up to 30 caliber, and shotguns) of different distances. Ranges A and B on the west end are long-distance ranges (up to 1,000 yards) and their ocean end consists of large earthen backstop berms with precast concrete barrier walls on top treated with sound absorbing materials. The other four ranges (C, D, E and F) are shorter rifle and pistol ranges from 0 to 50 yards long with earthen impact berms along the beach.



Figure 1-1 Location of the PRTF and other MCBH facilities

1.4 MILITARY MISSION

MCBH provides forward-based, sustainable and secure training and operational support, facilities, and services to enable Fleet Marine Forces to accomplish their training missions. The primary mission of MCBH is to provide operational, training, maintenance, berthing, and personnel support facilities to support the III Marine Expeditionary Force (III MEF) (Hawaii) (DON 2006). Major III MEF ground units include the 3rd Marine Littoral Regiment, and 3rd Radio Battalion. Air units include Marine Aircraft Group 24, Fleet Logistics Squadron 51, Helicopter Maritime Strike Squadron 37, and Tactical Operational facilities at MCBH Kaneohe Bay and other ground training facilities. The mission of the III MEF is to execute amphibious assault and other required air/ground operations. This mission requires constant deployment of appropriately organized units of an air/ground task force. Units of the III MEF (Hawaii) may also be required to augment other Marine Corps air/ground task forces worldwide.

1.5 Responsibilities for Compatible Land Use

Military installations and local government agencies with planning and zoning authority share the responsibility for preserving land use compatibility near the installations. Installation commands, which are responsible for the RTAs, are encouraged to participate in partnering efforts with adjacent landowners, users, community councils, commissions, and planning and zoning agencies. Cooperative action by all parties is essential in preventing land use incompatibility and encroachment.

Table 1-1 identifies roles and responsibilities shared by the Marine Corps, state and local governments, and various community stakeholders.

Marine Corps	 Examine the air mission for operations changes that could reduce impacts. Conduct noise and safety studies and develop RCUZ maps. Examine local land uses and growth trends. Actively participate in the land use planning process. Release an RCUZ Study and update the study as required. Work with local governments and private citizens. Monitor operations and address noise concerns. 		
State and Local Government	 Incorporate RCUZ guidelines into a comprehensive development plan and zoning ordinance. Regulate height and obstruction regulations Regulate acoustical treatment in new construction. Require fair disclosure in real estate for all buyers, renters, lessees, and developers. 		
Builders/Developers	Develop properties in a manner that appropriately protects the health, safety, and welfare of the civilian population by constructing facilities that are compatible with aircraft operations (e.g., sound attenuation features, densities, and occupational noise considerations).		
Real Estate Professionals	Ensure potential buyers and renters receive and understand RCUZ information on affected properties.		
Private Citizens	 Seek information and self-education on the established zones and the impacts they may have for individuals. Identify RCUZ considerations in all property transactions. Understand RCUZ effects before buying, renting, leasing, or developing property. 		

Table 1-1 Responsibilities for Compatible Land Use

1.6 FEDERAL AUTHORITY

Authority for the establishment and implementation of the RCUZ process is derived from:

- The Noise Control Act of 1972 (42 United States Code [U.S.C.] 4901 et seq.), which seeks to protect Americans from "noise that jeopardizes their health or welfare" and directs federal agencies to further this policy with their programs;
- MCO 11011.23A, dated 20 July 2020, which establishes responsibility for control of encroachment on Marine Corps operations and real property; and
- MCO 3550.13, dated 27 April 2021, which establishes the RCUZ program and details specific responsibilities for land use compatibility within the Marine Corps.

1.7 COMMUNITY AUTHORITY

The Marine Corps can provide recommendations or advise community decision makers regarding land use compatibility; however, local governments have ultimate authority for preserving land use compatibility near the installation.

Local governments manage land use and future growth through zoning regulations, land use plans/comprehensive plans, subdivision regulations, and building codes. These planning tools define standards to restrict or permit land uses, density, and development. Elected city or county legislators enact zoning laws and appoint agencies/boards to review proposed development and administer zoning regulation provisions. Although land use activities directly outside an installation's fence line can impact DoD operations, the use and development of the surrounding properties are under the jurisdiction of local governments. Planning and zoning authority for land uses around PRTF include Honolulu County and the State of Hawaii.

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2 MCBH RTA FOOTPRINT

This chapter provides background on the RTAs within MCBH PRTF that are the focus of this study. This chapter includes details about the history and location of the ranges and their historical use.

2.1 HISTORY

Marine Corps Air Station (MCAS) Kaneohe Bay stood up in 1952 at the previously designated Naval Air Station Kaneohe Bay. Both Marine Aircraft Group (MAG) 24 and 3d Marine Regiment have been based there for an extended period. The 1st Marine Brigade was also based there from the 1960s through 1992. During that period there was a known distance (KD) rifle and KD pistol ranges located off the Air Station at the PRTF, southwest of Pearl Harbor.

PRTF has been in operation since 1915, has been managed by the Marine Corps since 1947, but is also utilized by all military branches as well as by State and County police and other agencies (e.g., the Federal Bureau of Investigation, Hawaii National Guard, State of Hawaii Department of Land and Natural Resources conservation officers, and the Honolulu Police Department, among others) requiring small caliber training and practice. It is the only range of its kind on O'ahu, where Marines can qualify with service weapons to include rifles, pistols, and shotguns. It is heavily utilized (generally 5 days per week but may be used on any day of the week).

2.2 RANGE DESCRIPTION

The PRTF provides annual marksmanship qualification training and readiness support to the MCBH tenant units and other Service units, and other government agencies in Hawaii. The expanding spectrum of required range users, diverse training requirements, and the increased capabilities of weapon systems of the Marine Corps, other Services, and federal government agencies will continue to create strong demand for MCBH's RTAs and in particular PRTF.

The following sections identify training range features that are part of this RCUZ Study.

Live-fire Training Ranges PRTF provides the only range capability set on O'ahu for Marines and other government agencies to meet individual small arms annual qualification and sustainment training requirements. PRTF conducts controlled static firing from registered firing positions to corresponding targets which is contained by elevated lateral side berms and an expansive positive backstop. There are two KD rifle ranges and four KD pistol/rifle square bay ranges (Figure 2-1) that support the Combat Marksmanship Program (CMP) for the Marines and other Service members stationed on O'ahu. Live-fire, small caliber training is authorized from 7 a.m. to 5 p.m. daily



Figure 2-1 PRTF Range Layout

Range	Type Range
А	KD Rifle (100–1,000 yds)
В	KD Rifle (25–600 yds)
С	KD Pistol and Rifle (0–50 yds)
D	KD Pistol and Rifle (0–25 yds)
Е	KD Pistol and Rifle (0–50 yds)
F	KD Pistol and Rifle (0–50 yds)
$N_{\text{red}} = V D = 1$	distance and

Table 2-1 Pu'uloa Range Training Facility Ranges

Notes: KD = known distance, yds = yards

2.2.1 Surface Danger Zones

2.2.1.1 Surface Danger Zones

Ground-to-ground Surface Danger Zones (SDZs) were provided by the MCB Hawaii Pu'uloa Range Safety Department for direct inclusion in this RCUZ Study. These SDZs were obtained as approved geographic information system (GIS) shape files.

This section of the RCUZ analysis presents the installation's SDZ files depicting live-fire operations on ranges at PRTF. All SDZs provided by the installation are contained within the boundaries of government-controlled property, both within the perimeter of the PRTF and the PHNDSA. In areas where SDZs overlap adjacent training areas, roads, or other installation features that may be used by additional forces, MCO 3570.1C outlines specific range-by-range procedures to de-conflict adjacent training to ensure safety by securing and monitoring road and waterways when ranges are in use. Individual deterministic and probabilistic Danger Zones (DZs) were combined to create a composite RCZ-I identifying containment of hazardous fragments to a one-in-a-million probability of escapement (which is considered negligible risk by the DoD). The vast majority of this composite SDZ resides over the water and within the existing 5-mile PHNDSA (Figure 2-2).

2.2.2 Amphibious Landing Beaches

There is an amphibious landing zone and small beach landing site that can support small boat operations at PRTF. However, it is located behind the impact berms, within the SDZ for the ranges, and there are no associated inland training areas, thus it is seldom used.



Figure 2-2 Combined DZs – Range Compatible Zone 1

3 EXERCISES AND RANGES

Ammunition usage data were obtained from the number of firings recorded in the Range Facility Management Support System (RFMSS), provided by the MCBH Range Control Office.

3.1 LIVE-FIRE OPERATIONS

3.1.1 Small Caliber

Reported small caliber operations at PRTF consist of firings of multiple weapon types, such as shotguns, rifles, and pistols.

Based on a review of the 2018–2022 RFMSS data, the maximum number of rounds per range and per weapon were used in modeling regardless of year and are presented in Table 3-1. It should be noted that there was a wide variation in usage on some of the ranges. Year-to-year variations in usage are expected for a variety of reasons, such as annual differences in operational tempos, deployment of units, and range development activities.

Year	Range	Weapon	Rounds Fired
2019	AP	RIFLE M14 7.62MM/M118 150GR	13,365
		RIFLE 300 WIN MAG/200G	710
		RIFLE M16 5.56MM/193 55GR	93,787
2018	А	RIFLE M14 7.62MM/M118 150GR	3,692
		RIFLE 300 WIN MAG/200G	2,705
		RIFLE M16 5.56MM/193 55GR	1,888,178
2010	D	RIFLE M14 7.62MM/M118 150GR	420
2019	D	SAW M249 5.56MM/M193 55GR	44,985
		RIFLE 300 WIN MAG/200G	175
		RIFLE M16 5.56MM/193 55GR	131,591
2018	С	PISTOL M9 9MM/115GR	40,658
		SHOTGUN 12 GA PUMP/MAG T SHOT	3,396
	D	RIFLE M16 5.56MM/193 55GR	89,376
2018		PISTOL M9 9MM/115GR	98,555
		SHOTGUN 12 GA PUMP/MAG T SHOT	5,772
	Е	RIFLE M16 5.56MM/193 55GR	83,954
2019		PISTOL M9 9MM/115GR	119,032
2018		SHOTGUN 12 GA PUMP/MAG T SHOT	7,423
		PISTOL .45ACP M119A1 AL/230G	50
		RIFLE M16 5.56MM/193 55GR	65,584
2019	F	PISTOL M9 9MM/115GR	322,648
		SHOTGUN 12 GA PUMP/MAG T SHOT	245

 Table 3-1
 Pu'uloa RTF Ranges, Weapons, and Annual Rounds Fired

3.2 FUTURE RANGE OPERATIONS

The best estimates of future operations from PRTF indicate a continuation of the types and levels of operations currently conducted. The noise analysis reviewed all of the small caliber ranges that are expected to be operating in 2030, and identified those ranges that are projected to utilize munitions that generate significant noise. The noise metrics used in this study are discussed briefly in Section 4.4.1 and

in more depth in Appendix B. The scenarios modeled for the noise analysis incorporate additional proposed administrative and engineering controls to mitigate local noise exposure.

A number of planned military construction (MILCON) projects may have an impact on the elements addressed in this RCUZ Study, including noise mitigation and safety measures. In addition, several range enhancement proposals are currently in the planning stages. As part of the planning process for each project, the National Environmental Policy Act (NEPA) of 1970 implementation and documentation would be carried forward and include noise and safety analyses.

1

4 RCUZ FOOTPRINT

This chapter focuses on the RCZs and the safety analysis of ground-to-ground live-fire operations based on the weapon systems currently used or projected to be used at PRTF through 2030. The objective of this analysis is to provide information and guidance about potential safety hazards generated by live-fire ranges. The goal of the safety analysis is to minimize exposure of military and civilian activities to potential dangers associated with weapons ranges.

4.1 GENERAL

RCZs translate ordnance delivery safety concerns into recommended compatible land use zones. The size of an RCZ is not affected by the number of annual range operations, but is based on the types of operations performed on the range. Each RCZ has specific restrictions and permissions related to the land use that exists within each zone, which, due to safety concerns, are more stringent than land use recommendations related to noise. RCZs are not predictors of safety hazards but, instead, depict areas where mishaps are likely to occur if they do occur. Modeled operations reflect current training activities as well as those that are either planned or predicted to occur in the future.

There are three RCZs related to ranges.

- RCZ-I: Defines the area of the greatest potential safety hazard and designates the minimum surface area needed to contain all ordnance. It is the composite of all DZs authorized at the installation.
- RCZ-II: Defines the area of armed aircraft over-flight. It is less restrictive than RCZ-I, but more restrictive than RCZ-III because there are safety concerns associated with the arming/de-arming of aircraft.
- RCZ-III: Defines the area within the designated Special Use Airspace (SUA) that provides aircraft with tactical maneuvering room and access to and from the air- to-ground targets. This zone has the least stringent land use compatibility requirements.

Within this study, only RCZ-1 will be carried forward as RCZ-II and RCZ-III are not applicable given that PRTF has no ground-to-air or air-to-ground ranges.

4.2 LIVE-FIRE RANGE SAFETY

In accordance with MCO 3570.1C, range safety is the responsibility of every individual and all Commanders at all times. Range safety and operations must intertwine so that risk management and range safety are a part of the planning and execution of all missions, exercises, live-fire events, and daily evolutions.

4.2.1 Ground-to-Ground Operations Safety

Range personnel are trained on the ground-to-ground range safety with the regulations, specific information, and procedures for the firing of approved weapons and associated ammunition, munitions, less-than-lethal devices, energy producing aiming devices (lasers), pyrotechnics, training devices, and explosives.

4.3 RANGE COMPATIBILITY ZONES

RCZ-I at PRTF was developed quantitatively through the incorporation of installation-modeled GIS files for SDZs. In accordance with MCO 3550.13, all of the individual DZs were combined using GIS software to develop an installation-wide composite shape file. This DZ composite is referred to as RCZ-I. It is depicted graphically in Figure 2-1.

Given that PRTF does not have air-to-ground ranges, areas of armed overflight, or tactical maneuvering airspace, RCZ-II and RCZ-III are not applicable.

4.4 NOISE ANALYSIS METHODOLOGY

How a military range manages noise can play a significant role in shaping the range's relationship with the community. PRTF has developed and defined noise contours for its RTAs, using the guidance provided in MCO 3550.13. These noise contours provide the community with a tool to plan for compatible development near ranges.

This chapter of the RCUZ Study describes the noise environment at PRTF ranges. This chapter also explains how environmental noise is measured and modeled and includes noise contours based on future range development and continued operations through 2030.

4.4.1 What is Noise?

Sound is vibrations in the air, which can be generated by a multitude of sources. When sound is invasive or deemed as unwanted or invasive to a listener, it becomes noise. Further discussion on noise and its effects on people and the environment is provided in Appendix B.

Noise sources at military bases can be classified as continuous noise (e.g., on-base vehicular traffic and aircraft operations) or impulsive noise (e.g., weapons firing or detonation of explosives). Not all noise sources are directly associated with training activities, but the noise environment on military bases is typically dominated by their training operations. The main source of noise at PRTF is small caliber weapons firing. However, additional noise sources in the vicinity includes the range Public Address system, aircraft arrivals and departures associated with Honolulu International Airport, and climatological factors such as wind and surf.

Humans perceive and react differently to impulsive and continuous noise events, depending on the level, frequency, and duration of the event. Because of the difference in human response to these types of noise events, military operational noise is measured using several different noise metrics. For small-caliber operations, such as those at PRTF, the noise metric Peak Sound Pressure Level is utilized, and expressed in decibels, giving it the symbol dBPk.

4.4.1.1 Peak Sound Pressure Level

The dBPk is the highest instantaneous (lasting a tenth of a second), un-weighted sound level over any given period time. It is used to quantify impulsive, short duration events, such as a large caliber weapon firing or an explosive detonation. High peak sound levels can generate complaints from people in the local community.

4.4.2 Noise Contours and Land Use Planning

Small caliber fire noise (muzzle blast and projectile detonation) exposure at range operations at PRTF are calculated using the un-weighted peak sounds levels (dBPk) measured in dB. The peak sound levels are visually depicted as a noise contour that connects points of equal value. The area between two noise contours is known as a noise zone.

A-weighted Day-Night Average Sound Level (ADNL, or sometimes simply DNL) is used to describe cumulative noise effects from aircraft noise. C-weighted Day-Night Average Sound Level (CDNL) is used to describe cumulative effects of impulsive low frequency noise from things like explosions and sonic booms. Both these metrics are discussed further in Appendix B.

For land use planning purposes, the DoD generally divides noise exposure from aircraft and weapons into three noise zones, as described below. Table 4-1 provides the noise level limits of each noise zone associated with land use planning for weapons and aircraft noise.

- Noise Zone 1: Represents the lowest area of noise exposure. Individuals can hear noise but can also adapt to noise levels. Most land uses are compatible within Noise Zone 1.
- Noise Zone 2: Represents the area of moderate impact where some land use control measures are recommended for both on- and off- installation locations.
- Noise Zone 3: Represents the most severely impacted areas where the greatest degree of land use control is recommended for both on- and off-installation.

Noise Zone	Aircraft (ADNL)	Large Caliber Noise (CDNL)	Small Caliber dBPk (peak)
Zone 1	< 65 dBA	< 62 dBC	<87 dBPk
Zone 2	65 to 75 dBA	62 to 70 dBC	87 to 104 dBPk
Zone 3	> 75 dBA	> 70 dBC	>104 dBPk

Table 4-1Noise Zone Definitions

While DNL contours are widely accepted for use in land use planning and zoning, they do not represent what an individual hears when a noise event occurs. Peak noise levels represent what an individual hears upon deployment of a weapon and at times, its impact at the target. Weather conditions and environmental aspects can contribute to the sound from an individual range being heard several miles away. Supplemental noise metrics are used to help explain this situation in a range environs.

4.4.3 Noise Models Used in this Study

Noise exposure was modeled under an annual average of existing munitions deployment and for the projected 2030 range development at PRTF which includes only ground-based weapon systems. Modeling parameters include ranges, firing positions, targets, target backstops, and range berms. All operations at PRTF occur between the hours of 7:00 a.m. and 5:00 p.m.

Noise contours for PRTF were developed using the standard DoD noise modeling software: Small Arms Range Noise Assessment Model (SARNAM), which includes use of weapon systems with ammunition less than or equal to .50 caliber.

4.4.3.1 Small-Arms Range Noise Assessment Model

Noise from small caliber range operations at PRTF, which consists of muzzle blast and projectile detonation (if high explosive charged), was assessed using SARNAM version 2.6. SARNAM calculates different sound exposure metrics, such as A-weighted Day-Night Average Sound Level and peak sound

levels, based on range attributes (size and structure, number of targets, and direction of fire), type of weapons and ammunition, number of rounds and time of firing, and atmospheric conditions. The model also accounts for spectrum and directivity of muzzle blast and projectile bow shock and downwind propagation conditions.

4.5 **BASELINE NOISE EXPOSURE LEVELS**

4.5.1 Baseline Small Caliber Noise

Baseline noise exposure levels are based on existing operations tempo and range configuration. Peak noise contours were developed and Noise Zone acreage both within and beyond on the based boundary were calculated.

Figure 4-1 depicts the existing Peak noise contours at PRTF for 2024. Table 4-2 includes the Noise Zones and representative acreage.

Noise Zone	dBPk	On-Base	Off-Base	Total
Noise Zone 2	87-104	19	719	738
Noise Zone 3	104+	138	22	160
Total		157	741	898

 Table 4-2
 Baseline (2024) Peak Noise Contours: Acreage and Noise Zones - Off-Base

4.6 NOISE COMPLAINTS

Noise complaint data help to gain a better understanding of MCBH overall noise impact on the surrounding communities and, consequently, help directs installation personnel efforts to effectively address and minimize noise concerns while sustaining mission requirements. Noise complaints can be directly phoned into the Marine Corps at (808) 496-8832or by completing a Sound Reporting Form at (https://forms.osi.apps.mil/r/PGVP4vQZGn). All noise concern documents are filed with the MCBH Community Relations Office.

4.7 **PROJECTED NOISE EXPOSURE LEVELS**

Noise contour maps provide the Marine Corps, local community planning organizations, and the public with modeled noise-related impacts from range operations. Noise contours, when overlaid with local land uses, can help identify areas of incompatible land uses and plan for future development around a range.

The RCUZ Instructions require modeling and analyzing existing conditions and any future operational changes that can be reasonably predicted. Using the operational data described in Chapter 3, the MCBH RCUZ noise contours were developed with DoD-approved computer-based models. Noise events at PRTF were modeled for Peak Sound Level for small caliber weapons.



Figure 4-1 Baseline (2024) Peak Noise Contours at PRTF

4.7.1 Short-Term Projected Exposure Levels

The Short-Term Projected RCUZ noise contours represent the noise exposure levels based on existing range utilization and includes administrative mitigation controls to reduce local noise exposure. Administrative mitigation controls include utilizing only noise-suppressed weapons on Range A, firing of all sniper systems will be suppressed, and rifles and shotguns would not be permitted on Range E and Range F. Operations are projected into the future to help ensure that the future operational capability of the Base is considered. Future year planning is necessary to consider the effects of expected changes in range operational levels. As a planning document, this RCUZ Study forecasts range operations based upon estimates of future mission requirements, including new platforms and ordnance, within the next 10 years to assess the installation's impact on the local community.

Recently, the PRTF revised the location, direction, and utilization of the Public Address system to further reduce operational off-Base noise levels and address local community input, while still maintaining range communication and safety requirements.

Short-Term Projected noise exposure levels are based on forecast operations tempo while using range administrative mitigation controls. Peak noise contours were developed and Noise Zone acreage both within and beyond on the based boundary were calculated.

Figure 4-2 depicts the Short Term peak noise contours at PRTF. Table 4-3 includes the Noise Zones and representative acreage off-Base.

Table 4-3	Short-Term Mitigation (with Administrative Controls) Peak Noise Contours
	at PRTF Off-Base

Noise Zone	dBPk	On-Base	Off-Base	Total
Noise Zone 2	87-104	37	704	741
Noise Zone 3	104+	121	12	133
Tot	al	157	716	873



Figure 4-2 Short-Term Mitigation (with Administrative Controls) Peak Noise Contours at PRTF

4.7.2 Long-Term Projected Exposure Levels

Long-Term noise exposure levels are based on forecast operations tempo and range development which includes administrative mitigation controls as described under Short-Term projections, and additional engineering mitigation controls. Engineering mitigation controls include a noise barrier behind the 600-yard firing line on Range B and a noise barrier placed along the western berm of Range B that extends from the target backstop wall to the 600 yard-line. Peak noise contours were developed and Noise Zone acreage both within and beyond on the based boundary were calculated.

Figure 4-3 depicts the Peak noise contours at PRTF under the Long-Term scenario. Table 4-4 includes the Noise Zones and representative acreage.

Table 4-4 Long-term (Administrative and Engineering Mitigation Controls) Peak Noise Contours Acreage and Noise Zones at PRTF both On- and Off-Base

Noise Zone	dBPk	On-base	Off-base	Total
Noise Zone 2	87-104	63	347	410
Noise Zone 3	104+	94	6	100
To	otal	157	353	511



Figure 4-3 Long-Term with both Administrative and Engineering Mitigation Controls Peak Noise Contours at PRTF

5 LAND USE COMPATIBILITY

This RCUZ Study is a planning document for the Marine Corps to use when working with government entities to adopt programs, policies, and regulations that support the Marine Corps mission and encourage compatible development near PRTF. The land use compatibility analysis is based on an assessment of existing land use and proposed development, both on- and off-Base within the Short- and Long-Term Composite RCUZ footprint.

Planning practices and population, housing, and economic trends were evaluated to determine how local and regional development patterns could impact future operations at the range. Recommended strategies for RCUZ implementation are based on the findings from the land use compatibility analysis.

5.1 GENERAL

This RCUZ Study is a planning document for the Marine Corps to use when working with government entities to adopt programs, policies, and regulations that support the Marine Corps mission and encourage compatible development near PRTF. The land use compatibility analysis is based on an assessment of existing land use and proposed development, both on- and off-Base within the Short- and Long-Term Composite RCUZ footprint.

Planning practices and population, housing, and economic trends were evaluated to determine how local and regional development patterns could impact future operations at the range. Recommended strategies for RCUZ implementation are based on the findings from the land use compatibility analysis.

5.2 RANGE AND SAFETY NOISE CONTOURS

The Composite RCUZ footprint is a composite of the noise zones and RCZs associated with each of the operations areas. The RCZs and the noise zones that are included in the RCUZ footprint reflect Long-Term projections. The RCUZ footprint is used as the basis for the land use compatibility analysis. The RCUZ footprint defines the minimum area within which land use control measures are recommended to protect public health, safety, and welfare and to preserve the range installation's mission.

PRTF RCUZ footprint and the land use recommendations presented in this RCUZ Study are fundamental tools for effective compatible land use planning. The Composite RCUZ footprint is depicted on Figure 5-1.

5.3 LAND USE COMPATIBILITY WITHIN RANGE SAFETY ZONES AND NOISE CONTOURS

The Marine Corps has developed guidelines for compatible land use and development within a range installation's noise zones and RCZs. These land use guidelines are provided in the Marine Corps RCUZ Instructions (MCO 3550.13).

Tables 5-1 and 5-2 provide a list of common land use classifications and their compatibility recommendations within RCUZ noise zones (Table 5-1) and RCZs (Table 5-2). Land use classifications presented in these tables are general and do not represent the local communities' land use designations. When current land uses and proposed development in the RCUZ footprint are compared to these guidelines, compatible and incompatible land uses can be identified.

The Marine Corps' land use recommendations are more stringent for RCZs than for noise zones. The land use recommendations for RCZs take into consideration the possible harmful consequences of injury and damage to property, which are considered more serious than the potential harm caused by aircraft and range noise impacts.



Figure 5-1 PRTF Composite Footprint with RCZ and dBPk Noise Contours, Long Term

	Land Use Compatibility within dB Peak Noise Zones			
Land Use	Noise Zone 1 < 87 dBP	Noise Zone 2 87–104 dBP	Noise Zone 3 104 dBP <	
Single Family Residential, Duplex, Mobile Homes	Y	Y (3)	Ν	
Multi-Family Residential, Transient Lodging	Y	Y (3)	Ν	
Public Assembly, Auditoriums, Concert Halls	Y	Y ⁽¹⁾	Ν	
Schools, Churches, Child Care, and Hospitals	Y	Y ⁽¹⁾	Ν	
Playgrounds, Neighborhood Parks	Y	$\mathbf{Y}^{(1)}$	Ν	
Shopping Centers and Superstores	Y	$\mathbf{Y}^{(1)}$	Ν	
Business Services	Y	$Y^{(1)(2)}$	Ν	
Manufacturing (ex. Petrol/chem.; textile)	Y	$Y^{(1)(2)}$	Ν	
Agriculture, Forestry Fishing, and Mining	Y	Y	Y	

Table 5-1 Land Use Classifications and Compatibility Guidelines in Noise Zones

Notes:

This generalized land-use table provides an overview of recommended land use. To determine specific land-use compatibility, see Appendix A.

⁽¹⁾Land use and related structures generally compatible; however, measures to achieve recommended noise-level reduction (25 to 30 NLR) should be incorporated into design and construction of the structures.

⁽²⁾Land use and related structures generally compatible; however, measures to achieve recommended noise- level (30 to 35 NLR) reduction should be incorporated into design and construction of the structures.

⁽³⁾Residential use is discouraged in Noise Zone 2. Where the community determines that these uses must be allowed, a NLR of at least 25 dB should be incorporated into building codes.

Source: Adapted from MCO 3550.13 (LFL)

Table 5-2	Land Use Classification	s and Compatibility	Guidelines in RCZs
			ouractimes in reells

Land Use	Land Use Compatibility within RCZs			
Lana Use	RCZ-I	RCZ-II	RCZ-III	
Single Family Residential, Duplex, Mobile Homes	Ν	Ν	Y ⁽³⁾	
Multi-Family Residential, Transient Lodging	Ν	Ν	Ν	
Public Assembly, Auditoriums, Concert Halls	Ν	Ν	Ν	
Schools, Churches, Child Care, and Hospitals	Ν	Ν	Ν	
Playgrounds, Neighborhood Parks	Ν	Ν	Y ⁽²⁾	
Shopping Centers and Superstores	Ν	Ν	Y ⁽²⁾	
Business Services	Ν	Ν	Y ⁽²⁾	
Manufacturing (ex. Petrol/chem.; textile)	Ν	Ν	Y ⁽²⁾	
Agriculture, Forestry Fishing, and Mining	Ν	Y ⁽¹⁾	Y ⁽²⁾	

Notes:

⁽¹⁾RCZ-II is an area of armed overflight. Land uses that have the potential to attract people are not compatible.

⁽²⁾Incompatible when the training mission requires low altitude overflight (less than 500 ft.).

⁽³⁾Suggested maximum density of RCZ-III is no more than 1 or 2 dwellings per acre.

Source: Adapted from MCO 3550.13 (LFL)

5.4 ON-BASE LAND USE

The recently completed 2016 PRTF Area Development Plan (ADP) provides the overall long-term development plan for PRTF and addresses future land use, circulation and parking, and facility and utility infrastructure development. The ADP regulating plan identifies the majority of the project area as "open space." The one exception is the area along the eastern shoreline of PRTF between Range F and the east installation boundary. This area is identified as parks and recreation areas. The ADP does not propose any new buildings or development in the project area. The ocean area directly offshore and extending up to the high-water mark of the PRTF shoreline is located within the PHNDSA. The PHNDSA was established by Presidential Executive Order (EO) 8143, and the federal jurisdiction of these waters preempts State and County land use permits, policies, and regulations.

The PRTF shoreline is flanked by publicly accessible shorelines on both sides. To the west of PRTF, a publicly accessible sandy beach extends approximately 1.4 miles along the residential community of 'Ewa Beach, and Pu'uloa Beach Park is located approximately 200 feet west of the PRTF fence line. Fishing and other ocean recreation activities are popular along this stretch of sandy coastline, especially in the vicinity of Pu'uloa Beach and the public beach access rights of way. To the east of PRTF, the sandy shoreline extends approximately 0.9 mile to the northeast toward the Pearl Harbor Entrance Channel. This beach was recently stabilized with the construction of nine "T-head" groins as part of the Iroquois Point Beach Nourishment and Stabilization Project. The shoreline fronts the Kapilina residential area, which is a gated community. However, a limited number of parking passes are available for the general public on a daily basis from sunrise to sundown. Recreational fishing is allowed from the east end (adjacent to the Pearl Harbor Entrance Channel) and west end (adjacent to PRTF) of the Kapilina/Iroquois Point Beach. Fishing is restricted to these two areas to prevent over-fishing (Joint Base Pearl Harbor-Hickam 2011). With publicly accessible beaches adjacent to the PRTF shoreline on both sides, civilians are warned of the hazards by posted restrictions. The shoreline is actively secured during range operations, and any unauthorized persons along the shoreline are promptly escorted off-Base. The waters off-shore from the project area are located within the PHNDSA, and Joint Base Pearl Harbor-Hickam regulates public access to these waters. Navigation in the waters adjacent to PRTF is restricted from 6:00 a.m. to 5:00 p.m. daily (including Saturdays and Sundays), and at other times upon notification (National Oceanic and Atmospheric Administration 2015). The waters to the west of PRTF are publicly accessible through the 'Ewa Beach State Park. The nearshore area is popular for a number of ocean recreational activities, including fishing, surfing, and outrigger canoe paddling. The 'Ewa Pu'uloa Outrigger Canoe club launches their canoes at Pu'uloa Beach Park, approximately 300 feet west of PRTF.

5.4.1 Existing Land Use

Existing PRTF land uses include the ranges, an access road along the ocean side of the impact berms for Ranges A and B, classrooms, and two guard shacks (one at the east shoreline boundary of the range, and one at the west shoreline boundary).

5.4.2 RCUZ Impact Analysis for Existing On-Base Land Use

All firing activities at Pu'uloa RTF and associated noise and SDZs are compatible with military zoning and on-Base land use.

5.4.3 Land Use in Counties, Municipalities, Other Federal Lands in Vicinity

Pu'uloa RTF is located on the leeward O'ahu coast near Pearl Harbor at the eastern edge of the 'Ewa Plain and within Honolulu County. The facility is located in an urbanized area, just east of the town of 'Ewa Beach, which had a population of 16,415 persons in the 2020 census. The northern border of the Pu'uloa Training Facility adjoins a Federal Aviation Administration Transmitter Facility site that is relatively undeveloped. Land to the east of the facility is primarily owned by the Navy and include the Kapilina privately managed residential area. To the east of the housing area, the Iroquois Point Elementary School is located on lands owned by the City and County of Honolulu. The western border of PRTF adjoins private property, portions of which have been developed into single-family housing. Directly adjacent to the western edge of this residential area (approximately 300 feet from PRTF) is Pu'uloa Beach Park, a public recreation area owned by the City and County of Honolulu.

5.5 EXISTING OFF-BASE LAND USE AND ZONING

Areas directly west of PRTF are zoned Residential, Preservation, and Recreational consisting of neighborhood homes, open space and 'Ewa Beach access. To the northwest, Agricultural zoning exists. East of PRTF is zoned Military, similar to the PRTF, but is dominated by Residential land use. Directly north of the PRTF is zoned agricultural with small sliver at the edge of the noise footprint zoned Preservation, both of which are part of the 'Ewa Country Club Golf Course.

5.5.1 Baseline

Baseline land use and zoning off-Base includes areas within both Noise Zone 2 and Noise Zone 3 and are presented in Table 5-3. Noise Zone 3 off-Base zoning includes Agriculture, Residential to the west, and Military. Within the Noise Zone 3 Military zoning, residential land use is also included to the east of PRTF. Similarly, Noise Zone 2 off-Base zoning and land use includes identical areas identified under Noise Zone 3 but covering larger acreage amounts. Preservation Zoning is also present within Noise Zone 2. RCZ-I is confined to the PRTF boundary on land and does extend into the ocean and is compatible with on- and off-Base land use.

Noise Zone	Zone Designation	Baseline Acres
Noise Zone 2	Military ⁽¹⁾	393
Noise Zone 2	Agriculture	295
Noise Zone 2	Residential	19
Noise Zone 2	Preservation	31
Noise Zone 3	Military ⁽¹⁾	159
Noise Zone 3	Agriculture	2
Noise Zone 3	Residential	<1.0

Table 5-3Baseline Land-Use

Note: ⁽¹⁾Includes residential land use on military zoned areas.

5.5.2 Short-Term

Incorporation of the Short-Term administrative mitigation controls reduces off-Base noise exposure acreage above the 87 dB level by 25 acres, which includes Residential land use within Military zoning to the east. Residential areas to the west are removed from 104+ dB exposure when compared to baseline conditions. Table 5-4 depicts both existing and Short-Term Land Use acreage and difference between the

two scenarios. Similar to Existing Conditions, RCZ-I is confined to the PRTF boundary on land and does extend into the ocean and is compatible with on- and off-Base land use.

Noise Zone	Zone	Baseline	Short-Term	Difference
Ivoise Lone	Designation	Acres	Acres	Acres
Noise Zone 2	Military ⁽¹⁾	393	397	+ 4
Noise Zone 2	Agriculture	295	295	+ 0
Noise Zone 2	Residential	19	19	+ 0
Noise Zone 2	Preservation	31	30	- 1
Noise Zone 3	Military ⁽¹⁾	159	131	- 28
Noise Zone 3	Agriculture	2	1	- 1

 Table 5-4
 Short-Term Mitigation (with Administrative Controls) Changes by Land-Use

Notes: ^{(1)I}ncludes residential land use on military zoned areas.

5.5.3 Long-Term

Implementation of Long-Term administrative and engineering mitigation controls would reduce approximately 59 acres of sensitive land use within Military Zoning from Noise Zone 3 to Noise Zone 2 when compared to baseline conditions. Additionally, 8 acres of residential land use to the west would be removed from Noise Zone 2. Table 5-5 depicts both existing and Long-Term Land Use acreage and difference between the two scenarios. Similar to Existing Conditions, RCZ-I is confined to the PRTF boundary on land and does extend into the ocean and is compatible with on- and off-Base land use.

 Table 5-5
 Long-Term Mitigation (with Engineering and Administrative Controls) Changes by

 Land-Use

Noise Zone	Zone Designation	Baseline Acres	Long-Term Acres	Difference Acres
Noise Zone 2	Military ⁽¹⁾	393	261	-132
Noise Zone 2	Agriculture	295	120	-175
Noise Zone 2	Preservation	31	18	-14
Noise Zone 2	Residential	19	11	-8
Noise Zone 3	Military ⁽¹⁾	159	100	-59

Note: ⁽¹⁾Includes residential land use on military zoned areas.

5.6 POPULATION TRENDS

Population within the State of Hawaii, County of Honolulu, and communities in the area of PRTF for the year 2019 are presented in Table 5-6. While population trends within the state of Hawaii and County and City of Honolulu are depicted in Table 5-7. Population within the state of Hawaii and County of Honolulu are predicted to increase by 10 percent and 16 percent, respectively, by the year 2030.

Location	Population
Hawaii	1,422,094
Honolulu County	984,821
Mokapu East	7,491
Mokapu West	3,798
Iroquios Point	5,013
'Ewa Beach	7,938
Lanikai	1,519
Keolu	6,065
Waimanlo	5,538
Waimanlo Beach	4.076
Homesteads	4,076
Source:	

Table 5-6Population within the State of Hawaii, County of Honolulu, and
Communities Near PRTF

https://histategis.maps.arcgis.com/apps/MapSeries/index.html?a ppid=feb19b4cef564ed1ab7067f7956a83f2. Hawaii 2015-2019 ACS 5-year Estimates by Census Tracts & Legislative Districts

Table 5-7 Population Trends within the State of Hawaii and County of Honolulu

Location	Population 2020	Population 2021	Population 2022	Population 2030	%Change 2020- 2030
Hawaii	1,451,043	1,447,154	1,440,196	1,576,088	10%
Honolulu County	1,012,305	1,004,673	995,638	1,251,602	16%
Honolulu	348,387	346,594	343,421	N/A	N/A

Source: Hawaii.gov https://census.hawaii.gov/home/data-products/

5.7 HOUSING TRENDS

Average housing units and home value for the years 2015 through 2019 within the state of Hawaii, County of Honolulu, and local communities in the areas near PRTF are presented in Table 5-8. Three areas, Mokapu East and West and Iroquios Point are within the Military Zoning area and are managed by private civilian companies.

Table 5-8State of Hawaii and Local Community Average Housing Unitsand Value from 2015-2019

Location	Housing Unit 2015-2019 (Average)	Median Home Value of Owner Occupied Unit
Hawaii	542,674	\$615,300
Honolulu County	350,571	\$678,200
Mokapu East	2,009	\$MH
Mokapu West	805	\$MH
Iroquios Point	1,545	\$MH
'Ewa Beach	1,982	\$602,600
Lanikai	694	\$2,000,001
Keolu	1,852	\$948,900
Waimanlo	1,314	\$604,900
Waimanlo Beach Homesteads	1,121	\$576,400

Sources: U.S. Census Bureau 2000, 2010, 2012a.

5.8 **EMPLOYMENT**

MCBH is the largest civilian employer in the windward O'ahu region. The Base and its personnel represent the main client base of most local businesses. MCBH directly employs 14,335 military and civilians totaling \$664.7 million in direct payroll (Marstel-Day 2014). The indirect/induced effect of that employment generates an additional 4,287 jobs. Nearly 93 percent of the total employment impact (17,243 jobs) occurs in the communities surrounding the installations (Table 5-9).

	Total Labor Force	Labor Force in Armed Forces	% Labor Force in Armed Forces
Hawaii	4,832,418	88,733	2%
Honolulu County	96,267	31,115	32%
	20121		

 Table 5-9
 Labor Force in the Armed Forces in Hawaii and Honolulu County, 2012

Source: U.S. Census Bureau 2012b.

Base spending generates \$180 million in economic output, 1,189 jobs, and \$7.6 million in state and local taxes (Table 5-10). Civilian personnel generate \$34.7 million in taxes in neighboring communities. In addition, Marine Corps retirees and their families contribute \$5.2 million to the local economic output. The total economic impact of MCBH on the state is \$1.5 billion annually (Marstel-Day 2014).

Table 5-10 Employment Trends, Hawaii and Honolulu County

	Per capita income (2012 dollars)1	Median Household Income (2012 dollars)1	Unemployment Rate Annual 2012a2	Unemployment Rate Annual 2013a2	Unemployment Rate Apr 2014b2
Hawaii	\$25,285	\$46,450	9.2%	8.0%	6.0%
Honolulu County	\$21,455	\$45,812	8.4%	7.6%	6.0%

Sources: U.S. Census Bureau 2012c; Bureau of Labor Statistics 2014.

5.9 SUMMARY OF RCUZ ANALYSIS

Under Existing Conditions, several land use areas exposed to PRTF operational noise are considered "compatible with conditions" or "incompatible". Residential land use to both the east and west of PRTF are in Noise Zone 2 and Noise Zone 3 are considered "compatible with conditions" and "incompatible", respectively. Further, an area immediately west of the PRTF (zoned Preservation) would be considered "compatible with conditions" within Noise Zone 2; however, this area has no structures and implementation of noise level reduction measures are not applicable. RCZ-I remains within the PRTF boundary on land and is considered compatible with existing on-Base land use.

Short-term PRTF operations would eliminate incompatible Residential land use (Noise Zone 3) acreage west of PRTF and reduce incompatible Residential land use acreage to the east. Residential areas to both the east and west of PRTF would remain within Noise Zone 2 and would be considered "compatible with conditions". Overall, short-term operations would result in an overall reduction of 25 acres exposed to noise levels in Noise Zone 2 and Noise Zone 3. RCZ-I would remain as described under Existing Conditions as there would be noise change to the range layout (i.e., firing positions, targets, and weapons).

Under long-term operations, only one Residential acre (approximately two residences) to the east of PRTF would remain within Noise Zone 3 and be considered "incompatible". Residential areas to both the east and west of PRTF would remain within Noise Zone 2 ("compatible with conditions") but acreage would be reduced when compared to Existing and Short-term scenarios. Overall, long-term operations

would result in an overall reduction of 329 acres beyond the PRTF boundary exposed to noise levels in Noise Zone 2 and Noise Zone 3 when compared to the Existing Operations baseline. RCZ-I would remain as described under Existing Conditions as there would be noise change to the range lay out (i.e., firing positions, targets, and weapons),

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6 RCUZ RECOMMENDATIONS

6.1 INTRODUCTION

The purpose of the RCUZ Program—to help local communities plan for compatible land use within noise and range compatibility zones associated with military aviation range and/or military ground range operations—can most effectively be accomplished by active participation of all interested parties.

These may include the Marine Corps, state, regional, and local governments, private citizens, developers, real estate professionals, and others. This chapter discusses specific actions that can be taken to mitigate the RCUZ impact on incompatible land uses identified in the previous chapter, and to avoid future incompatible development.

Although the emphasis of RCUZ program implementation is focused on off-base areas within the RCUZ footprint (noise and safety impact area), MCBH, as an adjacent "landowner," can take a position and comment on land use issues outside the footprint that might lead to incompatible development. For example, large-scale developments bordering the RCUZ footprint or new transportation or utility corridors could make adjacent areas in the RCUZ footprint more desirable for potentially incompatible development. Such development could also impact mission changes or mission expansion in the future. Therefore, MCBH should monitor proposed development beyond the RCUZ footprint, and, if needed, present those concerns in appropriate forums.

6.2 ACHIEVING COMPATIBLE LAND USE

With the focus of promoting land use compatibility between MCBH and surrounding communities, the RCUZ Program recognizes the local government's responsibility to protect the public health, safety, and welfare through various land use tools such as zoning ordinances, building codes, subdivision regulations, building permits, and disclosure statements. Continuing the working relationship between the Marine Corps, local governments, and private citizens can help to resolve incompatibilities in land uses and prevent future incompatible land use or development in the vicinity of the installation.

This following sections (6.3 through 6.7) discuss various recommendations for programs, controls, and regulations that will aid the installation and the local communities in achieving land use compatibility.

6.3 NOISE ABATEMENT PROCEDURES

MCBH takes precautions and implements mitigation factors to reduce impacts on noise sensitive areas located near the base. The Marine Corps conducts noise abatement procedures to the best of its ability, keeping in line with safety and operational training requirements.

Quiet hours are in place at PRTF from 5:00 p.m. to 7:00 a.m. daily. During quiet hours, the Marine Corps restricts the firing of all weapon systems, and other systems as directed. In order to fire restricted weapons during quiet hours, requests must be endorsed by the unit's chain of command and forwarded to the Commanding Officer of MCBH and Director of the Range Control Division for approval at least 30 working days in advance.

6.4 NOISE MITIGATION

6.4.1 Short Term

PRTF has taken immediate steps to reduce noise exposure on the local community from operations at the range. In addition to making changes to the location, height, and operation parameters of the range's Public Address system, the following changes have been implemented on specific ranges regarding specific weapons systems:

Range A – Noise suppressors on all weapons and at all firing lines

Range E – No rifle or shotgun operations

Range F – No rifle or shotgun operations

Quantitative noise reduction results are presented within Section 5.5.2, Short-Term Projected Noise Exposure Levels.

6.4.2 Long-Term

The following engineering controls are being pursued that would further reduce the noise exposure from range operations on the local community. These controls would be in addition the Short-Term measures that are already taking place.

Range B - Construct a 12-foot high rear noise barrier, 10 feet in arrear to the 600-yard firing line. Rear barrier would include noise absorption material and go in length from the west barrier to the east berm.

Range B – Construct a 12-foot high noise barrier on the existing west berm. The west noise barrier would include noise absorption material and go in length from the newly developed Range B rear barrier to the target backstop berm.

Quantitative noise reduction results are presented within Section 5.5.3, Long-Term Projected Noise Exposure Levels.

6.5 COMMUNITY INFORMATION PROGRAMS

MCBH has completed various studies, created programs, and notification protocols to help keep the community up-to-date with operations at MCBH. These information-sharing programs help to keep surrounding residents and visitors informed of potential impacts from operations at the installation, and to maintain and strengthen the relationship between MCBH and the surrounding communities.

Additionally, MCBH Government and External Affairs (GEA) provides public notice when larger scale Marine Corps training activity deviate from typical training activities including publishing these announcements through social media, Neighborhood Boards, local elected officials, newsletters, and news releases. The Base's Community Plans and Liaison Officer also provides regular updates on training activities to the county and local communities.

6.6 NOISE COMPLAINT RESPONSE PROGRAMS

To mitigate noise complaints and provide citizens with prompt response, MCBH created a sound reporting system. Tracking and assessing noise complaints submitted through the system helps the base identify noise-sensitive areas, determine which operational activities are responsible for the noise

complaints, and ultimately abate future noise complaints.

Through the installation's noise abatement program, MCBH personnel evaluate operational procedures to reduce noise impacts on the surrounding communities. Additionally, the program emphasizes both the installation's commitment to the public and demonstrates the importance of noise abatement.

6.7 LAND USE CONTROLS

Local governments have the authority to implement regulations and programs to control development and direct growth in order to ensure compatible land use and development within the RCUZ footprint. Future land use and development is guided by the federal regulations and local comprehensive land use planning controls discussed below.

6.7.1 Acquisitions

Local governments can establish land acquisition programs to support the RCUZ Program. Land acquisition programs are designed to eliminate or prevent land use incompatibilities through voluntary transactions in the real estate market and local development process. Land acquisition strategies can support goals of preventing urban growth near an airfield, while protecting the environment, maintaining agricultural lands, and conserving open spaces. Local governments can partner with an installation to identify areas of conservation interest and determine protection priorities around installations.

When the operational integrity of an installation is threatened by incompatible land use and development, and when the local community is unwilling or unable to address the threat using their own authority, the Marine Corps may also seek to acquire interest in properties (acquisition) to protect its mission.

6.7.1.1 DoD Encroachment Partnering Program

Title 10, U.S.C. Section 2684a authorizes the Secretary of Defense or the Secretary of a military department to enter into agreements with an eligible entity or entities to address the use or development of real property in the vicinity of, or ecologically related to, a military air-to-ground range or military airspace, to limit encroachment or use of the property that would be incompatible with the mission of the range or place other constraints on military training, testing, and operations. Eligible entities include a state, a political subdivision of a state, or a private entity that has as its principal organizational purpose or goal the conservation, restoration, or preservation of land and natural resources, or a similar purpose or goal.

Encroachment partnering agreements provide for an eligible entity to acquire fee title, or a lesser interest, in land for the purpose of limiting encroachment on the mission of a military range and/or to preserve habitat off the range to relieve current or anticipated environmental restrictions that might interfere with military operations or training at the range. The DoD can share the real estate acquisition costs for projects that support the purchase of fee or conservation or other restrictive easement for such property. The eligible entity negotiates and acquires the real estate interest for encroachment partnering projects with a voluntary seller. The eligible entity must transfer the agreed-upon restrictive easement interest to the United States of America upon the request of the Secretary of Defense.

6.7.1.2 Transfer of Development Rights

Transfer of development rights (TDR) allows landowners in development-restricted areas to sell the rights to develop their property (sending property) and transfer those development rights to another landowner's

property (receiving property) that can support greater density development. Transfers are typically administered through a local TDR program, which is typically established through local zoning ordinances. TDR programs are established to preserve environmentally sensitive areas, agricultural resources, historic properties, or valuable open space. A successful TDR program should identify the public purpose of the program, sending and receiving districts/areas, and the procedures to carry out the transaction.

Development rights from the sending property are purchased as TDR credits. After development rights are transferred, the sending property is secured from future development under a conservation easement or deed restrictions, and the TDR credit is applied to the receiving property as a density bonus. The value of TDR credits should be defined in the local TDR program.

6.7.1.3 Purchase of Development Rights

Local governments (or a land trust) can also establish purchase of development rights (PDR) programs to manage growth and preserve open space. A local government or agency provides landowners compensation for not developing their land—essentially buying the development rights—and then obtains a legal easement (conservation easement) that further restricts development on the property. The landowner maintains ownership of the property and can use the land under conditions specified in the terms of the easement (e.g., farming, timber production, or hunting). The local government may consider PDR for agricultural land within the RCUZ footprint.

6.7.2 Federal Policies and Regulations

Certain federal policies and regulations are in place to assist state and local governments as well as private citizens in minimizing any issues with nearby military installations. The regulations listed below discuss these regulations and how they are used to ensure compatibility between the military and the surrounding communities.

6.7.2.1 Executive Order 12372, Intergovernmental Review of Federal Programs (July 1982)

EO 12372 allows state governments, in consultation with local governments, to establish review periods and processes for federal projects. In accordance with the Intergovernmental Cooperation Act of 1968, the U.S. Office of Management and Budget requires federal agencies to coordinate and communicate with state, regional, and local officials in the early planning stages of any federal aid development projects. The Intergovernmental Review Program provides an early entry point into the process for the Marine Corps to introduce RCUZ concepts and discuss RCUZ issues.

6.7.2.2 Housing and Urban Development Circular 1390.2: Noise Abatement and Control

In 1971, the U.S. Department of Housing and Urban Development (HUD) established noise standards and polices for approving HUD-assisted housing projects in high noise areas and noise attenuation measures under HUD Circular 1390.2: Noise Abatement and Control. HUD published new noise regulations in 1979 with the same standards set forth in Circular 1390.2 included new noise measurement descriptions to account for improvements in noise modeling technology. The approval of all mortgage loans from the Federal Housing Administration or the Veterans Administration is subject to the standards and polices of the HUD noise regulations. The HUD regulations set forth a discretionary policy to withhold funds for housing projects when noise exposure is in excess of prescribed levels. The HUD regulations allow for new housing construction assisted or supported by HUD within a noise area of 65 dB Day-Night Average

Sound Level (DNL) or less. Construction within a 65 to 75 dB DNL noise area is subject to appropriate sound attenuation measures, and construction within an area exceeding a 75 dB DNL noise level is not acceptable. Due to the discretionary framework of the HUD policy, variances may be permitted, depending on regional interpretation and local conditions.

6.7.2.3 Environmental Review

Federal agencies, including the Marine Corps, are required to consider the environmental impacts of any federal project that could significantly impact the environment by conducting a comprehensive environmental review. NEPA mandates full disclosure of the environmental effects resulting from proposed federal actions, approvals, or funding. Impacts of the action are generally documented in an Environmental Impact Statement or Environmental Assessment. The environmental review process is a viable means for incorporating the fundamentals of the RCUZ Study in the planning review process of a project.

6.7.3 State Programs

In addition to the federal regulations and policies previously listed, several state programs also allow representatives of military bases from across the state of Hawaii to convene and discuss issues affecting the Bases. The primary purpose of these programs is to protect the mission of the installation, while remaining a good neighbor to surrounding communities.

6.8 **Recommendations**

6.8.1 Federal/Marine Corps Recommendations

6.8.1.1 Engage in the Local Planning Process

MCBH should maintain routine communication with local governments to stay informed of local land use plans and regulations and to ensure the Marine Corps' input is offered in the early stages of any longrange planning initiatives.

The MCBH Community Plans and Liaison Officer (CPLO) and/or other staff should endeavor to attend public hearings and provide comments on actions that affect RCUZ planning including land use studies, capital improvement plans, and other land development regulation updates/amendments. The CPLO should advise communities of future Marine Corps operations and offer guidance on identifying areas of potential incompatibilities.

In addition to ongoing community involvement, the CPLO and/or other staff should endeavor to attend Board of Commissioners meetings. Attendance and participation will keep the installation engaged in the local planning process and provide a forum for comments as they affect RCUZ planning. During local planning meetings, MCBH can also address current and future operation activities, noise complaints (both the process for filling and resolving complaints), and other relevant topics related to the interaction between MCBH and the communities surrounding the installation.

6.8.1.2 Community Outreach Activities

Outreach and information sharing assist in educating the community about the Marine Corps' mission and help build alliances with the community and regional decision makers to ensure continuation of mission-essential operations. MCBH should provide community decision makers with the information necessary

to make informed decisions regarding the impacts of their actions on mission readiness. The CPLO should be responsible for communicating MCBH program changes and offering supporting information and resources to the community decision makers. Through outreach efforts, the CPLO and Public Affairs Officer (PAO) can educate the public on the importance of MCBH training operations, its economic impact on the community, and the ability of the installation to support military activities to sustain a combat-ready Marine Corps.

6.8.1.3 Presentation of the RCUZ Study and Educational Materials

To encourage community interaction and facilitate a better understanding of the Marine Corps' scope of operations, MCBH should employ a package of RCUZ outreach materials, including community presentations and educational brochures, on training activities and the Marine Corps' mission.

MCBH should provide a brochure for a civilian audience with appropriate verbiage and maps to explain the basic elements of the RCUZ Program and the ways incompatible development within the RCUZ footprint can impact Installation operations. The brochure should detail the significance of RCZs and noise zones to protect both Marine Corps pilots and civilian safety.

Maps illustrating the RCZs and noise zones should be included in the brochure, and these maps should be provided to real estate brokers for property disclosure.

MCBH should prepare a presentation outlining elements of the RCUZ Program for community decision makers, including the Board of Commissioners, Economic Development Councils, Board of Realtors, and local civic organizations. The RCUZ Program presentation should also discuss how land uses and local policies (e.g., infrastructure siting, schools, rezoning) can influence Marine Corps operations.

MCBH should post the 2025 RCUZ Study and related educational materials on their website. Presentation and distribution materials, including RCUZ poster boards, maps of the installation, and fact sheets, should also be posted to the website and used for community outreach activities.

6.8.1.4 Installation Study Integration

The Marine Corps is continually examining local operations in response to changing national defense demands, Unit level training requirements, and public involvement. Several noise and safety-related studies either have been or will be completed for military facilities associated with MCBH. These separate studies should be integrated with studies related to MCBH at the installation-level to provide the community with an operational picture of not only a single location such as MCBH but also how this installation is part of a larger training concentration area in Hawaii.

6.8.1.5 Continue to Maintain Sound Reporting System

MCBH will continue to collect, document, and research noise complaints. All noise complaints are investigated by the MCBH staff, and corrective actions are taken, as appropriate. Noise complaint procedures for MCBH are established in the installation's Range and Training Regulations, Standard Operating Procedure. All complaints will be collected in a standard format for plotting locations in a spatial database for future planning use. Recording these complaints can help to:

- Provide land use planning information for local governments.
- Determine which operational procedure may be responsible for the noise complaint and at what time most complaints occur.

- Provide valuable information for real estate transactions.
- 6.8.1.6 Real Estate Disclosures

MCBH should provide local real estate agencies with RCUZ-related materials and maps showing military training routes, military operations areas, RCUZ boundaries, and high-impact areas. The CPLO should meet with the local Board of Realtors to discuss the importance of real estate disclosure when clients are buying or selling property within or near the RCUZ footprint. Similarly, MCBH should approach the Hawaii Home Builders Association and provide guidelines regarding construction techniques and the use of materials for noise attenuation to mitigate potential airborne noise.

6.8.2 State/Regional Recommendations

MCBH should work with the State of Hawaii to propose statewide regulations that prohibit the development of structures that may interfere with the use of military training routes or compromise the mission and operations at MCBH. The Base should provide these agencies with information regarding air operations and flight courses.

6.8.3 Local Government Recommendations

6.8.3.1 Pursue Funding from the Office of Economic Adjustment for a JLUS Update

It is recommended that Honolulu City/County apply for funding from the Defense Department's Office of Local Defense Community Cooperation to update the 2003 Joint Land Use Study (JLUS). There have been many changes within the community as well as aboard MCBH since the study was completed. Updating the JLUS to include this RCUZ information will provide Honolulu County with an updated tool to encourage land uses that are compatible with military operations.

6.8.3.2 Planning Partnerships with the Installation

Just as the Marine Corps should ask to be part of the local planning process, it is incumbent upon the counties to seek input from the Marine Corps. When local governments consider land use decisions near a military installation and the established RCUZ footprint, they should realize the following:

- Their decisions may decrease the capabilities of the installation, increasing the chances of the local commands having to relocate resources to ensure training is completed.
- Noise contours and RCZs comprising the RCUZ footprint are dynamic and may change over time.
- A proactive approach to planning with the Marine Corps will serve the local population by mitigating, in advance, potential problems with noise and safety concerns.
- As mentioned previously, they have a statutory obligation to notify MCBH of any proposed land use changes within 5 miles of the Base perimeter in accordance with Hawaii General Statutes and to evaluate any comments from the Marine Corps regarding the proposed action.

6.8.3.3 Adopt RCUZ Study Recommendations

Local governments are encouraged to adopt and implement all or parts of the RCUZ study, including amending their comprehensive plan and zoning ordinances to be consistent with the RCUZ composite map and recommended land uses. The study is the installations defining statement regarding the impact of the installation on the surrounding community. The RCUZ Program is intended to support local government land use planning programs and processes by providing scientifically based technical information on military activities.

6.8.3.4 Regulate Land Uses within Identified Noise Zones and RCZs

Incompatible land use concerns are mostly a conflict between military and civilian land uses. To minimize these impacts, local planning tools can be used to encourage compatible development and discourage incompatible development around the installation's fence line or under any of the flight operational areas. A comprehensive zoning map amendment designed to prevent encroachment can be one of the strongest tools available to local governments to synchronize the plan's land use recommendations with the zoning code and official zoning map.

6.8.3.5 Local Development Review

Local governments should invite a representative of the installation to participate on the local development review staff team as a way to integrate the military's missions with the local government's planning and development review processes. The military is a major stakeholder in the community, and its input is needed if decision makers are to consider the full impact of a development proposal on all stakeholders. The review process presents an opportunity for a military representative to work with a local government's development review team to identify issues and opportunities associated with the development application.

6.8.3.6 Communication

MCBH is responsible for informing and educating community decision makers about the RCUZ Program; however, local governments have a role to play in educating members of the community and to actively inform and request input from MCBH regarding land use decisions that could impact the operational integrity of the installation. Local government websites should include information about the RCUZ Program for MCBH and provide a link to the MCBH website for information regarding range operations.

6.8.3.7 Capital Improvement Plans

All capital improvement projects in proximity to MCBH should be evaluated and reviewed for potential direct and indirect impacts that such improvements may have on the ability to implement a successful RCUZ Program.

6.8.3.8 Building Codes

Local governments should continue to monitor and/or amend their building codes to require noise attenuation techniques for new construction within the noise zones footprint. Additional insulation and soundproofing should be included in the local building standards for all new single- and multi-family residential construction within the footprint.

6.8.3.9 Real Estate Disclosures

Honolulu County should continue to or begin providing disclosure notification for all real estate transactions for properties surrounding the installation. The county may consider establishing a real estate disclosure area around the installation to enforce disclosure regulations.

6.8.4 Private Citizens/Real Estate Professionals/Businesses Recommendations

6.8.4.1 Business Development and Construction Loans to Private Contractors

Lending institutions should consider whether to limit financing for real estate purchases or construction

incompatible with the RCUZ Program. This strategy encourages evaluation of noise and accident potential as part of a lender's investigation of potential loans to private interests for real estate acquisition and development. Diligent lending practices will promote compatible development of the area surrounding MCBH and protect lenders and developers alike. Local banking and financial institutions should be encouraged to incorporate a "Due Diligence Review" of all loan applications to determine possible noise or RCZ impacts on the mortgaged property. The Marine Corps can help facilitate this strategy by providing RCUZ seminars to lenders throughout the region.

6.8.4.2 Real Estate Professionals Cooperation

Real estate professionals should continue to ensure that prospective buyers or lessees have all available information concerning the noise environment and accident potential zones surrounding an air-to-ground range prior to purchasing or leasing property near the range. They should provide written disclosure to prospective purchasers, renters, or lessees when a property is located within an RCZ or high noise zone. Real estate professionals should also show properties at a time when noise exposure is expected to be at its worst in order to provide full awareness of the potential magnitude of noise exposures.

6.8.4.3 Private Citizens

The citizens of the local communities surrounding MCBH should become informed about the RCUZ Program and learn about the program's goals and objectives; its value in protecting the health, safety, and welfare of the population; the limits of the program; and the positive community aspects of a successful RCUZ Program.

Citizens considering purchasing, renting, or leasing properties near MCBH should ask local real estate professionals, lending institutions, and/or a MCBH representative if the property is within an RCZ and/or noise zone.

Citizens should also provide sufficient and accurate information when registering a noise complaint with the range. Range personnel need sufficient and accurate information to assess the potential causes resulting in the complaint and to assess any practical remedies for reducing future complaints.

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8 APPENDICES

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Appendix A Marine Corps Order 3550.13

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Appendix B

Noise Modeling, Methodology, and Effects

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