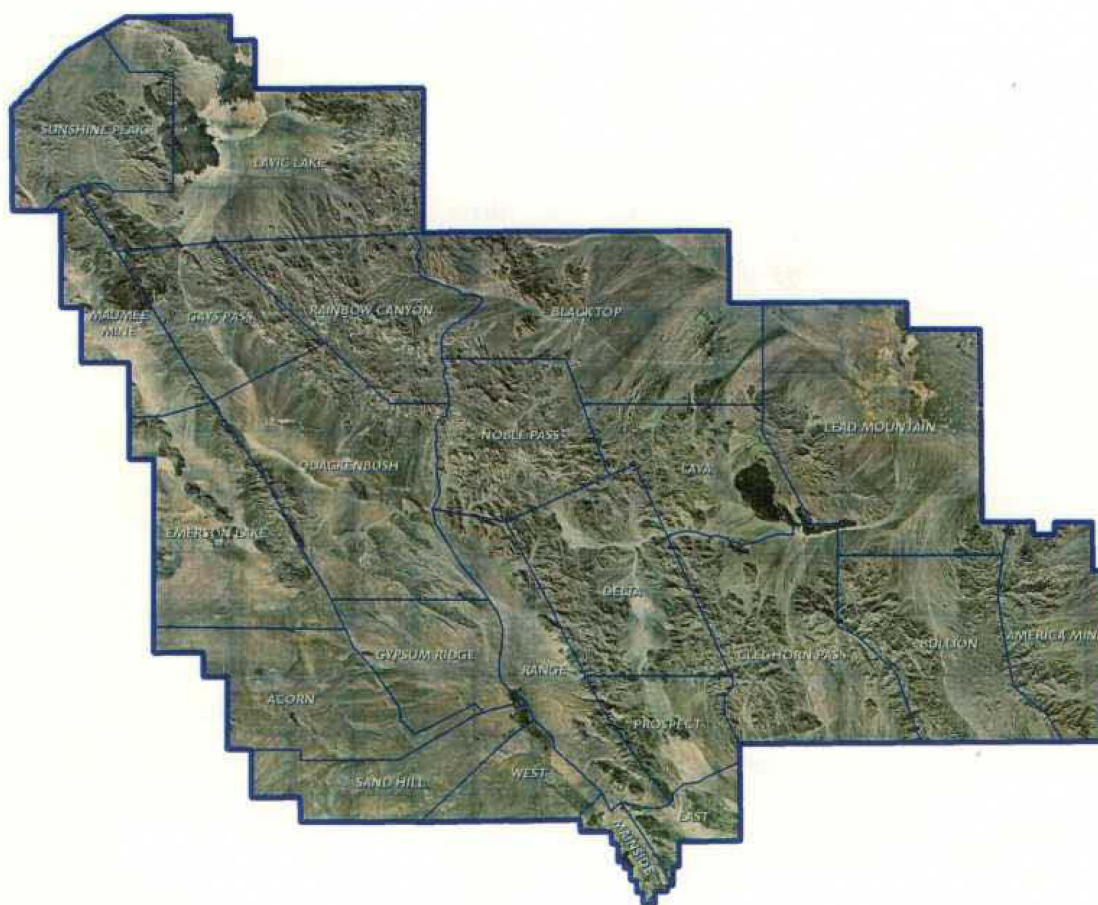


PROGRAMMATIC ENVIRONMENTAL ASSESSMENT

Ongoing and Proposed Training Activities at Marine Corps Air Ground Combat Center Twentynine Palms, CA



May 2003



Department of the Navy

DEPARTMENT OF DEFENSE
UNITED STATES MARINE CORPS

FINDING OF NO SIGNIFICANT IMPACT FOR ONGOING AND PROPOSED TRAINING
ACTIVITIES AT MARINE CORPS AIR GROUND COMBAT CENTER TWENTYNINE
PALMS, CALIFORNIA.

Pursuant to Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] §§ 1500-1508) implementing procedural provisions of the National Environmental Policy Act (NEPA), the U.S. Department of the Navy (U.S. Navy) gives notice that a Programmatic Environmental Assessment (EA) has been prepared and an Environmental Impact Statement (EIS) is not required for ongoing and proposed activities at Marine Corps Air Ground Combat Center (MCAGCC) Twentynine Palms, California. A programmatic NEPA analysis such as the one provided in the EA is prepared when a federal agency is planning or contemplating a broad action or program, the specific details of which have not yet been defined. In this case, a Programmatic EA has been prepared as part of an ongoing Marine Air Ground Task Force Training Command (MAGTFTC) planning process intended to optimize MCAGCC's current training capability and to respond effectively to potential changes in training requirements or demand.

The purpose of the proposed action is to plan and prepare for a potential increase in the need for live-fire combined arms training provided by MAGTFTC. The need for such an action is anticipated because of the current U.S. war against terrorism and the evolving geopolitical and military situation in the Middle East. Due to its established training infrastructure and relatively isolated desert setting, MCAGCC would be a likely candidate for providing additional training opportunities. Though the MAGTFTC is challenged with both internal and external encroachment issues (i.e., constraints on training opportunities), the current constraints do not encumber the training mission to the level experienced by other southern California Marine Corps installations. Therefore, in anticipation of its role as the most likely Marine Corps command to be tasked with training mission enhancements, the MAGTFTC needs to evaluate and plan for alternative means of achieving an enhanced training capacity and greater flexibility to respond to training needs.

Two alternatives have been analyzed in the EA: the No-Action Alternative and the Proposed Action. The No-Action Alternative is represented by current levels of training activity. The proposed action is a planning scenario involving a 15-percent across-the-board increase in training operations at MCAGCC. Current training objectives and methodologies are not expected to change under the Proposed Action; only the quantity and/or frequency of training activities differentiate the Proposed Action from the No-Action Alternative (current levels of operations).

Potential environmental impacts associated with both the No-Action Alternative and the Proposed Action have been analyzed programmatically for geological resources, water resources, biological resources, cultural resources, air quality, noise, transportation and circulation, land use, public health and safety, and socioeconomics/environmental justice. Due to the non-specific nature of the action and the programmatic focus of the EA, resource-specific impacts were evaluated qualitatively. No significant environmental impacts have been identified for either the No-Action

Alternative or the Proposed Action. Cumulative effects of the No-Action Alternative and the Proposed Action in combination with other past, present, or reasonably foreseeable future actions in the vicinity of MCAGCC were also analyzed. Based on this analysis, cumulative impacts at MCAGCC Twentynine Palms would not be significant.

This Programmatic EA functions as a first-tier environmental analysis that would serve as a foundation for subsequent tiered NEPA documents that would focus on site-specific impacts of any future individual actions. Once a broader plan of action has been evaluated that would optimize the training capacity at MCAGCC, planning efforts for specific projects and actions would begin (e.g., if new ranges or other facilities were needed to accommodate increased training). At that time, more specific environmental analyses and NEPA documentation would be prepared, as necessary.

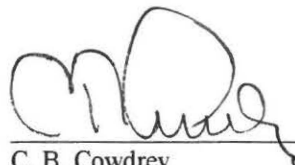
The Programmatic EA prepared by the U.S. Marine Corps addressing this action is on file, and interested parties may obtain a copy from: Commanding General, Head NREA Division, Building 1451, Box 8110, Marine Air Ground Task Force Training Command, Twentynine Palms, California, 92278-8100. A limited number of copies of the EA are available to fill single copy requests. Telephone inquiries may be directed to Mr. Mahlon Yokley at (760) 830-7396 ext. 211.

FINDING OF NO SIGNIFICANT IMPACT (FONSI)

After careful review of the EA prepared in accordance with the requirements of NEPA, CEQ regulations, Department of Navy Procedures for Implementing NEPA (32 CFR 775) as described in Marine Corps Order P5090.2A, I have determined that implementation of the No-Action Alternative or the proposed action would not have significant impacts on the natural and human environment; therefore, an EIS does not need to be prepared.

Date

16 June 03



C. B. Cowdrey
Brigadier General, United States Marine Corps

Acronyms

AAV	Assault Amphibious Vehicle	IR	Installation Restoration
ADT	Average Daily Traffic	IRP	Installation Restoration Program
AICUZ	Air Installation Compatible Use Zone	kg	kilogram(s)
ALZ	Assault Landing Zone	km	kilometer(s)
APE	Area of Potential Effect	m	meter(s)
APZ	Accident Potential Zone	$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
BA	Biological Assessment	mm	millimeter(s)
BAM	Bird Avoidance Model	LAV	Light Armored Vehicle
BASH	Bird/Wildlife-Aircraft Strike Hazard	LCTA	Land Condition Trend Analysis
Bearmat	Operations and Training Directorate, Range Control Section	MAGTFTC	Marine Air Ground Task Force Training Command
BLM	Bureau of Land Management	MBTA	Migratory Bird Treaty Act
BO	Biological Opinion	MCAGCC	Marine Corps Air Ground Combat Center
BZO	Battle Site Zero		
CAA	Clean Air Act	MCO	Marine Corps Order
CAX	Combined Arms Exercise	MEF	Marine Expeditionary Force
CDFG	California Department of Fish and Game	MLRS	Multiple Launch Rocket System
CDNL	C-weighted Day-Night Average Sound Level	MSR	Main Supply Route
CEQ	Council on Environmental Quality	NEPA	National Environmental Policy Act
CFR	Code of Federal Regulations	NO_2	nitrogen dioxide
CMA	Center Magazine Area	NO_x	oxides of nitrogen
CNEL	Community Noise Equivalent Level	NREA	Natural Resources & Environmental Affairs Division
CNO	Chief of Naval Operations	NRHP	National Register of Historic Places
CNPS	California Native Plant Society	O_3	ozone
CO	carbon monoxide	O&T	Operations and Training Directorate
CWA	Clean Water Act	PM_{10}	particulate matter ≤ 10 microns in diameter
dB	decibel(s)	ppm	parts per million
dba	A-weighted decibel	RCUZ	Range Compatible Use Zone
DESFIREX	Desert Fire Exercise	PRTSS	Predesignated Range Training Support Site
DZ	Drop Zone	RFMSS	Range Facility Management Support System
EA	Environmental Assessment		
EAF	Expeditionary Airfield	RONA	Record of Non-Applicability
EO	Executive Order	RRPC	Range Residue Processing Center
EOD	Explosive Ordnance Disposal	RTAMS	Range Training Area Maintenance Section
EPCRA	Emergency Planning and Community Right-To-Know Act		
ESA	Endangered Species Act	SCM	Special Conservation Measures
ESB	Exercise Support Base	SEL	Sound Exposure Level
ESQD	explosive safety quantity distance	SIP	State Implementation Plan
FASP	Field Ammunition Supply Point	SO_2	sulfur dioxide
FICON	Federal Interagency Committee on Noise	SO_x	oxides of sulfur
FICUN	Federal Interagency Committee on Urban Noise	TACP	Tactical Air Control Party
FONSI	Finding of No Significant Impact	TEC	The Environmental Company
FSCAC	Fire Support Coordination Application Course	TRI	Toxic Chemical Release Inventory
		USC	U.S. Code
HERO	Hazards of Electromagnetic Radiation to Ordnance	USEPA	U.S. Environmental Protection Agency
		USFWS	U.S. Fish and Wildlife Service
ICOP	Integrated Contingency and Operations Plan	U.S. Navy	U.S. Department of the Navy
ICRMP	Integrated Cultural Resources Management Plan	UXO	Unexploded Ordnance
		UXORMP	Unexploded Ordnance Range Management Plan
INRMP	Integrated Natural Resources Management Plan	VOC	volatile organic compound

FINAL

PROGRAMMATIC ENVIRONMENTAL ASSESSMENT

Lead Agency for the EA: Department of the Navy; U.S. Marine Corps

Title of Proposed Action: Ongoing and Proposed Training Activities at the Marine Corps Air Ground Combat Center Twentynine Palms, California

Affected Region: San Bernardino County

Designation: Programmatic Environmental Assessment

Abstract

This Programmatic Environmental Assessment (EA) has been prepared to analyze the environmental effects of planning scenarios associated with ongoing and proposed training operations at the Marine Corps Air Ground Combat Center (MCAGCC), Twentynine Palms, California. The EA is focused on the effects of the No-Action operational scenario represented by current levels of training activity, as well as the potential effects of a planning scenario involving a 15-percent across-the-board increase in training operations at MCAGCC. This programmatic EA has been prepared as part of an ongoing Marine Air Ground Task Force Training Command (MAGTFTC) planning process intended to identify ways to optimize MAGTFTC's training capability and the use of MCAGCC training assets, and to respond effectively to potential and undefined changes in training requirements or demand.

The purpose of the proposed action is to plan and prepare for a potential increase in the need for live-fire combined arms training provided by MAGTFTC. The need for such an action is anticipated because of the current U.S. war against terrorism and the evolving geopolitical and military situation in the Middle East. Due to its established training infrastructure and relatively isolated desert setting, MCAGCC would be a likely candidate for providing additional training opportunities. Though the MAGTFTC is challenged with both internal and external encroachment issues (i.e., constraints on training opportunities), the current constraints do not encumber the training mission to the level experienced by other southern California Marine Corps installations. Therefore, in anticipation of its role as the most likely Marine Corps command to be tasked with training mission enhancements, the MAGTFTC needs to evaluate and plan for alternative means of achieving an enhanced training capacity and greater flexibility to respond to training needs.

Current training objectives and methodologies are not expected to change under the Proposed Action; only the quantity and/or frequency of training activities differentiate the Proposed Action from the No-Action Alternative (current levels of operations). Accordingly, and in the interest of presenting a concise programmatic analysis of environmental effects, the No-Action Alternative is described first and with more emphasis in this Programmatic EA. The analysis of impacts associated with a potential 15-percent increase in training activity is then presented to the extent that such impacts would differ from the environmental effects of ongoing training.

This Programmatic EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S. Code § 4321 *et seq.*); the Council on Environmental Quality implementing regulations (40 Code of Federal Regulations §§ 1500-1508); and procedures for implementing NEPA as described in the Marine Corps' Environmental Compliance and Protection Manual (Marine Corps Order P5090.2A). Potential environmental and human resource impacts have been analyzed for geological resources, water resources, biological resources, cultural resources, air quality, noise, transportation and circulation, land use, public health and safety, and socioeconomics/environmental justice.

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MAY 2003

EXECUTIVE SUMMARY

This Programmatic Environmental Assessment (EA) has been prepared to evaluate the environmental impacts associated with ongoing Combined Arms Exercises (CAX) and other training activities under the direction of the Marine Air Ground Task Force Training Command (MAGTFTC) at the Marine Corps Air Ground Combat Center (MCAGCC), Twentynine Palms, California. Two different planning scenarios for ongoing training activities at MCAGCC have been considered in this EA. The first planning scenario is the No-Action scenario, which assumes that all training activities conducted at MCAGCC would proceed at current operational levels. The second scenario is the Proposed Action, which assumes a 15-percent across-the-board increase in training operations in response to a potential increase in the U.S. Military's need for combined arms training.

The purpose of the proposed action is to enhance MAGTFTC's ability to accommodate a potential increase in the U.S. Military's need for live-fire combined arms training. An increased need for such training is anticipated because of the current U.S. war against terrorism and the current geopolitical and military situation in the Middle East. MCAGCC would be the most likely candidate installation to provide any additional training needed because of its unique resources and relatively isolated desert setting. Though the MAGTFTC is challenged with both internal and external encroachment issues, the current constraints do not encumber the training mission to the level experienced by other southern California Marine Corps installations. Therefore, the MAGTFTC is the most likely Marine Corps command to be tasked with potential training mission enhancements. This Programmatic EA is a proactive effort to plan for such a scenario before it occurs by identifying environmental impacts and constraints associated with ongoing training.

In addition to conducting ongoing combined arms training exercises at MCAGCC, the MAGTFTC anticipates a potential need to increase the scope of training such that a 15-percent increase in all types of training activity would be implemented on the installation. This across-the-board increase in training, though not currently a command requirement or intended action, is analyzed in this Programmatic EA as the "Proposed Action." Ongoing training objectives and methodologies are not expected to change under the Proposed Action; only the quantity and/or frequency of training activities differentiate the Proposed Action from the No-Action Alternative (current levels of operations). No other alternatives have been identified that would satisfy the purpose and need for the proposed action.

Potential environmental impacts associated with both the No-Action Alternative and the Proposed Action have been analyzed for geological resources, water resources, biological resources, cultural resources, air quality, noise, transportation and circulation, land use, public health and safety, and socioeconomics/environmental justice. No significant environmental impacts have been identified for either the No-Action Alternative or the Proposed Action (Table ES-1). Cumulative effects of the No-Action Alternative and the Proposed Action in combination with other past, present, or reasonably foreseeable future actions in the vicinity of MCAGCC were also analyzed. Based on this analysis, cumulative impacts would also not be significant.

Table ES-1. Comparison of Potential Environmental Consequences

<i>Resource Area</i>	<i>No-Action</i>	<i>Proposed Action</i>
Geological Resources	○	○
Water Resources	○	○
Biological Resources	○	○
Cultural Resources	○	○
Air Quality	○	○
Noise	○	○
Transportation and Circulation	○	○
Land Use	○	○
Public Health and Safety	○	○
Socioeconomics/E.J.	+	+

Notes: ○ = No significant impacts
 ● = Potentially significant impacts
 + = Beneficial impacts

Final

**PROGRAMMATIC ENVIRONMENTAL ASSESSMENT
ONGOING AND PROPOSED TRAINING ACTIVITIES AT
MARINE CORPS AIR GROUND COMBAT CENTER
TWENTYNINE PALMS, CALIFORNIA**

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CHAPTER 1

PURPOSE AND NEED FOR PROPOSED ACTION

1.1 INTRODUCTION

This Programmatic Environmental Assessment (EA) has been prepared by the Department of the Navy and the United States Marine Corps to evaluate the environmental impacts of ongoing training activities that are the responsibility of the Marine Air Ground Task Force Training Command (MAGTFTC) at the Marine Corps Air Ground Combat Center (MCAGCC), Twentynine Palms, California. Two different planning scenarios for ongoing training activities at MCAGCC have been considered in this EA. The first planning scenario to be evaluated for environmental impacts is the 'No-Action' scenario, which assumes that all training activities conducted at MCAGCC would proceed at current operational levels. The second scenario is the 'Proposed Action,' which assumes a 15 percent across-the-board increase in training operations in response to a potential increase in the U.S. Military's need for combined arms training.

This Programmatic EA has been prepared in compliance with:

- The National Environmental Policy Act (NEPA) of 1969 (42 U.S. Code [USC] § 4321, as amended);
- Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (Title 40 Code of Federal Regulations [CFR] Parts 1500-1508, July 1, 1986); and
- Marine Corps Environmental Compliance and Protection Manual (Marine Corps Order [MCO] P5090.2A).

A programmatic NEPA analysis such as the one provided in this EA is prepared when a federal agency is planning or contemplating a broad action or program, the specific details of which have not yet been defined. In this case, a Programmatic EA has been prepared as part of an ongoing MAGTFTC planning process intended to optimize MCAGCC's training capability and to respond effectively to potential changes in training requirements or demand. Since the specific nature of any such changes is unknown at this time, the specific actions that would best augment the installation's training capability are also unknown. Accordingly, much of the information contained in this EA is general in nature. However, CEQ guidance suggests that federal agencies "integrate [the environmental process] with other planning at the earliest possible time to ensure that planning and decisions reflect environmental value." The purpose of this EA is to achieve Marine Corps compliance with CEQ guidance as well as the specific requirements of NEPA. Additional information about the scope and objectives of this Programmatic EA is provided in Section 1.4.

1.2 LOCATION AND DESCRIPTION OF MCAGCC

MCAGCC is located in the Mojave Desert, 130 miles (211 kilometers [km]) east of Los Angeles and 54 miles (87 km) northeast of Palm Springs in San Bernardino County, California (Figure 1-1). The southern boundary of the installation is adjacent to the City of Twentynine Palms and is approximately 6 miles (10 km) north of Highway 62. The northern boundary is located south of Interstate 40. Other communities within the vicinity of MCAGCC include Joshua Tree, Yucca Valley, and Landers.

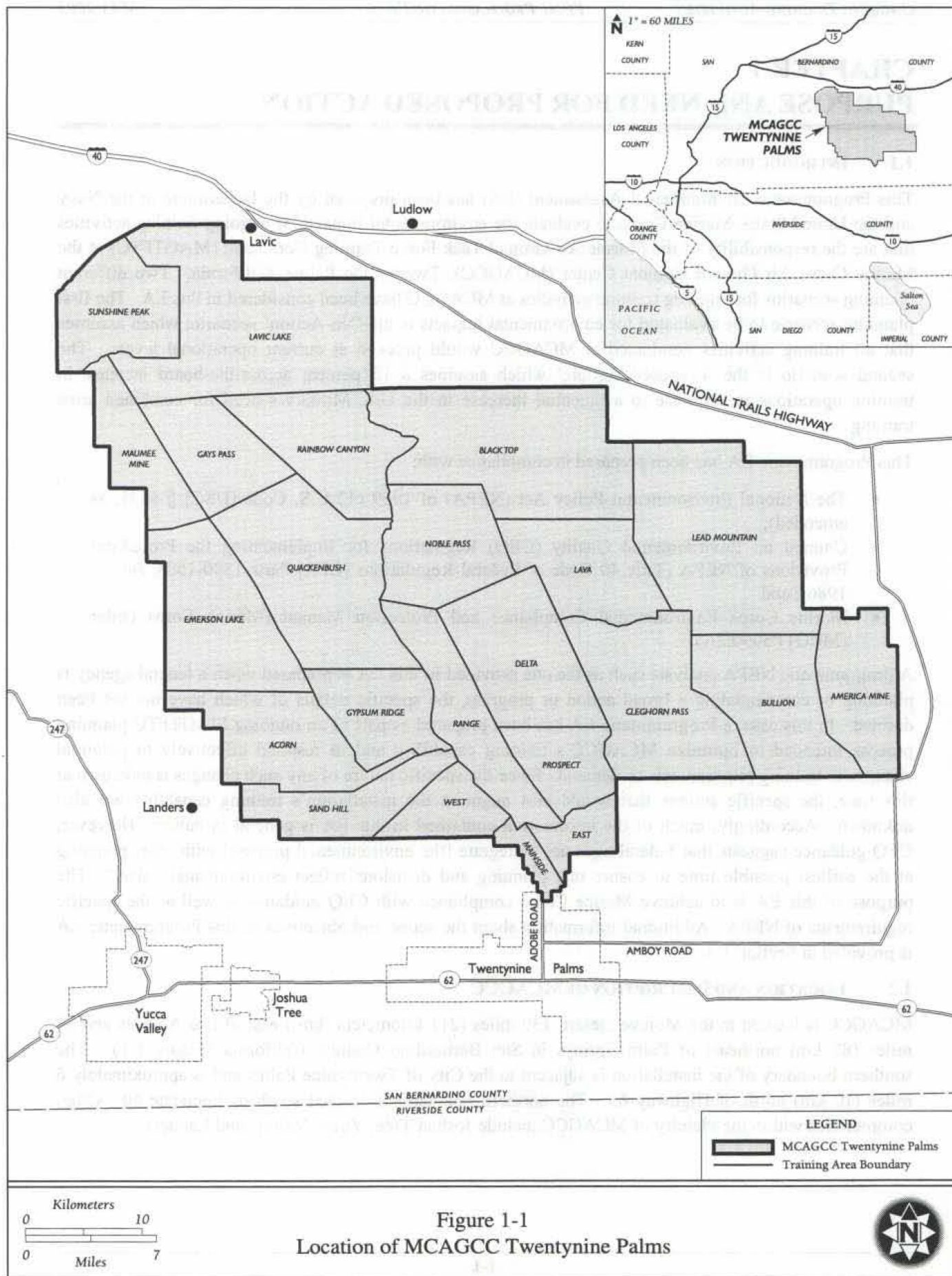


Figure 1-1
Location of MCAGCC Twentynine Palms

MCAGCC is the Marine Corps' largest live-fire training facility, encompassing 598,178 acres (242,075 hectares), most of which is undeveloped. The unique mission of the MAGTFTC is to develop, conduct, and evaluate the Marine Corps' Combined Arms Exercise (CAX) program at MCAGCC, while supporting the tenant commands of the Marine Expeditionary Force and the Marine Corps Communications and Electronics School. Annually, MAGTFTC trains over one-third of the total Marine Corps forces in live-fire and maneuver exercises. Operating procedures at MCAGCC permit Marines to maneuver both on foot and on vehicles through live-ordnance impact areas. These procedures further permit most air and ground weapons commonly found in a Marine Air Ground Task Force to be used in a combined arms setting. Most importantly, CAX training enables commanders to practice command control and combat essential skills such as fire support coordination and fire maneuvers over a vast and challenging terrain.

1.3 PURPOSE AND NEED

The purpose of the Proposed Action is to enhance MAGTFTC's ability to accommodate a potential increase in the U.S. Military's need for combined arms warfare training. An increased need for such training is anticipated because of the current U.S. war against terrorism and the evolving geopolitical and military situation in the Middle East. MCAGCC would be the most likely candidate to provide any additional training needed because of its unique resources and relatively isolated desert setting. Similar training installations (e.g., Marine Corps Base Camp Pendleton and Marine Corps Air Station Miramar in California) have become increasingly constrained in terms of training capacity and opportunities, in part due to environmental constraints as a result of compliance with the Endangered Species Act and the growth of adjacent civilian communities. Though the MAGTFTC is challenged with both internal and external encroachment issues, the current constraints do not encumber the training mission to the level experienced by other southern California Marine Corps installations. Therefore, the MAGTFTC is the most likely Marine Corps command to be tasked with additional training mission requirements. The Proposed Action is needed to provide MAGTFTC with an enhanced training capacity and greater flexibility to respond to an increased need for training should it become necessary. This Programmatic EA is a proactive effort to plan for such a scenario before it occurs.

1.4 SCOPE OF THE PROGRAMMATIC ENVIRONMENTAL ASSESSMENT

The objective of this Programmatic EA is to provide decision-makers with general environmental information related to the Proposed Action and to assess whether training activities of this type and scale have the potential to cause significant environmental effects in the current setting. Additionally, this EA assesses the programmatic environmental effects of ongoing training at current operational levels using existing training assets and capacity (the No-Action Alternative). The findings of this Programmatic EA will allow MAGTFTC planners, decision-makers, and other interested parties to compare the environmental effects of the proposed increase in training capacity and operations to the effects of taking no action.

This Programmatic EA also functions as a first-tier environmental analysis that would serve as a foundation for subsequent tiered NEPA documents that would focus on site-specific impacts of any future individual actions. The programmatic nature of the analysis and the generalized level of detail presented in this EA increase its usefulness as a planning tool at this early stage of the planning process. Since specific plans and actions designed to achieve the broader programmatic objectives would be largely contingent on a number of factors that may change over time (including mission requirements, availability of funding and political influence), it is premature to attempt to identify detailed impacts of any proposed project in any specific location. Once a broader plan of action has been evaluated that

would optimize the training capacity at MCAGCC, planning efforts for specific projects and actions can begin (e.g., if new ranges or other facilities were needed to accommodate increased training). At that time, more specific environmental analyses and NEPA documentation would be prepared, as necessary.

1.5 REGULATORY COMPLIANCE

An analysis of the applicability of the Clean Air Act General Conformity Rule (described in detail in Section 4.5) is not being performed at this time because of the nonspecific and programmatic nature of the Proposed Action. The proposed 15-percent increase in training activities is not currently defined in sufficient detail, and associated pollutant emissions are not sufficiently predictable, to enable analysis under the Conformity Rule. Accordingly, a determination of the applicability for CAA conformity is neither feasible nor appropriate at this stage of the planning process. As individual actions designed specifically to achieve MAGTFTC planning objectives reach the "proposal" stage in NEPA terms, and are subjected to more focused analysis in the next tier of NEPA documents, conformity applicability analyses would need to be performed.

Various other federal and state laws, rules, regulations, and policies are pertinent to implementation of the proposed action. A description of the proposed action's consistency with these policies and regulations, as well as regulatory agencies responsible for their implementation, is presented in Chapter 6.

CHAPTER 2

PROPOSED ACTION AND ALTERNATIVES

In addition to conducting current combined arms training exercises at MCAGCC, the MAGTFTC anticipates a potential need to increase the scope of training such that a 15-percent increase in all types of training activity could be accommodated at the installation. Such an increase in training is not currently a requirement nor is it an action being formally proposed in the manner traditionally associated with NEPA documents. It represents a proactive planning scenario that is being programmatically evaluated in this EA in order to enhance MAGTFTC's readiness should the need for additional training arise. However, to be consistent with NEPA, this increased training scenario will be referred to as the "Proposed Action" throughout this document.

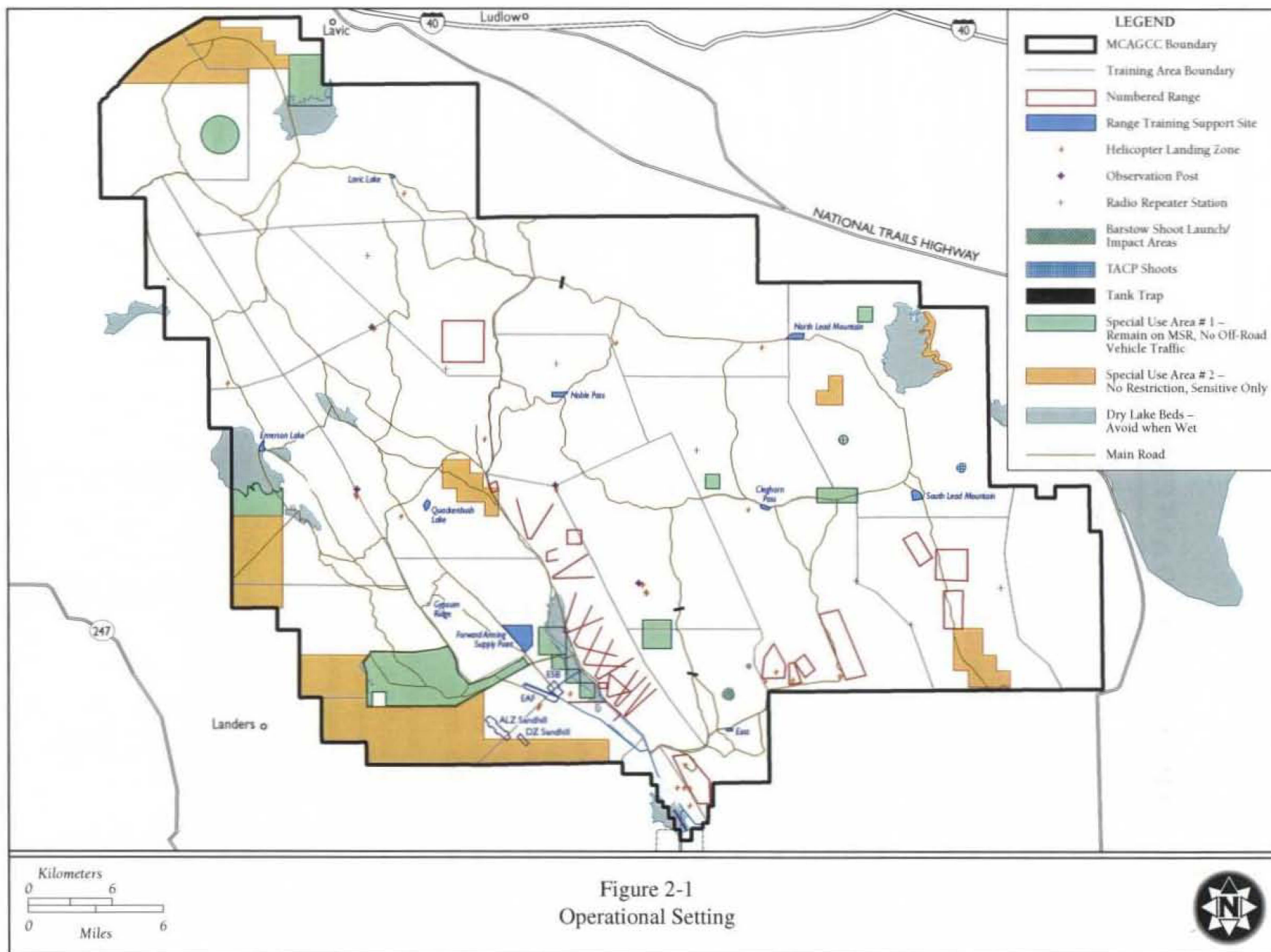
Current training objectives and methodologies are not expected to change under the Proposed Action; only the quantity and/or frequency of training activities differentiate the Proposed Action from the No-Action Alternative (current levels of operations). Accordingly, and in the interest of presenting a concise analysis of potential impacts, the No-Action Alternative is described first and with more emphasis throughout this Programmatic EA.

The remainder of this chapter is divided into 3 major subsections:

- Section 2.1 provides a general overview of the current operational setting at MCAGCC, including an introduction to Training Areas, Fixed Ranges, and other major facilities, and an overview of essential range safety priorities. This operational setting is equally relevant to both the Proposed Action and the No-Action Alternative.
- Section 2.2 then describes the No-Action Alternative (current operations scenario), including the major training exercises conducted at MCAGCC each year, the four general categories of training activities on which the impact analysis in Chapter 4 will be focused, the current level of operations for each category, and the special conservation measures and environmental protection programs that are currently implemented at MCAGCC to limit and reduce the environmental impacts of training operations.
- Section 2.3 describes the Proposed Action (increased operations scenario) by quantifying the incremental increase in operations for each category of training activity. The Proposed Action would also incorporate the complete set of special conservation measures and environmental protection programs introduced in Section 2.2.

2.1 OVERVIEW OF MCAGCC OPERATIONAL SETTING

This section provides an overview of the established operational setting, available resources, and range safety priorities that support and characterize all training at MCAGCC. The major components of this operational setting are illustrated in Figure 2-1.



2.1.1 Training Areas

The entire installation has been designated as a single training range, though for scheduling purposes it is divided into 23 separate Training Areas. Training Areas are functional, administrative units that enable different types of training to be conducted simultaneously without jeopardizing safety. The boundaries of Training Areas, though not marked, are defined by training requirements, topography, and other constraints. The Training Areas vary in size, use, terrain, and training restrictions. For example, a portion of the Acorn Training Area (7,600 acres [3,075 hectares]) is designated as a Special Use Area #1. This area has use constraints that protect MCAGCC's potable water field and the area's biological and cultural resources. Training Areas (or portions thereof) may also be subject to Standard Operating Procedures (SOPs) that limit or restrict their use for maneuvers, live-fire, or other training activities (Figure 2-2). Live-fire and other SOP limitations on any Training Area within MCAGCC are established by direction of the Commanding General. These SOPs can be lifted or changed at any time to support training needs. Appendix A provides a more detailed description of all 23 Training Areas and any current restrictions or focused uses that may apply.

2.1.2 Fixed Ranges

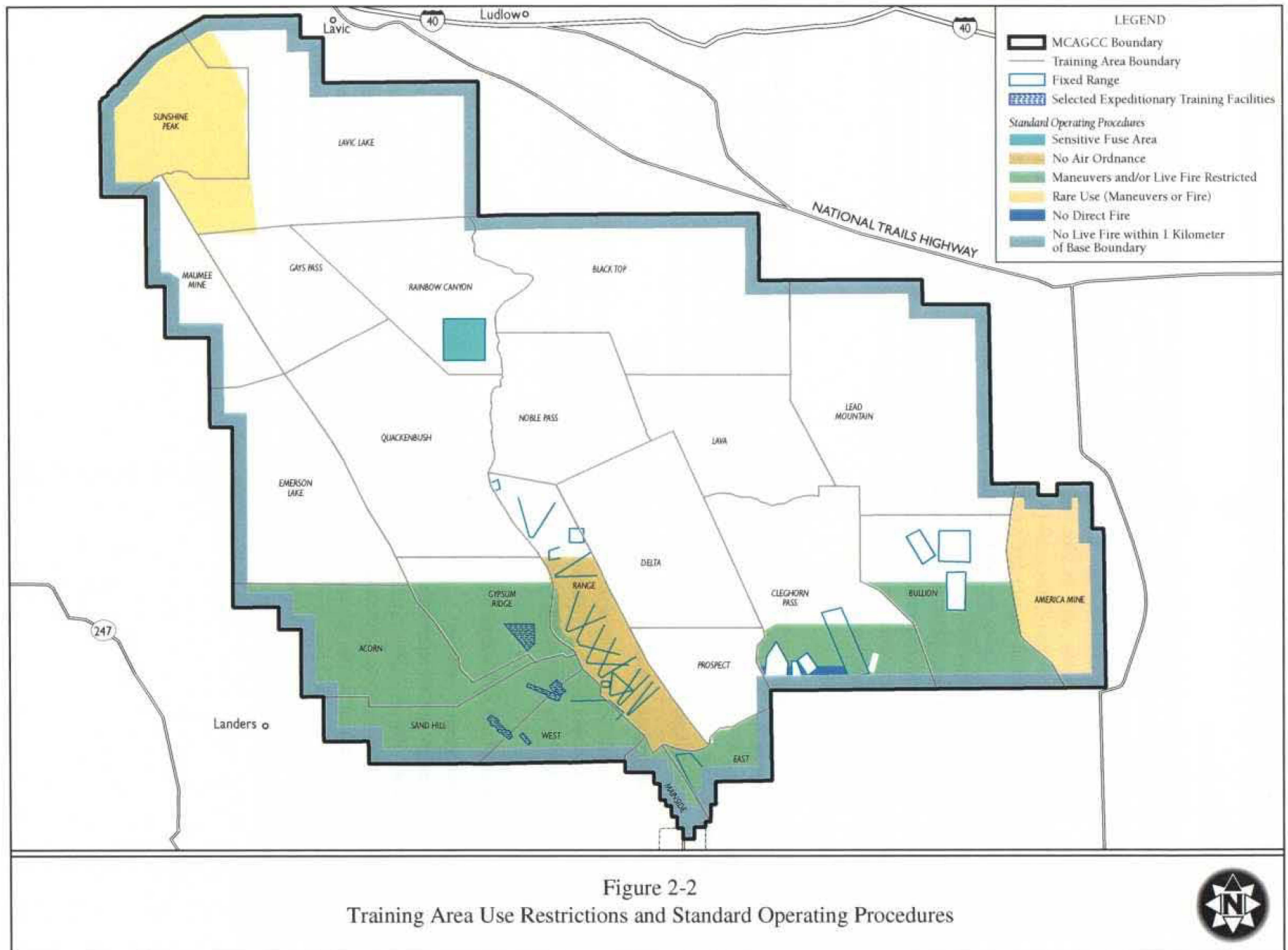
Certain types of focused training activities at MCAGCC are concentrated within a series of 25 Fixed Ranges. The training on Fixed Ranges is controlled in terms of impact areas, types of weapons and munitions used, and allowable maneuvers. Each Fixed Range is subject to SOPs that specify allowable uses and relevant restrictions on use of the range. For example, certain Fixed Ranges do not allow live-fire while others do not permit vehicular travel. See Appendix A for a description of each Fixed Range.

2.1.3 Range Control and Management of Unexploded Ordnance

Command and control of all training at MCAGCC is managed and operated by the Operations and Training (O&T) Directorate. The Directorate's Operations Officer is tasked with overseeing all range scheduling, range control, range safety, and range maintenance activities, including Explosive Ordnance Disposal (EOD).

2.1.3.1 Range Control and Range Safety

The Range Control Section (referred to as "Bearmat") maintains communication with all training units and provides oversight of all activities being conducted at MCAGCC, both on the ground and in associated airspace. Range Safety personnel in the O&T Directorate provide safety guidance, conduct formal classes for training units, and randomly check units to assist in range safety procedures. Range safety is also the responsibility of each unit commander conducting training or maneuvering on MCAGCC. All personnel (military, civilian, or contractor) entering MCAGCC training ranges are first required to attend a range safety briefing, the topics of which include (but are not limited to) desert survival, environmental protection, range control and operational procedures, and unexploded ordnance (UXO).



2.1.3.2 Range Maintenance and EOD

Range maintenance is conducted through the Range Training Area Maintenance Section (RTAMS). RTAMS responsibilities include management of target arrays in support of pre-CAX and CAX activities, supervision of range clean-up after the conclusion of each CAX, annual clean-up of all Training Areas and Fixed Ranges, and support of various range and road maintenance projects. Though related to the clean-up and maintenance of training ranges, EOD is particularly important for maintaining a safe training environment; accordingly, the EOD unit reports directly to the Director of O&T. The mission of the EOD unit is to (1) reduce the hazard from UXO, (2) remove ordnance residue from training areas, and (3) provide a safe and constructive training area for all training units.

Range clearance operations are conducted throughout the year and are focused on three categories of range-related materials. Ammunition/Ordnance Derived Materials are non-explosive and consist primarily of package or ordnance item handling material. Range Residue is training ordnance that has been expended and recovered in pieces or substantially whole parts. Range Residue is more dangerous than the Ammunition/Ordnance Derived Materials because there still remains a potential for the residue to contain explosive material. Range Residue includes brass, projectiles, missiles, rockets, bombs, and non-fragmentary grenades. All Range Residue is cleared by a qualified EOD technician before it is processed for recycling or disposal. The last category, UXO, includes ordnance that failed to detonate during training activities. UXO is never removed from the range; it is detonated in place to create Range Residue, which is then cleared according to the relevant operating procedures.

All range clearance operations are conducted in accordance with the MAGTFTC Unexploded Ordnance Range Management Plan (UXORMP) (MAGTFTC 2001c) and with Combat Center Order P3500.4F (*Standing Operating Procedures for Range/Training Areas and Airspace*) (MCAGCC 2000b) and Combat Center Order P3120.4C (*Standing Operating Procedures for Units Training Aboard the Combat Center*) (MCAGCC 93). These plans and operating procedures clearly define the scope and procedural requirements associated with EOD and range clearance operations. EOD operations are described further in Section 3.9, Public Health and Safety.

2.1.4 Expeditionary Training Facilities

Many of the training sites and support facilities at MCAGCC are expeditionary in nature. Expeditionary training facilities are designed to be temporary to provide a realistic replication of a combat situation. These facilities include the Expeditionary Airfield (EAF), the Exercise Support Base (ESB), the Assault Landing Zone (ALZ Sandhill), a parachute drop zone (DZ Sandhill), 16 helicopter landing zones, 14 observation posts, radio repeater towers, and Pre-designated Range Training Support Sites (PRTSSs) (see Figure 2-1). Environmental effects of training activities occurring at the EAF and ESB have previously been evaluated in an EA (MCAGCC 1997) and are therefore not evaluated in this Programmatic EA.

- The EAF is a temporary support base for the Aviation Combat Element of Marine Corps units engaged in CAXs. It is located in the south-central part of the installation on the border of the Sand Hill and West Training Areas. The EAF has an 8,000-foot (2,438-meter [m]) aluminum matting runway, aircraft parking area, tactical airfield fuel dispensing system, expeditionary control tower, weather facilities, and emergency facilities.
- The ESB (Camp Wilson) supports deployed units during CAX operations. It lies northeast of the EAF, partially within the Sand Hill and West Training Areas. Permanent and temporary structures are located at the site.

- ALZ Sandhill is an unimproved dirt airfield with a 5,000-foot (1,524-m) dirt runway; it is used by fixed-wing aircraft and helicopters. Sixteen other landing zones used for helicopters and other aircraft are distributed throughout MCAGCC (see Figure 2-1).
- DZ Sandhill, located about one kilometer southeast of ALZ Sandhill, is used for parachute drops of personnel and cargo. Parachute drops are permitted in other areas but are not recommended due to the presence of large obstructions in these areas that could injure parachutists.
- The observation posts are located throughout MCAGCC on strategic high points. The posts are used to evaluate training exercises. Radio repeater towers are also situated on mountain tops throughout the installation.
- PRTSSs are combat support sites that have already been established in fixed locations to support units during training exercises. Forward arming refueling sites, field ammunition supply points, forward logistics bases, field mess areas, and shower units are some of the PRTSS facilities that already exist to support combat training. MAGTFTC has 9 of these training support sites strategically located within 9 different Training Areas. Establishment of these types of facilities would otherwise require excavation and other ground disturbance to create fuel containment berms, slit trenches, bivouac areas, and vehicle parking. Consequently, units are encouraged to utilize the existing multiple use PRTSS as a means to reduce the environmental burdens associated with establishing new sites, to ensure environmental compliance, and to extend the use of valuable training lands. The use of predesignated sites compared to other options for providing for such combat and service support activities was evaluated using NEPA (Templeton 1997).

2.1.5 Targets and Target Systems

A variety of targets and target systems are used at MCAGCC. A total of 16 Training Areas contain Laser Target Areas, which are used for laser ground-to-ground and air-to-ground firing. Strict regulations and guidelines are enforced to prevent exposure to hazardous levels of laser radiation (see also Section 3.9.2.8). Two types of permanent automated target systems are used in the Training Areas: the Infantry Remote Engagement Target System (pop-up stationary infantry targets and pop-up moving infantry targets on aluminum rails) and the CAX Target System (172 stationary pop-up armor targets). Other permanent but non-automated targets are used for direct live-fire munitions from artillery, tanks, and aircraft. These targets consist of stationary plywood presenting a tank or other military silhouette, large and small surplus military vehicles, stacks of tires, and silhouettes of personnel. Mobile targets are occasionally moved for differing exercises and training scenarios.

2.1.6 Vehicular Circulation

Vehicular circulation throughout MCAGCC occurs on 354 miles (570 km) of unpaved main supply routes (MSRs) and 665 miles (1,070 km) of secondary roads. MSRs have an average width of 32 feet (10 m) and a maximum speed limit of 30 miles (48 km) per hour. Areas within 656 feet (200 m) of the MSRs are subject to intense training activity, especially by tracked vehicles. MAGTFTC places signs at common Training Area entry points and along some MSRs that note the presence of desert tortoises and discourage all unnecessary off-road use. Secondary roads average 16 feet (5 m) in width and are also limited to 30 miles (48 km) per hour; however, such speeds are not possible on substantial portions of these roads.

2.2 THE NO-ACTION ALTERNATIVE – ONGOING TRAINING

Under the No-Action Alternative, the proposed enhancements to training capacity at MCAGCC (increased operations) would not occur. Ongoing operations, environmental protection programs, and training exercises throughout the installation (as described below) would continue unchanged. The MAGTFTC would continue to accomplish its mission objectives and continue to provide the most realistic live-fire training exercises conducted by the U.S. Military. The programmatic environmental impacts of current, ongoing training activities at MCAGCC are described in Chapter 4, Environmental Consequences.

2.2.1 Major Training Exercises

This section describes the major training exercises that take place at MCAGCC on a regular basis. Included are the types of training involved with each exercise and the frequency with which they are conducted. A brief summary is also provided in Table 2-1. Training at MCAGCC is necessarily complex as a variety of users from the Marine Corps (both resident and transient), Army, Navy, and Air Force conduct wide-ranging activities and exercises, and many different activities can occur simultaneously in different parts of the installation. Some type of training occurs each day of the year, with major exercises conducted over 250 days per year (70 percent). The remaining 30 percent of the year is devoted to smaller types of activities and exercises.

Table 2-1. Major Training Exercises Conducted at MCAGCC

<i>Operation/Exercise</i>	<i>Frequency (per year)</i>	<i>Duration</i>	<i>Units and Maneuvers Involved</i>
CAX	10	15 or 22 days	All air and ground procedures
Steel Knight	1	2 weeks	Ground maneuvers, tanks, artillery, air support and reconnaissance
DESFIREX	2	1-2 weeks	Artillery, ground maneuvers
Desert Scimitar	1	2 weeks	Tanks, ground maneuvers, artillery
FSCAC	1	12-14 days	Live fire, air ordnance
TACP	10	3 days	Artillery, non-live fire air support
Fallbrook Shoot	Variable	Variable	Test-firing of expired munitions, etc.
Barstow Shoot	Variable	Variable	Test-firing of rebuilt howitzers

2.2.1.1 The CAX Training Program

The primary mission of MAGTFTC is to develop, conduct, administer, and evaluate the CAX Training Program. Each CAX is composed of a series of live-fire training exercises conducted by active duty and Reserve Fleet Marine Force units. Infantry troops, artillery and armored battalions, fixed-wing aircraft, and attack helicopters are employed closely together in various maneuvers and exercises. Currently, over one-third of the Marine Corps' forces train during the ten CAXs that are conducted annually at MCAGCC.

Eight of the CAX programs last 22-days each, while the two CAXs set aside for Reserve units are 15 days in duration. The CAX is the largest and longest-lasting activity that occurs at MCAGCC and it has priority over all other types of exercises. Each CAX is comprised of an intensive training cycle involving a series of progressive live-fire exercises that test the ability and adaptability of a force of approximately 3,500 Marines. The CAX program is an evolving exercise; fragmentary orders delivered to the exercise

commander can alter or provide new missions at any given time during the cycle. This precludes complete pre-planning of every phase of the CAX and adds realistic pressures to the CAX commanding staff.

The forces involved in the CAX are composed of air and ground combat elements and a combat service support element. The Ground Combat Element normally consists of one infantry battalion (approximately 800 Marines) reinforced by a tank company (14 M1A1 and 2 M-88 tanks) and an artillery battalion (12 to 18 howitzers and support trucks). The Air Combat Element consists of a fixed-wing squadron (approximately 12 F/A-18s or AV-8Bs), an attack helicopter squadron (6 to 8 AH-1 Cobras), and a composite helicopter squadron (CH-46s and CH-53s) for transportation and heavy lift. The Combat Service Support Element provides supplies and repair services to the two combat elements.

The first two days of each CAX are focused on classroom training. Seventeen days of each 22-day CAX include comprehensive and integrated combined arms training for Marine infantry battalions using air and ground procedures simultaneously. During this time, fire support coordination exercises, which consist of mortar, artillery, and air attacks on the same target, are conducted. The Ground Combat Element, consisting of infantry squads, platoons, and companies, also practices attacking enemy positions using mortars and machine guns without the assistance of air or artillery support.

The three-day final exercise of each CAX combines all the tactics, techniques, and procedures practiced during the training period. Extensive ground maneuvers and numerous live-fire exercises occur over a variable 50- to 75-mile (80- to 121-km) course throughout MCAGCC. Following each CAX or other live-fire exercise, Reset and Clean up operations take place in accordance with the installation's UXO Range Management Plan (MAGTFTC 2001c), including removal of unexploded ordnance and repair or replacement of targets.

A large portion of the CAX occurs in the '400 series' Fixed Ranges in the Cleghorn Pass Training Area and the Delta corridor (see Figure 2-1). Quackenbush Lake, Gays Pass, Lead Mountain, Bullion (north of the O3 grid line), north central Lava, northeast Black Top, and Lavic Lake are other Training Areas that experience use during the CAX, especially during Days 14-19. Emerson Lake, Maumee Mine, Gypsum Ridge, and Lava Training Areas are also used, but operations are generally limited to maneuvers and Light Armored Vehicle (LAV) operations.

2.2.1.2 Steel Knight Exercises

Steel Knight occurs once per year, usually in December, and is one of the largest exercises held at MCAGCC. It is a Division-level live-fire exercise of two weeks duration. The individual training scenarios vary from year to year, but exercise events typically include: deliberate attack, counterattack, day/night deliberate defense, withdrawal, battlefield interdiction, direct air support, close air support, night tactical withdrawal, and withdrawal not-under-enemy-fire. Exercises also include aerial reconnaissance/surveillance and long-range artillery missions. Although most Training Areas are usually employed, the most heavily-used are the Delta corridor, Black Top, Lavic Lake, Emerson Lake, Quackenbush Lake, and the southern half of Gays Pass (see Figure 2-1). Less frequently used Training Areas are Bullion, Lead Mountain, and Cleghorn Pass. Major staging areas for Steel Knight are Sand Hill, West, and East Training Areas.

2.2.1.3 Desert Fire Exercises

The Desert Fire Exercise (DESFIREX) is primarily an artillery training exercise that has recently been downgraded from a regiment to a two-battalion exercise, with each battalion in the regiment seeing one DESFIREX per year. One DESFIREX each year focuses exclusively on artillery unit training while the

other also invites infantry, reconnaissance, and armored units to participate. Each DESFIREX is one to two weeks in duration. Army Multiple-Launch Rocket System (MLRS) units are also invited to the second type of DESFIREX. MLRS units range from a battery (nine launchers) to a battalion (27 launchers). The full operation of the MLRS requires use of the sensitive fuse range (Fixed Range 601), which has been closed to sensitive fuse ordnance for the past five years. When MLRS units participate in the DESFIREX, reduced and partially inert MLRSs are deployed.

Other DESFIREX training scenarios can include helo-borne raids and Unmanned Aerial Vehicle operations. The scenario for a DESFIREX is variable and can encompass most of the Training Areas. The heaviest artillery use occurs in Quackenbush Lake, southern Gays Pass, Lead Mountain, and the northern part of Bullion Training Area, with moderate artillery firing into Black Top, Lavic Lake, Delta, and north central Lava Training Areas (see Figure 2-1).

2.2.1.4 Other Training Exercises

Desert Scimitar is a large exercise that emphasizes tank maneuvers with infantry and indirect artillery fire support, comparable to Steel Knight. It is held once per year for two weeks.

The *Fire Support Coordination Application Course* (FSCAC) occurs annually for 12-14 days. This exercise involves live-fire, mostly air-delivered in Delta, Quackenbush, and Prospect Training Areas, and non-live fire in Gypsum Ridge Training Area. The FSCAC is often closely associated with DESFIREX.

Tactical Air Control Party (TACP) live-fire evolutions are the primary means by which the Marine Corps is able to provide Marines the requisite qualifications to be a Forward Air Controller (FAC). TACP evolutions typically occur over a 4-5 day period and are held 10 times per year. TACP training involves an artillery firing battery of at least 4 guns that normally occupy the same firing position (see Figure 2-1), an 81mm mortar platoon that often co-locates with the FAC Students, and enough sorties of fixed and rotary wing aircraft to adequately train the amount of students in the TACP Class. During the training evolution, air delivered ordnance, artillery, and mortars are fired into the Lead Mountain and Bullion Training Areas..

The *Fallbrook Shoot* is a highly variable exercise that typically occurs when Naval Ordnance Center, Pacific Division, Fallbrook brings sample lots of ammunition, fuses, or propellants in order to verify the integrity and performance of each lot, and to ensure that the lots are capable of meeting manufacturer's tolerances. These shoots occur as needed only at select ranges that are suitable for these types of artillery.

The *Barstow Shoot* occurs periodically as needed to test howitzers that have been rebuilt by the Marine Corps Logistics Base, Barstow. The nature of this test requires that guns be fired horizontally. This is done in the southeastern portion of the Delta Training Area (see Figure 2-1). These howitzers are fired in a northeast direction into the side of a mountain (just west of Fixed Range 400).

Unit level training activities occur on a periodic basis at MCAGCC. Transient commands (those not stationed permanently at MCAGCC) that schedule individual Fixed Ranges for unit training include numerous Marine Corps, Air Force, Army, and Navy units. Tenant organizations (those stationed permanently at MCAGCC) conduct unit level training augmented with tanks, artillery, and aviation on a routine basis.

Field Testing of new weapons systems, vehicles, or other equipment occurs on a sporadic, case-by-case basis in individual Training Areas or Fixed Ranges that best meet the requirements of the system or equipment being tested. Testing operations may involve vehicle maneuvers, ordnance delivery, or other general categories of training activity as necessary to achieve the objectives of the test.

2.2.2 Categories of Training Activities at MCAGCC

All training activities at MCAGCC can be grouped into 4 major categories: vehicle maneuvers, infantry maneuvers, aircraft operations, and ordnance delivery. Each is an integral part of the training mission of MAGTFMC and contributes to the overall combat readiness and success of the Marine Corps. The training exercises described above typically involve some or all of these categories of activities simultaneously and at varying scope and scale.

2.2.2.1 Vehicle Maneuvers

Vehicles use MCAGCC's Training Areas, Fixed Ranges, and road network daily and are a crucial element in maneuvers and operational activities. Normally, the MSRs and secondary roads are used to transport troops and supplies to Fixed Ranges and other training sites. However, off-road use of vehicles is an integral part of the 'real-life battle scenarios' that take place during large exercises such as the CAX, when large numbers of vehicles travel off-road for varying periods of time. Vehicles involved in training operations are categorized as follows:

- Tracked Vehicles – vehicles with non-rubber wheels or tracks (e.g., tanks, Assault Amphibious Vehicles [AAVs], MLRSs);
- Heavy Wheeled Vehicles – vehicles with multiple axles and/or more than four rubber tires (e.g., LAVs, five- and seven-ton trucks, personnel carriers); and
- Light Wheeled Vehicles – vehicles with four rubber tires (e.g., utility vehicles, humvees, and smaller trucks);

Tracked vehicles function as weapons systems, armored personnel carriers, engineering devices, and recovery systems. The M1A1 Main Battle Tank and the AAV are the main components of mechanized operations. The M1A1 Main Battle Tank's mission is to close with and destroy enemy forces on the integrated battlefield using mobility, firepower, and shock effect. The AAV is an armored, amphibious, fully-tracked landing vehicle. The AAV carries troops from ship to shore and to inland locations. In a combat environment, the capabilities of tracked vehicles are influenced by terrain-related factors such as surface, subsurface, and slope. Tracked vehicles utilize terrain to the maximum advantage and have the capability of traveling over virtually any flat or gently sloping land (a 22-percent grade is normally used as a planning factor to evaluate tracked vehicle maneuverability). When moving into position, vehicles use terrain for cover and concealment; vehicles also spread out over washes, hills, rocky outcrops, and sloping terrain to cover and mask their movements. Depending upon the tactical training requirements and terrain, tracked vehicles may or may not utilize roads. During the 250 days per year on which major training exercises are conducted, tracked vehicles collectively travel an estimated aggregate average of 220 miles (354 km) per day or approximately 55,000 miles (88,514 km) per year (see Table 2-2).

Wheeled vehicles (both heavy and light) primarily function as weapons systems, reconnaissance vehicles, troop transports, and combat service support vehicles. Many of the same tactics and limitations that apply to tracked vehicles apply to wheeled vehicles as well: excessive slopes and rough terrain can severely impair mobility or stop travel altogether and the vehicles typically spread out during travel to present smaller targets. During major exercises such as the CAX, all heavy-wheeled vehicles collectively travel an average of 3,280 miles (5,279 km) per day or 820,000 miles (1,319,662 km) per year (see Table 2-2). Light-wheeled vehicle use under the same conditions involves an aggregate average of 4,500 miles (7,282 km) per day or 1,125,000 miles (1,810,512 km) per year.

When in a stationary position for an extended period of time, such as in defense or in preparation for an ambush, vehicles must be dug in. Digging in is the act of constructing a fighting position below the surface of the ground to provide the vehicle and crew with protection against direct and indirect enemy fire and to conceal their position from enemy forces. This critical skill typically utilizes engineering equipment or other large machinery. Digging in is normally done during defensive operations and takes place in only a few locations at MCAGCC. Obstacles are also built to channelize, slow down, or stop enemy forces. There are various types of natural and mechanical obstacles that can be constructed, but the most common is a tank ditch. In addition, anti-tank training relies on berm and trench systems called 'tank traps.' There are three such traps constructed in strategic locations at MCAGCC (see Figure 2-1).

Table 2-2. Current Annual Vehicle Use During Peak Periods

<i>Category</i>	<i>Average Daily Number of Vehicles at Peak Use¹</i>	<i>Aggregate Miles (km) Per Day at Peak Use¹</i>	<i>Average Annual Days Per Year of Peak Use¹</i>	<i>Average Annual Miles (km) Per Year at Peak Use - all vehicles</i>
Tracked	63	220 (354)	250	55,000 (88,514)
Heavy-Wheeled	185	3,280 (5,279)	250	820,000 (1,319,662)
Light-Wheeled	200	4,500 (7,282)	250	1,125,000 (1,810,512)

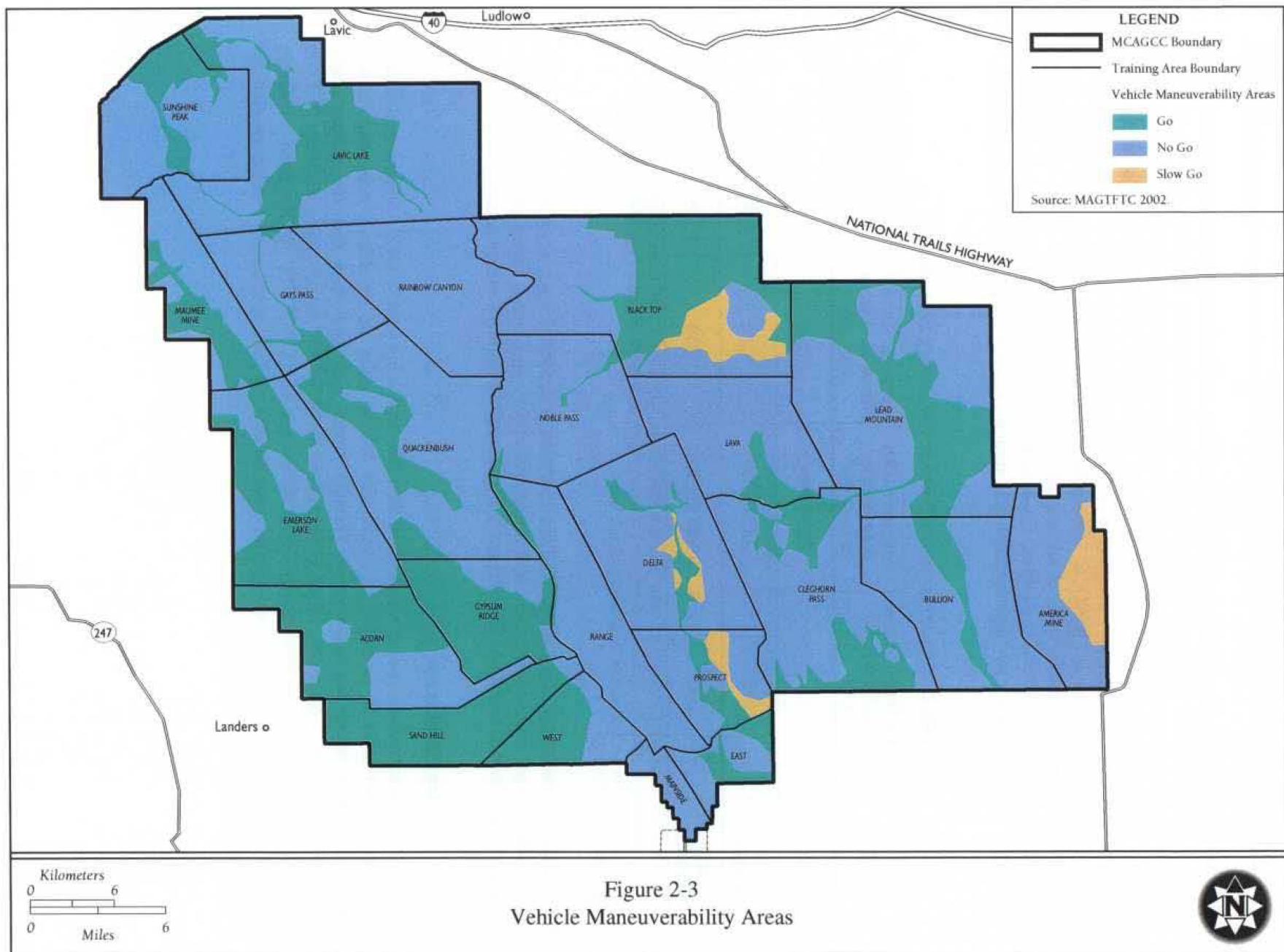
Notes: ¹ Peak use includes CAXs and other major exercises (Steel Knight, DESFIREX, and Desert Scimitar) only. Data regarding the levels of vehicle use during the 115 days per year of off-peak use are not available, but such use is estimated to be considerably lower than peak use levels.

Source: MAGTFTC 2002e

Vehicle maneuverability within MCAGCC Training Areas is dependent upon several factors, including terrain, vehicle type, training objectives, and safety restrictions. In general, terrain is divided into three categories: Go, No Go, and Slow Go. Figure 2-3 illustrates the primary maneuverable areas based on terrain.

2.2.2.2 Infantry Maneuvers

Infantry or "dismounted" operations are essential elements of training at MCAGCC. Dismounted attacks are necessary and must be practiced to ensure that Marine units are capable of achieving mission objectives. These operations occur in all Training Areas, including those that are geographically restrictive to vehicles. Annually, infantry maneuvers at MCAGCC involve approximately 531,000 ground troops, an average of approximately 1,500 Marines per day (MAGTFTC 2002f). Such maneuvers are often extensive in the distance and area covered on foot, with an average of 3 miles traveled per Marine per day (MAGTFTC 2002f).



Ground training exercises and activities can last for extended periods of time and require bivouacking, in which Marines camp on the range and conduct various operations. Staged operations can include excavation of soils for trenches and foxholes (to provide individuals with protection against enemy fire or for sanitation reasons). Digging activities associated with staged operations create ground disturbance below the normal soil horizon of twelve inches, and can be for both sanitation and force protection reasons. On average, an estimated 12 percent of the ground element forces (180 Marines) will dig a fighting hole on any given day (MAGTFTC 2002f). Finally, infantry maneuvers also require the use of restrictive materials (e.g., barbed wire) with associated berms and trenches to facilitate realistic battle scenarios.

2.2.2.3 Aircraft Operations

A variety of fixed- and rotary-wing aircraft are used at MCAGCC on a regular basis for air-to-ground ordnance delivery (discussed in Section 2.2.2.4), troop transport, and other combined arms training activities. Most training-related aircraft operations originate and/or terminate at the EAF located on the border between the Sand Hill and West Training Areas. Specific aircraft operations and activities may include the following: Low-Level Bombing, Strafing, Close Air Support, Limited Ground Controlled Intercepts, Air Combat Maneuvers, Dissimilar Air Combat Training, Parachute Operations, Close In Fire Support, Target Marking, Forward Air Control, Electronic Warfare, Visual Reconnaissance, Aerobatic Flights, Troop Inserts, Tactical Air Control Party, Medical Evacuation Support, Troop Lifts, Resupply, Low Altitude Training, Night Vision Goggle Training, Spotter of Artillery and/or Air Strikes, and Photo and Photoflash Runs. Air operations independent of major exercises include: numerous independent training flights by Marine, Navy, Army, and Air Force aircraft; low-altitude air defense firing exercises, air school proficiency training, joint airborne-air transportability training and aerial delivery missions, and a small number of general aviation flights. Total aircraft sorties in MCAGCC airspace in any given year (including Restricted Areas and Military Operating Areas) can range between 25,000 and 28,000 sorties, including non training-related flights (MAGTFTC 2003a). Table 2-3 displays the total training-related aircraft sorties by aircraft type at MCAGCC in 2001. Data for 2001 is being used as a representative year since total sorties in 2002 were reduced considerably by deployment commitments.

Table 2-3. Current Annual Aircraft Sorties at MCAGCC (2001)

<i>Aircraft</i>	<i>Sorties</i>
FA-18 C/D	4,938
F-5E	158
KC-130	1,169
AV-8B	4,043
AH-1	5,181
UH-1	1,623
CH-53E	2,507
CH-46E	4,858
UAV	1,294
Total	26,221

Source: Wyle Laboratories 2003.

2.2.2.4 Ordnance Delivery

Aircraft-Delivered

The delivery of air-to-ground ordnance is one of the characteristic training activities conducted at MCAGCC. The majority of air-to-ground ordnance delivery occurs on approximately 80,000 acres (13.4 percent of total area) encompassing many different Training Areas. These include almost all of Quackenbush Lake Training Area, the southern half of Gays Pass, Lavic Lake, the northern portions of Rainbow Canyon and Noble Pass, most of Lead Mountain, the central portion of Black Top, and the Delta Training Area corridor. Fixed Range 601 and Fixed Range 605 are used exclusively for aircraft-delivered ordnance.

The following areas are restricted from receiving live aircraft ordnance: Mainside, West, East, and Sand Hill Training Areas, below the 03 grid line of Emerson Lake Training Area, Gypsum Ridge, Bullion (except the 600 Series Fixed Ranges), and below the 05 grid line in the Range Training Area. In addition, no impact from live fire is permitted within a 3,000-foot (914-m) buffer along the MCAGCC boundary.

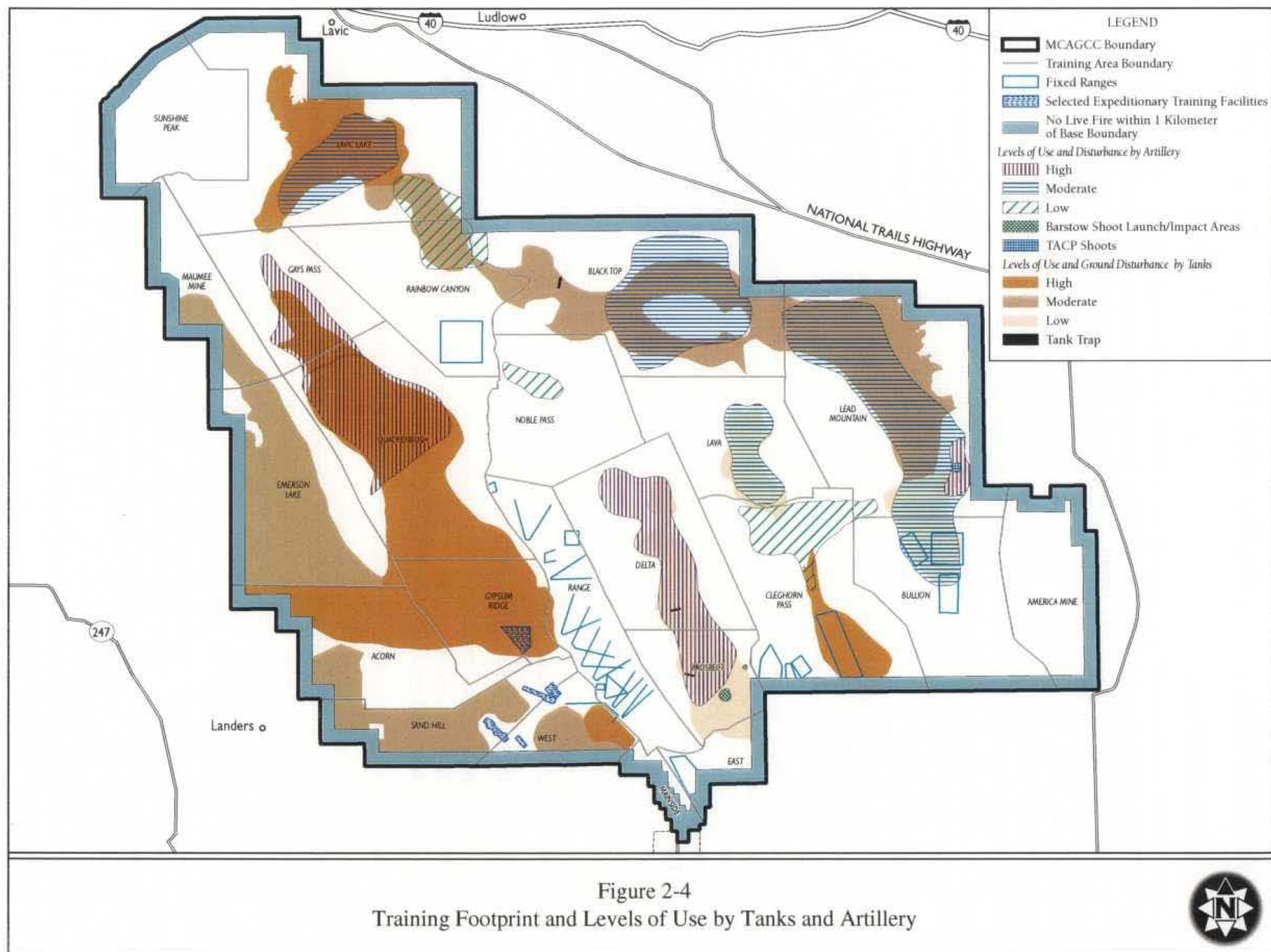
The manner and type of ordnance delivered are highly variable due to differences in aircraft, weapons systems, and missions. Currently, an estimated 35,000 units of aircraft ordnance are delivered annually at MCAGCC, including rockets, machine gun munitions, and conventional bombs.

Artillery

Artillery use occurs on approximately 110,000 acres (18 percent) of MCAGCC, but is concentrated on approximately 45,000 acres (7.5 percent) (Figure 2-4). Most artillery firing is directed at fixed targets and areas that are already heavily disturbed. Most of the explosive ordnance fired leaves craters about two feet wide and six inches deep (MCAGCC 1999). Very little artillery use occurs in the mountainous areas of the base.

All artillery use at MCAGCC is subject to the following constraints: no live fire within 3,000 feet of the MCAGCC boundary, no live fire within 3,280 feet of a Training Area that is not controlled or scheduled by the firing party, and no live fire below the 03 grid line in Emerson Lake, Gypsum Ridge, and Bullion Training Areas. There is also no live fire permitted in Range, East, West, Sand Hill, and Mainside Training Areas. The heaviest use areas for artillery are Quackenbush Lake Training Area (most used area), Gays Pass, Lead Mountain, and northern Bullion Training Areas (above 03 grid line). There is also artillery firing into Black Top, Lavic Lake, Delta, and north central Lava Training Areas (especially during major exercises). There is very little artillery fired into south-central Lava, Noble Pass, and north central Rainbow Canyon Training Areas due to a combination of difficult, low-visibility terrain for forward observers, and the convergence of multiple routes of travel and consequent high density of vehicle traffic in those areas.

Currently, an estimated 58,000 units of artillery ordnance are fired annually at MCAGCC, including mortar shells, missiles, and heavy artillery munitions.



Tank and Other Armor Ordnance

Tank operations are conducted over approximately 200,000 acres (80,937 hectares) (33 percent) of MCAGCC (see Figure 2-4), but most of the ordnance delivered from tanks and associated maneuvers are concentrated in 132,000 acres (53,419 hectares) (22 percent). The majority of tank operations take place in areas that are already moderately to highly disturbed. Tank firing occurs in all or parts of the following Training Areas: Black Top, Lavic Lake, Emerson Lake, Quackenbush Lake, Gays Pass, Delta Corridor, Bullion, Lead Mountain, Maumee Mine, and Cleghorn Pass. Unit-level tank, AAV, and LAR training and annual gunnery qualifications occur at Range 500 in the Cleghorn Pass Training Area.

Currently, an estimated 52,000 units of ordnance are fired annually by tanks (120 millimeter [mm]), AAVs (30 mm), and LARs (25 mm) at MCAGCC, including both explosive and inert munitions.

Small Arms Ordnance

A wide variety of small arms, mortars, ground missiles and related ordnance is used during infantry maneuvers and related training activities. Overall, approximately 5,800,000 rounds of small arms ordnance are fired annually within MCAGCC, the majority of which are from rifles and other small arms.

These operations occur at certain Fixed Ranges such as the 400 Series Ranges (see Appendix A) and throughout various Training Areas during major exercises. In addition to the small arms component of major exercises, qualification and annual requalification with the service rifle and service pistol occurs at the Marksmanship Training Unit (MTU) ranges located at the north end of the Mainside Training Area. The MTU ranges include: known-distance and unknown-distance rifle ranges; a Battle Sight Zero range for calibrating rifle sights; known-distance, moving target, and close combat pistol ranges; a multipurpose shotgun range; and an indoor simulated marksmanship trainer. In 2002, 5,683 Marines fired for annual requalification with the service rifle at the MTU and 1,778 fired for annual qualification or requalification with the service pistol. An additional 3,300 Marines and other personnel were trained during supplemental MTU operations, unit training, or other live-fire training operations.

Grenades, Demolitions, and Signal Illumination

Infantry maneuvers and other training exercises also rely upon a variety of mines, explosive charges, signal illumination, smoke grenades, practice grenades, etc., to increase the realism of the battlefield environment. On an annual basis, an estimated 29,000 units of such ordnance are used at MCAGCC.

2.2.3 Special Conservation Measures and Environmental Protection Programs

The Marine Corps and the MAGTFCTC at MCAGCC have continuously demonstrated their commitment to protecting the environment while conducting their training mission. This commitment is reflected in the high quality environmental compliance and natural/cultural resources programs operative at MCAGCC. MAGTFCTC has completed an Integrated Natural Resources Management Plan (INRMP) and an Integrated Cultural Resources Management Plan (ICRMP) to guide natural and cultural resources management. Active programs are also in place for pollution prevention, water and air quality assurance, hazardous waste management, and compliance enforcement. The purpose of these programs and policies is to ensure that MAGTFCTC mission and support activities are compliant with environmental regulatory requirements. The Command is devoted to maintaining a balance between fulfilling mission objectives and fulfilling their role as stewards of the environment (MCAGCC 2002e). This pursuit of balance between resource use and preservation has earned MCAGCC national, state, and local recognition for excellence in accomplishing its mission while simultaneously ensuring compliance with federal, state, and local environmental laws and regulations.

A few of the more prominent environmental programs and special conservation measures implemented at MCAGCC are summarized below. All ongoing environmental protection programs and conservation measures are included in both the No-Action Alternative (current operations scenario) and the Proposed Action (increased operations scenario).

- **Special Use Areas:** Specific areas have been designated as Special Use Areas to protect biological and cultural resources, potable water sources, etc., (e.g., by limiting vehicle traffic to existing roads or restricting live-fire activities) (see Figure 2-1).
- **Flora Inventory and Monitoring Project:** Inventory of flora and monitoring of species and communities that are indicators of ecosystem integrity, habitat conditions, capability of lands to support military missions, and status of sensitive species and communities (e.g. inventory of desert tortoise-related habitat condition and health).
- **General Wildlife Inventory and Monitoring Project:** Inventory of faunal resources and monitoring of species that are indicators of ecosystem integrity and other special interests (e.g. possible future inventory of burrowing owl populations).
- **Federally-listed Species Inventory and Monitoring Project:** Inventory of fauna, monitoring of ecosystem indicator species, and monitoring of long-term desert tortoise population trends at MCAGCC.
- **Soils Inventory and Monitoring Project:** Use of soil parameters to manage military activities, protect soil stability, restore training lands, and conserve wildlife habitat.
- **Ecosystem Management and Coordination Project:** Use of coordinated planning to manage natural resources to sustain military training capability (i.e. coordinate natural resources planning with military mission planning).
- **Desert Tortoise Management Project:** Meeting the terms of the Endangered Species Act to protect and improve desert tortoise habitats and contribute toward recovery of tortoise populations.
- **Other Wildlife Species Management Project:** Consideration of all State-protected and other nonfederally-listed species in MAGTFCTC actions.
- **Wet Areas Management Project:** Management of wet areas to protect their significance to the ecosystem functionality.
- **Mission Support Management Project:** Coordination with training organizations to minimize disturbance to training lands and natural and cultural resources and, when justified and cost effective, restore training lands.
- **Pest Management Support Project:** Control of plant and animal species that affect natural resources management or directly affect the military mission.
- **Wildfire Management Projects:** Prevention and suppression of wildfires to maintain ecosystem biodiversity and functionality.
- **Special Interest Area Protection Project:** Protection of areas of special ecological concern by compliance with environmental statutes and use of Geographic Information System (GIS) technology.
- **Natural Resources Enforcement Project:** Compliance of military and civilian activities with regard to natural resources by enforcing the provisions of the Standard Operation Procedure (SOP) for cleanup of trash and communication wire, as well as strictly monitoring contractor activities.
- **Mission Support Awareness Project:** Development of an awareness of values and requirements for natural and cultural resources protection among military personnel in order to minimize impact to the land and natural resources.
- **Cultural Resource Protection Project:** Avoidance of adverse effects to cultural and natural resources by implementation of the Integrated Cultural Resources Management Plan, as well as using GIS archaeological information in planning and implementing ground-disturbing projects.

2.3 PROPOSED ACTION

MCAGCC's training mission is expected to continue to evolve and potentially increase in scope. The form that such an evolution or change in scope might take is unknown, but the nature of the training provided at MCAGCC would continue to involve the same basic categories of training activities that are currently supported at the base. These include vehicle maneuvers, infantry maneuvers, aircraft operations, and ordnance delivery, all of which may be deployed in a wide variety of training exercises. The number and frequency of specific training exercises and operations may increase, and the strategies for employing them may change, but these general categories of activities are not expected to change appreciably.

For purposes of this Programmatic EA, it is assumed that the Proposed Action involves a 15 percent increase in each category of training activity. Table 2-4 describes the proposed increase in operations for each category. Precisely how or where these additional training operations would be conducted is unknown at this time, but in keeping with the programmatic planning objectives of this document, it is assumed that the additional training activities could occur anywhere within the current operational footprint defined for each category (see Figures 2-3 and 2-4). It is further assumed that the increase in training activities could be part of any type of training exercise (e.g., CAX, Steel Knight, individual unit non-CAX training, etc.) and that all current and ongoing environmental protection programs, operational restrictions, and conservation measures would continue to be in effect under the proposed action. In Section 4, Environmental Consequences, the potential environmental impacts of increased training utilization of MCAGCC lands are addressed programmatically for each category of training activity (regardless of where such activity might occur within existing operational footprints).

2.3.1 Alternatives to the Proposed Action

Alternatives to the proposed action must be considered in accordance with NEPA, CEQ guidelines for implementing NEPA, and MCO P5090.2A. However, only those alternatives determined to be reasonable relative to their ability to fulfill the purpose and need for the proposed action require detailed analysis. At this stage of the planning process, no alternatives have been identified that would satisfy the purpose and need for the proposed action. Consequently, only the No-Action Alternative has been carried forward for analysis.

Table 2-4. Proposed Increase in Training Activities by Category

<i>Categories</i>	<i>Current Operations (No-Action)</i>	<i>Proposed Increase in Operations (15%)</i>	<i>Total Operations with Proposed Action</i>
<i>Vehicle Maneuvers (Average Aggregate Vehicle Miles [km] Per Year – peak use only¹)</i>			
Tracked Vehicles	55,000 [88,514]	+8,250 [13,277]	63,250 [101,791]
Heavy-Wheeled Vehicles	820,000 [1,319,662]	+123,000 [197,949]	943,000 [1,517,611]
Light-Wheeled Vehicles	1,125,000 [1,810,512]	+168,750 [271,576]	1,293,750 [2,082,089]
<i>Infantry Maneuvers (Personnel-days)</i>			
Average Per Year	531,000	+79,650	610,650
Average Per Day	1,500	+225	1,725
<i>Aircraft Sorties</i>			
Total Annual	26,221	+3933 ²	30,154
<i>Ordnance Delivery (Annual Average)</i>			
Aircraft-Delivered	35,000	+5,250	40,250
Artillery	58,000	+8,700	66,700
Tanks and Armor	52,000	+7,800	59,800
Small Arms	5,800,000	+870,000	6,670,000
Grenades, Demolitions	29,000	+4,350	33,350
<i>Total Ordnance:</i>	5,974,000	+896,100	6,870,100

Notes:

¹ Peak use includes CAXs and other major exercises (Steel Knight, DESFIREX, and Desert Scimitar) only. Data regarding the levels of vehicle use during the 115 days per year of off-peak use are not available, but such use is estimated to be considerably lower than peak use levels.

² Distributed proportionately across aircraft types as per current distribution.

Sources: MAGTF TC 2002e; MAGTF TC 2002f; MAGTF TC 2002h; Wyle Laboratories 2003.

2.3.2 Comparison of Alternatives

Table 2-5 presents a comparison of the potential environmental consequences resulting from the proposed action and the No-Action Alternative. Chapter 4 provides a more thorough discussion of these potential environmental effects.

Table 2-5. Comparison of Potential Environmental Consequences

<i>Resource Area</i>	<i>No-Action</i>	<i>Proposed Action</i>
Geological Resources	○	○
Water Resources	○	○
Biological Resources	○	○
Cultural Resources	○	○
Air Quality	○	○
Noise	○	○
Transportation and Circulation	○	○
Land Use	○	○
Public Health and Safety	○	○
Socioeconomics/E.J.	+	+

Notes: ○ = No significant impacts
 ● = Potentially significant impacts
 + = Beneficial impacts

CHAPTER 3

AFFECTED ENVIRONMENT

3.1 GEOLOGICAL RESOURCES

3.1.1 Definition of Resource

Geological resources are generally defined as the geology, soils, and topography of a given area. The geology of an area includes bedrock materials, mineral deposits, and fossil remains. The principal geologic factors influencing the stability of structures are soil stability and seismic properties. Soil refers to unconsolidated earthen materials overlying bedrock or other parent material. Topography is typically described with respect to the elevation, slope, aspect, and surface features found within a given area.

Soil structure, elasticity, strength, shrink-swell potential, liquefaction potential, and erodibility all determine the ability for the ground to support structures and facilities. Soils are typically described in terms of their type, slope, physical characteristics, and relative compatibility or limitations with regard to particular construction activities and types of land use. Long-term geological, seismic, erosional, and depositional processes typically influence the topographic relief of an area. The Alquist-Priolo Special Studies Zone Act of 1972 prohibits the construction of structures for human occupancy within 50 feet (15 m) of an active fault. The area of potential effect (APE) for geological resources includes all of the land area under MAGTFTC control.

3.1.2 Existing Conditions

MCAGCC is located at the western base of the Bullion Mountains, which trend in a northwest/southeast direction across the installation. Quartz monzonite and granite are the main constituents of the Bullion Mountains (MCAGCC 1996). Quartz monzonite consists of quartz (silicon dioxide), feldspar (crystalline aluminosilicate minerals), and minor ferromagnesian minerals (Humboldt State University 2003). Other mountain ranges on base include Lava Bed and Hidalgo ranges, which are composed of granite and metamorphic rocks of the Mesozoic era (248 to 65 million years ago).

MCAGCC is characterized by rocky uplands and low valleys containing broad alluvial (i.e., deposits pertaining to flowing water) plains or bajadas, washes, and playas (i.e., dry lake beds). In addition, ancient lava fields exist within some Training Areas at MCAGCC. A number of volcanic craters are located in the vicinity of MCAGCC. The most remarkable craters outside MCAGCC boundaries are the Amboy and Pisgah craters. The Sunshine Peak Crater lies within the Sunshine Peak Training Area at the northwest section of MCAGCC (MCAGCC 1996). Elevations at MCAGCC range from 604 feet (184 m) at the Lead Mountain Training Area to approximately 4,700 feet (1,433 m) at Observation Post Round (MAGTFTC 2001a, MCAGCC 1996). However, the typical range of elevations at MCAGCC lies between 1,500 feet (457 m) and 3,000 feet (914 m) and slopes range between 15 and 90 percent (MCAGCC 1996).

Soils at MCAGCC consist primarily of Tertiary Age (65 to 1.6 million years ago) bedrock overlain by Quaternary Age (1.6 million years ago to present) alluvial fan deposits and Holocene Age (8,000 years ago to present) eolian deposits (wind-deposited sand). The Tertiary Age bedrock is impermeable, except where fractures have been formed. The alluvial materials consist of sediment generated from weathering and erosion of local mountain ranges. The depositions derived from local mountains are generally coarsest in the high plains and finest in the valley floors. Alluvial sediments are composed of fine to medium-grained silty sand, poorly graded sand, and poorly graded sand with silts. These materials are

normally loose near the surface and increase in density at depth (Geotechnics Incorporated 2002a). The highly-erodible eolian deposits reach a depth of 2 feet (0.6 m) and are composed of loose, poorly graded sand (Geotechnics Incorporated 2002b). In 1999, the Natural Resources Conservation Service completed a report of the soil types and composition at MCAGCC. Table 3-1 summarizes the findings of this study for the 9 soil types at MCAGCC. Regardless of soil type, and as a result of harsh desert conditions and low precipitation levels, and training activities soils at MCAGCC develop slowly and are highly vulnerable to wind erosion, water erosion, and compaction (MAGTFTC 2001a).

Table 3-1. Soil Characteristics at MCAGCC

<i>Soil Type</i>	<i>Description</i>	<i>Occurrence</i>	<i>Percent Cover</i>
Arizo	Very deep, sandy-skeletal soils formed in mixed alluvium	Northwestern, central, and southeastern parts of MCAGCC, on recent fan piedmonts	20
Dalvord-Goldroad-Rock Outcrop	Very shallow to shallow, loamy-skeletal soils formed in residuum and colluvium (i.e. a loose deposit of rock debris) from granitic and metamorphic sources	Southeastern part of MCAGCC on granitic mountains	18
Carrizo	Very deep, sandy-skeletal soils formed in mixed alluvium	Northeastern part of MCAGCC on recent fan piedmonts	16
Haleburu	Very shallow to shallow, loamy-skeletal soils formed in residuum and colluvium from volcanic sources	Northwestern part of MCAGCC on volcanic mountains	13
Cajon-Bluepoint	Deep soils formed in sandy material	Southwestern section of MCAGCC, on smooth granitic fan piedmonts	9
Edalph-Narea-Calico	Deep, sandy soils formed in granitic alluvium	Southwestern section of MCAGCC	9
Eastrange-Owlshead-Gaysspass	Very shallow to very deep soils formed in alluvium from mixed sources	Throughout MCAGCC on older fan piedmonts	6
Sunrock-Haleburu-Lava Flows	Very shallow to shallow, loamy-skeletal soils formed in residuum and colluvium from volcanic sources	Northern part of MCAGCC	6
Playa	Deep, salt-affected soils formed in lacustrine (i.e. along lakes) deposits.	Basin floors	3

Source: MAGTFTC 2001a.

MCAGCC is located in the Mojave Desert Geomorphic and Tectonic province commonly referred to as the Mojave Block. Situated in the eastern part of the Mojave Block, MCAGCC is bounded by the San Andreas, Pinto Mountain, and Garlock Faults, located to the southwest, south, and north, respectively (Norris 1990). Other smaller faults in the area include Lavic Lake, Surprise Spring, West Calico, Bullion Mountain, Mesquite Lake, Emerson, Galway, Deadman, Mesquite, and Quackenbush Lake. In addition, another 50 smaller faults, some of which are unnamed, are located within the boundaries of MCAGCC (MAGTFTC 2001a). The Calico-Mesquite Lake fault system which includes the West Calico, Calico, Pisgah, and Mesquite Lake Faults is the most well-known fault system within MCAGCC. Several low

magnitude earthquakes within the combat center have been caused by the abovementioned faults. The seismicity of the Mojave region is well demonstrated by the Landers Earthquake in 1992 and the Hector Mine Earthquake in 1999. While the Landers earthquake occurred approximately 12 miles (19 km) northwest of MCACC on a segment of the Camp Rock-Emerson Fault Zone, the Hector Mine earthquake occurred at the north central section of the Rainbow Canyon Training Area at the northwestern section of the installation. These earthquakes had a magnitude of 7.5 and 7.1 on the Richter scale respectively (MCAGCC 1996, MAGTFTC 2001a).

3.2 WATER RESOURCES

3.2.1 Definition of Resource

Water resources include surface and subsurface water and floodplains. Surface water includes all lakes, ponds, rivers, streams, impoundments, and wetlands within a defined area or watershed. Subsurface water, commonly referred to as groundwater, is typically found in areas known as aquifers. Aquifers are areas of mostly high porosity soil where water can be stored between soil particles and within soil pore spaces.

The Clean Water Act (CWA) of 1972 is the primary federal law that protects the nation's waters, including lakes, rivers, aquifers, and coastal areas. The primary objective of the Act is to restore and maintain the integrity of the nation's waters. Jurisdictional waters of the U.S. are regulated resources and are subject to federal authority under Section 404 of the CWA. This term is broadly defined to include navigable waters (including intermittent streams), impoundments, tributary streams, and wetlands. Areas meeting the waters of the U.S. definition are under the jurisdiction of the U.S. Army Corps of Engineers. The APE for water resources includes all of the land area under MAGTFTC control.

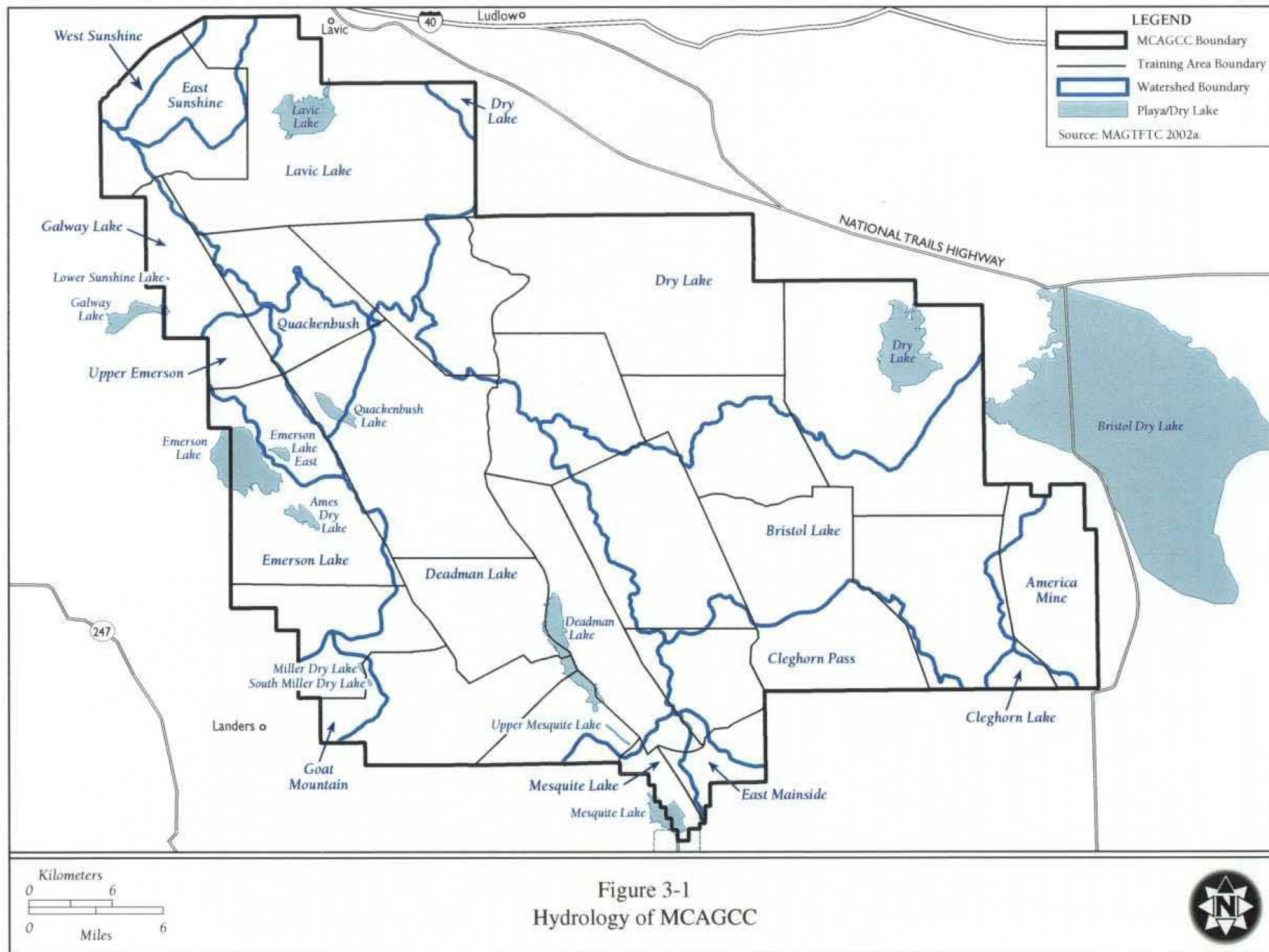
3.2.2 Existing Conditions

Annual precipitation at MCAGCC averages approximately 4 inches (10 centimeters), the majority of which occurs during summer and early fall thunderstorms (U.S. Department of Agriculture 1999 and MAGTFTC 2001a). Rainfall quickly percolates into the sandy soil of dry washes (drainage channels that are generally dry, except after storm events) or temporarily collects on playas (dry or intermittently dry lake beds). Surface drainage at MCAGCC is internal; most runoff flows inward, from all directions, into playas (Lato et al., 1999). No naturally-occurring permanent water bodies exist at MCAGCC (MAGTFTC 2001a).

Sixteen individual watersheds have been defined within the boundaries of MCAGCC. These watersheds range in size from 2,819 acres (1,141 hectares) to 52,178 acres (21,116 hectares). Over 50 percent of MCAGCC is encompassed by the Deadman Lake, Bristol Lake, and Dry Lake watersheds. These watersheds are located at the southwestern, eastern, and northeastern sections of the installation, respectively (Figure 3-1). The Quackenbush Lake Watershed at the western section of MCAGCC is the only watershed whose boundaries lie completely within MCAGCC.

A 1994 Waters of the U.S. study identified several types of "wet areas" that are of special concern at MCAGCC. These include playa lakes, dry washes, seeps and springs, and man-made water bodies. Each of these resources is important for mission diversity and biodiversity, even though they are all (with the exception of some man-made water bodies), ephemeral in nature.

Fourteen playas, totaling 7,674 acres (3,106 hectares) are located within or partially within MCAGCC boundaries. Of these, Mesquite Lake (with an area of 1,069 acres [433 hectares]) and Deadman Lake (with an area of 2,017 acres [816 hectares]) are the largest (Figure 3-1). Playas were once settings for cultural activities and continue to be important ecosystems supporting waterfowl, terrestrial birds, and mammals when ponding of runoff occurs or when adequate vegetative cover exists (MAGTFTC 2001a).



MCAGCC contains 289 dry washes encompassing an area of 50,471 acres (20,425 hectares). Deadman Lake, Bristol Lake, and Dry Lake watersheds contain the largest dry washes at MCAGCC. Seventy-two (25 percent) of the dry washes at MCAGCC are within the Bristol Lake Watershed (MCAGCC 1996). Dry washes serve as sediment transport corridors, maintain intra/inter ecosystem integrity, and were important settings for cultural activities. They are also areas of high biodiversity, with all major fauna groups present, and interactions between fauna are common. Moreover, dry washes serve as travel corridors for many species of desert wildlife and, in some cases, provide the only access to and between some of the training ranges.

Seeps and springs can be valuable sources of water for wildlife when they are discharging. Based on a 1994 study, *The Waterways Experiment Station*, the U.S. Army Corps of Engineers recorded 2 springs within the boundaries of MCAGCC from U.S. Geological Survey topography maps (MCAGCC 1996, MAGTFTC 2001a). Seasonal seeps are located in the Imperial Lode mining area, the Lead Mountain area and several mine shafts throughout the base. Seasonal seeps and springs are an ephemeral, yet valuable source of standing and flowing water, respectively.

Permanent man-made water resources at MCAGCC include storm water retention ponds located on the easterly side of Mesquite Lake, golf course ponds within the Desert Winds Golf Course, and sewage lagoons located in the vicinity of Deadman Lake and Mesquite Lake. As the only permanent water areas on the installation, these water bodies support migratory species and numerous resident wildlife species.

Potable water used at MCAGCC is supplied via 11 wells in the Surprise Spring Subbasin, located in the southwestern part of MCAGCC. The Surprise Spring Subbasin is bounded by the Emerson and Copper Mountain Faults to the west and the Surprise Spring Fault on the east, which separates this subbasin from the Deadman Lake Subbasin. Water within the Surprise Spring Subbasin is mostly fossil water (i.e., from previous geologic times). Very little water is recharged to the Surprise Spring Subbasin and the only source for recharge is from the San Bernardino Mountains, located to the west of MCAGCC. The depth to groundwater in the Surprise Spring Subbasin ranges from 200 to over 400 feet (60-120 m) below the surface (U.S. Geological Survey [USGS] 2003). Groundwater pumping has resulted in a drop of as much as 100 feet (30 m) near Surprise Spring and, though an estimated 125 to 150 years of potable water remains within the Surprise Spring Subbasin, water quality may decline due to aquifer drawdown.

Three other groundwater subbasins are known to exist beneath MCAGCC, all in the southwestern part of the installation. In the Giant Rock Subbasin, located west of the Surprise Spring Subbasin, groundwater is found at depths of 175 feet (53 m) and greater. In the Deadman Subbasin, located east of the Surprise Spring Subbasin, groundwater has been measured at depths of 30 feet (9 m) to 280 feet (85 m). Lastly, in the Mainside Subbasin, located to the east of the Mesquite Subbasin beneath the Mainside Training Area, groundwater has been encountered at 75 feet (23 m) in one well but is more commonly found at more than 200 feet (60 m) (USGS, 2003). These subbasins are not used as sources of potable water due to naturally occurring high concentrations of sulfates and fluoride. While water from these subbasins could be used for purposes other than drinking, it would require treatment (MAGTFTC 2001a).

3.3 BIOLOGICAL RESOURCES

3.3.1 Definition of Resource

Biological resources include native or naturalized plant and animal species and the vegetation communities within which they occur. Although the existence and conservation or management of biological resources are intrinsically valuable, these resources also provide aesthetic, recreational, and socioeconomic values to society. This analysis focuses on species or vegetation communities that are important to the functions of biological systems, of special public importance, or are protected under federal or state law. For purposes of this EA, these resources are divided into 3 categories: vegetation types, wildlife, and special-status species.

Vegetation types include all existing terrestrial plant communities as well as individual component species, with the exception of those identified as special-status species.

Wildlife includes all animals with the exception of those identified as special-status species. Wildlife includes mammals, birds, amphibians, and reptiles. Wildlife also includes those bird species protected under the federal Migratory Bird Treaty Act (MBTA). Assessment of a project's effects on migratory birds places an emphasis on "Species of Concern" as defined by Executive Order (EO) 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*. MBTA is currently under Legislative/Executive review.

Special-status species are defined as those plant and animal species listed as threatened, endangered, or proposed as such, by the U.S. Fish and Wildlife Service (USFWS) or California Department of Fish and Game (CDFG). The federal Endangered Species Act (ESA) protects federally listed threatened and endangered plant and animal species. The State of California, under the California ESA, utilizes a classification system similar to the federal ESA for protected species. In addition, species of concern include those species formerly considered as candidates for federal listing; species of special concern to the State of California, and species that are regionally rare or of limited distribution and listed by the California Native Plant Society (CNPS). Federal species of concern, formerly Category 2 candidate species, are not protected by law; however, these species could become listed and, therefore, protected at any time. Their consideration early in the planning process may avoid future conflicts that could otherwise occur.

3.3.2 Existing Conditions

3.3.2.1 Vegetation Types

Although 15 plant communities have been identified on the 598,178-acre (242,075-hectare) installation, the base is dominated by Mojave creosote bush scrub (Figure 3-2 and Table 3-2). Mojave creosote bush scrub covers approximately 533,520 acres (215,900 hectares) or 89 percent of the base (MAGTFTC 2001a, b). Based on plant assemblages, the Mojave creosote bush scrub community on MCAGCC can be subdivided into 7 categories: creosote bush scrub, disturbed creosote bush scrub, creosote bush/galleta grass, sparse creosote scrub, dune creosote bush scrub, Nevadan creosote bush scrub, and creosote bush clones.

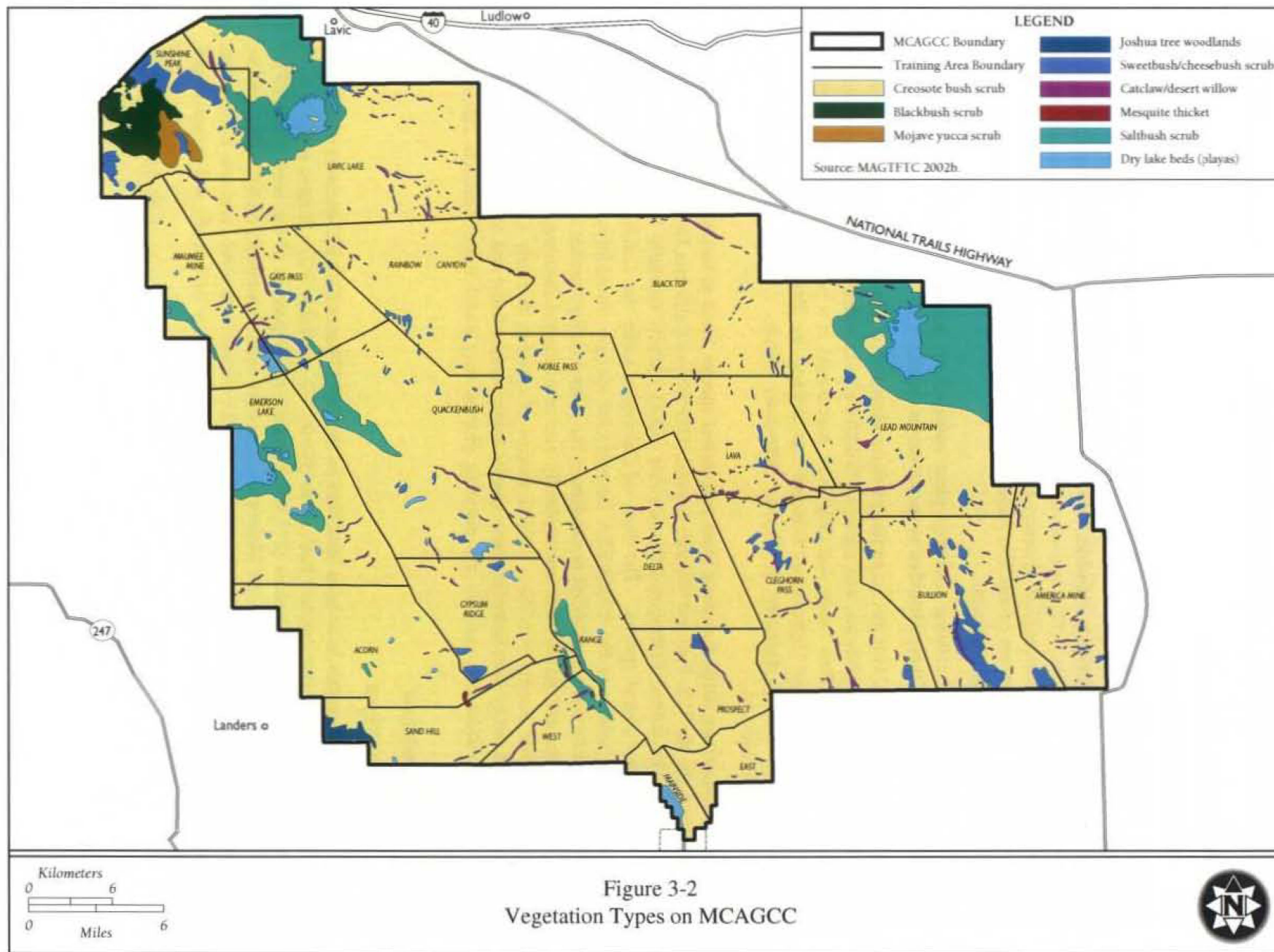


Table 3-2. Vegetation Types found within Training Areas on MCAGCC

Training Area	CS	DC	CG	SC	DC	CC	NC	BS	MY	JT	S/C	C/D	MT	SS	LB
Acorn	x	x			x	x						x		x	x
America Mine											x	x			
Black Top	x	x		x							x	x			
Bullion	x			x			x				x	x		x	
Cleghorn Pass	x	x		x			x				x	x			
Delta	x	x		x	x						x	x			
East	x	x			x							x			
Emerson Lake	x	x	x	x	x	x	x					x		x	x
Gays Pass	x	x	x	x	x	x	x					x		x	
Gypsum Ridge	x	x	x		x						x	x	x	x	x
Lava	x	x		x							x	x			
Lavic Lake	x	x	x	x	x		x				x	x		x	x
Lead Mountain	x			x							x	x		x	x
Mainside	x		x		x										x
Maumee Mine	x	x	x	x							x	x		x	x
Noble Pass	x	x		x			x				x				
Prospect	x	x	x	x			x				x	x			
Quackenbush	x	x	x	x			x				x	x		x	x
Rainbow Canyon	x	x		x			x				x	x			
Range	x	x	x	x	x							x		x	x
Special Use Area #1	x	x	x			x						x	x	x	x
Sand Hill	x	x	x		x					x		x	x	x	x
Sunshine Peak	x			x			x	x	x		x	x		x	
West	x	x	x									x	x	x	

Sources: MAGTFTC 2001a, 2001b, 2002b.

Notes: ¹Vegetation communities: CS = creosote bush scrub, DC = dune creosote bush scrub, CG = creosote bush/galleta grass, SC = sparse creosote scrub, CC = creosote bush clones, NC = Nevadan creosote bush scrub, BS = blackbush scrub, MY = Mojave yucca scrub, JT = Joshua tree woodlands, S/C = sweetbush/cheesebush scrub, C/D = catclaw/desert willow, MT = mesquite thicket, SS = saltbush scrub, LB = dry lake beds (playas).

Creosote bush scrub covers approximately 64 percent of MCAGCC and is dominated by creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*). This vegetation type occurs on rocky to sandy substrates. Disturbed creosote bush scrub covers approximately 10 percent of MCAGCC and is similar in plant assemblage to creosote bush scrub, but is distinguished by high levels of disturbance, generally caused by vehicular activities. Creosote bush/galleta grass covers approximately 6 percent of MCAGCC and is dominated by big galleta (*Hilaria* [= *Pleuraphis*] *rigida*), with common associates of white bursage, cheesebush (*Hymenoclea salsola*), and bush encelia (*Encelia frutescens*). This vegetation type occurs on sandy substrates. Sparse creosote bush scrub covers approximately 4 percent of MCAGCC and only differs from creosote bush scrub by its relatively low plant abundance resulting from differing environmental conditions (lower precipitation, different soil composition, slope, or aspect). Dune creosote bush scrub is not defined by a distinct assemblage of plant species, but rather is indicative of the sandy/dune substrate on which it occurs. It covers approximately 3 percent of MCAGCC. Since the sandy soils of this vegetation type are loose and prone to wind movement, there are fewer shrubs when compared to creosote bush/galleta grass. Nevadan creosote bush scrub covers approximately 1.5 percent of MCAGCC and is similar in plant assemblage to that of creosote bush scrub. However, this vegetation type differs from creosote bush scrub in its occurrence at higher elevations and greater relative abundance of boxthorn (*Lycium andersonii*), Nevada ephedra (*Ephedra nevadensis*), and spiny senna (*Senna*

armata). Creosote bush clones covers less than 0.05 percent of the installation and is identified by a characteristic clonal ring of creosote bush ranging up to 50 feet (15 m) in diameter. This vegetation type is found in soils absent of erosional forces or degrading processes/activities for a long period of time (MAGTFTC 2001a, b).

Blackbush scrub covers approximately 0.7 percent of MCAGCC and is similar to creosote bush scrub, but contains a higher abundance of blackbush (*Coleogyne ramosissima*) and other associates including boxthorn, spiny senna, Mojave aster (*Xylorhiza tortifolia* var. *tortifolia*), and turpentine broom (*Thamnosma montana*). Blackbush scrub occurs on sandy to older alluvium substrates at elevations ranging from 3,900 to 5,900 feet (1,200 to 1,800 m). Mojave yucca scrub covers less than 1 percent of MCAGCC and has a similar plant assemblage to that of blackbush scrub, but occurs at higher elevations that can support Mojave yucca (*Yucca brevifolia*). This vegetation type occurs in the wettest regions of the base and only occurs in the Sunshine Peak Training Area (Figure 3-2). Joshua tree woodlands cover less than 1 percent of MCAGCC and can be described by common associates found in creosote bush/galleta grass communities, but occurring at higher elevations that support Joshua trees (MAGTFTC 2001a, b).

Saltbush scrub covers approximately 6 percent of MCAGCC and is dominated by saltbush species (*Atriplex canescens*, *A. polycarpa*, and *A. hymenelytra*). Distribution of this community is limited to both saline and alkaline soils that occur at the periphery of dry lake beds. Fourteen dry lake beds or playas, which are technically not considered a vegetation type, cover approximately 9,059 acres (3,666 hectares) or 1.5 percent of MCAGCC. They are generally characterized by the absence of vegetation and presence of surficial salt deposits. During the wet season, and particularly during very wet years, these playas support a diverse community of bird and invertebrate species (MAGTFTC 2001a, b, Simovich et al 2003).

Sweetbush/cheesebush scrub covers approximately 11,344 acres (4,591 hectares) or 4 percent of MCAGCC and is a transitional vegetation type between creosote bush scrub and catclaw/desert willow woodland communities. It is dominated by sweetbush (*Bebbia juncea*), cheesebush, and desert lavender (*Hyptis emoryi*) and is most commonly found along smaller washes containing a shallow gravel substrate. Additionally, smoke tree (*Psoralea spinosa*) is found within this vegetation type. Catclaw/desert willow woodland covers approximately 1.5 percent of MCAGCC and is dominated by catclaw acacia (*Acacia greggii*), desert willow (*Chilopsis linearis* ssp. *arcuata*), and smoke tree. It can be observed in larger washes containing a deeper gravel substrate and a more permanent water supply relative to sweetbush/cheesebush scrub. Mesquite thicket covers approximately 198 acres (80 hectares) or less than 0.05 percent of MCAGCC and is characterized by large clumps of honey mesquite (*Prosopis glandulosa* var. *torreyana*) occurring where groundwater levels are closest to the surface (MAGTFTC 2001a, b).

3.3.2.2 Wildlife

Wildlife species found at MCAGCC Twentynine Palms are typical of those occurring in the Mojave Desert. Mammals commonly found at MCAGCC include black-tailed jackrabbit (*Lepus californicus*), round-tailed ground squirrel (*Spermophilus tereticaudus*), white-tailed antelope squirrel (*Ammospermophilus leucurus*), long-tailed pocket mouse (*Chaetodipus formosus*), Merriam's kangaroo rat (*Dipodomys merriami*), coyote (*Canis latrans*), and kit fox (*Vulpes macrotis*) (MAGTFTC 2001a). Birds potentially occurring on MCAGCC include 122 migrant species and 87 resident species including red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), Gambel's quail (*Callipepla gambelii*), great horned owl (*Bubo virginianus*), common raven (*Corvus corax*), mourning dove (*Zenaidura macroura*), killdeer (*Charadrius vociferous*), great-tailed grackle (*Quisicalus mexicanus*), ash-throated

flycatcher (*Myiarchus cinerascens*), northern mockingbird (*Mimus polyglottos*), cactus wren (*Campylorhynchus brunneicapillus*), common yellowthroat (*Geothlypis trichas*), and horned lark (*Eremophila alpestris*), all of which are considered migratory birds and are protected under the MBTA (MAGTFTC 2001a). Amphibians and reptiles potentially occurring on MCAGCC include 5 amphibian species and 36 reptile species including red-spotted toad (*Bufo punctatus*), western whiptail (*Cnemidophorus tigris*), desert iguana (*Dipsosaurus dorsalis*), common chuckwalla (*Sauromalus obesus*), zebra-tailed lizard (*Callisaurus draconoides*), desert spiny lizard (*Sceloporus magister*), side-blotched lizard (*Uta stansburiana*), Mojave rattlesnake (*Crotalus scutulatus*), and sidewinder (*Crotalus cerastes*) (MAGTFTC 2001a).

3.3.2.3 Special-Status Species

Although no federally or state-listed plant species are known to occur on MCAGCC, 7 species listed by the CNPS are known to occur on the installation (Table 3-3 and Figure 3-3) (MAGTFTC 2001a). There is also the potential for an additional 26 sensitive plant species to occur on MCAGCC (MCAGCC 2000a).

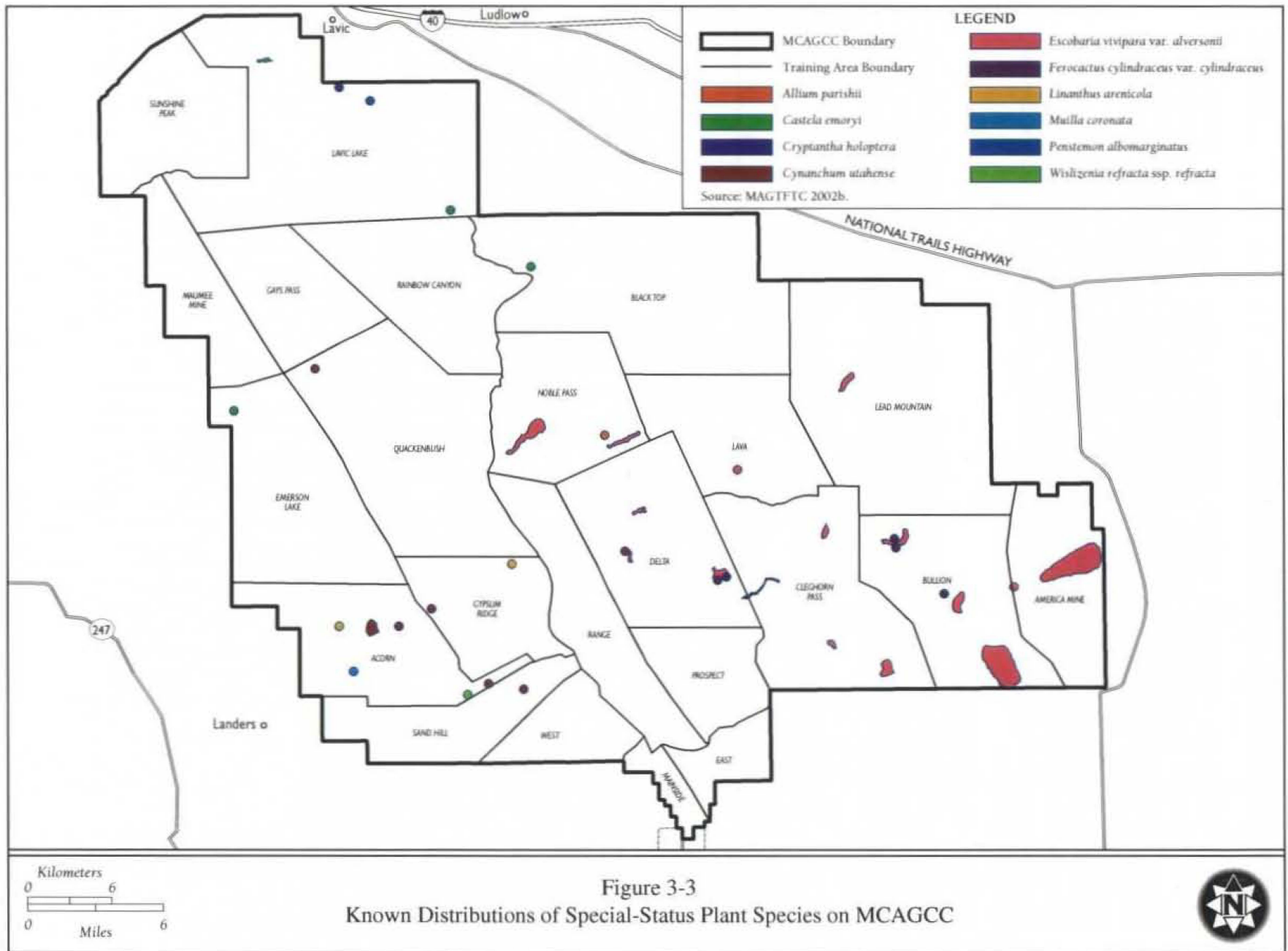
Table 3-3. Special-Status Plant Species Known to Occur at MCAGCC

Common Name/ Scientific Name	CNPS Status ¹	Training Area ²														
		Ac	AM	BT	Bn	CP	Da	EL	GR	La	LL	LM	NP	Qk	SU	SH
Parish's onion/ <i>Allium parishii</i>	4													x		
Crucifixion thorn/ <i>Castela emoryi</i>	2			x				x				x				
Utah cynanchum/ <i>Cynanchum utahense</i>	4	x					x									x
Foxtail cactus/ <i>Coryphantha alversonii</i> (= <i>Escobaria vivipara</i> var. <i>alversonii</i>)	1B		x		x	x	x		x	x		x				
Crowned muilla/ <i>Muilla coronata</i>	4											x				
White-margined beardtongue/ <i>Penstemon albomarginatus</i>	1B											x				
Jackass clover/ <i>Wislizenia refracta</i> ssp. <i>refracta</i>	2														x	

Notes: ¹ 1B = rare or endangered in California and elsewhere; 2 = rare or endangered in California, but more common elsewhere; 4 = plants of limited distribution (a watch list).

² Only those Training Areas with known occurrences of special-status plant species are listed. Ac = Acorn, AM = America Mine, BT = Black Top, Bn = Bullion, CP = Cleghorn Pass, Da = Delta, EL = Emerson Lake, GR = Gypsum Ridge, La = Lava, LL = Lavic Lake, LM = Lead Mountain, NP = Noble Pass, Qk = Quackenbush, SH = Sand Hill, SU = Special Use Area #1.

Sources: CNPS 2001; MAGTFTC 2001a, 2001b, 2002b.



There are 9 bird, 5 mammal, and 2 reptile species classified as special-status species that are known to occur at MCAGCC (MAGTFTC 2001a; Table 3-4).

Table 3-4. Special-Status Wildlife Species Known to Occur at MCAGCC

Common Name	Scientific Name	Status ¹ Federal/State
BIRDS		
Burrowing owl	<i>Athene cunicularia</i>	FSC/CSC
Cooper's hawk	<i>Accipiter cooperii</i>	- /CSC
Golden eagle	<i>Aquila chrysaetos</i>	BGEPA/CSC and FP
LeConte's thrasher	<i>Toxostoma lecontei</i>	FSC/CSC
Loggerhead shrike	<i>Lanius ludovicianus</i>	FSC/CSC
Long-eared owl	<i>Asio otus</i>	- /CSC
Northern harrier	<i>Circus cyaneus</i>	- /CSC
Prairie falcon	<i>Falco mexicanus</i>	- /CSC
Sharp-shinned hawk	<i>Accipiter striatus</i>	- /CSC
MAMMALS		
California leaf-nosed bat	<i>Macrotus californicus</i>	- /CSC
Western mastiff bat	<i>Eumops perotis californicus</i>	FSC/CSC
Townsend's western big-eared bat	<i>Corynorhinus townsendii</i>	FSC/CSC
Pallid bat	<i>Antrozous pallidus</i>	- /CSC
Pallid San Diego pocket mouse	<i>Chaetodipus fallax pallidus</i>	- /CSC
REPTILES		
Desert tortoise	<i>Gopherus agassizii</i>	T/T
Mojave fringe-toed lizard	<i>Uma scoparia</i>	- /CSC

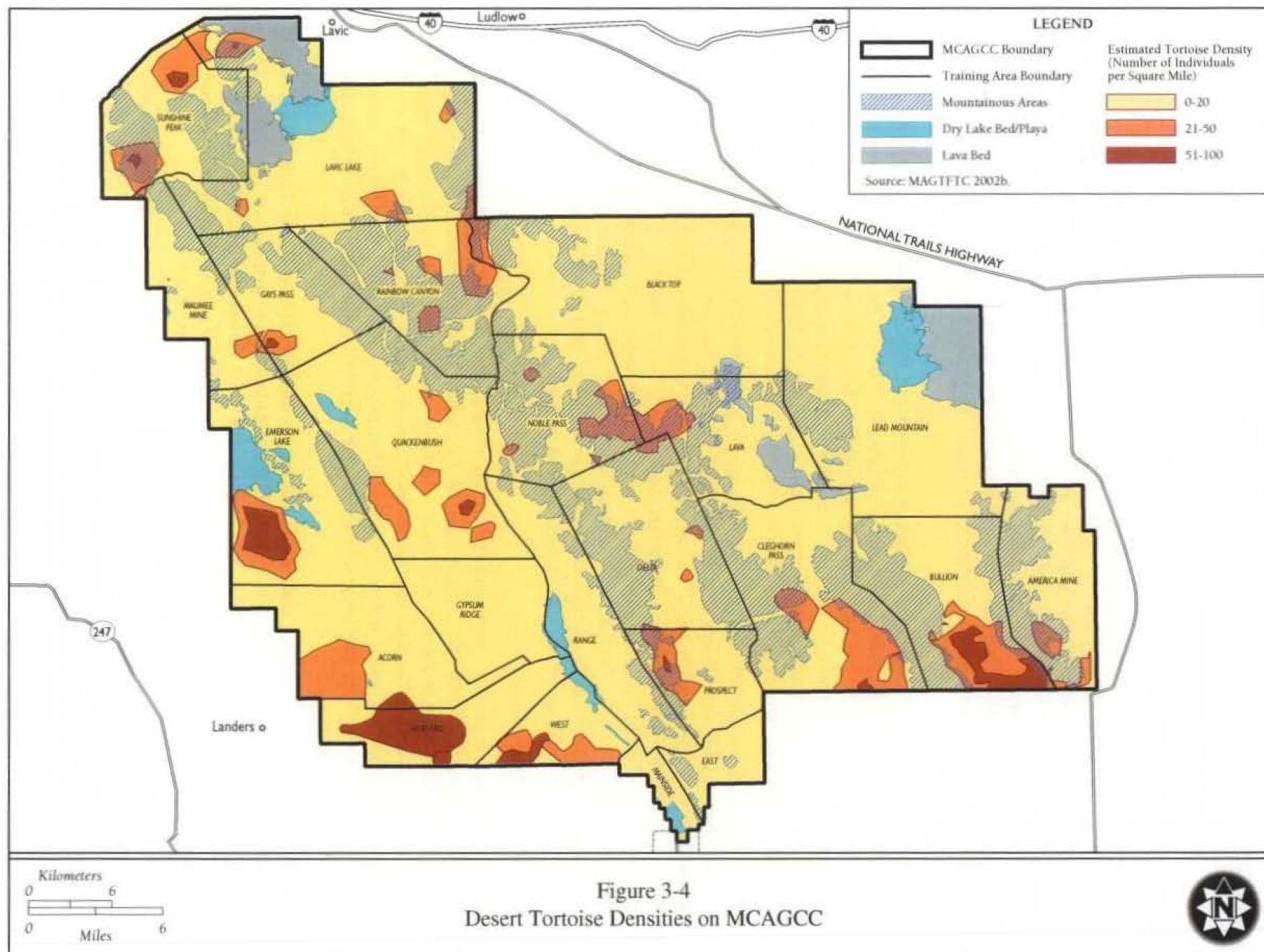
Notes: ¹ BGEPA = protected under the Bald and Golden Eagle Protection Act; CSC = California Species of Special Concern; FP = Fully protected in accordance with Section 3511 of the California Fish and Game Code; FSC = federal species of concern; T = Threatened.

Sources: MAGTFTC 2001a, CDFG 2002.

One federally and state-listed threatened wildlife species, the desert tortoise (*Gopherus agassizii*), is known to be a permanent resident at MCAGCC (MAGTFTC 2001a). The desert tortoise is a large, herbivorous reptile found throughout much of the Mojave and Sonoran Deserts where its range generally correlates to that of the range of creosote bush scrub. Desert tortoises prefer habitats which possess substrates capable of supporting temporary to permanent burrows where much of its life is spent. This behavior protects the tortoise from extreme summer and winter temperatures typical of the desert. An adult tortoise generally has a home range of 25-198 acres (10-80 hectares) (MCAGCC 1999). The desert tortoise is active in the spring, summer, and fall seasons when daily temperatures are below 90°F (32°C) and is most readily observed during the spring and early summer months.

The causes of decline in desert tortoise populations have been documented and attributed to several factors including habitat destruction, predation by ravens, livestock grazing, upper respiratory tract disease intensified by physiologic stress of several drought seasons, and direct disturbance by humans (MCAGCC 1999). However, the primary cause of population decline can be attributed to habitat destruction/loss from urban development and construction of transportation corridors (MCAGCC 1999). The USFWS determined that the Mojave Desert tortoise population warranted emergency listing in August 1989 and officially listed the Mojave population as federally threatened in April 1990 (USFWS 1989, 1990).

Numerous studies over the past 2 decades have resulted in an effort to assess the distribution and density of desert tortoise at MCAGCC. Results from these studies (the most recent conducted in 1998 by Jones and Stokes), have identified tortoise distributions within most Training Areas and desert tortoise sign (i.e. burrows, scat, tracks, remains) within every Training Area (MCAGCC 1999). Tortoises at MCAGCC and are generally found at very low densities. The highest densities are found predominantly along the southern and southwestern portions of the base in the Sand Hill (including Special Use Area #1), West, Bullion, and Emerson Lake Training Areas (Figure 3-4). Findings indicate that densities (based upon both live verification and sign) greater than 50 tortoises/mi² occur on 5,779 acres (2339 hectares), densities of 21-50 tortoises/mi² occur on 40,985 acres (16,586 hectares), densities of 6-20 tortoises/mi² occur on 103,078 acres (41,714 hectares), and densities of 0-5 tortoises/mi² occur on 283,530 acres (114,741 hectares). Additionally, no correlations were observed to occur between desert tortoise densities and vegetation community, geomorphology, or type of dominant substrate (MCAGCC 1999).



3.4 CULTURAL RESOURCES

3.4.1 Definition of Resource

The Department of the Navy defines cultural resources as buildings, structures, sites, districts, and objects eligible of listing in the National Register of Historic Places (SECNAVINST 4000.35 a). Prehistoric resources are physical properties resulting from human activities that predate written records and are generally identified as archeological sites. Prehistoric resources can include village sites, temporary camps, lithic scatters, roasting pits/hearths, milling features, rock art (both petroglyphs and pictographs), rock features and burials. Traditional cultural properties are tangible places that are important in maintaining the cultural identity of a community or group. They must have been important for 50 years or more.

Historic resources include resources that postdate the advent of written records in the region. As the buildings and structures at MCAGCC have been evaluated for listing in the National Register of Historic Places and were found to be ineligible, historic resources at MCAGCC are limited to those related to mining activities or homesteading. All of these resources are historic archeological sites as they are now remnants of once extant mining sites or homesteads. There are 59 known mines and/or mining sites located aboard the base; however, there is only one recorded homestead at Surprise Springs.

Historic properties are cultural resources that meet one or more criteria for eligibility for listing in the National Register of Historic Places (NRHP). Historic properties are considered primarily through the National Historic Preservation Act of 1996 (as amended), the Archaeological and Historic Preservation Act of 1974, Archeological Resources Protection Act of 1979, Native American Graves Protection and Repatriation Act of 1990, and the regulations (36 CFR 800) that implement Section 106 of the National Historic Preservation Act. Section 106 requires federal agencies to consider the effects of their undertakings on properties listed or eligible for listing in the NRHP and afford the Advisory Council on Historic Preservation the opportunity to comment on such undertakings.

3.4.2 Existing Conditions

Native Americans occupied the Twentynine Palms region for at least the past 12,000 years. At the time of European contact in the mid 1800s, two groups, the Chemehuevi and the Serrano, were documented as living at the Oasis of Mara in Twentynine Palms. The lands currently occupied by MCAGCC appear to have been variously used and occupied by the Serrano, Chemehuevi and Mojave Indians as well as others during the prehistoric and early historic periods. Documentation indicates that Native Americans occupied reservation land near the Oasis of Mara until the early 1910s when they removed to the Indian Reservation at Morongo.

Beginning with the 1849 California Gold Rush, and lasting until World War II, the Twentynine Palms region first attracted miners and in the 1920s, homesteaders made their way to the desert community. The military presence in the Twentynine Palms area began in 1941 with the establishment of Camp Condor, a U.S. Army glider-training base. The base was officially commissioned as a Marine Corps installation in 1957, and became known as the Marine Corps Air Ground Combat Center in 1979.

Approximately 20 percent (or 120,981 acres) of the base property has been inventoried for cultural resources (Cottrell 2002*) and more than 1254 archeological sites have been officially recorded as a result of these inventories. The majority of sites found at MCAGCC are locations where Native Americans acquired stone for tool making (MAGTFTC 2001b). Various defined as lithic scatters, segregated reduction locations, prospects and quarries, these sites are ubiquitous over much of the

northern half of the installation. Other prehistoric site types include habitations, rock shelters, and rock art. Historic sites on the installation are also defined as archeological resources.

Fifty-nine known mines and/or mines sites have been located on the base (MAGTFTC 2001a). Of these, 32 have been determined eligible for listing in the NRHP. Among the 32 sites eligible for listing are the sites that comprise two historic mining districts: The Lava Bed Mining District in Sunshine Peak Training Area and the Delta Mining District located on the border between the Prospect and Delta Training Areas. Additionally, seven individual sites have been determined eligible for listing in the NRHP: War Eagle Mine, Bullion #1, Coltrane Mining Camp, Hidalgo Mountain Mine #2, Emerson Lake #1 and #3, and Cleghorn Mining Camp. The principal historic site not directly associated with mining activity is the historic component of Surprise Spring in the Sand Hill Training Area (MAGTFTC 2001b). This site probably started as a homestead then became a resort and guest ranch during the early 1900s, and finally it became a second home for the Sabol family prior to the military acquisition of the property.

Inclusive of the historic sites, there are over 1,254 sites recorded for the installation. Of these, 271 have been evaluated for eligibility for listing in the NRHP. One hundred and three of these have been recommended for listing; 92 have been recommended as not eligible; and results are pending for 76 others (Cottrell 2002). The Foxtrot Petroglyph site, one of MCAGCC's most notable cultural resources was officially listed in the NRHP in 1995. This rock art site includes over 400 petroglyph and pictograph panels representing over 1500 images over a three-kilometer area. To date, there are six rock art sites recorded within the boundaries of the installation and all of them are considered eligible for listing in the NRHP.

Traditional Cultural Properties are now considered as being potentially eligible for listing in the NRHP. Native American Tribes who maintain a cultural affinity with the land currently occupied by MCAGCC include the Chemehuevi Indian Tribe, the Colorado River Indian Tribes, the Fort Mojave Indian Tribe, the Morongo Band of Mission Indians, the San Manuel Band of Mission Indians, and the Twentynine Palms Band of Mission Indians (MCAGCC 2002b). Consultation with the Native American Tribes began in 1995 and one of the issues discussed is the presence of Traditional Cultural Properties. Although none of the tribes specifically identified Traditional Cultural Properties, they all expressed a desire to be consulted regarding any prehistoric or Native American site located on MCAGCC.

3.5 AIR QUALITY

This section addresses existing air quality conditions in the vicinity of MCAGCC and includes a description of common air quality terminology. Regulatory requirements associated with air quality are introduced in Section 4.5. The APE for air quality includes the Mojave Desert Air Basin, which includes all of San Bernardino County and portions of Riverside, Los Angeles, and Kern counties.

3.5.1 Definition of Resource

3.5.1.1 Air Quality Standards

Air quality is defined as the ambient air concentrations of specific criteria pollutants determined by the U.S. Environmental Protection Agency (USEPA) to be of concern to the health and welfare of the general public. These criteria pollutants include ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than or equal to 10 microns in diameter (PM_{10}), and lead. Both California and the federal government have established ambient air quality standards (California Ambient Air Quality Standards and National Ambient Air Quality Standards, respectively) for several pollutants, often referred to as criteria pollutants (Figure 3-5). These standards identify the maximum allowable concentrations of criteria pollutants that are considered safe, with an additional adequate margin of safety to protect human health and welfare. Depending upon the type of pollutant, these maximum concentrations may not be exceeded at any time, or may not be exceeded more than once per year (USEPA 2002a). As depicted in Figure 3-5, the California standards are more stringent than federal standards.

The Clean Air Act (CAA), as amended, requires each state to develop, adopt, and implement a State Implementation Plan (SIP) to achieve, maintain, and enforce federal air quality standards throughout the state. SIPs are developed on a pollutant-by-pollutant basis whenever one or more air quality standards are being violated. Local governments and air pollution control districts have had the primary responsibility for developing and adopting the regional elements of the California SIP. In the San Bernardino County region, the Mojave Desert Air Quality Management District is responsible for governing air quality and reports to the California Air Resources Board.

3.5.1.2 Emissions

Air quality within a region is a function of the type and amount of pollutants emitted, size and topography of the air basin, and prevailing meteorological conditions. Criteria pollutants affecting air quality in a given region can be characterized as being either stationary or mobile sources. Stationary sources of emissions are typified by emissions from smokestacks. Mobile sources of emissions include emissions from vehicles and aircraft.

Emissions are often characterized as being "primary" or "secondary" pollutants. Primary pollutants are those emitted directly into the atmosphere such as CO, SO_2 , and PM_{10} . Secondary pollutants are those formed through chemical reactions in the atmosphere such as O_3 and NO_2 . Volatile organic compounds (VOCs) (also referred to as hydrocarbons or reactive organic gases) are precursors to the production of O_3 . SO_2 and NO_2 are commonly referred to and reported as oxides of sulfur (SO_x) and oxides of nitrogen (NO_x), respectively, as SO_2 and NO_2 constitute the majority of their respective oxides.

POLLUTANT	AVERAGING TIME	CALIFORNIA STANDARDS ⁽¹⁾	NATIONAL STANDARDS ⁽²⁾	
			Primary	Secondary
Ozone (O ₃)	8 Hour ⁽³⁾	•	0.08 ppm (157 µg/m ³)	Same as Primary Standards
	1 Hour	0.09 ppm (180 µg/m ³)	0.12 ppm (235 µg/m ³)	
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10 mg/m ³)	9.0 ppm (10 mg/m ³)	•
	1 Hour	20 ppm (23 mg/m ³)	35 ppm (40 mg/m ³)	
Nitrogen Dioxide (NO ₂)	Annual Average	•	0.053 ppm (100 µg/m ³)	Same as Primary Standard
	1 Hour	0.25 ppm (470 µg/m ³)	•	
Sulfur Dioxide (SO ₂)	Annual Average	•	0.030 ppm (80 µg/m ³)	•
	24 Hour	0.04 ppm (105 µg/m ³)	0.14 ppm (365 µg/m ³)	•
	3 Hour	•	•	0.50 ppm (1300 µg/m ³)
	1 Hour	0.25 ppm (655 µg/m ³)	•	•
Respirable Particulate Matter Less than or Equal to 10 Microns in Diameter (PM ₁₀)	Annual Arithmetic Mean	30 µg/m ³	50 µg/m ³	Same as Primary Standards
	24 Hour	50 µg/m ³	150 µg/m ³	
Respirable Particulate Matter Less than 2.5 Microns in Diameter (PM _{2.5}) ⁽³⁾	Annual Arithmetic Mean	No Separate Standard	15 µg/m ³	Same as Primary Standards
	24 Hour		65 µg/m ³	
Sulfates	24 Hour	25 µg/m ³	•	•
Lead (Pb)	30 Day Average	1.5 µg/m ³	•	•
	Calendar Quarter	•	1.5 µg/m ³	Same as Primary Standard
Hydrogen Sulfide (H ₂ S)	1 Hour	0.03 ppm (42 µg/m ³)	•	•
Vinyl Chloride (chloroethene)	24 Hour	0.010 ppm (26 µg/m ³)	•	•
Visibility Reducing Particles	8 Hour (10:00 A.M. to 6:00 P.M.)	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent. Measurement in accordance with California Air Resources Board (CARB) Method V.	•	•

ppm – parts per million µg/m³ – micrograms per cubic meter mg/m³ – milligrams per cubic meter • – no standard established

(1) CO, SO₂ (1- and 24-hour), NO₂, O₃, PM₁₀, and visibility reducing particles standards are not to be exceeded.
All other California Standards are not to be equaled or exceeded.

(2) Not to be exceeded more than once a year except for annual standards.

(3) The O₃ 8-hour standard and the PM_{2.5} standards are included for informational purposes only. Although the USEPA has been authorized to implement these standards, they are not final due to current litigations. In November 2001, the USEPA proposed a response to authorize the implementation of these standards (66 Federal Register 57267). Final implementation of these standards is still pending.

Sources: CARB 2002a; USEPA 2002a.

Figure 3-5
California and National Ambient Air Quality Standards

Areas that violate ambient air quality standards are designated as nonattainment areas. Nonattainment designations for O₃, CO, and PM₁₀ include subcategories indicating the severity of the air quality problem (e.g., the classifications range from moderate to serious for CO and PM₁₀, and from marginal to severe for O₃). Areas that comply with federal air quality standards are designated as attainment areas. Areas that have been redesignated from O₃ nonattainment to attainment for the 1-hour O₃ standard are designated as maintenance areas. Areas that lack monitoring data to demonstrate attainment or nonattainment status are designated as unclassified and are considered to be in attainment for regulatory purposes.

3.5.2 Existing Conditions

Sources of emissions at MCAGCC include various stationary sources, aircraft operations, ground support equipment, and mobile sources, including personal and government owned vehicles. Stationary sources include stationary engines used for generators and compressors, fuel storage and handling facilities, boilers, and gasoline stations. Table 3-5 presents 1999 actual stationary source emissions for MCAGCC. Mobile emission sources are exempt from permit requirements under Mojave Desert Air Quality Management District Rule 219 (E) (1) and, therefore, emissions have not been inventoried (MCAGCC 2002a).

Table 3-5. Estimated 1999 Emissions from Stationary Sources at MCAGCC
(tons/year [metric tons/year])

CO	NO _x	SO ₂	VOC	PM ₁₀
2.9 (2.6)	7.1 (6.4)	0.5 (0.4)	0.9 (0.8)	0.7 (0.6)

Source: MCAGCC 2002a.

Emissions from motor vehicles (i.e., heavy wheeled and tracked vehicles) used during training operations represent the primary source of all emissions at MCAGCC. In addition, fugitive dust (PM₁₀) emissions generated during training events and as a result of vehicle activity on nearby unpaved roads or directly blown from exposed soil surfaces also affect air quality in the area.

The entire Mojave Desert Air Basin is in severe nonattainment for the federal and state O₃ standards and in moderate nonattainment for the federal and state PM₁₀ standards (California Air Resources Board 2002b, USEPA 2002b). Table 3-6 summarizes representative O₃, PM₁₀, CO, SO₂, and NO₂ air quality data from a monitoring station operated by the Mojave Desert Air Quality Management District and located in the Mainside Area at MCAGCC for October through December 2002 (the most recent months for which data were available).

Table 3-6. Representative Air Quality Data for the Mainside Area (2002)

<i>Air Quality Indicator</i>	<i>October</i>	<i>November</i>	<i>December</i>
Ozone (O₃)^a			
Peak 1-hour value (ppm)	0.070	0.051	0.044
Days above federal standard (0.12 ppm)	0	0	0
Days above state standard (0.09 ppm)	0	0	0
Particulate Matter less than 10 microns in diameter (PM₁₀)^b			
Average 24-hour value (µg/m ³)	30.8	30.2	14.3
Days above state standard (50 µg/m ³)	0	1	0
Carbon Monoxide (CO)			
Peak 8-hour value (ppm)	0.2	0.3	0.3
Days above federal standard (9.0 ppm)	0	0	0
Days above state standard (9.0 ppm)	0	0	0
Sulfur Dioxide (SO₂)			
Peak 24-hour value (ppm)	0.001	0.001	0.001
Days above federal standard (0.14 ppm)	0	0	0
Days above state standard (0.04 ppm)	0	0	0
Nitrogen Dioxide (NO₂)			
Peak 1-hour value (ppm)	0.028	0.029	0.025
Days above state standard (0.25 ppm)	0	0	0

Notes: ^a The APE is in severe nonattainment for the federal and state O₃ standards.

^b The APE is in moderate nonattainment for the federal and state PM₁₀ standards.

ppm = parts per million by volume, µg/m³ = micrograms per cubic meter.

Source: Naval Facilities Engineering Service Center 2003.

Table 3-7 summarizes representative PM₁₀ air quality data for each of the six monitoring stations at MCAGCC for October through December 2002 (the most recent months for which data were available). The PM₁₀ monitoring stations developed as part of MCAGCC's PM₁₀ monitoring network have not recorded a violation of the federal PM₁₀ standard (under the Air Quality Management District's Rule 403) over the history of monitoring activities (i.e., at least 6 years) (MCAGCC 2002a, Naval Facilities Engineering Service Center 2003). The measured PM₁₀ concentrations exceeded the state standard (50 µg/m³) once during the October – November 2002 period (see Table 3-6).

Table 3-7. Representative PM₁₀ Air Quality Data for the Six Monitoring Stations at MCAGCC (October – December 2002)

<i>Air Quality Indicator</i>	<i>Average Value (µg/m³)</i>	<i>Peak Value (µg/m³)</i>
Bristol Perimeter Station	9.9	30.0
East Perimeter Station	16.4	36.9
Emerson Perimeter Station	8.1	18.8
Lavic Perimeter Station	10.6	26.2
Mainside Perimeter Station	27.6	54.2
Sandhill Perimeter Station	11.3	23.7

Notes: These average and maximum readings do not include the 2 days of measurements when winds gusted above 25 mph.

Source: Naval Facilities Engineering Service Center 2003.

3.6 NOISE

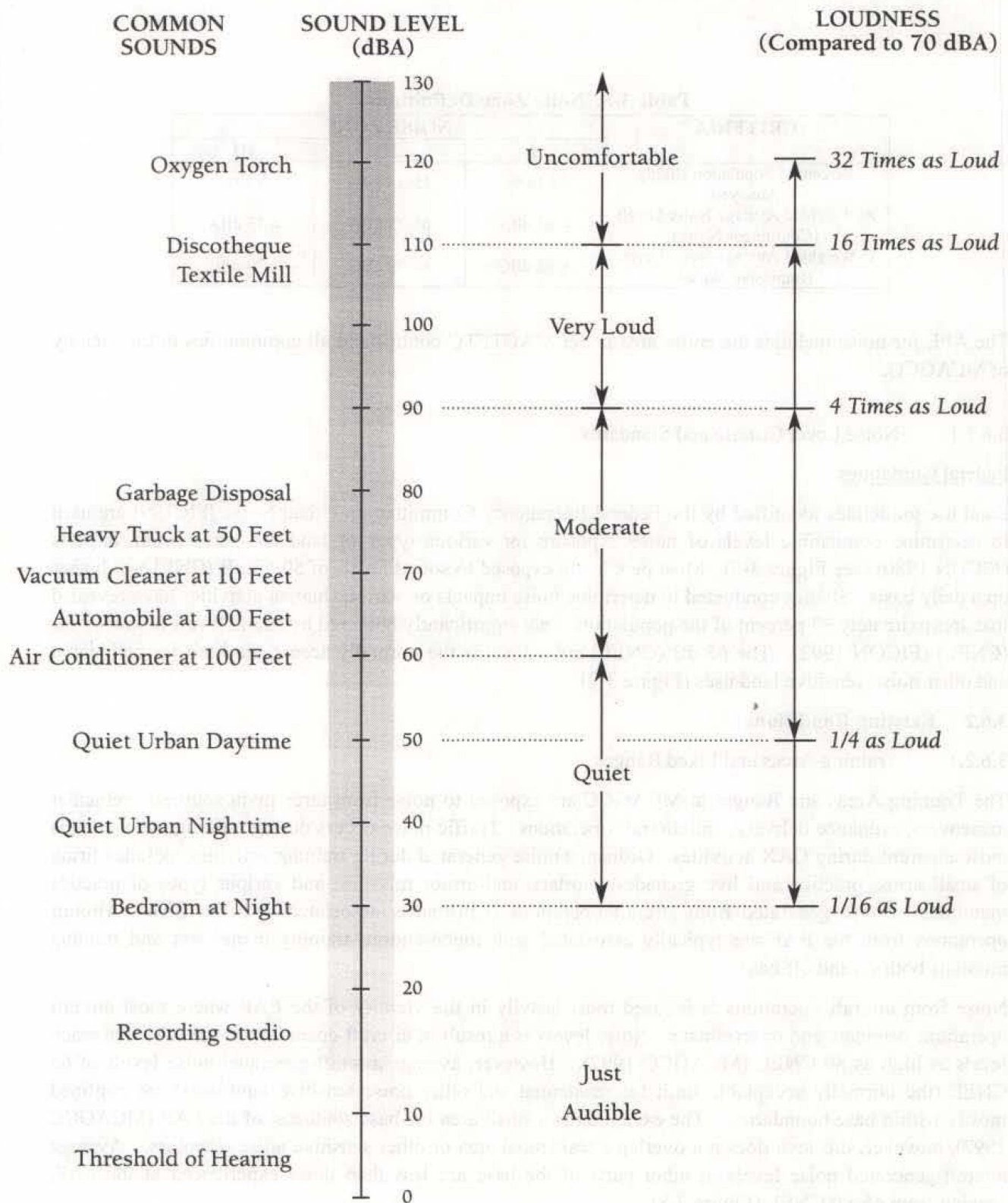
3.6.1 Definition of Resource

Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying (Federal Interagency Committee on Noise [FICON] 1992). Human response to noise can vary according to the type and characteristic of the noise source, the distance between the noise source and the receptor, the sensitivity of the receptor, and the time of day.

The physical characteristics of sound include its level, frequency, and duration. Sound is commonly measured with instruments that record instantaneous sound levels in decibels (dB), which are based on a logarithmic scale (e.g., a 10-dB increase corresponds to a 100 percent increase in perceived sound). Under most conditions, a change of 5 dB is required for humans to perceive a change in the noise environment (USEPA 1973). While the range of frequencies across which humans hear extends from 20 to 20,000 Hertz (Hz), the human ear is most sensitive to sounds in range of 1,000 and 8,000 Hz, with sensitivity diminishing at lower and higher frequencies. Therefore, A-weighted sound level measurements (dBA), which de-emphasize low and high frequencies and emphasize mid-range frequencies, are used to characterize sound levels that are heard especially well by the human ear. As shown in Figure 3-6, human hearing ranges from approximately 20 dBA (the threshold of hearing) to 120 dBA (the threshold of pain).

The sound exposure level (SEL) is a measure of the physical energy associated with a noise event that incorporates both the intensity and duration of the event. For example, the SEL associated with an aircraft overflight would comprise noise levels for the period of time when the aircraft is approaching (noise levels are increasing), the instant when the aircraft is directly overhead (noise levels are at a maximum), and the period of time when the aircraft is departing (noise levels are decreasing). Since the SEL also considers the duration of a noise event, SEL values are typically higher than the maximum noise level measured for most noise events. SEL values are usually A-weighted, but may also be C-weighted. A-weighting is used to describe transportation noise (e.g., aircraft), while C-weighting is used to describe impulsive noise events such as a blast from a gun or detonation of high explosive ordnance.

Average noise exposure over a 24-hour period is often presented as a community noise equivalent level (CNEL). The CNEL is the energy-averaged sound level of all SEL values within a 24-hour period, with a 10-dB penalty assigned to noise events occurring between 10:00 P.M. and 7:00 A.M. to compensate for the increased annoyance associated with the occurrence of nighttime noise events. In addition, applications of the CNEL metric to measure noise levels in California include an additional 5-dB annoyance penalty for evening (10:00 P.M. and 7:00 A.M.) noise events. The C-weighted Community Noise Equivalent Level (CCNEL) is used for estimating average sound levels and community annoyance associated with high-amplitude noise resulting from artillery or demolition firing. CCNEL is similar to CNEL except that the sound level is weighted by the C-scale. The 62 CCNEL contour is equivalent to the compatibility level of 65 CNEL (A-weighted) typically used for aircraft and other non-impulsive noise (Table 3-8).



Source: Harris 1979.

Figure 3-6
Examples of Typical Sound Levels in the Environment

Table 3-8. Noise Zone Definitions

CRITERIA	NOISE ZONE		
	I	II	III
Percent of Population Highly Annoyed	≤ 15 %	15% - 39%	> 39%
A-Weighted Average Noise Levels (Continuous Noise)	≤ 65 dBA	65-75 dBA	> 75 dBA
C-Weighted Average Noise Levels (Impulsive Noise)	≤ 62 dBC	62-70 dBC	> 70 dBC

The APE for noise includes the entire area under MAGTFTC control and all communities in the vicinity of MCAGCC.

3.6.1.1 Noise Level Criteria and Standards

Federal Guidelines

Land use guidelines identified by the Federal Interagency Committee on Urban Noise (FICUN) are used to determine compatible levels of noise exposure for various types of land use surrounding airports (FICUN 1980) (see Figure 3-6). Most people are exposed to sound levels of 50-55 dB (CNEL) or higher on a daily basis. Studies conducted to determine noise impacts on various human activities have revealed that approximately 87 percent of the population is not significantly bothered by sound levels below 65 dB (CNEL) (FICUN 1992). The 65-dB (CNEL) noise level is the normally acceptable limit for residential and other noise-sensitive land uses (Figure 3-7).

3.6.2 Existing Conditions

3.6.2.1 Training Areas and Fixed Ranges

The Training Areas and Ranges at MCAGCC are exposed to noise from three main sources: vehicular maneuvers, ordnance delivery, and aircraft operations. Traffic noise occurs during training events and is most apparent during CAX activities. Ordnance noise generated during training activities includes firing of small arms, practice and live grenades, mortars, anti-armor missiles, and various types of practice munitions. Noise generated from aircraft operations is primarily associated with the EAF. Aircraft operations from the EAF are typically associated with touch-and-go training maneuvers and training missions both on and off base.

Noise from aircraft operations is focused most heavily in the vicinity of the EAF where most aircraft operations originate and/or terminate. Noise levels as a result of aircraft operations at the EAF can reach levels as high as 80 CNEL (MCAGCC 1997). However, average aircraft-generated noise levels of 65 CNEL (the normally acceptable limit for residential and other noise-sensitive land uses) are confined mostly within base boundaries. The exception is a small area off base southeast of the EAF (MCAGCC 1997); however, this area does not overlap a residential area or other sensitive noise receptors. Average aircraft-generated noise levels in other parts of the base are less than those experienced at the EAF, ranging from 45-60 CNEL (Figure 3-8).

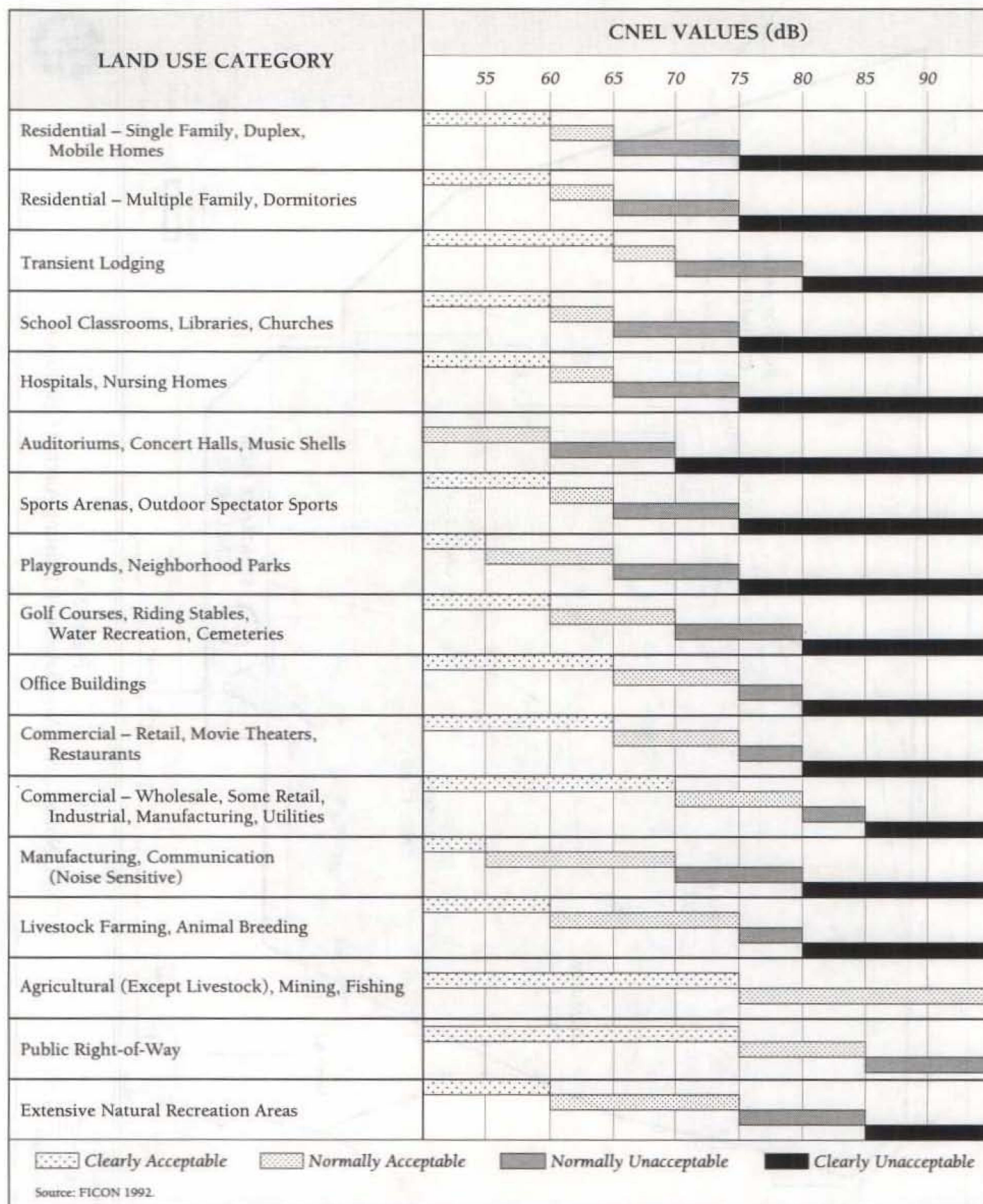


Figure 3-7
Land Use Compatibility Guidelines

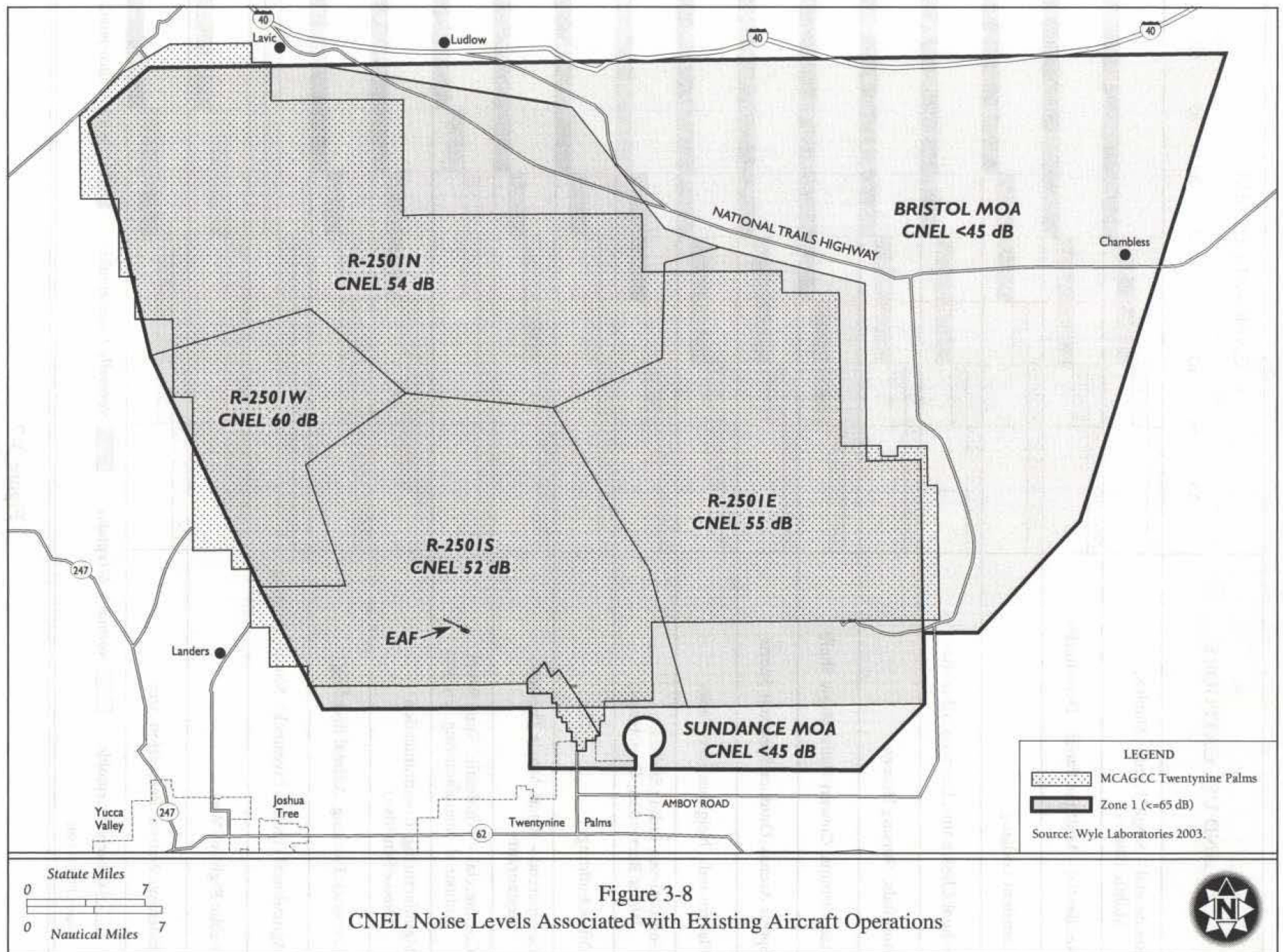


Figure 3-8
CNEL Noise Levels Associated with Existing Aircraft Operations

The *Draft Airspace and Blast Noise Study for MCAGCC Twentynine Palms* (Wyle Laboratories 2003) included the noise contours resulting from ordnance and aircraft activities on base. The results of this study will be incorporated into an update of the MCAGCC Range Compatible Use Zone (RCUZ) study. The series 400 ranges are specifically designed for training with CAX, the largest of MCAGCC's live fire exercises. Noise levels at a typical Series 400 Range are estimated to vary between 60 dB CCNEL (Zone 1) and 80 dB CCNEL (Zone 3), consistent with a typical military training area (Wyle Laboratories 2003). The combined noise contours for ordnance noise exposure show the 60 dB CCNEL contour remaining within the boundaries of the Range Complex, except for small areas south of Cleghorn Pass, north and northeast of Blacktop, and west of Emerson Lake (Figure 3-9). The total impact outside the boundaries of the base is estimated to be 1,926 acres (779 hectares) (Wyle Laboratories 2003). There are many activities that contribute to the noise environment at MCAGCC, but the primary noise sources are aircraft operations and detonation of high explosive ordnance (Wyle Laboratories 2003).

The closest off-base noise-sensitive receptors are located in the community of Landers, about 2 miles (3.2 km) west of the base boundary, and the City of Twentynine Palms, south of MCAGCC. These noise-sensitive receptors include residences, schools, libraries and hospitals. However, the majority of the dozen or so noise complaints received by MAGTFTC each year are associated with aircraft flying to or from MCAGCC along the Federal Aviation Administration-controlled airspace corridors connecting MCAGCC to other military installations (MAGTFTC 2003b). Rarely are there any noise complaints associated with training activities being conducted within the installation.

3.6.2.2 Mainside Area

The Mainside Area is exposed to noise from three main sources: vehicular traffic, training range activities, and aircraft operations. Traffic noise in the vicinity of the housing areas associated with traffic on Adobe Road and other surface streets represents the greatest source of noise within the Mainside Area. Large trucks and other heavy vehicles, which generate more noise than cars, comprise approximately 10 percent of the total vehicle traffic volume within the Mainside Area. Due to the location of training ranges away from the Mainside Area and on-base topography, noise associated with training operations is rarely audible within the Mainside Area. Noise generated from aircraft operations is primarily associated with the EAF located approximately 7.5 miles (12 km) northwest of the Mainside Area. CNEL contours associated with the EAF do not encroach into the Mainside Area (Wyle Laboratories 2003).

3.7 TRANSPORTATION AND CIRCULATION

3.7.1 Definition of Resource

For the purposes of this analysis, transportation and circulation refer to the movement of vehicles throughout the roadways and intersections at MCAGCC. Roadway and intersection operating conditions and the adequacy of existing and future roadway systems to accommodate vehicles are typically described in terms of average daily traffic volumes and level of service (LOS) ratings. LOS ratings range from A for free-flowing traffic conditions to F for congested conditions (Table 3-9). LOS ratings are influenced by speed, travel time, freedom to maneuver, safety, driving comfort, and convenience. The APE for transportation and circulation includes road networks on MCAGCC.

Table 3-9. Signalized Intersection Delay and Associated LOS Ratings

<i>Delay (sec/vehicle)</i>	<i>LOS Rating</i>
≤ 10.0	<i>A</i>
$> 10.0 \text{ to } \leq 20.0$	<i>B</i>
$> 20.0 \text{ to } \leq 35.0$	<i>C</i>
$> 35.0 \text{ to } \leq 55.0$	<i>D</i>
$> 55.0 \text{ to } \leq 80.0$	<i>E</i>
> 80.0	<i>F</i>

Source: Transportation Research Board 1997.

3.7.2 Existing Conditions

The County of San Bernardino transportation and circulation significance criteria only consider LOS ratings for signalized intersections. Signalized intersections with a LOS of C or better are designated as operating at an acceptable level. Conversely, signalized intersections that operate at a LOS of D or worse are considered to be deficient (County of San Bernardino 2001).

3.7.2.1 Access to MCAGCC

The primary transportation passageway to and from MCAGCC is Adobe Road, a north-south, four lane roadway that links the Mainside Area to the City of Twentynine Palms and State Route 62. All visitors and vehicles with two or more axels must enter and exit via Adobe Road, where MCAGCC's Main Gate is located (MCAGCC 1996). Adobe Road is a four-lane roadway from south of the Main Gate up until Del Valle Road, where it becomes a two-lane road. The Average Daily Traffic (ADT) volume for Adobe Road south of the Main Gate is 12,347 and this segment currently operates at a LOS of A. Limited access to MCAGCC is available to two-axle vehicles and buses via two secondary (auxiliary) gates (MCAGCC 1996). These gates are located at Condor Road, which runs parallel to Adobe Road, and Morongo Road.

3.7.2.2 Transportation within MCAGCC

Mainside

The primary roadway through Mainside is Del Valle Road which runs in a northwesterly-southeasterly direction. Del Valle Road becomes Phillips Road as it continues north towards the EAF. Since military tracked vehicles and self-propelled artillery can damage Mainside's asphalt roads, these vehicles observe certain restrictions while traveling within this area. Tracked vehicles and self-propelled artillery are restricted from traveling on or crossing asphalt roads, except at concrete reinforced intersections. The main trails for military tracked vehicles within Mainside are along First and Tenth Streets (just north of

the Main Gate and south of Berkeley Avenue, respectively) and along Del Valle Road. The trail along First Street also goes east of Mainside to the Delta Training Area. (MCAGCC1996).

Access to Training Areas

There are two types of roads that traverse MCAGCC's Training Areas: MSRs and secondary roads. MSRs are primary unpaved thoroughfares that cover approximately 354 miles (570 kilometers) and an area of 1,400 acres (567 hectares). Most vehicular circulation throughout the Training Areas occurs on MSRs. Secondary roads are narrower and more numerous than the MSRs, and cover approximately 665 miles (1,070 kilometers) and an area of 1,300 acres (526 hectares) (MCAGCC 1999). The width of MSRs and secondary roads depends on terrain and proposed use. However, the average width for MSRs is 32 feet (10 m), while secondary roads are approximately 16 feet (5 m) wide (MCAGCC 1999).

3.8 LAND USE

3.8.1 Definition of Resource

For purposes of this analysis, land use is defined as the natural conditions and/or human-modified activities occurring at a particular location. Human-modified land use categories typically include residential, commercial, industrial, transportation, communications and utilities, agricultural, institutional, recreational, and other developed use areas. Management plans and zoning regulations determine the type and extent of land use allowable in specific areas and are often intended to protect specially designated or environmentally sensitive areas. The APE for land use includes the entire area of MCAGCC and a 10-mile (16-km) radius around the base.

3.8.2 Existing Conditions

3.8.2.1 Regional Conditions

MCAGCC is located in southern San Bernardino County, which is divided into sub-regional planning areas. The northern boundary of MCAGCC is bordered by the Baker Sub-Regional Planning Area; the southern, eastern, and western boundaries are bordered by the Morongo Basin Sub-Regional Planning Area.

The Baker Sub-Regional Planning Area adjacent to the northern boundary of MCAGCC is undeveloped and the majority of the land is under control of the BLM. Although federally controlled property is not subject to local land use controls, this area is almost entirely designated as Resources Conservation by the county. Development of the private land in the planning area is constrained by the lack of infrastructure facilities and delivery systems. No groundwater is available in any of the areas adjacent to the base, all existing development is on septic systems, and no sewers are expected to be added in the next decade. Improved roads, even in established communities, are limited to major highways only, and most roads in outlying areas are unpaved. Development in the Baker Sub-Region is further limited by the rugged terrain and the potential for flash floods, particularly in the low lying areas.

The Morongo Basin Sub-Regional Planning Area is primarily designated for Resources Conservation and Rural Living in the areas adjacent to MCAGCC. Most of the land on the east and west sides of the installation are under the control of the BLM and are only sparsely developed. The Johnson Valley off-road vehicle area on the western border of MCAGCC is a BLM property which shares a 17-mile (27-km) border with MCAGCC. Other neighboring federal land uses include the Joshua Tree National Park to the south, and the Cleghorn Lakes Wilderness Area on the southeastern border of MCAGCC (MAGTFTC 2001a). Access to BLM land is restricted to protect wildlife species (MCAGCC 1994). On the southern boundary of the installation, although the BLM retains control of large areas of land, most of it is privately held. The predominant land use designations north of Highway 62 and south of MCAGCC are Rural Living and Resources Conservation. Rural Living land use areas have only partial public services and limited public improvements and are intended to prevent high demand for public services. This area is characterized by scattered low-density residential development. Much of the area consists of minimum parcel sizes of 2.5 acres (one hectare) or five acres (two hectares) per dwelling unit.

The City of Twentynine Palms, located directly south of the Main Gate, is the closest incorporated city to MCAGCC. The installation and the city are connected via Adobe Road which includes various commercial, industrial, open spaces, and some residential areas along its path. Twentynine Palms is characterized by low-density residential areas and some commercial, recreational, public facilities, and agricultural zones. Other communities in the vicinity of MCAGCC include Landers, Joshua Tree, and Yucca Valley, but none of these communities encompass lands directly adjoining MCAGCC.

3.8.2.2 Current Land Use at MCAGCC

MCAGCC encompasses 598,178 acres (242,075 ha). The Mainside Area, located in the southern portion of the base, is the only developed area within the base. Mainside comprises 3,942 acres (1,595 hectares) and contains administrative, maintenance, housing, and community support facilities. The remainder of the base is primarily undeveloped land used to support ongoing training activities. Approximately 20,600 acres (8,337 hectares) is not used for training purposes due to mountainous terrain (MCAGCC 1999).

MCAGCC is divided into 23 Training Areas (including Mainside), which are regulated by Bearmat. Figure 2-2 in Chapter 2 illustrates the distribution of Training Areas at MCAGCC. Training Areas vary in size from 6,890 acres (2,788 hectares) to 54,761 acres (22,161 hectares). The Lavic Lake Training Area and the East Training Area are the largest and smallest training areas at MCAGCC, respectively (MAGTFTC 2001a). The primary training functions in these areas are aerial bombardment maneuvers and various ground-based weapons firing exercises that occur in Fixed Ranges (MAGTFTC 2001a).

Approximately 16,000 acres (6,475 hectares) at MCAGCC are designated as Fixed Ranges, which only permit certain types of training activities. For example, some Fixed Ranges do not allow live fire or vehicular travel. However, the restrictions are range-specific. There are 25 Fixed Ranges within MCAGCC, the largest of which is Range 601 with an area of 2,380 acres (963 hectares). Range 105 is the smallest range and covers an area of 91 acres (37 hectares) (MCAGCC 1999). Other sites used for training are expeditionary in nature to provide a realistic scenario of combat conditions. There are several types of expeditionary training facilities (see Section 2.1.4): the EAF (an 8,000-foot [2,438-m] aluminum matting runway on the corner of Sand Hill and West Training Areas; the ESB (buildings and tents supporting deployed units during the CAX); the ALZ (a 5,000-foot [1,524-m] dirt runway in the Sand Hill Training Area used by fixed wing aircraft and helicopters); 5 parachute or cargo DZs; 14 observation posts located throughout the base; and PRTSS (repeatedly used areas providing refueling sites, ammunition supply points, messing areas, shower units, etc).

3.8.2.3 Land Use Policies

Land use planning guidelines established by FICON are used by the U.S. Department of Housing and Urban Development to determine acceptable noise exposure levels for various land use categories (see Figure 3-7). Land use activities most sensitive to noise typically include residential and commercial areas, public services, and areas associated with cultural and recreational uses.

As described in the Comprehensive Neighborhood Plan, the MCAGCC Master Plan provides a blueprint for future development and includes recommendations for proposed development, siting of proposed facilities, and safety and operational criteria at MCAGCC (MCAGCC 1998). For a discussion of accident potential zones and ESQD arcs refer to section 3.9, Public Health and Safety.

There are two types of Special Use Areas at MCAGCC (see Figure 2-1). Areas designated as Special Use Area #1, such as the large one in the Acorn Training Area, require that vehicles remain on MSRs while traversing the area (no off-road traffic is authorized). Dismounted training activities are permitted in areas designated Special Use Area #1. However, live fire activities are area-dependent (live fire is not authorized in the Special Use Area #1 in the Acorn Training Area). Areas designated as Special Use Area #2, though resource-sensitive, do not have any specific restrictions. Area use is coordinated with the O&T Directorate and the Natural Resources and Environmental Affairs Division (NREA) on a case-by-case basis (MAGTFTC 2002c). In addition to the Special Use Areas, 900 acres (364 hectares) have been committed to permanent tortoise study plots. These plots are located in the Sand Hill, Emerson Lake, Cleghorn Pass and Bullion Training Areas (MCAGCC 1999; Evans 2003).

3.9 PUBLIC HEALTH AND SAFETY

3.9.1 Definition of Resource

This section includes a description of issues related to public health and safety in and around MCAGCC. These issues include range safety and control, EOD operations and UXO, storage and handling of ammunition and explosives, hazardous materials and wastes, non-hazardous wastes, installation restoration (IR) sites, electromagnetic hazards, laser safety, accident potential zones (APZ), and the protection of children. The APE for safety includes the entire MCAGCC installation and any surrounding areas that could potentially be affected by hazards associated with ongoing training activities.

In 1997, EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (Protection of Children), was issued to identify and address issues that affect the protection of children. Socioeconomic data specific to the distribution of population by age and the proximity of youth-related facilities (e.g., day care centers and schools) are used to analyze potentially incompatible activities associated with a proposed action. Data generally used for the Protection of Children analysis are collected from the *2000 Census of Population and Housing* (USCB 2002a).

3.9.2 Existing Conditions

3.9.2.1 Range Safety and Control

The Range Control Section of the O&T Directorate (Bearmat) maintains communication with all training units and provides oversight of all activities being conducted at MCAGCC, both on the ground and in associated airspace. Training operations are controlled by a combination of radio coordination with Bearmat and range inspectors who monitor all training activities. Training units continually use cell phones and/or radios to coordinate with Bearmat personnel while training maneuvers are being conducted.

Range Safety personnel in the O&T Directorate provide safety guidance, conduct formal classes for training units, and randomly check units to assist in range safety procedures. Range safety is also the responsibility of each unit commander conducting training or maneuvering on MCAGCC. All personnel (military, civilian, or contractor) entering MCAGCC training ranges first attend a range safety briefing, which includes (but is not limited to) desert survival, environmental considerations, range SOPs and control procedures, and UXO awareness.

All field work or construction onboard MCAGCC is scheduled around range activities and coordinated with the O&T Directorate. In addition, all persons involved in field work or construction are required to attend a safety briefing to minimize potential injuries. When out in the field, workers use cell phones and/or radios to stay in contact with Bearmat.

Unauthorized public access is not permitted at MCAGCC. The boundaries of the installation are posted with bilingual signs that warn of potential hazards, but there is no perimeter fence installed around the installation. Unauthorized access by trespassers is most likely to occur on the west side of the installation because of the nearby Johnson Valley off-road vehicle area; however, unauthorized access has also been documented on the east and north sides of the installation. Trespassers may include hikers and off-road vehicle users who inadvertently cross the installation boundary, or "scrappers" who purposely enter known training areas to mine for scrap metal from range residue. Prior to the commencement of each day's training exercises a safety helicopter performs a visual flight around any scheduled Training Area to search for unauthorized personnel. If trespassers are encountered at any time they are quickly escorted

out of the area and placed in the custody of Military Police prior to initiation or continuation of training activities.

3.9.2.2 EOD Operations and UXO

As was described in Section 2.1.3.2, range clearance operations conducted by EOD teams play a crucial role in creating and maintaining a safe training environment at MCAGCC. The mission of the EOD unit is to (1) reduce the hazard from UXO, (2) remove ordnance residue from training areas, and (3) provide a safe and constructive training area for all training units. All range clearance operations are conducted in accordance with the UXORMP (MAGTFTC 2001c) and with Combat Center Order P3500.4F (MCAGCC 2000b) and Combat Center Order P3120.4C (MCAGCC 1993). These plans and operating procedures clearly define the scope and procedural requirements associated with EOD and range clearance operations.

Per the UXORMP, before a training exercise or operation is conducted at MCAGCC, a Combat Center Order, Operation Order, or Letter of Instruction is prepared by the training unit. The type of guidance document required depends upon the magnitude and complexity of the exercise. These documents stipulate the level of range policing activity that is required after completion of the exercise. Additionally, the Director of O&T, Range Safety personnel, Range Maintenance personnel, and the base EOD unit are constantly assessing the accumulation of UXO on the ranges. If a range is considered saturated at a level of 10,000 pounds of net explosive weight of UXO, then a specific range clearance operation is conducted by EOD. If a range is considered to have less than the 10,000 pound threshold, it is scheduled under a routine clearance cycle.

The MAGTFTC EOD Unit performs surface range clearance by systematically sweeping each Training Area and Fixed Range throughout the year (MAGTFTC 2001c). The Director of O&T also requires the EOD Unit to biannually conduct range clearance operations in each range training area, with the exception of the Delta and Quackenbush Training Areas, which are completely swept at least once per year. EOD performs limited subsurface clearance. Subsurface clearance is conducted in conjunction with contracted construction activities on MCAGCC. EOD will be on call during any excavation activities.

MAGTFTC uses two automated record-keeping systems for management of ordnance and UXO on MCAGCC (MAGTFTC 2001c). The Range Facility Management Support System (RFMSS), which expedites the process of range scheduling and utilization, can also enable decision-makers to logically forecast the rate of UXO saturation. In addition, the Unexploded Ordnance Site Management Model is a Geographic Information System-based tool that provides 3 modules for managing UXO on MCAGCC. The first module contains 15 years of historical data on range operation, ammunition usage, and range clearance activities throughout the base. The second module is a data acquisition model that can access the ammunition usage report from the RFMSS to present a polygon map of the ordnance impact areas. The third module provides a day-to-day operational tool of EOD activities that support range operations and emergency operations. These management tools enable the EOD Unit to analyze ordnance location, UXO density, UXO type, and the resources needed to accomplish the next round of range clearance activities.

All personnel involved in training at MCAGCC perform constant monitoring of the Training Areas and ranges. When personnel are training and see UXO that has not been cleared by EOD personnel, the incident is reported and action is taken. Training units also provide feedback to the Commanding General after each operation and identify any problems encountered on the range. The O&T staff of Operations Officer, Range Safety, Range Management, and EOD are also on the relevant ranges whenever training operations are being conducted. Finally, personnel from the Range Residue Processing Center (RRPC)

regularly tour MCAGCC to determine if ordnance-derived materials or Range Residue needs to be recovered.

3.9.2.3 Storage and Handling of Ammunition and Explosives

Ammunition Storage and ESQD Arcs

Explosives and ammunition are stowed in specially-designed structures called magazines or in associated hardstand areas (for more temporary storage up to 30 days). Magazines are of various sizes, types of construction, and classes depending upon the nature of the material to be stowed. ESQD arcs surround each magazine used for the storage or handling of ordnance. The type and quantity of the explosives stored in a magazine determine the type and size of ESQD arcs. ESQD arcs have been developed to protect humans from the possible sabotage or accidental detonation of explosives or ammunition. Regulations associated with ESQD arcs prohibit the placement of inhabited buildings, public traffic routes, and other human activities within unsafe distances from ordnance storage facilities. Training activities are not permitted within ESQD range of any ordnance storage facilities.

The Center Magazine Area (CMA) is the primary facility used for storage of ammunition on MCAGCC. It is located in the Range Training Area, northwest of Mainside. The CMA provides explosives storage support for aviation and ground combat elements of the CAX forces, tenant units, visiting forces, and foreign forces. The CMA requisitions, receives, processes, and issues 55 percent of the Marine Corps' continental U.S. ground training ammunition and 43 percent of aviation training ammunition. Currently, the CMA is operated at or near full capacity, which causes public traffic route ESQD arcs to extend across Phillips Road, a public traffic route under Department of Defense explosive safety criteria (Department of Defense 1997). To remedy this situation, a project is currently being implemented to build additional magazines and to reduce the amount of ammunition stored at existing magazines, thereby reducing the size of the ESQD arcs associated with those existing magazines such that they no longer cross Phillips Road.

Ammunition is also stored at 2 Field Ammunition Supply Points (FASPs) for support of major training exercises such as the CAX. The primary FASP is a 593-acre (240-hectare) facility located in the Gypsum Ridge Training Area northwest of the ESB. A second FASP is located north of Mainside. All ESQD requirements and land use restrictions associated with these locations are properly maintained.

Handling and Control of Ammunition

Combat Center Order P3500.4F (MCAGCC 2000b), establishes strict guidelines and procedures for the control of ammunition and explosives that are used during training exercises. The Officer in Charge of each firing site has the overall responsibility for the control, handling, and accountability of ammunition and explosives at that range. Control of ammunition is accomplished by proper supervision at all times, to ensure that every round of ammunition that is authorized, requisitioned, on-hand for security purposes, or maintained in the field in conjunction with an exercise is accounted for. Ammunition not expended upon termination of each exercise is returned to the appropriate storage activity. All personnel involved in the use of ammunition and explosives are thoroughly indoctrinated in safety precautions, procedures, and principles.

During field training exercises, unit commanders establish procedures which ensure the recovery of all ordnance and salvageable ammunition components (brass, links, etc.) prior to departing from the firing site. Ammunition requested and maintained in the field is limited to the quantity necessary to support known requirements. The quantity is not to exceed that which can be properly safeguarded. Numerous

other SOPs associated with safe handling and control of ammunition and explosives are listed in Combat Center Order P3500.4F, and all are strictly adhered to by all personnel.

3.9.2.4 Hazardous Materials and Wastes

Hazardous materials include, but are not limited to, hazardous substances, hazardous wastes, or any materials that pose a potential hazard to human health and safety or the environment due to their quantity, concentration, or physical and chemical properties. A variety of hazardous materials are used and stored at MCAGCC for daily training operations. The primary hazardous materials used during a typical CAX training exercise are fuels of various types (diesel, JP-8, and JP-5). A total of 165,000 gallons of fuel was used during a recent CAX training event (MAGTFTC 2003c). Other hazardous materials used during CAX events include batteries, petroleum, oils, and lubricants (POLs), hydraulic fluid, antifreeze, cleaning products, and printer cartridges.

MCAGCC records toxic chemical release inventory (TRI) chemicals generated during training events as part of the Emergency Planning and Community Right-to-Know Act (EPCRA). The EPCRA establishes requirements for Federal, State, and local governments and industry regarding reporting of hazardous and toxic chemicals. Access to this information contributes to improving chemical safety and protecting public health and the environment. Based on MCAGCC training records from 2001, the TRI threshold for three TRI chemicals (copper, lead, and nitroglycerin) were exceeded and were reported to the TRI database. The TRI database is a publicly available USEPA database that contains information on toxic chemical releases reported annually by certain industry groups and federal facilities.

Hazardous wastes are products characterized by their ignitability, corrosiveness, reactivity, and toxicity. Hazardous wastes include any waste which, due to its quantity, concentration, or physical, chemical, or infectious characteristics may either 1) cause or significantly contribute to an increase in mortality, serious irreversible illness, or incapacitating reversible illness, or 2) pose a substantial threat to human health or the environment. A total of 38,014 pounds of hazardous waste were generated during a recent CAX training exercise (MAGTFTC 2003c). A variety of hazardous waste was generated, including alkaline batteries, fuels, used oil, oily rags, POLs, and cleaning fluids. Hazardous waste is inventoried and managed by the Hazardous Waste Management Section prior to disposal off-site by a certified contractor to a permitted treatment, storage, or disposal facility that accepts hazardous waste.

Management and control of hazardous materials and wastes at MCAGCC is guided by the Integrated Contingency and Operations Plan (ICOP) (MAGTFTC 2002g). This comprehensive plan consolidates a number of related management action plans and policies into one central source, which is made available to all appropriate personnel and is posted on the installation's Internet site. Among the many components of the ICOP are an Oil and Hazardous Substance Spill Contingency Plan, a Spill Prevention, Control, and Countermeasures Plan, a Business Emergency and Contingency Plan, a Storm Water Pollution Prevention Plan, a Hazardous Waste Management Plan, and a Hazardous Waste Minimization Plan. The ICOP clearly defines all responsibilities, procedures, requirements, and responses associated with hazardous material and waste management.

In 2002, a total of 50 accidental releases of hazardous substances occurred throughout MCAGCC's Training Areas and ranges. These included 15 releases of diesel fuel totaling 287 gallons, 18 releases of JP-8 fuel (298 gallons), 11 releases of oil (232 gallons), 2 releases of JP-5 fuel (190 gallons), 2 releases of hydraulic fluid (3 gallons), and 2 releases of antifreeze (12 gallons) (MAGTFTC 2003c). In accordance with the ICOP, the affected training units took immediate action by notifying Bearmat and stopping the release of material. Abatement actions commenced within 24 hours of release and included soil removal and disposal, and cleanup validation.

3.9.2.5 Non-Hazardous Waste

A wide variety of non-hazardous waste is generated during training events. During a recent CAX training exercise a total of 123,133 pounds of non-hazardous waste was generated (MAGTFTC 2003c). These wastes included small arms brass, artillery shells and casings, ammunition cans, wood, cardboard, scrap metal, paper products and food wrappers. Management and control responsibilities and procedures associated with these types of wastes are defined in Combat Center Order P3500.4F (MCAGCC 2000b) and Combat Center Order P3120.4C (MCAGCC 1993). Waste generated during training exercises is collected by each unit at the conclusion of training and is taken to the RRPC, which is responsible for safely managing, inspecting, processing, and certifying all ordnance-derived materials and range residue generated at MCAGCC. Once the process of certifying the material is completed, the RRPC offers those materials to the Qualified Recycling Program or the Defense Reutilization and Marketing Office for sale (MAGTFTC 2001c).

3.9.2.6 Installation Restoration Sites

To facilitate the investigation and cleanup of contaminated sites (i.e., IR Sites) at military bases, the Department of Defense has developed the Installation Restoration Program (IRP). The IRP is the process by which contaminated sites and facilities are identified and characterized and existing contamination is contained, removed, and disposed of to allow for the future beneficial use of the property. There have been 63 IR sites identified onbase through the MCAGCC IRP (MCAGCC 2002c). However, only 4 sites remain active and these sites are in various stages of remediation or closure activities. All current and former IR sites are located within the Mainside area or at the EAF/ESB; no IR sites are located in the live-fire and maneuver ranges (MAGTFTC 2003c).

3.9.2.7 Hazards of Electromagnetic Radiation to Ordnance (HERO)

Electromagnetic radiation emitted from communications, radar, and similar systems has the potential to create a hazard to ordnance systems containing sensitive electro-explosive devices, which can result in degradation of these devices as well as premature device actuation causing propellant ignition and/or warhead detonation. Safety measures, responsibilities, and SOPs associated with HERO are contained in Combat Center Order 3565.1 (*Hazards of Electromagnetic Radiation Emissions Control Bill*), which is incorporated here by reference (MAGTFTC 2000).

Even though there are certain types of ordnance used on board MCAGCC that are designated HERO Unsafe, antenna placement of radiation sources and/or the relatively low operating power are such that the distance to ordnance storage, handling, loading, and arming locations, or transportation routes, preclude the need for permanent radio frequency emission control procedures. Therefore, the primary focus of Combat Center Order 3565.1 is on procedures for mobile equipment (stationary, vehicular and aircraft) that may affect personnel working around transmitters, refueling operations, and other HERO sensitive ordnance.

3.9.2.8 Laser Safety

Training operations involving the use of laser-based weapons systems occur at designated laser ranges and laser target areas distributed throughout 16 different Training Areas at MCAGCC. Laser ranges include Ground Laser Ranges, Aerial Laser Ranges (fixed wing and rotary wing), Armor Maneuver Ranges (tanks), and Composite Ranges. The primary hazard associated with laser use is eye damage. This damage can vary from a small burn, undetectable by the injured person, to sever impairment. Range control procedures and safety precautions associated with laser training are described in Combat Center

Order P3500.4F (MAGTFTC 2000b). The regulations and guidelines listed therein are designed to prevent exposure to hazardous levels of laser radiation.

Prior to conducting any laser operations, training units must establish laser safety programs that address such issues as laser regulations and SOPs, safety training for all relevant personnel, laser protective goggles and equipment, and medical surveillance. All personnel within the target area or danger area along the laser-target line must wear appropriate eye protection when laser firing is in progress. Range guards with radios are posted at each of the access points to a ground laser range and all laser operations are halted if communication is lost with any of the personnel participating in the laser training (including Bearmat, which maintains control of the training at all times).

3.9.2.9 Accident Potential Zones

Through the Air Installation Compatible Use Zone (AICUZ) program, APZs have been established to define recommended surrounding land use guidelines to protect persons and property from potential aircraft-related accidents. APZs, which define the areas in which an aircraft-related accident would be more likely to occur, consist of three areas: the Clear Zone, APZ I, and APZ II. The Clear Zone is the area closest to the end of the runway and represents the highest overall potential for accidents. APZ I is the area beyond the Clear Zone and possesses a significant potential for accidents. APZ II is beyond APZ I and represents the lowest accident potential of the three areas. MCAGCC's APZ's are associated with the EAF, located in the southern portion of the base, west of Mainside. No incompatible land uses are presently located within APZs at MCAGCC.

3.9.2.10 Protection of Children

As of 2000, the total number of children under the age of 18 living within the APE was 9,992, or approximately 28 percent of the total population (Table 3-10) (USCB 2002a). This number is slightly less than the San Bernardino County average (32.3 percent) and slightly more than the state average (27.3 percent).

There are no schools, parks, residences, or other areas where children would congregate located in the vicinity of the training ranges. All onbase housing and school or playground locations are located in the Mainside Area of MCAGCC, well removed from any training activities.

Table 3-10. Number of Children in the APE, County of San Bernardino, and the State of California (2000)

<i>Geographic Area</i>	<i>Population Total</i>	<i>Number of Children</i>	<i>Percent of Total Population</i>
Joshua Tree	4,207	1,156	27.5
Twentynine Palms	14,764	4,601	31.2
Yucca Valley	16,865	4,235	25.1
APE Total	35,836	9,992	27.9
San Bernardino County	1,709,434	552,047	32.3
California	33,871,648	9,249,829	27.3

Source: USCB 2002a.

3.10 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

3.10.1 Definition of Resource

Socioeconomics comprise the basic attributes of population and economic activity within a particular area and typically encompasses population, employment and income, education, and housing. To illustrate local and regional socioeconomic conditions, data are provided for the City of Twentynine Palms, Joshua Tree, Yucca Valley, San Bernardino County, and the state of California.

In 1994 EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* (Environmental Justice), was issued to focus the attention of federal agencies on human health and environmental conditions in minority and low-income communities. This EO was also established to ensure that disproportionately high and adverse human health or environmental effects on these communities are identified and addressed. This socioeconomic analysis gives particular attention to the distribution of race and poverty status in areas potentially affected by implementation of a proposed action.

3.10.2 Existing Conditions

3.10.2.1 Socioeconomics

MCAGCC is located in southern San Bernardino County. Land to the north and east of MCAGCC is predominantly undeveloped, open desert under the control of the BLM, while the City of Twentynine Palms is the closest incorporated area, located approximately 5 miles (8 km) south of the Main Gate. Joshua Tree is located approximately 15 miles (24 km) southwest of the base and Yucca valley is located approximately 20 miles (32 km) southwest of the base. Joshua Tree, Twentynine Palms, and Yucca Valley make up the APE for socioeconomic.

Population. Population in the APE experienced an increase of 18.6 percent between 1990 and 2000 (Table 3-11). The total manpower for MCAGCC in 2001 was 12,636 individuals, including 685 officers, 10,137 enlisted, and 942 civilians (MCAGCC 2002d).

Table 3-11. Population within the MCAGCC APE

<i>Area</i>	<i>1990 Census</i>	<i>2000 Census</i>	<i>Percent Change</i>
Joshua Tree	3,898	4,207	7.9
Twentynine Palms	11,821	14,764	24.9
Yucca Valley	13,701	16,865	23.1
APE Total	29,420	35,836	18.6
San Bernardino County	1,418,380	1,709,434	20.5
California	29,760,021	33,871,648	13.8

Sources: USCB 2002a.

Employment and Earnings. As of December 2000, approximately 14,836 employed and 1,159 unemployed civilian individuals resided within the APE, with an average unemployment rate of 4.4 percent (USCB 2002b). In 2000, the total personal income in San Bernardino County was \$37.6 billion annually, with an average per capita income of \$21,891 (Bureau of Economic Analysis 2002). Employment in San Bernardino County is currently dominated by services (24 percent), government (22.4 percent), manufacturing (12.2 percent), and retail trade (11.8 percent) (Bureau of Economic Analysis 2002). MCAGCC is the largest employer in the immediate area.

Education. Approximately 9,390 students are enrolled in the Morongo Unified School District, the primary school district serving Joshua Tree, Twentynine Palms, and Yucca Valley. With 486 teachers employed in this school district, the average student/teacher ratio in the APE is 19.5:1 (Education Data Partnership 2002). The state of California allocated approximately \$35.3 billion in local, state, and federal funds in fiscal year 1999-2000 and had an enrollment of 5,951,612 students (Education Data Partnership 2002). This equates to approximately \$5,931 per student in combined funding.

Housing. In 2000, the number of housing units in the APE was 17,016, with a vacancy rate of 15.9 percent (USCB 2002a). MCAGCC currently provides 2,304 family housing units and 75 trailers, in addition to temporary lodging facilities.

3.10.2.2 Environmental Justice

Approximately 20.6 percent of the total population within the APE is composed of minorities (Table 3-12), significantly less than the percentage for San Bernardino County or the State of California (USCB 2002a). Approximately 12.9 percent of the APE's total population is of Hispanic origin, while about 39.2 and 32.4 percent of the total population of San Bernardino County and the State of California, respectively, is of Hispanic origin. Within the APE itself, the City of Twentynine Palms has a much higher percentage of minority populations than Joshua Tree or Yucca Valley. The percent of population living below poverty level within the APE in 1999 was 18.4 percent, slightly higher than the 1999 San Bernardino County and California rates of 15.8 and 14.2 percent, respectively (USCB 2002b).

Table 3-12. Minority and Low-Income Population Data for the APE, County of San Bernardino, and the State of California

Geographic Area	Total Population	Minorities ¹ (2000)		Low-Income (1999)	
		Population Total	Percent of Total Population	Population Total	Percent of Total Population
Joshua Tree	4,207	596	14.2	920	21.2
Twentynine Palms	14,764	4,556	30.9	2,440	16.8
Yucca Valley	16,865	2,223	13.2	3,247	19.5
APE Total	35,836	7,375	20.6	6,607	18.4
San Bernardino County	1,709,434	722,698	42.3	263,412	15.8
California	33,871,648	11,833,371	34.9	4,706,130	14.2

Sources: USCB 2002a.

Notes: ¹ The Hispanic population is not a racial category, and includes components in each of the five racial categories. Hispanic figures cannot be added to racial categories to reach total population figure; double counting would result.

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

4.1 GEOLOGICAL RESOURCES

4.1.1 Approach to Analysis

This section evaluates potential impacts to geological resources associated with the No-Action Alternative and the Proposed Action. The analysis focuses exclusively on soil disturbance resulting from training activities because of the tendency of such disturbance to increase susceptibility to wind and water erosion and other related effects. While the potential also exists for training activities to damage unique geological or topographical features on MCAGCC, the uniqueness of such features is subjective and areas that may be considered unique tend to be subject to little or no training activity. In general, mountainous areas and other locations that might contain such features are avoided during training because of topography and potential damage to vehicles. In addition, seismic features and characteristics are not addressed in this section because there is no indication that ongoing military training has any effect on such resources.

The following analysis of potential impacts from training-induced soil disturbance is qualitative in nature, and based largely on the INRMP (MAGTFTC 2001a) and the results of a Land Condition Trend Analysis (LCTA) developed as part of an ongoing Land Condition Trend Monitoring Program conducted by MAGTFTC. These documents describe in detail the ways in which training operations disturb different types of soils at MCAGCC and, therefore, are incorporated here by reference. The information is summarized below as necessary to support the following impact analysis.

4.1.2 Impacts

All categories of training at MCAGCC (i.e., vehicle maneuvers, infantry maneuvers, certain aircraft operations, and ordnance delivery) are recognized sources of soil disturbance. Vehicle maneuvers and ordnance delivery are the most prominent sources of disturbance, particularly in the valley floors, playas, and along the flatter slopes of bajadas where most training occurs. Training operations can disturb soils in two primary ways: soil compaction and the disruption of surface crusts to expose underlying soil. Soil compaction reduces soil aeration and root growth of vegetation, and contributes to increased stormwater runoff and flash flooding because of reduced water infiltration. Loosening of surface crusts leaves soils and subsoils more susceptible to wind and water erosion. Gillette et al. (1982) found that for undisturbed soils even a weak surface crust protects the soil from wind erosion and that disturbed soils were readily erodible. However, the crust can seal itself after one or two significant rainstorms. In general, the severity of disturbance to soils is dependent upon the type and frequency of disturbance, soil type and texture, grain size, and soil moisture at time of impact. Soil types on MCAGCC that are most susceptible to severe wind erosion when the surface is disturbed are those that contain low rock cover and higher contents of silt and fine sand. Erosion by water is less of a concern than wind erosion because storm events are rare and transported soil tends to remain within the boundaries of MCAGCC.

Soil disturbance and resulting erosion at MCAGCC is not a compliance issue associated with any federal, state, or local regulations. However, soil erosion can become a compliance issue to the extent that it contributes to sedimentation or pollution of water bodies, depletion of sensitive vegetation and habitat for special-status species, or degradation of air quality (PM₁₀) beyond allowable thresholds. Erosion-related impacts to water resources, biological resources, and air quality are described in Sections 4.2, 4.3 and 4.5, respectively.

4.1.2.1 No-Action Alternative

Vehicle Maneuvers

Vehicle maneuver activities that cause the most disturbances to soils include: 1) off-road use of vehicles, 2) digging in of vehicles, 3) building obstacles, and 4) use of engineering equipment and other large vehicles in order to construct roads and obstacles. Vehicle maneuvers disturb desert soils by breaking up soil crusts, which leads to loosening of surface soils and loss of aggregation, thereby leaving the alluvial and eolian deposits susceptible to both water and wind erosion (MAGTFTC 1998). Compaction effects also result from vehicle maneuvers due to the excessive weight of vehicles.

Vehicular movement on desert substrates and roads can also create sizeable dust clouds while maneuvers are being conducted, even under calm conditions (Rundel et al. 1995). Under windy conditions, a large amount of dust is lifted from bare soil areas, accelerating wind erosion. The smallest, lightest particulates, especially pulverized clays, may enter long-term suspension and travel great distances (Rundel et al. 1995).

Though vehicle maneuvers have an adverse impact on soils due to direct disturbance, such impacts are largely confined to previously disturbed Go and Slow Go zones and, therefore, are not widespread throughout MCAGCC (see Figure 2-3). In order to minimize impacts to soils from vehicular traffic, MAGTFTC has introduced several measures, including: 1) requiring vehicular traffic to stay on well-defined roads unless training scenarios require otherwise; 2) using previously disturbed sites as much as possible during off-road maneuvers to minimize damage to undisturbed sites (MCAGCC 1996); 3) maintaining natural drainage at the lowest elevation possible and avoiding realignment or blockage of drainages by roads and other construction; 4) aligning linear features perpendicular to the wind direction to minimize wind erosion; 5) minimizing travel on old soils (such as those covered by desert pavement) as these soils can be permanently altered through heavy use; and 6) filling in of tank traps, trenches, and other major excavations to original grade (when feasible) upon the completion of training exercises. Implementation of the above measures, along with periodic erosion control projects, monitoring programs such as the LCTA, and maintenance and use of existing environmental resource databases, support the INRMP goal of managing training lands for long-term sustainability and protection of natural resources such as soils. As a result of these programs and procedures, soil disturbance impacts associated with ongoing vehicle maneuvers are adverse but not significant.

Infantry Maneuvers

Foot traffic associated with infantry maneuvers causes disruption of soil crusts in previously undisturbed areas, the effects of which have been described previously. Foot traffic also causes general disturbance and mixing of soil profiles in already disturbed areas. Because infantry maneuvers may be extended over several days, bivouacking and other excavation activities are frequently conducted. These bivouacking activities and the associated construction of trenches, foxholes, obstacles, etc., are the largest source of soil disturbance associated with infantry maneuvers. These activities disturb desert soils to varying depths, exposing alluvial and eolian deposits that can become more susceptible to wind and water erosion. However, disturbance is minimized as a result of MAGTFTC procedures requiring backfilling of any excavations to original grade at the completion of infantry maneuvers. MAGTFTC also conducts awareness programs designed to educate Marines on ways to minimize natural resource impacts during training. As a result of these programs and procedures, soil disturbance impacts associated with ongoing infantry maneuvers are adverse but not significant.

Aircraft Operations

Aircraft operations (non-ordnance related) such as parachute drops, troop inserts, and cargo drops can form small depressions in the soil and otherwise compact and disturb desert soils, potentially leaving them susceptible to wind and water erosion. However, the majority of such operations occur in pre-designated, hardened DZs, thereby limiting disturbance to soils. Currently there are 5 DZs used for personnel and cargo drops and 16 helicopter LZs and 1 ALZ used for aircraft landing. Impacts tend to be concentrated in these previously disturbed areas within MCAGCC. Therefore, soil disturbance impacts associated with aircraft operations are not significant.

Ordnance Delivery

Air- and land-based ordnance use can result in adverse impacts to soils at MCAGCC by creating small craters, causing compaction and shearing of soil profiles, and dispersing soil particles as dust via explosive contact. Much of the heavier ordnance delivery with the most damage potential for soils is conducted on Fixed Ranges that have been developed for this purpose. Ordnance delivery outside of Fixed Ranges tends to be focused on previously disturbed areas and resulting dust tends to remain within the installation (MAGTFCTC 2001a). Figure 2-2 in Chapter 2 identifies the areas on MCAGCC that are regularly used for ordnance delivery. Although artillery use occurs within a number of areas at MCAGCC, it mainly occurs within valley bottoms and bajadas in the Quackenbush Lake, Gays Pass, Lead Mountain, Black Top, and Delta Training Areas. Due to concentration of ordnance use in previously disturbed areas within MCAGCC, impacts to geological resources from ordnance delivery are adverse but not significant.

4.1.2.2 Proposed Action

Implementation of the proposed action would result in a potential 15-percent increase in vehicle maneuvers, infantry maneuvers, aircraft operations, and ordnance deliveries. Since the proposed action involves the same categories of training, impacts to geological resources resulting from implementation of the proposed action would be similar to those described above for the No-Action Alternative. The proposed increase in tempo and/or number of training activities would not raise these impacts to a level of significance, due to continued concentration of activities in disturbed areas, protection or avoidance of undisturbed areas, and continued application of monitoring, conservation, and environmental awareness programs.

4.2 WATER RESOURCES

4.2.1 Approach to Analysis

This section evaluates potential impacts to water resources associated with the No-Action Alternative and the Proposed Action. The analysis focuses only on impacts to surface water resources; area groundwater resources are located at sufficient depth as to be unaffected by ongoing training operations. MCAGCC's potable water is obtained from the Surprise Spring Subbasin which mostly contains fossil water or water obtained through recharge from the San Bernardino Mountains located to the west of MCAGCC. Of the various types of surface water resources on MCAGCC, playa lakes and dry washes are the most impacted by military training activities, and will be the focus of this section. Seeps and springs are generally located in remote locations, away from training activity (MCAGCC 1996) and man-made water bodies are also unlikely to be affected.

The following analysis of potential impacts to playas and dry washes is qualitative in nature, and based largely on the INRMP (MAGTFTC 2001a). Several sections of the INRMP address water resource issues, including Wet Area Management, Water Resources Management, Training Land Management, and Mainside Grounds Maintenance. These sections contain numerous environmental protection measures that have become SOPs to help manage and protect surface water resources. For example, Combat Center Order 5090.1B includes measures to be taken by Marines and other forces training on MCAGCC to conserve and protect water resources. Other measures intended to reduce the effects of soil disturbance and erosion (see Section 4.1) also indirectly protect water resources. All of these measures help to minimize potential impacts to water resources associated with current and future training operations and are incorporated into the following impact analysis by reference.

4.2.2 Impacts

4.2.2.1 No-Action Alternative

Vehicle Maneuvers

Of all the types of training conducted on MCAGCC, vehicle maneuvers in particular result in the most impacts to playas and dry washes. Regular vehicle activity in these areas has created compacted and rutted surfaces that can reduce water absorption into the soil and otherwise alter stormwater flow. Emerson, Deadman, and Lavic lakes each have over 4 miles of roads (MAGTFTC 2001a). Vehicles are also used regularly on dry washes; in 1994 there were about 76 miles of desert wash roads at MCAGCC (U.S. Army Corps of Engineers, 1994). Environmental protection measures used to control impacts to playas and washes include avoiding use of playas to the maximum extent possible when surfaces are wet, and identifying a limited number of crossing sites on playas (especially on Deadman Lake, a heavily damaged area) in order to minimize vehicle crossing and damage. Other impacts are reduced by requirements to design tank traps to allow the natural surface flow of water during runoff events. Older tank traps can be modified to meet this requirement (MCAGCC 1996). Impacts to water resources due to vehicle maneuvers are further minimized by MAGTFTC requirements that troops use existing, well-defined roads when not in conflict with training objectives. In summary, given the dearth of surface water resources in the absence of storms and MAGTFTC policies and programs designed to manage and protect playas and dry washes, ongoing training operations under the No-Action Alternative do not result in significant impacts to water resources.

Infantry Maneuvers

Infantry maneuvers, particularly those involving any type of soil disturbance or excavation (e.g., for purposes of bivouacking or construction of fox holes), contribute to a higher soil erosion potential, which can impact playas and dry washes in similar ways as those described above for vehicle maneuvers. Since many of the same conservation and prevention measures described above and in Section 4.1 are relevant, infantry maneuvers associated with ongoing training activities do not result in a significant impact to water resources.

Aircraft Operations

Aircraft operations that would have the potential to result in water resources impacts include soil-disturbing events such as parachute drops and cargo drops. However, the majority of such operations occur in pre-designated, hardened DZs and LZs, thereby limiting disturbance to soils. Impacts tend to be concentrated in these previously disturbed areas within MCAGCC, which are not located within playas or dry washes. Therefore, aircraft operations do not result in a significant impact to water resources.

Ordnance Delivery

Ordnance delivery can impact playas and dry washes by disturbing soil crusts, causing compaction of the soil, and creating small craters that may then trap or impede stormwater flow. However, ordnance delivery at MCAGCC takes place primarily in Fixed Ranges or in areas that are already disturbed. These operations are also limited in the vicinity of playas. With continued application of monitoring, conservation, and environmental awareness programs directed at the protection of playas and dry washes (as described in the INRMP), ordnance delivery operations do not result in significant impacts to surface water resources.

4.2.2.2 Proposed Action

Since the Proposed Action involves the same categories of training as the No-Action Alternative, impacts to water resources resulting from implementation of the Proposed Action would be similar to impacts associated with ongoing training activities. The proposed increase in tempo and/or number of training activities would not significantly impact water resources, due to continued concentration of activities in disturbed areas, protection or avoidance of undisturbed areas, and continued application of monitoring, conservation, and environmental awareness programs.

4.3 BIOLOGICAL RESOURCES

4.3.1 Approach to Analysis

In accordance with the Sikes Act Improvement Act (Public Law 105-85), an INRMP has been prepared for base-wide military operations at MCAGCC (MAGTFTC 2001a). In addition, in accordance with NEPA, an EA was prepared to analyze the potential impacts of implementing the proposed objectives and goals of the INRMP and a Finding of No Significant Impact (FONSI) was signed in October 2001. The INRMP and EA were developed in cooperation with the USFWS and CDFG and reflect the mutual agreement of these parties on all regulatory requirements concerning the conservation, protection, and management of natural resources on MCAGCC. The USFWS issued a Biological Opinion (BO) in March of 2002, which detailed the effects of training at MCAGCC on the desert tortoise (USFWS 2002). Upon issuance of the 2002 BO, the INRMP also became the Endangered Species Management Plan for the desert tortoise on MCAGCC (MAGTFTC 2001a).

This section discusses the potential impacts to biological resources associated with the No-Action Alternative and the Proposed Action. Potential impacts due to current and future military operations (i.e., vehicle maneuvers, infantry maneuvers, aircraft operations, and ordnance delivery) would be minimized through implementation of Special Conservation Measures (SCMs) and Environmental Protection Programs (refer to Section 2.2.3), the goals and objectives in the INRMP, and the Terms and Conditions in the 2002 BO (USFWS 2002). These SCMs, Environmental Protection Programs, and Terms and Conditions are incorporated into this impacts analysis discussion by reference.

4.3.2 Impacts

4.3.2.1 No-Action Alternative

Vehicle Maneuvers

Vegetation. The use of light-wheeled, heavy-wheeled, and tracked vehicles over vegetated lands at MCAGCC either temporarily disturbs or permanently removes vegetation and disturbs associated soils. The degree of impact is determined by the level of use, vehicle types used, and type of vegetation within an area. The INRMP provides a number of measures to protect and conserve vegetation and habitats (including soils) on MCAGCC, including requiring units to utilize existing travel corridors (e.g., MSR's, secondary roads, and off-road routes) and emphasizing the use of previously disturbed sites for ongoing and future training and potential facility development. (MAGTFTC 2001a). With implementation of the SCMs and Environmental Protection Programs summarized in Section 2.2.3 and presented in detail in the INRMP, impacts to vegetation communities as a result of ongoing vehicle maneuvers are adverse but not significant.

Wildlife. As with vegetation, impacts to wildlife during vehicle maneuvers are unavoidable. Wildlife may be temporarily displaced during vehicle maneuvers, protective shrubs or burrows which function to protect wildlife from predators and environmental conditions may be damaged, and the increase in human presence may increase predators in an area. However, many of the same measures discussed previously to protect and conserve vegetation and habitat are also beneficial in the conservation and management of wildlife species. In addition, the INRMP outlines a number of wildlife monitoring, inventory, and management programs designed to effectively maintain or enhance wildlife populations, including migratory birds, on MCAGCC (MAGTFTC 2001a). With implementation of the SCMs and Environmental Protection Programs summarized in Section 2.2.3 and presented in detail in the INRMP, impacts to wildlife resulting from ongoing vehicle maneuvers are not significant.

Special-Status Species. The only federally-listed species at MCAGCC is the threatened desert tortoise. The majority of military exercises occur in moderately to highly disturbed areas that have low to very low tortoise densities (MCAGCC 1999). In accordance with Section 7 of the ESA, MCAGCC prepared a Biological Assessment (BA) to evaluate the effects of military training and land use at MCAGCC on the desert tortoise (MCAGCC 1999). The BA included a number of mitigation measures to reduce the potential for death or injury to individual desert tortoises, reduce or minimize disturbance of tortoise habitat, and monitor the take of desert tortoises. In their BO addressing the BA, the USFWS stated that the Marine Corps' training operations and routine maintenance at MCAGCC are not likely to jeopardize the continued existence of the desert tortoise (USFWS 2002). Upon issuance of the 2002 BO, the INRMP also became the Endangered Species Management Plan for the desert tortoise on MCAGCC (MAGTFTC 2001a). With implementation of the mitigation measures in the BA and the terms and conditions of the BO, no significant impacts to desert tortoises and their habitat are resulting from ongoing vehicle maneuvers.

Infantry Maneuvers

Vegetation Types. As with vehicle maneuvers, infantry maneuvers also have the potential to affect large areas of the desert environment. Training exercises may last for several days, crossing large tracts of land and requiring the construction of bivouacs (temporary encampments). Trampling and removal of vegetation and soil disturbance can occur during bivouac construction. Although vegetation can generally be avoided, some exercises (e.g., berm, trench, or tank-trap emplacements) may require site-specific construction and thus, directly impact vegetation and associated soils. In addition, the use of restrictive materials (i.e., barbed wire) can impact long linear stretches of habitat and disturb vegetation. With implementation of the SCMs and Environmental Protection Programs summarized in Section 2.2.3 and presented in detail in the INRMP, no significant impacts to vegetation communities are resulting from ongoing infantry maneuvers at MCAGCC.

Wildlife. Impacts to wildlife from infantry maneuvers are typically associated with the massive movement of troops occurring in a localized area. During such exercises, wildlife may be temporarily displaced during troop movements or at bivouac sites, protective shrubs or burrows which function to protect wildlife from predators and environmental conditions may be damaged, and the increase in human presence may increase predators in an area. However, with implementation of the SCMs and Environmental Protection Programs summarized in Section 2.2.3 and presented in detail in the INRMP, impacts to wildlife as a result of ongoing infantry maneuvers are not significant.

Special-Status Species. As discussed previously for vehicle maneuvers, with implementation of the mitigation measures in the BA (MCAGCC 1999) and the terms and conditions of the BO (USFWS 2002), there are no significant impacts to desert tortoises or their habitat resulting from ongoing infantry maneuvers at MCAGCC.

Aircraft Operations

Vegetation Types. Since ground-disturbing activities associated with aircraft operations (e.g., parachute drops of personnel and cargo) occur only within designated DZs and LZs (e.g., parachute drops of personnel and cargo) and these areas are previously disturbed, there are no impacts to vegetation resulting from ongoing aircraft operations.

Wildlife. The potential sources of impacts to wildlife from aircraft overflights are the visual effect of the approaching aircraft and the associated subsonic noise. Visual impacts to wildlife at MCAGCC are not expected to be significant because the majority of the sortie-operations take place at altitudes greater than

1,000 ft AGL, which is higher than the altitude accounting for most reactions to visual stimuli by wildlife (Lamp 1989, Bowles 1995).

Studies on the effects of noise on wildlife have been predominantly conducted on mammals and birds. Studies of subsonic aircraft disturbances on ungulates (e.g., pronghorn, bighorn sheep, elk, and mule deer), in both laboratory and field conditions, have shown that effects are transient and of short duration and suggest that the animals habituate to the sounds (Workman et al. 1992, Krausman et al. 1993, Weisenberger et al. 1996). Similarly, the impacts to raptors and other birds (e.g., waterfowl) from aircraft low-level flights were found to be brief and insignificant and not detrimental to reproductive success (Smith et al. 1988, Lamp 1989, Ellis et al. 1991, Grubb and Bowerman 1997). Consequently, aircraft operations at MCAGCC are not expected to result in significant impacts to wildlife or wildlife populations.

The bird-aircraft strike hazard (BASH) potential in the existing airspace is characterized as low to moderate (U.S. Air Force 2003). From 1985 to June 2002, there have been only 8 reported BASH incidents at the EAF, the main airfield at MCAGCC (MAGTFTC 2002d). Current procedures for avoiding flight operations during periods of high concentrations of migratory birds (both in space and time) include the use of the U.S. Air Force's Bird Avoidance Model (BAM) (U.S. Air Force 2003) and adherence to the EAF BASH Plan (MAGTFTC 2002d). Therefore, no significant impacts to wildlife populations, particularly migratory birds, result from ongoing aircraft operations.

Special-Status Species. As discussed previously for vehicle maneuvers, with implementation of the mitigation measures in the BA (MCAGCC 1999) and the terms and conditions of the BO (USFWS 2002), there are no significant impacts to desert tortoises at MCAGCC under the No-Action Alternative.

Ordinance Delivery

Vegetation Types. Ordinance delivery currently occurs primarily within designated ranges or portions of Training Areas that have already been disturbed. Impacts to vegetation as a result of ordinance delivery are expected to be similar to those previously discussed for vehicle maneuvers and would also include potential impacts to soils and increased erosion potential. With implementation of the SCMs and Environmental Protection Programs summarized in Section 2.2.3 and presented in detail in the INRMP, there are no significant impacts to vegetation communities as the result of ongoing ordinance delivery at MCAGCC under the No-Action Alternative.

Wildlife. Impacts to wildlife as a result of ordinance delivery are expected to be similar to those previously discussed for vehicle maneuvers. With implementation of the SCMs and Environmental Protection Programs summarized in Section 2.2.3 and presented in detail in the INRMP, there are no significant impacts to wildlife as the result of ongoing ordinance delivery under the No-Action Alternative.

Special-Status Species. Although the majority of ordinance delivery is restricted to MCAGCC's Fixed Ranges, impacts do occur outside of these areas. Unprotected areas which receive ordinance delivery are known to support low to very low tortoise densities (MCAGCC 1999). As discussed previously for vehicle maneuvers, with implementation of the mitigation measures in the BA (MCAGCC 1999) and the terms and conditions of the BO (USFWS 2002), there are no significant impacts to desert tortoises or their habitat as a result of ongoing ordinance delivery.

4.3.2.2 Proposed Action

The proposed action would involve a 15-percent increase in vehicle and infantry maneuvers, aircraft operations, and ordnance delivery. Since the proposed action involves the same categories of training, the impacts to biological resources resulting from the implementation of the proposed action would be similar to impacts associated with the No-Action Alternative. As discussed previously, with implementation of the mitigation measures in the BA (MCAGCC 1999), the terms and conditions of the BO (USFWS 2002), and the natural resource management and monitoring programs outlined in the INRMP (MAGTFTC 2001a) (and summarized in Section 2.2.3 of this EA), there would be no significant impacts to biological resources at MCAGCC under the Proposed Action.

4.4 CULTURAL RESOURCES

4.4.1 Approach to Analysis

In keeping with the purpose and scope of this Programmatic EA (Section 1.4), the approach to analysis underlying the following discussion is qualitative in nature and does not focus on specific cultural resources known to exist at MCAGCC. Direct and indirect impacts to cultural resources were assessed by 1) identifying the inherent characteristics of MCAGCC training activities (vehicle maneuvers, infantry maneuvers, aircraft operations, and ordnance delivery) and how they influence the land environment; 2) analyzing how these influences might impact cultural resources under current and increased training scenarios; and 3) evaluating the effectiveness of procedures outlined in the ICRMP (MCAGCC 2002b) intended to reduce or limit impacts to cultural resources.

4.4.2 Impacts

4.4.2.1 No Action Alternative

Vehicle Maneuvers

Vehicle use on existing roads is unlikely to disturb NRHP-eligible resources, but off-road vehicle travel can uproot vegetation, contribute to increased erosion, and damage or move surface artifacts. Excavation of tank traps and trenches and the construction of obstacles, berms, etc., can also disturb or destroy both surface and subsurface artifacts. Any training activities that result in ground disturbance can adversely affect NRHP-eligible resources and undocumented resources in the area.

MAGTFTC has developed site protection measures in the ICRMP (MCAGCC 2002b) (incorporated by reference) to avoid disturbing known significant sites and to assess potential damage to sites from training activities. Potential avoidance measures include designating certain areas as "special use or limited use," redirecting training activities that could impact these sites, and fencing specific sites. NRHP-eligible sites are also monitored to ensure that these sites are not impacted by training operations.

MAGTFTC also conducts a program to monitor specific sites that have not yet been evaluated for NRHP eligibility. These sites are examined to determine the effects that natural processes and training activities are having on cultural resources over time and to develop additional procedures for reducing impacts by avoidance, data recovery, or other measures. With implementation of the ICRMP and the associated protection programs, impacts to cultural resources from ongoing vehicle maneuvers are not significant.

Infantry Maneuvers

As described above, training activities that result in ground disturbance can adversely affect NRHP-eligible and undocumented resources on MCAGCC. Infantry maneuvers are known to be a source of such disturbance, particularly when they involve the excavation of berms, trenches, and foxholes and clearance of areas for bivouac. With implementation of the ICRMP and associated protection programs, impacts to cultural resources associated with ongoing infantry maneuvers are not significant.

Aircraft Operations

Aircraft operations that cause ground disturbance (e.g., parachute drops of personnel and cargo) can adversely affect NRHP-eligible and undocumented resources in the Training Areas where such operations are conducted. Procedures in the ICRMP help to avoid or reduce such impacts so that they are not significant. Aircraft overflights that do not cause ground disturbance have no effect on NRHP sites.

Ordnance Delivery

Air-to-ground ordnance delivery occurs on approximately 80,000 acres and encompasses many Training Areas: Quackenbush Lake, the southern half of Gays Pass, Lavic Lake, the northern portions of Rainbow Canyon and Noble Pass, most of Lead Mountain, the central portion of Black Top, and the Delta corridor. Fixed Ranges 601 and 605 are used exclusively for aircraft-delivered ordnance. Aircraft ordnance delivery has the potential to adversely impact NRHP-eligible resources. Ongoing implementation of the procedures presented in the ICRMP help avoid or limit these impacts such that they are not significant.

Artillery use occurs on approximately 110,000 acres but is concentrated on 45,000 acres, where artillery firing is directed at fixed targets. The heaviest artillery use areas are Quackenbush Lake, Gays Pass, Lead Mountain, and northern Bullion. Some artillery is delivered in the Black Top, Lavic Lake, Delta, and north-central Lava Training Areas. Owing to the highly disturbed conditions surrounding the fixed targets, it is highly unlikely that artillery-delivered ordnance impacts any NRHP-eligible properties. Resources located in the areas surrounding the targets have the potential to be adversely impacted; however, procedures in the ICRMP help to avoid or limit the effects to below a level of significance.

Tank and other armor ordnance delivery is conducted on approximately 200,000 acres but is concentrated in areas that are already moderately to heavily disturbed, including Black Top, Lavic Lake, Emerson Lake, Quackenbush Lake, Gays Pass, Delta Corridor, Bullion, Lead Mountain, Maumee Mine, and Cleghorn Pass Training Areas. As a result, it is unlikely that any NRHP-eligible resources are being affected by this training practice. In conjunction with management procedures defined in the ICRMP, no significant impacts on cultural resources result from ongoing training of this type.

Small arms, mortars, ground missiles, and related ordnance are used during infantry maneuvers at Fixed Ranges and throughout various Training Areas on MCAGCC. The majority of the ordnance fired annually is from rifles and other small arms. Construction of targets, surface skipping by larger caliber munitions, and ordnance clean-up can adversely affect NRHP-eligible cultural resources. Procedures presented in the ICRMP avoid or limit these impacts such that they are not significant.

Traditional Cultural Properties

Consultation with Native American tribes in 1995 did not identify any traditional cultural properties on MCAGCC (MAGTFTC 2001a). Therefore, no known traditional cultural properties are adversely affected by training activities. MCAGCC continues to consult with these Native American tribes on range activities and construction projects and is required to consult on Data Recovery Projects not only with Native American Tribes but also with the State Historic Preservation Officer and Advisory Council on Historic Preservation per ICRMP.

4.4.3 Proposed Action

Under the Proposed Action, additional vehicle maneuvers, infantry maneuvers, ordnance delivery, and other activities resulting in ground disturbance would result in adverse impacts to cultural resources. MCAGCC would continue to adhere to the monitoring plan proposed in the ICRMP which identifies adverse impacts to NRHP-eligible and unevaluated cultural resources and reduces impacts by avoidance, data recovery, or other measures. Therefore, impacts to cultural resources as a result of the Proposed Action would not be significant.

4.5 AIR QUALITY

4.5.1 Approach to Analysis

Section 176(c) of the CAA, as amended, requires federal agencies to ensure that actions undertaken in nonattainment or maintenance areas are consistent with the CAA and with federally enforceable air quality management plans. The USEPA General Conformity Rule applies to federal actions occurring in nonattainment or maintenance areas when the total direct and indirect emissions of nonattainment pollutants (or their precursors) exceed specified thresholds. The emission thresholds that trigger requirements for a conformity analysis are called *de minimis* levels. *De minimis* levels (in tons per year) vary from pollutant to pollutant and are also dependent upon the severity of the nonattainment status. The applicable *de minimis* levels for the APE are listed in Table 4-1.

Table 4-1. Applicable Criteria Pollutant *de minimis* Levels within the APE
(tons/year [metric tons/year])

<i>VOCs</i> ¹	<i>NO_x</i> ¹	<i>CO</i> ²	<i>SO_x</i> ²	<i>PM₁₀</i> ³
25 (23)	25 (23)	100 (91)	100 (91)	100 (91)

Notes: ¹ The APE is in severe nonattainment for the federal and state O₃ standards; VOCs and NO_x are precursors to the formation of O₃.

² The APE is in attainment of the federal and state CO and SO_x standards; *de minimis* levels are presented for comparison purposes only.

³ The APE is in moderate nonattainment for the federal and state PM₁₀ standards.

Source: Mojave Desert Air Quality Management District 2002.

The USEPA Conformity Rule establishes a process that is intended to demonstrate that a proposed federal action would not: 1) cause or contribute to new violations of federal air quality standards; 2) increase the frequency or severity of existing violations of federal air quality standards; and 3) delay the timely attainment of federal air quality standards. Compliance is presumed if the net increase in direct and indirect emissions from a federal action would be less than the relevant *de minimis* level. If the increase in emissions for a nonattainment pollutant exceeds *de minimis* levels, a formal conformity determination process must be implemented.

Because of the nonspecific and programmatic nature of the Proposed Action as currently defined, a determination of the applicability for CAA conformity is neither feasible nor appropriate at this stage of the planning process. The proposed 15-percent increase in training activities is not currently defined in sufficient detail, and associated pollutant emissions are not sufficiently predictable, to enable analysis under the Conformity Rule. Conformity applicability analyses would need to be performed as more specific actions reach the "proposal" stage in NEPA terms, and are subjected to more focused analysis in the next tier of NEPA documents. Consequently, this section focuses on a qualitative analysis of the potential air quality impacts associated with ongoing and proposed levels of training, without evaluating the applicability of the Conformity Rule to either the Proposed Action or the No-Action Alternative.

A qualitative assessment of air quality impacts is based upon factors such as topography, prevailing winds, and the influence of MCAGCC's resource management policies, programs, and standard operating procedures designed to reduce the effects of erosion, limit the proliferation of roads, minimize unnecessary expansion of disturbed areas, etc. In general, air quality impacts would be considered significant if either the No-Action Alternative or the Proposed Action would:

- produce emissions that would be the primary cause or significantly contribute to a violation of state or federal ambient air quality standards;

- establish land uses that would expose people to localized (as opposed to regional) air pollutant concentrations that violate state or federal ambient air quality standards;
- cause a net increase in pollutant or pollutant precursor emissions that exceeds relevant emission significance thresholds (such as CAA conformity *de minimis* levels or the numerical values of major source thresholds for nonattainment pollutants);
- conflict with adopted air quality management plan policies or programs; or
- foster or accommodate development in excess of levels assumed by the applicable air quality management plan.

4.5.2 Impacts

4.5.2.1 No-Action Alternative

The primary contributors to air quality impacts associated with ongoing training operations at MCAGCC include vehicle exhaust emissions and airborne particulate matter, or dust (i.e., PM_{10}). Dust is generated by training activities directly and by winds blowing across desert soils. Unpaved roads are one of the two largest sources of dust on MCAGCC. Several roads within or close to Mainside and along installation boundaries have been paved in order to help reduce dust generation. However, paving is neither practical nor consistent with the military mission in most locations on base. The other major source of dust is open desert activities such as off-road vehicle and infantry maneuvers, ordnance delivery, etc. Dry lake beds also produce dust during dry, windy conditions.

Mountains act as a barrier to help keep most of the dust generated on MCAGCC within its boundaries (MAGTFTC 2001a). Much of the training activity conducted at MCAGCC occurs well within the boundaries of the installation, in relatively narrow valleys surrounded by rocky ridges. This helps keep dust generated by localized sources (e.g., from explosives, infantry maneuvers, etc.) onsite because prevailing winds have limited time and air-land interface area needed to propel particulates up and over the mountains.

MAGTFTC is in compliance with Clean Air Act standards (MAGTFTC 2001a), but is in a nonattainment area for PM_{10} . Accordingly, MAGTFTC has installed 6 air monitoring stations on MCAGCC, which are used to monitor and quantify the origins of fine particulate dust ($PM_{2.5}$ and PM_{10}) (refer to Table 3-7). Such information is used as a management tool to help prioritize any needed corrective actions. Fugitive dust (PM_{10}) emissions are reduced by applying conservation measures and best management practices to limit soil disturbance and dust generation from training operations. Some of these measures have been described in Section 4.1. Other measures include encouraging vehicles to stay on MSRs when not in conflict with training objectives, establishing mileage and speed controls for vehicles under certain conditions, and restricting activities during high wind periods.

In the absence of calculated estimates of actual pollutant emissions generated by ongoing and proposed training activities, this programmatic assessment of air quality impacts must rely instead on ambient pollutant concentrations measured at air quality monitoring stations established onboard MCAGCC. Data from these monitoring stations were presented and discussed in Tables 3-6 and 3-7. The inference that can be drawn from these data is that MCAGCC's contributions to air quality degradation are not significant. This is partially indicated by the fact that (with one exception) the highest levels measured did not exceed established California and National Ambient Air Quality Standards (refer to Figure 3-5). The one exception was a slight violation of the state PM_{10} standard of $50 \mu\text{g}/\text{m}^3$ (a reading of $54.2 \mu\text{g}/\text{m}^3$ at Mainside in November 2002).

A further consideration is the fact that pollutant concentrations measured at MCAGCC monitoring stations are substantially influenced by emission sources located outside the installation. The entire Mojave Desert Air Basin is in nonattainment for O_3 and PM_{10} and many different pollutant sources both within and outside the Air Basin contribute to these classifications (e.g., urban and suburban populations, transportation sources, agricultural production, industrial facilities, winds blowing over large expanses of the Mojave Desert, etc.). Unlike dust and other pollutants generated at MCAGCC, pollutants generated from these other sources are relatively unconstrained, and are more easily dispersed throughout the regional air basin. Therefore, MAGTFTC training operations are not likely to be solely responsible for the levels of pollutants measured at MCAGCC's own monitoring stations; such stations also measure a substantial proportion of pollutants that have been generated elsewhere and transported to the vicinity of MCAGCC.

While it is not possible to determine the exact proportion of each measured concentration that is attributable to MAGTFTC operations, it is safe to assume that the air quality impact directly attributable to MAGTFTC operations is considerably overestimated by the concentrations measured at the monitoring stations. Therefore, even in the case of the state PM_{10} violation in November 2002, it is extremely unlikely that dust generated exclusively from MCAGCC was solely responsible. All of the aforementioned factors suggest that the No-Action Alternative does not result in significant impacts to air quality.

4.5.2.2 Proposed Action

Emissions resulting from a 15-percent increase for each category of training activity as described in Section 2.2.2 would result in a slight increase in criteria pollutant emissions. The extent of such an increase cannot be predicted based upon available data. However, as described above, the ambient pollutant levels are, for the most part, well below established standards, and the measured pollutant concentrations are not solely attributable to MCAGCC operations. Tables 4-2 and 4-3 present a worst-case scenario whereby the proposed 15-percent increase in training activity would cause a corresponding 15-percent increase in average pollutant levels measured at MCAGCC monitoring stations. Based upon the previous discussion of offsite pollutant sources and their predominant contribution to regional air quality, such a scenario is not likely to occur, but has been provided here for purposes of illustration. Note that, even with a 15-percent increase in average pollutant concentrations, such values are still well below established standards.

In addition, as part of the proposed action, MAGTFTC would continue to implement dust control and abatement measures, such as focusing training operations to the extent possible on previously disturbed areas (thereby limiting the rate of expansion of disturbed areas) and implementing reasonable speed limits on unpaved roads. MAGTFTC would also continue to monitor and quantify the origins of fine particulate dust throughout the training areas at MCAGCC in order to prioritize any needed corrective actions. Therefore, implementation of the proposed action would not result in significant impacts to air quality within the APE. However, in the event that specific tiered actions are developed to achieve MAGTFTC planning objectives, and such actions become subject to focused NEPA analysis, a more quantitative analysis based on projected emissions compared with applicable *de minimis* levels would need to be conducted to fully assess potential air quality impacts under the CAA conformity requirements and NEPA.

Table 4-2. Mainside Air Quality Data (2002) with Hypothetical 15-percent Impact Factor

<i>Air Quality Indicator</i>	<i>October</i>	<i>November</i>	<i>December</i>
Ozone (O₃)			
Peak 1-hour value (ppm)	0.07 (0.08)	0.051 (0.059)	0.044 (0.050)
Federal standard (0.12 ppm)			
State standard (0.09 ppm)			
PM₁₀			
Average 24-hour value (µg/m ³)	30.8 (35.4)	30.2 (34.7)	14.3 (16.4)
Federal standard (150 µg/m ³)			
State standard (50 µg/m ³)			
Carbon Monoxide			
Peak 8-hour value (ppm)	0.2 (0.23)	0.3 (0.34)	0.3 (0.34)
Federal standard (9.0 ppm)			
State standard (9.0 ppm)			
Sulfur Dioxide			
Peak 24-hour value (ppm)	0.001 (0.0012)	0.001 (0.0012)	0.001 (0.0012)
Federal standard (0.14 ppm)			
State standard (0.04 ppm)			
Nitrogen Dioxide			
Peak 1-hour value (ppm)	0.028 (0.032)	0.029 (0.033)	0.025 (0.029)
State standard (0.25 ppm)			

Notes: ppm = parts per million by volume, µg/m³ = micrograms per cubic meter.

Numbers in parentheses are 15-percent higher than the actual measured concentrations.

Source: Naval Facilities Engineering Service Center 2003.

Table 4-3. PM₁₀ Air Quality Data at MCAGCC Monitoring Stations with Hypothetical 15-percent Impact Factor (October – December 2002)

<i>Air Quality Indicator</i>	<i>Actual Average Value (µg/m³)</i>	<i>Value with 15-percent Increase (µg/m³)</i>
Bristol Perimeter Station	9.9	11.4
East Perimeter Station	16.4	18.9
Emerson Perimeter Station	8.1	9.3
Lavic Perimeter Station	10.6	12.2
Mainside Perimeter Station	27.6	31.7
Sandhill Perimeter Station	11.3	12.99

Source: Naval Facilities Engineering Service Center 2003.

4.6 NOISE

4.6.1 Approach to Analysis

The primary factor considered in determining the significance of potential noise impacts is the extent or degree to which the No-Action Alternative or the Proposed Action would affect sensitive noise receptors and land use in the vicinity of MCAGCC.

4.6.2 Impacts

Noise is an unavoidable product of MCAGCC training activities. The predominant noise sources in the Training Areas at MCAGCC include vehicle traffic, aircraft operations, and weapons and ordnance use. The AICUZ and RCUZ summarize the results of MCAGCC noise studies, and assess areas of incompatible land use associated with various levels of noise at MCAGCC. This section discusses expected noise levels and associated impacts under the No-Action Alternative and the Proposed Action. In addition, impacts associated with noise are addressed in Section 4.3, Biological Resources, and Section 4.8, Land Use.

4.6.2.1 No-Action Alternative

Vehicle Maneuvers

Vehicle maneuvers are a regular source of noise at MCAGCC, particularly during a CAX. Vehicle noise occurs within the Training Areas and along MSRs and secondary roadways when the vehicles are accessing Fixed Ranges and other training sites. However, due to the location of training ranges away from the Mainside Area and on-base topography, noise associated with training operations (including vehicle noise) is rarely audible within the Mainside Area. Thus, vehicle maneuvers are not a substantial noise source for sensitive receptors in surrounding communities – specifically Landers (2 miles [3.2 km] west of the base) and the City of Twentynine Palms (immediately south of the base near Mainside). Therefore, no noise impacts are associated with vehicle maneuvers under the No-Action Alternative.

Infantry Maneuvers

Noise associated with infantry maneuvers include activities such as excavation of trenches and foxholes and troop maneuvers on foot. However, noise from these activities is minimal in relation to vehicle maneuvers, aircraft operations, and ordnance use, described separately in this section. Therefore, no noise impacts are associated with infantry maneuvers under the No-Action Alternative.

Aircraft Operations

MCAGCC has historically received about 12 aircraft-related noise complaints per year; the majority of which involve air traffic en route to the EAF or on one of the low-level military training routes. Such complaints typically do not involve aircraft-related or other training activities within MCAGCC (MAGTFTC 2003b). All noise complaints received by the installation are investigated and processed through the O&T Directorate and the Public Affairs Office. As discussed further in Section 4.8 Land Use, average aircraft-generated noise levels of 65 CNEL (the normally acceptable limit for residential and other noise-sensitive land uses) are confined mostly within base boundaries. The exception is a small area off base southeast of the EAF (MCAGCC 1997); however, this area is not near a residential area or other sensitive noise receptors. Therefore, no significant aircraft-related noise impacts are associated with the No-Action Alternative.

Ordnance Delivery

Explosive ordnance creates high-energy impulsive sounds that are analyzed differently than aircraft noise, due to significantly higher energy at low frequencies. For artillery and ordnance use activities, the C-Weighted CNEL is the appropriate measurement for impulsive sounds. As discussed in Section 3.6.1, the 62-CCNEL contour is equivalent to the compatibility level of 65 CNEL (A-weighted) typically used for aircraft and other non-impulsive noise. The combined noise contours for ordnance noise exposure show the 60-dB CCNEL contour remaining within the boundaries of the Range Complex, except for small areas south of Cleghorn Pass, north and northeast of Blacktop, and west of Emerson Lake (see Figure 3-9). The total impact outside the boundaries of the range is estimated to be 1,926 acres (779 hectares), and consists of unoccupied land (Wyle Laboratories 2003). The 62-CCNEL contour also extends to the base boundaries in the Emerson Lake, Cleghorn Pass, and Black Top Training Areas but does not extend off base in these areas. Therefore, no noise impacts are associated with ordnance delivery under the No-Action Alternative.

4.6.2.2 Proposed Action

Since quantitative estimates for increased noise associated with the Proposed Action are not available, the following analysis addresses estimated increases qualitatively. Aircraft-generated 65-CNEL contours associated with EAF activities currently extend to a small area off base southeast of the EAF. The increased operations would extend this portion of the 65-CNEL contour outward slightly farther. However, the area is currently unoccupied, and the contour still would not overlap a residential area or other sensitive noise receptors. Average aircraft-generated noise levels over the entire base would not change noticeably and would likely remain within 45 to 60 CNEL in most areas. The portion that currently experiences 60 CNEL is in the Emerson Lake Training Area; a 15-percent increase in aircraft activities would be distributed over the entire base, so this area is not likely to increase to 65 CNEL (the 65-dB CNEL noise level is the normally acceptable limit for residential and other noise-sensitive land uses [see Figure 3-7]). In addition, the Emerson Lake Training Area is located about 5 miles (8 km) from the nearest community, Landers (see Figure 3-8).

For ordnance-related activities, the 62-CCNEL contour currently extends off base in 1 area and approaches the base boundary in 3 other areas (see Figure 3-9). A 15-percent increase in ordnance delivery would only slightly extend the noise contours outward, possibly enough to extend off base in all 4 of these areas; however, these open, unoccupied areas mostly consist of BLM-owned lands with no sensitive receptors. Therefore, implementation of the Proposed Action would not result in significant impacts associated with noise.

4.7 TRANSPORTATION AND CIRCULATION

4.7.1 Approach to Analysis

This section evaluates impacts associated with training-related vehicle transportation and circulation on the network of unpaved MSRs and secondary roads that traverse the Training Areas at MCAGCC. Although off base transportation corridors and some paved roads within the Mainside Area are used for the transportation of troops and equipment to and from MCAGCC to participate in major training events, such trips occur only periodically (e.g., CAXs occur 10 times per year) and any associated impacts are temporary and not significant. In addition, regular daily traffic volumes associated with assigned personnel and employees who work at MCAGCC are not an issue given the sufficient capacity of area roads (e.g., Adobe Road and State Route 62) and the acceptable LOS ratings for these roads. Consequently, the following discussion focuses only on the MSRs and secondary roads located onbase. Only impacts associated with vehicle maneuvers are discussed here since aircraft operations and ordnance delivery have no impact on area transportation and infantry maneuvers have minimal and relatively intermittent transportation requirements. Finally, the following evaluation is programmatic and qualitative in nature; no direct quantitative studies of vehicle activity have been conducted for this EA.

4.7.2 Impacts

4.7.2.1 No-Action Alternative

When traveling to and from the Mainside Area, established support facilities (e.g., the EAF and ESB), and scheduled Training Areas and Fixed Ranges, vehicle operators are encouraged to use MSRs and established secondary roads to reduce the proliferation of unplanned secondary roads and trails. Off-road vehicle travel is reserved for actual training maneuvers, which are a critical component of the training mission. The average daily number of vehicles at peak use (448 tracked, heavy-wheeled, and light-wheeled vehicles [see Table 2-2]) may be widely distributed throughout the base at any given time, thereby having little impact on traffic conditions on MSRs, secondary roads, or their intersections; no major circulation problems have been identified for areas on base. Therefore, impacts to transportation and circulation associated with vehicle maneuvers at MCAGCC are not significant.

4.7.2.2 Proposed Action

Vehicle maneuvers are the only category of training that currently has any appreciable effect on transportation and circulation at MCAGCC. These activities do not adversely impact traffic conditions on the established road network and no major circulation problems have been identified onbase. The proposed 15-percent increase in vehicle maneuvers and other training activities would also focus on established MSRs, secondary roads, and off-road areas and additional vehicle trips would be widely distributed throughout the extensive base network. Therefore, impacts of the Proposed Action to transportation and circulation at MCAGCC would not be significant.

4.8 LAND USE

4.8.1 Approach to Analysis

The analysis of potential land use impacts includes an identification and description of land use activities that could be affected by implementation of the No-Action Alternative and the Proposed Action, and an examination of the potential impacts on land use patterns and activities. Noise is an indirect effect associated with aircraft operations and ordnance delivery activities. Since certain noise levels can create land use incompatibilities or be inconsistent with local land uses, the effects of aircraft- and ordnance-generated noise are also addressed in this analysis.

4.8.2 Impacts

4.8.2.1 No-Action Alternative

Vehicle Maneuvers

As with all training at MCAGCC, Bearmat schedules vehicle maneuvers to avoid conflicts with other activities for safety purposes. Therefore, no land use conflicts occur on base.

Non-military activities such as hiking and off-road vehicle recreation occur on the public and privately owned lands immediately surrounding MCAGCC. Vehicle maneuvers are fully contained within MCAGCC boundaries and do not preclude any activities from occurring off-base. Control of public access to the installation is a key issue for ensuring public safety; the public is not allowed onto the base (see Section 4.9). Therefore, no land use impacts are associated with vehicle maneuvers for the No-Action Alternative.

Infantry Maneuvers

As described for vehicle maneuvers, infantry maneuvers are fully contained within MCAGCC boundaries and do not preclude any activities from occurring off base. Though infantry maneuvers consist of accessing large areas of land on foot, most infantry maneuvers occur in pre-designated areas (e.g., bivouac areas). Therefore, no land use impacts are associated with infantry maneuvers for the No-Action Alternative.

Aircraft Operations

Aircraft operations originating from the EAF occur over all the Training Areas at MCAGCC. Noise from aircraft operations is focused most heavily in the vicinity of the EAF where most aircraft operations originate and terminate. Average aircraft-generated noise levels of 65 CNEL (the normally acceptable limit for residential and other noise-sensitive land uses) are confined mostly within base boundaries. The exception is a small area off base southeast of the EAF (MCAGCC 1997); however, this area is not near a residential area or other sensitive noise receptors. The nearest noise-sensitive receptors to the EAF are in the community of Landers, about 2 miles (3.2 km) west of the base boundary and approximately 10 miles (16 km) from the area where the 65 CNEL contour extends off base. Average aircraft-generated noise levels in other parts of the base are less than those experienced at the EAF, ranging from 45-60 CNEL (see Figure 3-8). Therefore, aircraft operations associated with the No-Action Alternative do not have significant land use impacts.

Ordnance Delivery

For safety purposes, ordnance delivery at MCAGCC is concentrated in special areas within the base, depending on the type of ordnance used. For example, aircraft-delivered ordnance only occurs on approximately 13.4 percent of MCAGCC, and certain areas such as Mainside are restricted from

receiving aircraft delivered ordnance. Ordnance delivery is further restricted as no live fire is permitted within 3,000 feet (914 meters) of the MCAGCC border, or within 3,280 feet (1,000 m) of a Training Area not in use by the training unit to protect surrounding land use. Thus, off-base land uses surrounding MCAGCC can occur simultaneously with ordnance delivery operations, and no conflicts occur.

Noise associated with ordnance delivery activities is described earlier in Section 4.6 and shown graphically on Figure 3-9. The 62-CCNEL contour is equivalent to the compatibility level of 65 CCNEL typically used for aircraft and other non-impulsive noise. The 62-CCNEL contour extends off base in the area between the Lavic Lake and Black Top Training Areas (see Figure 3-9). This is an open, unoccupied area. The 62-CCNEL contour also extends to the base boundaries in the Emerson Lake, Cleghorn Pass, and Black Top Training Areas but does not extend off base in these areas. Therefore, ordnance delivery associated with the No-Action Alternative does not have significant land use impacts.

4.8.2.2 Proposed Action

In general, impacts of the Proposed Action would be similar to those described under the No-Action Alternative. Implementation of the Proposed Action would not introduce a new land use to the area and would be compatible with activities at MCAGCC. Aircraft operations and ordnance delivery activities are the two categories of training that currently have off-base effects associated with noise. The majority of the potential noise impacts would occur on base and would continue to be compatible with the military and industrial use of the base.

Aircraft-generated 65-CNEL contours associated with EAF activities currently extend to a small area off base southeast of the EAF. The increased operations would extend this portion of the 65-CNEL contour outward slightly farther. However, the area is currently unoccupied, and the contour still would not overlap a residential area or other sensitive noise receptors. Average aircraft-generated noise levels over the entire base would not change noticeably and would likely remain within 45 to 60 CNEl in most areas. The portion that currently experiences 60 CNEl is in the Emerson Lake Training Area; although noise in this Training Area would increase, average noise levels would likely remain below 65 CNEl because the 15-percent increase in aircraft activities would be distributed over the entire base. In addition, this Training Area is about 5 miles (8 km) from the nearest community, Landers (see Figure 3-8).

For ordnance-related activities, the 62 CNEl contour currently extends off base in 1 area and approaches the base boundary in 3 other areas. The 15-percent increase would likely extend the arcs slightly farther into off-base areas. However, these are open, unoccupied areas; these increased noise levels would not affect land use in communities farther away, such as Landers and the City of Twentynine Palms. In addition, noise levels would continue to be monitored according to the AICUZ and RCUZ to identify high-noise and high-hazard areas associated with training and aircraft activities. Continued planning to ensure compatible development in areas at and surrounding MCAGCC would help minimize potential noise impacts on base and in the surrounding communities. Therefore, implementation of the Proposed Action would not result in significant impacts to land use.

4.9 PUBLIC HEALTH AND SAFETY

4.9.1 Approach to Analysis

This section evaluates impacts to public health and safety associated with ongoing training operations and potential impacts that could result from the Proposed Action. Impacts would be significant if the No-Action Alternative or the Proposed Action were likely to substantially increase safety and health risks to the public and/or military personnel. The discussion incorporates a qualitative analysis of the types of health and safety issues introduced in Section 3.9, but frames this analysis in the context of the 4 major categories of training operations. A quantitative analysis of health and safety issues (e.g., estimating potential increases in hazardous waste generated, etc.) is beyond the scope of a programmatic analysis and is not possible given the lack of specific details associated with the proposed planning scenario. All current safety standards, Combat Center Orders, and other regulations and requirements pertaining to range safety and environmental compliance would be equally applicable under the Proposed Action as they are for current training operations.

4.9.2 Impacts

4.9.2.1 No-Action Alternative

Vehicle and Infantry Maneuvers

To minimize potential conflicts with ongoing training activities at MCAGCC, training maneuvers (both vehicle and infantry) within any given Training Area or range begin only when authorized to proceed by Bearmat. All units are briefed in advance of training operations to ensure that all personnel are familiar with applicable range regulations or restrictions. Training units continually use cell phones and/or radios to coordinate with Bearmat personnel while training maneuvers are being conducted. In addition, training maneuvers do not occur within sensitive fuse areas, within ESQD arcs surrounding munitions magazines, or in areas known to contain high densities of UXO. Any hazardous materials used during vehicle or infantry maneuvers are used, stored, transported, and disposed of in accordance with base, military, state, and federal regulations. Non-hazardous wastes and range residue are collected and turned into the RRPC who is responsible for inspecting, processing, and certifying all range residue prior to reuse, recycling, or disposal. In addition, vehicle and infantry maneuvers are fully contained within MCAGCC boundaries and unauthorized access by trespassers is protected against using pre-exercise reconnaissance flights of affected areas. Therefore, vehicle and infantry maneuvers under the No-Action Alternative do not have significant public health and safety impacts.

Aircraft Operations

The AICUZ program at MCAGCC establishes APZs for the EAF, the purpose of which is to delineate areas of potential exposure to aircraft accidents and restrict land use development accordingly for the protection of persons and property on the ground. In the event of an aircraft accident at MCAGCC, on-site personnel are equipped to conduct the necessary fire, spill, and crash response procedures. The Clear Zone (i.e., the area with the highest accident potential near the airfield), APZ I, and APZ II are all located within MCAGCC boundaries. Although there is a possibility for aircraft mishaps to occur outside these zones, the potential is much lower outside these areas. No military aircraft mishaps have been documented for the off-base areas immediately surrounding MCAGCC. The BASH potential at the EAF is considered low, with a bird strike reported on average once every 2 years (MCAGCC 2002c). Therefore, aircraft operations under the No-Action Alternative do not have significant public health and safety impacts.

Ordnance Delivery

All hazardous materials associated with ordnance delivery are used and disposed of in accordance with applicable regulations and base policies. Ordnance derived materials are turned into the RRPC who safely manages and certifies all ordnance and range residue generated at MCAGCC. As with all other training activities at MCAGCC, ordnance delivery is scheduled and monitored through Bearmat to ensure range safety.

Unauthorized public access is not permitted at MCAGCC. The nature of the military mission combined with inherent dangers associated with UXO make public access incompatible with base operations. The boundaries of MCAGCC are posted with signs, but there is no perimeter fence installed around the Center. Unauthorized access by trespassers is most likely to occur on the west side of the installation because of the nearby Johnson Valley off-road vehicle area; however, unauthorized access has also been documented on the east and north sides of the installation. Bilingual signs are posted at existing roads, trails, and access points and contain warnings about potential hazards (such as UXO and high energy equipment) but there still is a potential for a trespasser to encounter UXO. However, most ordnance delivery activities occur in more central Training Areas away from the perimeter of the base. In addition, non-military activities such as hiking and off-road vehicle recreation occur on the public and privately owned lands immediately surrounding MCAGCC. Prior to daily training exercises a safety helicopter performs a visual flight around the scheduled Training Area to search for unauthorized personnel. If trespassers are encountered they are quickly escorted off-base prior to initiation of training activities. Therefore, ordnance delivery operations under the No-Action Alternative do not have significant public health and safety impacts.

Protection of Children

Per EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, impacts to children as a result of the No-Action Alternative have been evaluated. Ongoing training activities do not result in the creation of hazardous substances or contamination that could potentially affect children. As with procedures for unauthorized military personnel, children are restricted from having access to any of the Training Areas used for maneuvers or ordnance delivery and, therefore, do not come into contact with unsafe operations or hazardous materials (such as UXO). Estimated emissions associated with training are in compliance with federal air quality standards, and all solid waste and hazardous substances associated with training activities are disposed of offsite in accordance with all applicable federal and state regulations. Therefore, implementation of the No-Action Alternative does not result in significant health and safety risks to children.

4.9.2.2 Proposed Action

The Proposed Action would involve an increase in the amount or frequency of vehicle maneuvers, infantry maneuvers, aircraft operations, and ordnance delivery at MCAGCC. However, the types of activities would not change, nor would the areas where these activities are conducted. Therefore, the impacts to public health and safety associated with the Proposed Action would be similar to impacts associated with the No-Action Alternative. In addition, impacts to public health and safety would continue to be minimized through coordination with Bearmat for range control and safety, AICUZ regulations, signs marking base boundaries, and adherence to applicable regulations for hazardous materials use and hazardous waste disposal. Therefore, implementation of the Proposed Action would not result in significant impacts to public health and safety, including protection of children.

4.10 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

4.10.1 Approach to Analysis

Population and expenditure impacts are assessed in terms of their direct effects on the local economy and related effects on other socioeconomic resources within the APE. Factors considered in assessing the socioeconomic impacts include whether or not ongoing or proposed training activities would result in a substantial shift in population trends, or notably affect regional employment, earning/spending patterns, or community resources.

In regards to potential environmental justice impacts, 3 criteria are used to assess the significance of impacts to minority and low income communities: 1) there must be one or more populations within the project area, 2) there must be adverse (or significant) impacts from the proposed action; and 3) the environmental justice populations within the project area must bear a disproportionate burden of those adverse impacts. If any of these criteria are not met, then impacts with respect to environmental justice are not considered significant.

4.10.2 Impacts

4.10.2.1 No-Action Alternative

MCAGCC greatly influences the socioeconomic conditions of the APE. In 2001, 67 percent of the total population within the APE was directly associated with MCAGCC (either as active duty personnel, retired military, civilians, or as military-dependents) (MCAGCC 2002d). MCAGCC is the largest single employer in the regional economy. Approximately \$300 million in military and civilian salaries are estimated to influence the economic activity of the area (MCAGCC 2002d). Over \$40 million in service and support contracts are generated from MCAGCC, providing revenue which is largely dispensed into the local economy. Construction and maintenance contracts in FY01 generated approximately \$50 million for contractors in the local area and throughout the state of California. In addition, MCAGCC maintains facilities, ranges, and housing worth approximately \$1 billion (MCAGCC 2002d). The military influence also significantly impacts federal, state, and local funding at public schools within the APE. Approximately 6,300 students enrolled in the Morongo Unified School District are dependents of MCAGCC personnel. This results in the allocation of nearly \$37 million in annual funding to schools within the APE (Education Data Partnership 2002). Ongoing operations at MCAGCC have a substantial positive impact on the socioeconomic environment in the surrounding region.

4.10.2.2 Proposed Action

Implementation of the proposed action would result in a 15-percent increase in vehicle maneuver, infantry maneuvers, aircraft operations, and ordnance deliveries. No new types of training activities would occur, and no additional permanent personnel would be assigned to MCAGCC Twentynine Palms. Therefore, impacts to socioeconomic associated with the Proposed Action would be the same as those described above for the No-Action Alternative.

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CHAPTER 5

CUMULATIVE EFFECTS

Federal and US Navy regulations implementing NEPA (42 USC § 4321 *et seq.* and 32 CFR 775, respectively) and the Marine Corps' Environmental Compliance and Protection Manual (MCO P5090.2A) require that the cumulative impacts of a proposed action be assessed. CEQ regulations implementing the procedural provision of NEPA define cumulative impacts as:

"The impact on the environment which results from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1507).

In order to analyze cumulative effects, a cumulative effects region must be identified within which effects of the proposed action and other past, proposed, and reasonably foreseeable actions would be cumulatively recorded or experienced. For this Programmatic EA, the region where cumulative effects may occur includes MCAGCC Twentynine Palms and the immediate vicinity. Several past, present, and reasonably foreseeable actions have been identified as potentially occurring within the identified cumulative effects region. A short description of each action is provided below.

5.1 CUMULATIVE PROJECTS

5.1.1 Expeditionary Airfield Enhancements

A feasibility study is currently being prepared to analyze the potential development of a parallel runway, concrete apron and taxiway, and supporting infrastructure at the Expeditionary Airfield in order to enhance the safety and capabilities of the airfield. At the conclusion of the Feasibility Study, an EA will be prepared to analyze potential impacts of the construction and operation of the runway and associated facilities.

5.1.2 Mainside Area Projects

A variety of housing projects (e.g., Military Family Housing) and support facilities (e.g., Total Force Integration Facility) are currently in progress or proposed for the Mainside Area of MCAGCC. Fifteen projects would be implemented over the next 4 years and would total approximately 735,000 ft² (68,000 m²).

5.1.3 Central Magazine Area

An EA has been prepared to analyze the potential impacts of actions associated with the construction of additional ammunition storage facilities at the Center Magazine Area, located within the Range Training Area, northwest of Mainside at MCAGCC Twentynine Palms. The purpose of the proposed action is to increase the ammunition storage capacity of the Center Magazine Area in order to bring the facility into compliance with ESQD regulations. No significant impacts were identified.

5.1.4 Equipment Upgrades at Range 500

An EA will be prepared for proposed equipment upgrades at Range 500. Range 500 encompasses approximately 1,725 acres (698 ha) within the Cleghorn Pass Training Area in the southeastern sector of the installation and is one of the most used ranges at MCAGCC Twentynine Palms. The purpose of the proposed action is to provide equipment upgrades for Range 500 existing facilities and support area.

contribute only slightly to overall vehicle and ordnance-related noise, and would represent a negligible proportion of overall vehicle maneuver activities. Therefore, in conjunction with other past, present, or reasonably foreseeable projects, the No-Action Alternative and the Proposed Action would not result in significant cumulative impacts to transportation and circulation at MCAGCC.

5.2.8 Land Use

Ongoing and proposed training activities would be consistent with existing and planned land use designations, as would each of the cumulative projects. Average noise levels and noise contours associated with ongoing and proposed training activities are consistent with all current and planned land uses off base and in the Mainside Area. All onbase land uses are consistent with the mission requirements of MAGTFTC and are not adversely affected by training-related noise. Therefore, in conjunction with other past, present, or reasonably foreseeable projects, the No-Action Alternative and the Proposed Action would not result in significant cumulative impacts to land use at MCAGCC.

5.2.9 Public Health and Safety

All ongoing and proposed training activities would continue to be coordinated closely with Bearmat operations and safety specialists to ensure that training operations are conducted in a safe and responsible manner. All hazardous materials (including munitions and UXO) and hazardous wastes would be handled, used, and disposed of properly in accordance with applicable regulations. Training activities do not pose health or safety risks to children or other non-participants in the Mainside Area or off base. Proposed cumulative projects, with the exception of the Assault Breacher Vehicle, are not training-related and therefore would not present the same kinds of safety issues as those addressed in this EA (See Section 4.9). Such projects would occur only when workers are authorized by Bearmat, all persons involved in construction activities would attend a safety briefing, and all hazardous materials and wastes would be

5.1.8 Landfill Expansion and Material Recovery Complex

An EA is being prepared to evaluate the potential impacts associated with a proposed expansion of the existing landfill at MCAGCC and the construction and operation of a material recovery facility. The project would increase the capacity of the landfill by more than a million cubic meters and would include excavation and stockpiling of native soil, installation of a non-porous liner, construction of leachate and methane gas collection systems, and a support building. The material recovery facility would consist of 4 separate buildings: a general waste sorting facility, a recycled material sorting and bailing facility, recycled material storage building, and an administrative support facility.

5.2 CUMULATIVE IMPACT ANALYSIS

This section addresses, for each resource area, the additive effects of the No-Action Alternative and the Proposed Action in conjunction with the projects identified above.

5.2.1 Geological Resources

Ongoing and proposed training activities in conjunction with identified cumulative projects would not result in significant cumulative impacts to geological resources. With the exception of the Assault Breacher Vehicle project, none of the cumulative projects above would impact soils in the same manner or in the same areas as ongoing or proposed training operations. Appropriate design measures, erosion control plans, and standard construction practices would be implemented for all projects involving new construction to reduce the potential for impacts. The Assault Breacher Vehicle would have similar potential effects as other tracked vehicles described in this EA (see Section 4.1), but the 6 proposed

used and disposed of in accordance with applicable regulations and base policies. Therefore, in conjunction with other past, present, or reasonably foreseeable projects, the No-Action Alternative and the Proposed Action would not result in significant cumulative impacts to land use at MCAGCC.

5.2.10 Socioeconomics and Environmental Justice

Ongoing and proposed training activities in conjunction with identified cumulative projects would result in positive cumulative impacts to socioeconomics. The cumulative projects would generate additional short-term construction expenditures, employment, and payroll effects in the local economy to contribute to the already substantial economic benefits of the base's presence. No cumulative impacts to environmental justice considerations would occur.

CHAPTER 6

OTHER CONSIDERATIONS REQUIRED BY NEPA

This chapter addresses topics required by NEPA in an EA, including irreversible and irretrievable commitments of resources, possible conflicts between the No-Action Alternative or Proposed Action and the objectives of federal, regional, state, and local land use plans, policies, and controls. In addition, the relationship between short-term environmental impacts and long-term productivity is addressed.

6.1 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

Energy required to successfully implement the No-Action Alternative or the Proposed Action would include fossil fuels and electricity needed to power aircraft, missiles, targets, vehicles, and equipment. Fuels for training vehicles are currently available and are in adequate supply from Marine Corps-owned sources or from area commercial distributors. Required electricity demands would be supplied by the existing electrical service at MCAGCC or by generators at some of the base's remote locations.

Direct energy requirements of the No-Action Alternative or the Proposed Action are limited to those necessary to operate established facilities, vehicles, and equipment. No superfluous use of energy related to the No-Action Alternative or the Proposed Action has been identified, and proposed energy uses have been minimized to the maximum extent possible without compromising the integrity of the training and facility management activities. Therefore, no additional conservation measures related to direct energy consumption are identified.

6.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

NEPA requires a discussion of any irreversible or irretrievable commitment of resources that would be involved in the action should it be implemented (40 C.F.R. § 1502.16 [1997]). Resources that are irreversibly or irretrievably committed to a project are those that are used on a long-term or permanent basis. This includes the use of nonrenewable resources such as metal, wood, fuel, and paper. Human labor is also considered an irretrievable resource. These resources are irretrievable in that they would be used for this project when they could have been used for other purposes. Another issue that falls under the category of the irreversible and irretrievable commitment of resources is the unavoidable destruction of natural resources, which could limit the range of potential uses of that particular environment.

Ongoing training operations at MCAGCC would require small amounts of nonrenewable resources (e.g., fuels, wood, metals, etc.). Implementation of the Proposed Action would require slightly elevated amounts of nonrenewable resources in comparison to the No Action Alternative. However, implementation of the No-Action Alternative or the Proposed Action would not result in the destruction of natural resources such that the range of potential uses of the environment would be limited. The proposed action or alternatives would not affect the biodiversity or cultural integrity of MCAGCC.

6.3 POSSIBLE CONFLICTS BETWEEN THE PROPOSED ACTION OR ALTERNATIVES AND THE OBJECTIVES OF FEDERAL AND STATE LAND USE PLANS, POLICIES, AND CONTROLS

The No-Action Alternative or the Proposed Action would be consistent with base land use plans as described in the MCAGCC Master Plan and with the land use objectives of the Chief of Naval Operations. Implementation of the No-Action Alternative or the Proposed Action would not conflict with the objectives of federal and state land use plans, policies, and controls. Table 6-1 provides a summary of environmental compliance for the proposed action.

Table 6-1. Possible Conflicts between the Proposed Action or Alternatives and the Objectives of Federal and State Land Use Plans, Policies, and Controls

<i>Plans, Policies, and Controls</i>	<i>Responsible Agency</i>	<i>Status of Compliance</i>
NEPA (42 USC 4321 <i>et seq.</i>), U.S. Navy Procedures for Implementing NEPA (32 CFR 775)	U.S. Navy	This EA has been prepared in accordance with the CEQ Regulations implementing NEPA and U.S. Navy NEPA procedures.
Clean Water Act Sections 401/402 (33 USC 1251 <i>et seq.</i>), Section 404 (33 USC 1251 <i>et seq.</i>)	USEPA/ U.S. Army Corps of Engineers	Implementation of the No-Action Alternative or Proposed Action would not discharge or place fill material into waters of the U.S.
EO 11990, <i>Protection of Wetlands</i>	U.S. Navy	Implementation of the No-Action Alternative or Proposed Action would not impact wetlands.
EO 11988, <i>Floodplain Management</i>	U.S. Navy	Implementation of the No-Action Alternative or Proposed Action would not impact floodplains.
ESA (16 USC 1531)	USFWS	No significant impacts to threatened or endangered species would occur as a result of implementation of the No-Action Alternative or Proposed Action.
CAA, as amended (42 USC 7401 <i>et seq.</i>)	USEPA	Implementation of the No-Action Alternative or Proposed Action would not compromise air quality attainment status or conflict with established attainment status and maintenance goals.
EO 12898, <i>Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations</i>	U.S. Navy	Minority or low-income populations would not be disproportionately affected by implementation of the No-Action Alternative or Proposed Action
EO 13045, <i>Protection of Children from Environmental Health Risks and Safety Risks</i>	U.S. Navy	Implementation of the No-Action Alternative or Proposed Action would not disproportionately expose children to environmental health risks or safety risks.
National Historic Preservation Act, Section 106 (16 USC 470 <i>et seq.</i>)	California State Historic Preservation Office	Implementation of the No-Action Alternative or Proposed Action would not impact cultural resources.
MCAGCC Master Plan	U.S. Marine Corps	Implementation of the No-Action Alternative or Proposed Action would be consistent with base land use plans as described in the Master Plan.

6.4 RELATIONSHIP BETWEEN SHORT-TERM ENVIRONMENTAL IMPACTS AND LONG-TERM PRODUCTIVITY

NEPA requires an analysis of the relationship between a project's short-term impacts on the environment and the effects that these impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This refers to the possibility that choosing one development option reduces future flexibility in pursuing other options, or that giving over a parcel of land or other resource to a certain use often eliminates the possibility of other uses being performed at that site.

The No-Action Alternative or the Proposed Action would result in both short-term environmental effects and long-term productivity. However, they would not result in any impacts that would reduce environmental productivity, permanently narrow the range of beneficial uses of the environment, or pose long-term risks to health, safety, or the general welfare of the public.

CHAPTER 7

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CHAPTER 8

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Appendix A

MCAGCC's Training Areas and Ranges

Table A-1. MCAGCC's Training Areas

<i>Training Area</i>	<i>Acres</i>	<i>Description</i>
Acorn	17,463	The Acorn Training Area is located in the southwestern area of MCAGCC and is used as a non-live-fire maneuver area. A SUA #1 is located at the southeastern portion of the Acorn Training Area, while a SUA #2 is located at the southwestern portion and extends into the Sand Hill Training Area to the south. A second SUA #2 is located at the northwestern portion of the Acorn Training Area and extends into the Emerson Lake Training Area.
America Mine	20,910	The America Mine Training Area is located on the eastern boundary of MCAGCC and is used for patrolling, mortar firing, infantry training, and LAV training. America Mine is composed of both mountainous (37%) and rolling terrain.
Black Top	50,848	The Black Top Training Area is located on the northern boundary of MCAGCC and is used for tank gunnery, artillery and small arms training, and major exercises. Black Top Training Area is mostly gently sloping and only 13% of this area is mountainous or rough.
Bullion	28,860	The Bullion Training Area is located to the west of America Mine Training Area and is used for aviation bombing and strafing, gunnery practice, artillery, and infantry maneuvers. Ranges 603, 605, and 607 are contained within the Bullion Training Area. Approximately 44% of the Bullion Training Area is mountainous. A SUA #2 is located at the southern portion of the Bullion Training Area.
Cleghorn Pass	36,301	The Cleghorn Pass Training Area is located in the southeastern area of MCAGCC and is used for small arms, tank gunnery, LAV live-fire, and maneuvers. Cleghorn Pass contains several Fixed Ranges: Range 400, Range 410, Range 410A, Range 500, and a Battle Site Zero Range (BZO). The Armor Multi-Purpose Range Complex, used for tank exercises, is located within Range 500. About 40% of the area within the Cleghorn Pass Training Area is mountainous or rough.
Delta	29,748	The Delta Training Area is located in the central area of MCAGCC and is used for live fire maneuvers and major exercises. Live fire is limited due to safety considerations. Heavy use occurs during pre-CAX and by tenant commands. About 48% of the Delta Training Area is gently sloping and 52% is mountainous. A SUA#1 is located at the southern boundary of the Delta Training Area. This SUA extends into the Prospect Training Area.
East	6,890	The East Training Area is located in the southern area of MCAGCC, east of Mainside, and is used for non-live fire activities, live-fire activities that impact in Prospect and Delta Training Areas, and as a staging area for major exercises. The majority of the East Training Area is gently sloping and only 12% is mountainous.

Table A-1. MCAGCC's Training Areas

<i>Training Area</i>	<i>Acres</i>	<i>Description</i>
Emerson Lake	32,141	The Emerson Lake Training Area is located at the western boundary of MCAGCC and is used for tank maneuvers, aviation bombardment, and aerial targetry. Principal use occurs during pre-CAX and Final Exercises. Approximately 70 % of the land is gently sloping and the remaining is composed of low rolling terrain (only 13% is mountainous or rough). A SUA #1 and a SUA #2 are located at the western and southwestern portion of the Emerson Lake Training Area, respectively. The SUA#2 extends into the Acorn Training Area to the south.
Gays Pass	18,307	Gays Pass Training Area is located in the northwestern area of MCAGCC and is used for ground-based, live-fire exercises and artillery. Principal use occurs during pre-CAX and Final Exercises. Gays pass is characterized by gently sloping land and mountains on either side (approximately 44% is mountainous).
Gypsum Ridge	17,546	The Gypsum Ridge Training Area is located in the southwestern area of MCAGCC and is used for bivouac and wheeled vehicle maneuvers and, on special occasion, live fire demonstrations. This area is used as a staging area for CAX Final Exercises. Gypsum Ridge consists of low rolling terrain and includes the northern section of Deadman Lake (a dry lake bed). The Gypsum Ridge Training Area has one SUA#1 in its southeastern section.
Lava	22,775	The Lava Training Area is located in the center of MCAGCC, to the north of the Cleghorn Pass Training Area, and is used primarily for battalion tactical training (including both ground-based and combined ground/air live-fire) and artillery. Principal use occurs during Pre-CAX and Final Exercises. The Lava Training Area has exposed lava rock and consists of 26% mountainous or rough terrain. A SUA#1 exists within the southwestern section of the Lava Training Area, while a second SUA #1 is located at the southeastern edge and extends into the Lead Mountain Training Area.
Lavic Lake	54,761	The Lavic Lake Training Area is located in the northwestern portion of MCAGCC and is used for aviation training exercises and live-fire maneuvers with major exercises. Principal use occurs during CAX Final Exercises. Most of the area is gently sloping and made up of lava rock. About 17% of the terrain is mountainous or rough. A SUA #1 is located at the northern portion and a SUA #2 is located at the northwestern portion of the Lavic Lake Training Area. A SUA #2 extends into the Sunshine Peak Training Area to the west.

Table A-1. MCAGCC's Training Areas

<i>Training Area</i>	<i>Acres</i>	<i>Description</i>
Lead Mountain	53,548	Located at the far northeastern boundary of MCAGCC, Lead Mountain Training Area is used for aviation, artillery, and ground-based live-fire. A dummy airfield is located in the southern portion of the Training Area. Principal use occurs during CAX Final Exercises. Lead Mountain Training Area is composed mostly of gently sloping land and only 8% of the terrain is rough. Three SUA #1s exist within the Lead Mountain Training Area. The first is located at the southwestern edge and is shared with the Lava Training Area, the second is located at the northern section, and the third is at the western section where a radio repeater station is located (see Figures 2-1 and 3-1). Two SUA#2 also exist within the Lead Mountain Training Area; one is located at the western section and the other borders the eastern boundary of Dry lake.
Main Side	3,942	Mainside is located at the southern boundary of MCAGCC and includes administration, housing, maintenance, supply and support, and community facilities. Live fire is limited due to safety considerations. Mainside is periodically used for Military Operations on Urbanized Terrain training.
Maumee Mine	16,103	The Maumee Mine Training Area is located at the northwestern boundary of MCAGCC and is used for artillery and maneuver training exercises. Principal uses of this area occur during CAX Final Exercises. This area is 19% mountainous.
Noble Pass	24,029	The Noble Pass Training Area is located in the center of MCAGCC and is used for aviation and/or ground-based live-fire, tank maneuvers, infantry training, and CAX's with some artillery use. This area is approximately 59% mountainous.
Prospect	13,146	The Prospect Training Area is located just north of the East Training Area in the southern portion of MCAGCC and is used for battalion and company level training. Principal use of this area occurs during Pre-CAX and by tenant commands. Approximately 22 % of the Prospect Training Area is mountainous. A SUA#1 is located at the northwestern section of the Prospect Training Area, extending into the Delta Training Area.
Quackenbush Lake	42,415	The Quackenbush Training Area is located east of the Emerson Lake Training Area, at the western section of MCAGCC. This area is used for ground-based live-fire, artillery, aviation training, and maneuvers. Heavy use occurs during Pre-CAX, Final Exercises and by tenant units. Approximately 13% of the terrain is mountainous. A SUA #2 is located at the eastern border of the Quackenbush Lake Training Area. This SUA extends slightly into the northwestern portion of the Range Training Area.

Table A-1. MCAGCC's Training Areas

<i>Training Area</i>	<i>Acres</i>	<i>Description</i>
Rainbow Canyon	25,567	The Rainbow Canyon Training Area is located to the west of the Black Top Training Area in the northwestern section of MCAGCC. It is used as a live-fire and maneuver area. Principal use occurs during pre-CAX and Final Exercises. Range 601 (Sensitive Fuse Impact Area), an abandoned air-to-ground range, is located within the Rainbow Canyon Training Area.
Range	21,739	The Range Training Area is located in the central part of MCAGCC and is used for training using fixed ranges and Sensitive Fuse Areas. Approximately 19% of the Range Training Area is mountainous or consists of rough terrain. A SUA#2 is located at the northwestern portion of the Range Training Area, extending into the Quackenbush Lake Training Area.
Sand Hill	16,786	The Sand Hill Training Area is located at the far southwestern border of MCAGCC and is used for maneuvers. Portions of the Exercise Support Base and Expeditionary Airfield as well as Assault Landing Zone Sand Hill are located within the Sand Hill Training Area. Portions of 3 SUA #1s occupy the northeastern end and a SUA #2 occupies the majority of the western and southern parts of the Training Area. Live-fire is not conducted due to proximity to Mainside which is located to the east.
Sunshine Peak	22,892	The Sunshine Peak Training Area is located at the far northwestern area of MCAGCC. This area is seldom used. When used, its primary use is an emergency ordnance drop zone. Approximately 38% of the Sunshine Peak Training Area is mountainous. A SUA #1 is located at the southeastern portion, while a SUA #2 occupies the northern portion of the Sunshine Peak Training Area, extending into the Lavie Lake Training Area.
West	10,621	The West Training Area is located in the southern area of MCAGCC, northwest of Mainside. Portions of Drop Zone Sand Hill, the Expeditionary Air Field and Exercise Support base, as well as the Assault Landing Zone are located within the West Training Area. No live fire maneuvers occur at the West Training Area. This area is used as a staging area for major exercises. Most of the West Training Area consists of gently sloping terrain. A SUA #1 occupies the northern section, while a SUA #2 occupies the southern edge of the West Training Area.

Source: MAGTFTC 2001a

Table A-2. MCAGCC's Fixed Ranges

<i>Range</i>	<i>Training Area</i>	<i>Description</i>
051	Range	EOD special use range for testing of equipment.
100	Cleghorn Pass	Squad Maneuver Range; this range is a land navigation training course.
101	Range	Tank Main Gun Training Range (miniaturized scale). This live-fire range is designed for armor units to fire subcaliber training devices at scaled targets. Range 101 is also used as a small arms and pistol range.
101A	Range	Battle Site Zero (BZO) Range. A BZO range is a 50 meter course for calibrating weapons.
102	Range	Squad Maneuver Range. The Compass Course is also a non-live fire land navigation course
103	Range	Squad Defensive Firing Range. This live-fire range is designed to improve defensive tactics by incorporating changing deployment requirements and scenarios.
104	Range	Anti-Mechanized/Grenade Range. Range 104 is designed to develop the confidence of unit members in their abilities to use grenades and special weapons.
105	Range	Gas chamber training occurs within Range 105.
105A	Range	BZO Range. A BZO range is a 50 meter course for calibrating weapons.
106	Range	Range 106 is a Mortar Range. Units practice firing live mortars.
107	Range	Infantry Squad Battle Course; this live-fire range features quick-reaction scenarios such as ambushes, raids, and reconnaissance.
108	Range	Infantry Squad Assault Range; this range is designed to improve offensive tactics during changing deployment requirements and scenarios.
109	Range	Anti-Armor Live Fire Tracking Range. Range 109 is designed primarily for use by DRAGON or TOW weapons systems.
110	Range	MK-19 Range; this live-fire range is used for firing of the MK-19 machine gun.
111	Range	Military Operations in Urban Terrain Assault Course (MOUT). Used to train units for MOUT operations and features automated stationary and moving targets.

Table A-2. MCAGCC's Fixed Ranges

<i>Range</i>	<i>Training Area</i>	<i>Description</i>
112	Range	EOD Demolition Range. Range 112 is restricted to MCAGCC EOD units for destroying dud and Grade III ordnance, as well as training with and testing special EOD tools and equipment.
113	Range	Multi-Purpose Machine Gun Range. This live fire range is designed for offensive and defensive machine gun practice.
113A	Range	BZO Range. A BZO range is a 50 meter course for calibrating weapons.
114	Range	Combat Engineer Demolition Range. This range is designed for company training in most types of mine training.
400	Cleghorn Pass	Company Live Fire and Maneuver Range. Range 400 is designed for company sized live-fire attacks on enemy strongholds.
410	Cleghorn Pass	Rifle Platoon Attack Range. Range 410 is designed for rifle platoons to attack enemy positions and practice wire breaching and trench clearing procedures.
410A	Cleghorn Pass	Rifle Platoon Attack Range. This range is designed to provide a rifle platoon the opportunity to conduct a minefield breach and a dismounted, live attack against an enemy squad.
500	Cleghorn Pass	Armor Live Fire and Maneuver Range. Provides the sites and supporting facilities for armor and anti-armor training.
601	Rainbow Canyon	Super Sensitive Fuse Impact Range. This range is restricted to critical fuse and ordnance that can be delivered by indirect fire weapons or aircraft. <i>Note: This range has been closed to sensitive fuses since 1995.</i>
605	Bullion	Helicopter Door Gunnery Range. This range is used by aircraft crews to train in the firing of machine guns and rockets.

Source: MAGTFTC 2001a; MAGTFTC 2002f.