Final

ENVIRONMENTAL ASSESSMENT

Aerial Maneuver Zones for MV-22 and Rotary-Wing Training at the Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center, Twentynine Palms, California

United States Marine Corps

May 2010

Acronyms and Abbreviations

°	degree(s)
°F	degrees Fahrenheit
µg/m^3	micrograms per cubic meter
%	percent
AB	Assembly Bill
AESO	Aircraft Environmental Support Office
AGL	above ground level
ALM	maximum sound level
ALZ	assault landing zone
AMZ	aerial maneuver zone
APE	area of potential effect
ATCAA	Air Traffic Control Assigned Airspace
BASH	Bird Airstrike Hazard
BO	Biological Opinion
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
CASEVAC	casualty evacuation
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Resources, Compensation, and Liability Act
CFR	Code of Federal Regulations
CH_4	methane
CLZ	combat landing zone
CMBC	Circle Mountain Biological Consultants
CMC	Commandant of the Marine Corps
CNEL	community noise equivalent level
$CNEL_{mr}$	Onset-Rate Adjusted Monthly variant of CNEL
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_{2e}	carbon dioxide equivalent
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
DoN	Department of Navy
EA	Environmental Assessment
EAF	Expeditionary Airfield
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
EXT	external loads
FAA	Federal Aviation Administration
FARP	forward arming and refueling point
FOD	foreign objects and debris
GHG	greenhouse gas
GWP	global warming potential
HIE	helicopter insertion and extraction
HRST	helicopter rope suspension techniques
INRMP	Integrated Natural Resources Management Plan
IP	initial point
knots	nautical miles per hour
L_{max}	maximum sound level
LZ	landing zone
MAGTF	Marine Air Ground Task Force
MAGTFTC	Marine Air Ground Task Force Training Command
MBTA	Migratory Bird Treaty Act
MCAGCC	Marine Corps Air Ground Combat Center
MCAS	Marine Corps Air Station
MCO	Marine Corps Order
MDAB	Mojave Desert Air Basin
MDAQMD	Mojave Desert Air Quality Management District
MOA	Military Operations Area
MV-22	MV-22 Osprey tilt-rotor
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAF	Naval Air Facility
NATOPS	Naval Air Training and Operations Procedures Standardization
NAVFAC	Naval Facilities Engineering Command
NAVMC	Navy Marine Corps
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NO_x	oxides of nitrogen
NREA	Natural Resources and Environmental Affairs
NRHP	National Register of Historic Places
O_3	ozone
OLZ	operational landing zone
Pb	lead
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
ppm	parts per million
PZ	pickup zone
RCRA	Resource Conservation Recovery Act
ROI	region of influence
RONA	Record of Non-Applicability
SCM	special conservation measure
SEL	sound exposure level
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_x	oxides of sulfur
SUA	Special Use Airspace
TA	Training Area
TECOM	Training and Education Command
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USMC	U.S. Marine Corps
VOC	volatile organic compound

DEPARTMENT OF DEFENSE
UNITED STATES MARINE CORPS
FINDING OF NO SIGNIFICANT IMPACT FOR THE AERIAL MANEUVER ZONES FOR MV-22 AND ROTARY-WING TRAINING AT THE MARINE AIR GROUND TASK FORCE TRAINING COMMAND, MARINE CORPS AIR GROUND COMBAT CENTER, TWENTYNINE PALMS, CALIFORNIA

Pursuant to the Council on Environmental Quality regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508) implementing procedural provisions of the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [USC] §§ 4321-4370h); and United States Marine Corps procedures for implementing NEPA, as described in Marine Corps Order (MCO) P5090.2A, Change 2, dated 21 May 2009, *Environmental Compliance and Protection Manual*, the United States Marine Corps (USMC) gives notice that an Environmental Assessment (EA) has been prepared and an Environmental Impact Statement (EIS) will not be prepared for the development and use of aerial maneuver zones by MV-22 Osprey tilt-rotor aircraft (MV-22) and rotary-wing aircraft training at the Marine Air Ground Task Force Training Command (MAGTFTC), Marine Corps Air Ground Combat Center (MCAGCC) located at Twentynine Palms, California (herein referred to as the Combat Center). Based on the analysis provided in the EA, I have selected Alternative 1 and find that it will not have a significant impact on the human environment, and, therefore, an EIS is not required.

Background: The MV-22 provides medium lift capability in support of: a) the full spectrum, joint, and combined Marine Air Ground Task Force (MAGTF) Predeployment Training Program; b) unit and individual training standards for both ground and air-related mission essential tasks; and c) combined arms exercises. The CH-46E Sea Knight is a USMC medium-lift helicopter used as an assault support helicopter. Its primary role is the transport of Marines into battle, often airlifting them directly from amphibious assault ships to the combat zone. A secondary role is the transport of supplies, which it can haul in its cabin or in underslung loads (i.e., any external load hanging beneath the aircraft). The CH-53E Super Stallion is a USMC heavy-lift transport helicopter also used for transporting Marines and supplies. The demand to integrate the MV-22 into existing exercises and operations is increased due to the decreased availability of the aging CH-46E, which has limited battlefield use due to its age and maintenance requirements. The MV-22 aircraft, which is replacing the CH-46E aircraft, utilizes tilt-rotor technology to provide the maneuverability and lift of a helicopter. In fixed-wing mode, MV-22s can fly twice as fast, four times as far, and carry twice the combat load of the CH-46E. Thus, replacing the CH-46E with the MV-22 will modernize the USMC medium fleet and improve the operational capabilities of the MAGTFs in full spectrum, combined, and joint operations.

Proposed Action: The proposed action consists of operating and integrating up to eight MV-22 aircraft squadrons (12 aircraft per squadron) into the current and future rotary-wing tactical and ground training activities as directed by Navy Marine Corps (NAVMC) Directive 3500.11. This will result in up to 2,148 sorties annually at the Combat Center. A busy month will involve about 267 sorties over 17 days of operations throughout the Combat Center, an average of about 16 sorties per day. Established Special Use Airspace will not be expanded or modified with implementation of the proposed action.

The purpose of the proposed action is to utilize identified aerial maneuver zones (AMZs) to integrate the MV-22 airframe into the existing rotary-wing tactical and ground training activities, as directed by NAVMC Directive 3500.11 and by applicable unit and individual ground training

standards. The need for the proposed action is to ensure that current and future operations and training requirements are met.

The integration of the MV-22 aircraft into the current and future rotary-wing tactical and ground training activities will be conducted where it can best support the full spectrum of combined, joint, and MAGTF training and special exercise operations. This will be done while making full use of existing land and airspace to the greatest extent practicable. Implementing the proposed action will ensure MV-22 and rotary-wing readiness, training, and special exercise operations will attain and maintain operational employment proficiency.

Alternatives: The EA evaluates two action alternatives and the No-Action Alternative. Alternative 1 involves the development and use of AMZs at the Combat Center for MV-22 and rotary-wing aircraft training. Seventy three AMZs were initially sited based on training and operational requirements before consideration of potential biological or cultural resource constraints. Subsequently, 25 AMZs were identified as potentially having biological or cultural resource constraints. The remaining 48 AMZs comprise Alternative 1 and cover a total of approximately 1,402 acres. Alternative 2 involves the development and use of 73 AMZs: the 48 AMZs from Alternative 1 plus the additional 25 AMZs identified as potentially having biological or cultural resource constraints. The 73 AMZs comprising Alternative 2 cover a total of approximately 2,193 acres. Under the No-Action Alternative, the proposed AMZ training activities for MV-22 and rotary-wing aircrews would not occur.

Summary of Environmental Effects: The EA analyzes the potential environmental impacts associated with implementation of Alternative 1, Alternative 2, and the No-Action Alternative. The resources most likely to be affected by this action are biological resources, cultural resources, air quality, and noise. Conversely, impacts to the following resources were considered to be negligible or non-existent and were not further analyzed in the EA: geological resources; water resources; utilities; community services; land use; visual resources; transportation and circulation; public health and safety; and socioeconomics and environmental justice. Implementation of the selected alternative (Alternative 1) will not result in significant environmental impacts. The selected alternative will have negligible direct, indirect, or cumulative impacts on the quality of the local environment and will comply with all regulatory requirements. A Record of Non-Applicability for Clean Air Act General Conformity requirements has been prepared and approved for this project.

Findings: There will not be any disproportionately high and adverse human health or environmental effects from the proposed action on minority and low-income populations. Nor will there be any impacts associated with the protection of children from environmental health and safety risks.

The EA and FONSI addressing this action are on file, and interested parties may obtain a copy from: NREA Division, Building 1451, Box 788110, MAGTFTC, MCAGCC, Twentynine Palms, California, 92278. Telephone inquiries may be directed to Mr. Scott Kerr at (760) 830-8190. A limited number of copies of the EA are available to fill single copy requests.

MAY 21 2010

Date

H. S. CLARDY, III
Brigadier General, United States Marine Corps

FINAL

ENVIRONMENTAL ASSESSMENT

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

Title of Proposed Action: Aerial Maneuver Zones for MV-22 and Rotary-Wing Training at the Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center, Twentynine Palms, California

Affected Region: San Bernardino County, California

Designation: Environmental Assessment

Abstract

This Environmental Assessment (EA) has been prepared to evaluate the potential environmental impacts associated with the use of aerial maneuver zones (AMZs) by MV-22 Osprey tilt-rotor (MV-22) aircraft and rotary-wing aircraft at the Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center at Twentynine Palms, California. The MV-22 and a variety of rotary-wing aircraft would use the AMZs; the two representative types of rotary-wing aircraft addressed in this EA are the CH-46E and the CH-53E. The purpose of the proposed action is to utilize the identified AMZs to integrate the MV-22 airframe into the existing rotary-wing tactical and ground training activities, as directed by Navy Marine Corps (NAVMC) Directive 3500.11 and by applicable unit and individual ground training standards. The need for the proposed action is to ensure that current and future operations and training requirements are met. Potential impacts from two action alternatives and the No-Action Alternative have been analyzed.

This EA has been prepared in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [USC] § 4321-4370h); the Council on Environmental Quality implementing regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508); and U.S. Marine Corps procedures for implementing NEPA, as described in Marine Corps Order (MCO) P5090.2A, Change 2, Dated 21 May 2009, *Environmental Compliance and Protection Manual*. Potential impacts have been analyzed for biological resources, cultural resources, air quality, and noise. No significant environmental impacts would result from implementation of Alternative 1 (Preferred Alternative). Implementation of Alternative 2 would result in potentially significant impacts to biological and cultural resources; however, through implementation of special conservation measures, avoidance, or mitigation measures as discussed in Sections 4.1.2.2 and 4.2.2.2 of this EA, these potentially significant impacts would be reduced to below a level of significance.

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MAY 2010

EXECUTIVE SUMMARY

This Environmental Assessment (EA) has been prepared to evaluate the potential environmental impacts associated with the use of aerial maneuver zones (AMZs) by MV-22 Osprey tilt-rotor (MV-22) aircraft and rotary-wing aircraft at the Marine Air Ground Task Force Training Command (MAGTFTC), Marine Corps Air Ground Combat Center (MCAGCC) at Twentynine Palms, California. The MV-22 and a variety of rotary-wing aircraft would use the AMZs; the two representative types of rotary-wing aircraft in this EA are the CH-46E and the CH-53E. This EA has been prepared in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [USC] §§ 4321-4370h); the Council on Environmental Quality (CEQ) implementing regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508); and U.S. Marine Corps procedures for implementing NEPA, as described in Marine Corps Order (MCO) P5090.2A, Change 2, Dated 21 May 2009, *Environmental Compliance and Protection Manual*.

The purpose of the proposed action is to utilize the identified AMZs to integrate the MV-22 airframe into the existing rotary-wing tactical and ground training activities, as directed by Navy Marine Corps (NAVMC) Directive 3500.11 and by applicable unit and individual ground training standards. The need for the proposed action is to ensure that current and future operations and training requirements are met. The integration of the MV-22 aircraft into the current and future rotary-wing tactical and ground training activities would be conducted where it can best support the full spectrum of combined, joint, and Marine Air Ground Task Force (MAGTF) training and special exercise operations. This would be done while making full use of existing land and airspace to the greatest extent practicable. Implementing the proposed action would ensure MV-22 and rotary-wing readiness, and training and special exercise operations would attain and maintain operational employment proficiency.

Alternatives to the proposed action must be considered in accordance with NEPA, CEQ regulations for implementing NEPA, and MCO P5090.2A. However, only those alternatives determined to be reasonable relative to their ability to fulfill the purpose of and need for the proposed action require detailed analysis. This EA examines two action alternatives and the No-Action Alternative. Other action alternatives were considered but were not carried forward for analysis in this EA because they failed to satisfy the alternatives screening criteria and, therefore, do not meet the purpose and need. The No-Action Alternative is not a viable alternative since it does not meet the purpose and need; however, it is evaluated in this EA as required by NEPA.

Approximately 29,561 operations are currently conducted annually at the Combat Center. Existing use of AMZs consists of 2,148 sorties per year, with 859 sorties for the CH-46E and 1,289 sorties for the CH-53E. The MV-22 aircraft is replacing the CH-46E aircraft over time, and under the proposed action, the 859 sorties conducted by the CH-46E would instead be conducted by the MV-22. Consequently, the total number of AMZ sorties would not change. However, the MV-22s can fly twice as fast, four times as far, and carry twice the combat load of the CH-46E, so eventually fewer operations would be flown as the transition to MV-22s take place. As a result, the tempo of airspace use would decrease because the total number of operations at the Combat Center following implementation of the proposed action would be approximately 25,160 operations annually, 15% less than baseline conditions.

This EA focuses on biological resources, cultural resources, air quality, and noise. Cumulative effects of the proposed action in combination with other past, present, or reasonably foreseeable future actions were also analyzed. A summary of environmental consequences for Alternative 1 (Preferred Alternative), Alternative 2, and the No-Action Alternative is presented in Table ES-1. As shown in Table ES-1, no significant environmental impacts would occur with implementation of Alternative 1. Implementation of Alternative 2 would result in potentially significant impacts to biological and cultural resources; however, through implementation of special conservation measures, avoidance, or mitigation measures as discussed in Sections 4.1.2.2 and 4.2.2.2 of this EA, these potentially significant impacts would be reduced to below a level of significance.

Table ES-1. Summary of Environmental Consequences

Resource Area	Alternative 1	Alternative 2	No-Action Alternative
Biological Resources	○	◑	○
Cultural Resources	○	◑	○
Air Quality	○	○	○
Noise	○	○	○

Notes: ○ = Negligible or no adverse impacts; ◑ = Adverse but not significant impacts; + = Beneficial impacts; ● = Significant impacts.

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CHAPTER 1.
PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

This Environmental Assessment (EA) has been prepared by the United States Marine Corps (USMC) in accordance with the National Environmental Policy Act (NEPA) of 1969. It evaluates the potential environmental impacts associated with the use of aerial maneuver zones (AMZs) by MV-22 Osprey tilt-rotor (MV-22) aircraft and rotary-wing aircraft at the Marine Air Ground Task Force Training Command (MAGTFTC), Marine Corps Air Ground Combat Center (MCAGCC) at Twentynine Palms, California (herein referred to as the "Combat Center" or the "installation"). The MV-22 and a variety of rotary-wing aircraft would use the AMZs; the two representative types of rotary-wing aircraft in this EA are the CH-46E and the CH-53E. Photos of each aircraft type are shown in Figure 1-1.

Figure 1-1. MV-22, CH-46E, and CH-53E Aircraft

The MV-22 provides medium lift capability to assigned Exercise Forces. This is in support of: a) the full spectrum, joint, and combined Marine Air Ground Task Force (MAGTF) Predeployment Training Program; b) unit and individual training standards for both ground and air-related mission essential tasks; and c) Combined Arms Exercises. The Boeing CH-46E Sea Knight is a USMC medium-lift helicopter used as an assault support helicopter (Department of the Navy [DoN] 2010). Its primary role is the transport of Marines into battle, often airlifting them directly from amphibious assault ships to the combat zone. A secondary role is the transport of supplies, which it can haul in its cabin or in underslung loads (i.e., any external load hanging beneath the aircraft). The CH-53E Super Stallion is a USMC heavy-lift transport helicopter also used for transporting Marines and supplies (DoN 2010).

The demand to integrate the MV-22 into existing exercises and operations is increased due to the decreased availability of the aging CH-46E, which has limited battlefield use due to CH-46E age and maintenance requirements. The MV-22 aircraft, which is replacing the CH-46E aircraft, utilizes tilt-rotor technology to provide the maneuverability and lift of a helicopter. In fixed-wing mode, MV-22s can fly twice as fast, four times as far, and carry twice the combat load of the CH-46E (DoN 2009). Thus, replacing the CH-46E with the MV-22 will modernize the USMC medium fleet and improve the operational capabilities of the MAGTFs in full spectrum, combined, and joint operations.

A recent Environmental Impact Statement (EIS) (DoN 2009) assessed the impacts for west coast basing of the MV-22. This included: a) construction and/or renovation of airfield facilities necessary to accommodate and maintain the MV-22 squadrons, and b) conducting readiness and training operations and special exercise operations to attain and maintain proficiency in the operational employment of the

MV-22. The EIS identified the Combat Center as capable of supporting the readiness and training operations necessary to support the basing of the MV-22 at Marine Corps Air Station (MCAS) Miramar and MCAS Camp Pendleton. The EIS included impact analysis for landing zone (LZ) and airfield operations to be conducted at the Combat Center. Training operations at the AMZs identified in this EA were not part of the proposed west coast basing action.

Navy Marine Corps (NAVMC) Directive 3500.11, the *MV-22 Training and Readiness Manual* (USMC 2007a), presents standards and regulations regarding training of MV-22 aircrews. NAVMC Directive 3500.88 (USMC 2006a) and NAVMC Directive 3500.89 (USMC 2006b) present standards and regulations regarding training of CH-46E and CH-53E aircrews, respectively. Operations for new or transition pilots also require completing exercises in the Naval Air Training and Operations Procedures Standardization (NATOPS) flight manuals for the respective aircraft types: MV-22 aircraft (DoN 2006), CH-46E aircraft (DoN 1998), and Ch-53E aircraft (DoN 1989). The NATOPS manuals standardize ground and flight procedures for the MV-22 and rotary-wing aircraft. These manuals contain information on all aircraft systems, performance data, and operating procedures required for safe and effective operations.

1.2 LOCATION AND DESCRIPTION OF THE COMBAT CENTER

The Combat Center is located in the Mojave Desert approximately 130 miles east of Los Angeles and 54 miles northeast of Palm Springs in San Bernardino County, California (Figure 1-2). The southern boundary of the installation is located approximately 6 miles north of Highway 62. The City of Twentynine Palms is adjacent to the southern boundary of the installation. The northern boundary of the installation is located south of Interstate 40. The Combat Center is the Marine Corps' only combined arms live-fire and maneuver training range complex, encompassing 935 square miles and comprised of 22 training areas and Mainside. The majority of the Combat Center is undeveloped and devoted to combined arms live-fire and maneuver training activities. Mainside, located in the southernmost portion of the base (Figure 1-3), is the primary developed area on the installation, providing an array of maintenance, storage, administrative, and housing facilities. Proposed AMZ training activities would occur at training areas throughout the Combat Center.

Airspace for military operations is a critical component of the range capability necessary to train Marine Corps forces. Special Use Airspace (SUA) is "airspace of defined dimensions wherein activities must be confined because of their nature, or wherein limitations may be imposed upon aircraft operations that are not part of those activities" (Federal Aviation Administration [FAA] 2008). One of the types of airspace designated in the vicinity of the Combat Center is a Restricted Area. Restricted Area 2501 is divided into four subparts (north, south, east, and west). This SUA roughly overlies (but is not coincident with) the Combat Center's boundaries (Figure 1-4). The altitudes published for Restricted Area 2501 are unlimited, meaning from ground level to the upper altitude that is required for the activity. Published times of use are "continuous," meaning the SUA remains active in support of training 24 hours per day, 7 days per week, unless the SUA is released by the Combat Center for use by the Los Angeles Air Route Traffic Control Center.

1.3 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed action is to utilize the identified AMZs to integrate the MV-22 airframe into the existing rotary-wing tactical and ground training activities as directed by NAVMC Directive 3500.11 and applicable unit and individual ground training standards.

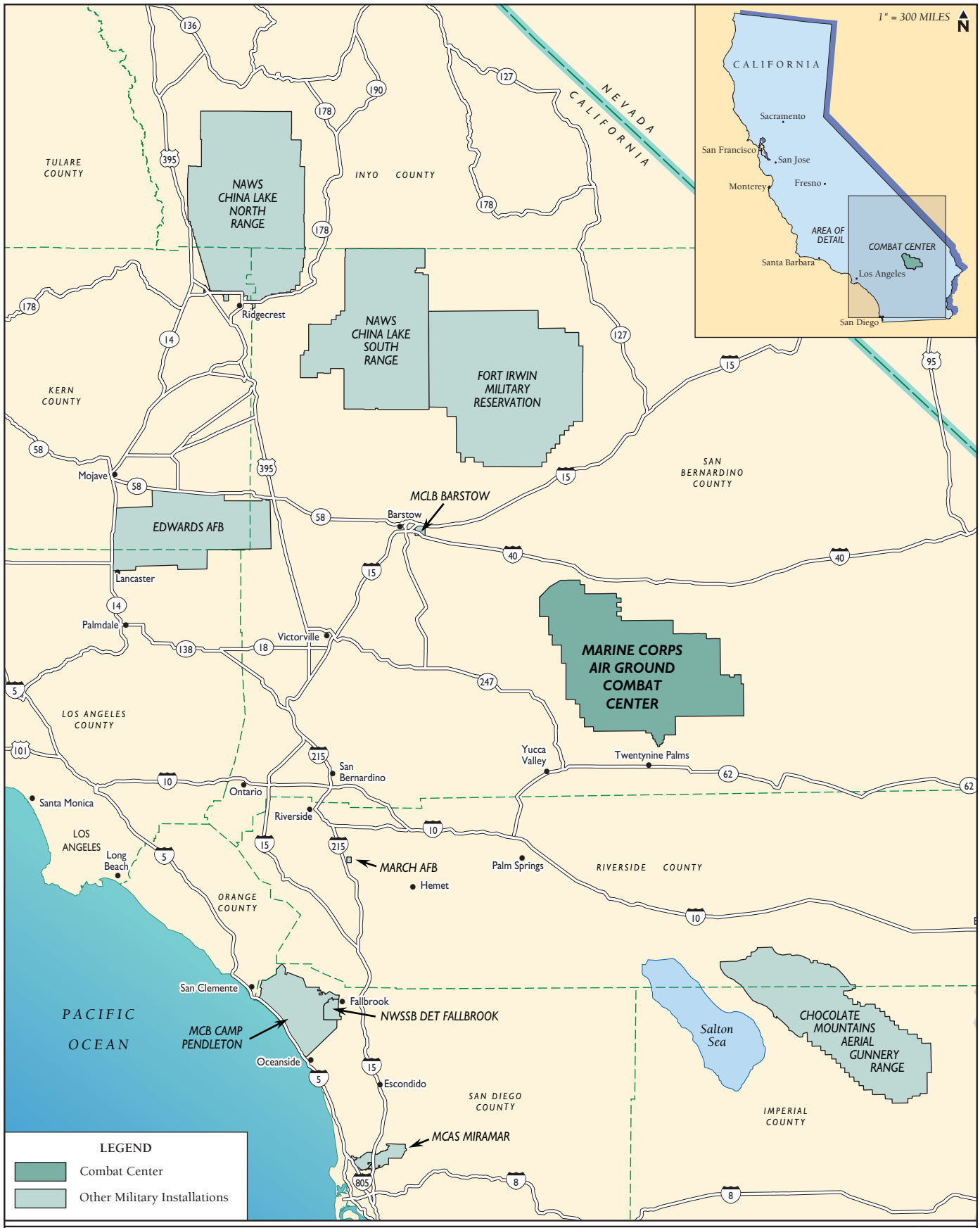


Figure 1-2
Regional Location of the Combat Center

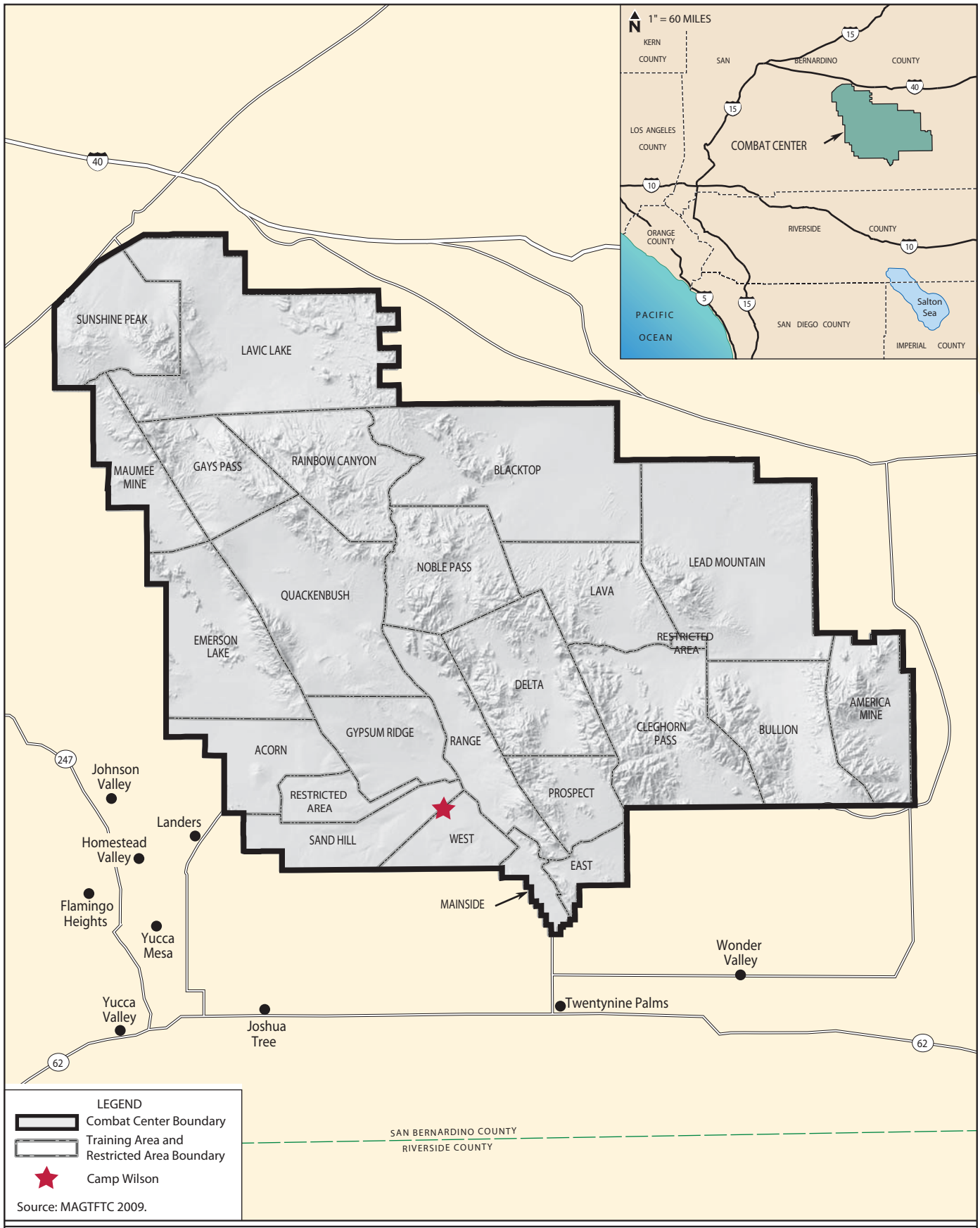
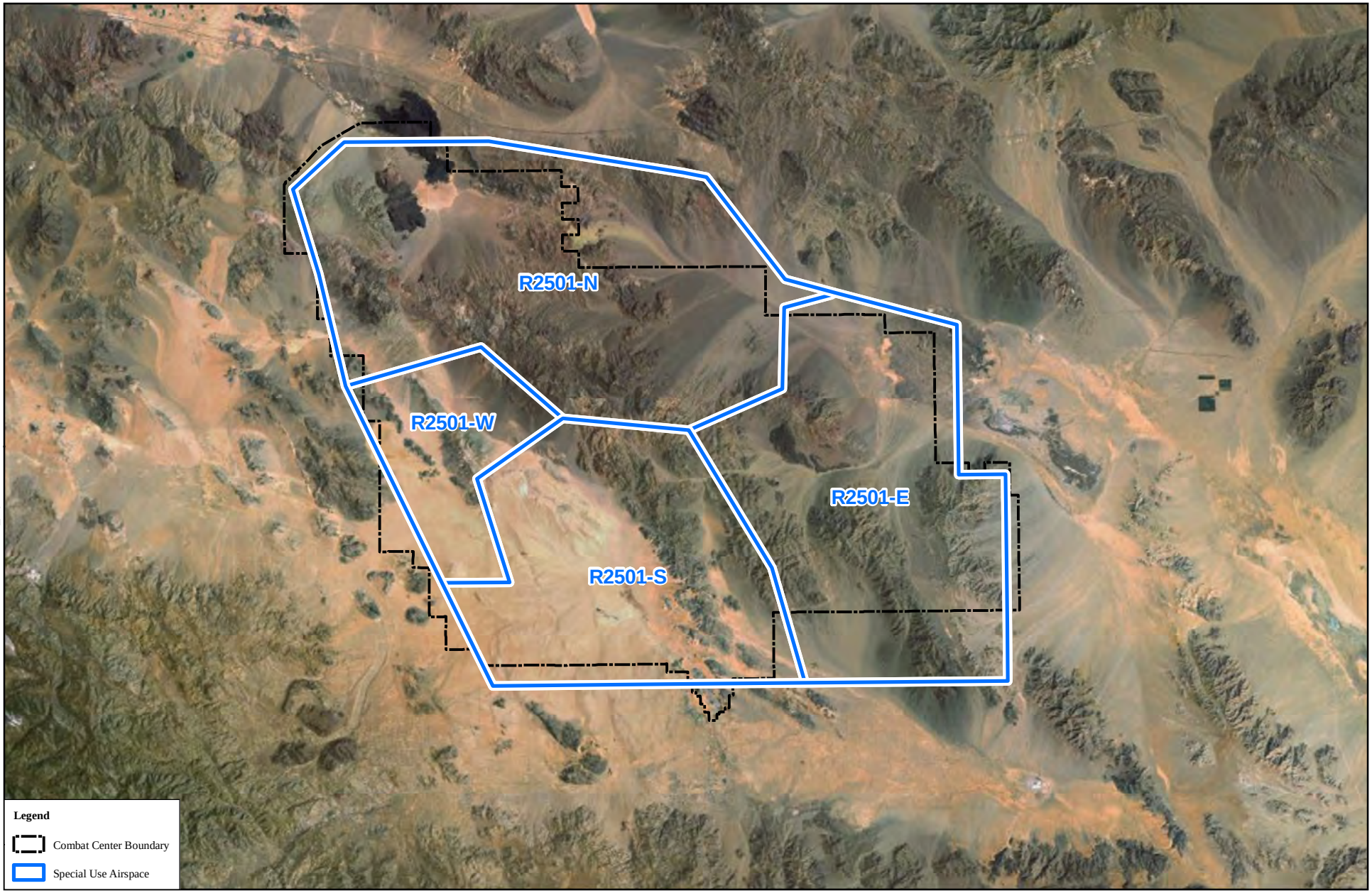


Figure 1-3
Training Areas



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Figure 1-4
Restricted Area 2501 Over the Combat Center

N

The need for the proposed action is to ensure that current and future operations and training requirements are met. The integration of the MV-22 aircraft into the current and future rotary-wing tactical and ground training activities would be conducted where it can best support the full spectrum of combined, joint, and MAGTF training and special exercise operations. This would be done while making full use of existing land and airspace to the greatest extent practicable. Implementing the proposed action would ensure MV-22 and rotary-wing readiness, and training and special exercise operations would attain and maintain operational employment proficiency.

1.4 REGULATORY SETTING

The preparation of this EA is based on the requirements including, but not limited to, what is presented below in Table 1-1.

Table 1-1. Applicable Laws and Regulations Considered

Title	Citation
Archaeological Resources Protection Act of 1979 (1994)	16 United States Code (USC) §§ 470aa-470mm
Clean Air Act (CAA)	42 USC §§ 7401-7671q and Pub. L. No. 101-549, 104 Stat. 2399
Clean Water Act (CWA)	33 USC §§ 1251-1387
Council on Environmental Quality (CEQ) Regulations	40 Code of Federal Regulations (CFR) Parts 1500-1508
Environmental Compliance and Protection Manual	Marine Corps Order (MCO) P5090.2A, Change 2, Dated 21 May 2009
Resource Conservation Recovery Act (RCRA)	42 USC §§ 6901-6992k
Comprehensive Environmental Resources, Compensation, and Liability Act (CERCLA) (1980)	42 USC §§ 9601-9675
Endangered Species Act (ESA) (1973, as amended)	16 USC §§ 1531-1544
Executive Order (EO) 12372 (Intergovernmental Review of Federal Programs)	47 Federal Register 30959
EO 12898 (Environmental Justice) (1994)	59 Federal Register 7629
EO 13045 (Environmental Justice for Children) (1997)	62 Federal Register 19885
EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) and Migratory Bird Treaty Act (MBTA)	66 Federal Register 3853 and 16 USC §§ 703-712
National Historic Preservation Act (NHPA) of 1966, as amended (1994)	16 USC §§ 470-470x-6
National Register of Historic Places (NRHP) (1977)	36 CFR Part 60
Pollution Prevention Act of 1990	42 USC §§ 13101-13109

1.5 ORGANIZATION OF THE EA

Following Chapter 1, this EA is organized as follows: Chapter 2 describes the proposed action and alternatives; Chapter 3 describes the affected environment; Chapter 4 describes the environmental consequences of each alternative; and Chapter 5 addresses various other considerations required by NEPA, including the cumulative impacts of the proposed action in conjunction with other projects in the area. This is followed by references, a list of preparers, and persons and agencies contacted.

1.6 PUBLIC INVOLVEMENT

A Notice of Availability for the Draft EA was published in local newspapers making the public aware that the document was placed in the Twentynine Palms Branch and Yucca Valley Branch Libraries and was available for review and comment. The public review period commenced on 21 April 2010 and concluded on 5 May 2010. No public comments were received.

CHAPTER 2.
PROPOSED ACTION AND ALTERNATIVES

2.1 OVERVIEW OF THE PROPOSED ACTION

The proposed action addressed in this EA consists of operating and integrating up to eight MV-22 aircraft squadrons (12 aircraft per squadron) into the current and future rotary-wing tactical and ground training activities as directed by NAVMC Directive 3500.11. This would result in up to 2,148 sorties annually at the Combat Center (see Section 2.2.2 for a definition of "sortie"). A busy month would involve about 267 sorties over 17 days of operations throughout the Combat Center, an average of about 16 sorties per day. Established SUA would not be expanded or modified with implementation of the proposed action.

2.2 PROPOSED TRAINING

2.2.1 Items not Covered in this EA

MV-22s and rotary-wing aircraft would transit to the AMZs from other installations or from the Expeditionary Airfield (EAF) at the Combat Center. The other installations include MCAS Yuma, AZ; MCAS Miramar, CA; MCAS Camp Pendleton, CA; and Naval Air Facility (NAF) El Centro, CA. Transit to the Combat Center is addressed in the West Coast Basing EIS and is not analyzed in this EA. The MV-22, CH-46E, and CH-53E have chaff/flare dispenser systems for use as countermeasures. Chaff and flares are already used at the Combat Center during aircraft operations, and no new use would be associated with the proposed action. Aerial refueling would be done at established refueling locations, and ground refueling would be done at existing forward arming and refueling points (FARPs). Maintenance would occur at established maintenance facilities on the Combat Center or at other installations. Ground activities associated with current rotary-wing aircraft training currently occur throughout the Combat Center and have been analyzed in previous NEPA documentation (DoN 2003); no new ground activities would be conducted with implementation of the proposed action. Therefore, these activities are not analyzed in this EA.

2.2.2 Proposed Training Activities at AMZs

In general, AMZs are locations where aircraft land and/or conduct various types of low-altitude training. Operations for new or transition pilots require completing exercises in the training and readiness manuals and NATOPS manuals for MV-22 and rotary-wing aircraft. Therefore, a range of training activities would occur at the Combat Center's AMZs.

Specific AMZ types proposed for use at the Combat Center are summarized below:

- Operational landing zone (OLZ). Zone for operations involving 4 or less aircraft to support maneuver elements.
- Assault landing zone (ALZ). Zone for operations involving 6-8 aircraft to support assault landing maneuver elements. ALZs include FARPs; no other ALZs are addressed in this EA. The two existing FARPs are FARP 1 East in Lava Training Area and FARP 2 Sand Hill in the Sand Hill Training Area.
- Combat landing zone (CLZ). Zone for operations involving 1-2 aircraft to support maneuver elements.

- Landing zone (LZ). Zone for operations involving 6-8 aircraft to support maneuver elements.
- Pickup zone (PZ). Zone for operations involving 6-8 aircraft to support maneuver elements.

The proposed AMZs would not require any site improvements (e.g., grading or construction). No site improvements would occur at any of the AMZs, and they would not require any construction or clearance of approach-departure clearance zones. Although each AMZ has a primary designation, each AMZ can potentially be used for the full suite of training activities.

A sortie consists of a single military aircraft flight from take-off through landing. A minimum of two AMZs would be visited during a single sortie: the PZ plus at least one other AMZ. However, up to six AMZs could be visited during a 60-minute sortie, depending on the complexity of the training activity.

2.2.2.1 Modes of Operation

The three modes of operation for the MV-22 during training are transit, conversion, and hover/land. The two modes of operation for rotary-wing aircraft during training are transit and hover/land (conversion mode does not occur for rotary-wing aircraft). These modes are described below and are shown in Figure 2-1:

- Transit mode (or "airplane" mode). This involves transit of MV-22 and rotary-wing aircraft from the originating airfield to the AMZs. In this mode, the MV-22 has flight characteristics similar to a multi-engine, turboprop, fixed-wing aircraft (see Figure 2-1). Normal flight path in transit is at altitudes of about 300-10,000 feet above ground level (AGL) and at a speed of 230 nautical miles per hour (knots). Transit at lower altitudes, down to 300 feet AGL would be infrequent to rare. Aircraft would fly in formation to the AMZs. A formation typically involves a lead aircraft and one or more other aircraft in formation either at a 45° angle behind the forward aircraft, or directly behind the forward aircraft. Separation between aircraft is typically 25 feet vertically and 25 feet horizontally.
- Conversion mode (MV-22 only). This involves the MV-22 aircraft changing from airplane mode to tilt-rotor mode (i.e., similar to how helicopters operate), to prepare for training activities at the AMZs. When flying to the training location and at a point about 3 miles from the AMZ, the MV-22 would begin either a spiral or other type of maneuver. When the aircraft arrives at a certain distance from the AMZ, the MV-22 initiates the conversion mode while in straight and level flight (see Figure 2-1). This is called the initial point (IP). Conversion mode typically occurs at 50-1,000 feet AGL at a speed of 110 knots. Once it completes the conversion mode, it can begin hover/landing training activities. When departing the AMZ, the MV-22 again initiates the conversion mode (either during a climb or level flight). Once it completes the conversion mode, it can begin transit back to the airfield or another AMZ.
- Hover/land mode (or "helicopter" mode). Following the conversion mode, the MV-22 would be less than 1,000 feet AGL and would be traveling at a speed of 110 knots. The MV-22 would then enter the "hover/land" mode (see Figure 2-1). In this mode, the MV-22 has flight characteristics similar to a rotary-wing aircraft, such as CH-46E and CH-53E aircraft. Typical operating altitudes for hover/land mode are 0-500 feet AGL. A typical vertical landing involves the aircraft starting a descent at 500 feet AGL at an initial speed of 110 knots, slowing to 50 knots at 50-300 feet AGL to initiate the approach turn, establishing a stable hover at 20 feet AGL, then landing the aircraft. In this mode, landings to and takeoffs from uneven terrain are possible. Aircraft

would typically operate within a radius of 750 feet from the center point of each AMZ during hover/land mode.

Figure 2-1. Modes of Flight: Transit, Conversion, Hover/Land

2.2.2.2 Proposed Tempo of Training

Approximately 29,561 operations are currently conducted annually at the Combat Center (refer to Appendix C). Existing use of AMZs consists of 2,148 sorties per year, with 859 sorties for the CH-46E and 1,289 sorties for the CH-53E. The MV-22 aircraft is replacing the CH-46E aircraft over time, and under the proposed action, the 859 sorties conducted by the CH-46E would instead be conducted by the MV-22. Consequently, the total number of AMZ sorties would not change. However, the MV-22s can fly twice as fast, four times as far, and carry twice the combat load of the CH-46E, so eventually fewer operations would be flown as the transition to MV-22s take place. As a result, the total number of operations at the Combat Center following implementation of the proposed action would be approximately 25,160 operations annually, 15% less than baseline conditions (refer to Appendix C).

Training tempo would vary from month to month. For example, a busy month may consist of 267 sorties and approximately 17 flying days. About 50% of the sorties would occur at OLZs (typically in formations of 2-4 aircraft), 15% at LZs (typically in formations of 6-8 aircraft), 15% at ALZs (typically in formations of 6-8 aircraft), 10% at PZs (typically in formations of 6-8 aircraft), and 10% at CLZs (typically in formations of 1-2 aircraft). Although each AMZ has a primary designation, each AMZ can potentially be used for the full suite of training activities. The majority (65%) of training activities would occur during the day (7 a.m. to 7 p.m.). About 25% would occur during the evening (7 p.m. to 10 p.m.), and about 10% would occur at night (10 p.m. to 7 a.m.). Proposed training sorties are summarized in Table 2-1.

Table 2-1. Annual and Average Busy Month Proposed Training Sorties

AMZ Type	Total Annual Sorties	Avg. Busy Month Sorties	# Aircraft/ Event	*Minutes/Busy Day:*		
				Transit *(230 knots at 300-10,000 ft AGL)*	Conversion Mode *(110 knots at 50-1,000 ft AGL)*	Hover/Land *(0-110 knots at 50-300 ft AGL)*
MV-22 or CH-46E				*MV-22/CH-46E*	*MV-22/CH-46E*	
ALZ	128	16	6-8	28/43	14/0	14
LZ	123	16	6-8	28/42	14/0	14
CLZ	90	11	1-2	19/28	9/0	9
OLZ	432	53	2-4	95/142	47/0	47
PZ	86	11	6-8	19/28	9/0	9
Subtotal	*859*	*107*	--	*189/283*	*93/0*	*93*
CH-53E						
ALZ	194	24	6-8	64	0	21
LZ	183	24	6-8	64	0	21
CLZ	135	16	1-2	42	0	14
OLZ	648	80	2-4	213	0	71
PZ	129	16	6-8	43	0	14
Subtotal	*1,289*	*160*	--	*426*	*0*	*141*
TOTAL	**2,148**	**267**	--	**615/709**	**93/0**	**234**

Notes: Up to 2,148 sorties would occur annually. "Busy month" represents the upper end of proposed sortie activities in a busy month, an average of 17 days of sorties per month.
MV-22 – assumes 60 minutes per sortie: 50% in transit, 25% in conversion mode, 25% in hover/land mode.
CH-46E/CH-53E – assumes 60 minutes per sortie: 75% in transit, 25% in hover/land mode.

2.2.2.3 Proposed Types of Training

Training activities (or maneuver elements) that could be conducted at each of the AMZs are defined and summarized below:

Figure 2-2.
Aerial Delivery of Troops

Aerial delivery. Following transit to the AMZs, the aircraft would conduct aerial delivery training. This would involve 1-4 aircraft operating in conversion mode at altitudes of 500-1,000 feet AGL. The aircraft would release parachute-equipped material (575-2,000 pounds) and personnel (Figure 2-2).

Figure 2-3
Transporting an External Load

External loads (EXT). This would involve the aircraft lifting and transporting external loads (Figure 2-3). Ground access is needed to pre-position external loads that cannot be carried across public roads or populated areas. During hoist operations, the aircraft may either a) maintain a steady hover over the spot until the load is secured, or b) hover at an adequate distance from personnel so the rotor wash does not disturb personnel at the pickup point. While transporting an external load from one location to another, aircraft would typically be operating in hover mode at 50 feet AGL and at speeds less than 60 knots. Helicopter rope suspension techniques (HRST) training would involve 1-2 aircraft approaching a staged external load or carrying an external load, hovering at 10-25 feet AGL for 2-5 minutes, then maneuvering a load (500-10,000 pounds) in both hover and conventional (transit) modes. Ground forces would utilize ground transportation to arrive at the AMZ and collect delivered equipment.

Figure 2-4.
Inserting Troops via Fast Rope

Helicopter insertion and extraction (HIE). HIE involves fast rope, rappelling, helo-casting, and parachute operations at the AMZs. For the HIE training, aircraft would land on the surface for 2-8 minutes, load/unload ground personnel and equipment, then depart. Proposed types of HIE to be conducted at the AMZs are summarized below:

Fast rope provides a means for rapidly delivering personnel to areas in which the aircraft is unable to land (Figure 2-4). This technique uses a 2-inch, specially woven, nylon rope up to 120 feet long. Once the aircraft is within a safe off-loading distance from the ground, personnel slide down the rope using gloved hands to control their descent rate in a "fire pole" type off-load. This would involve 1-2 aircraft hovering in helicopter mode at 25-200 feet AGL for the deployment of 4-12 personnel.

HIE would also involve casualty evacuation (CASEVAC) training, simulating extraction of wounded personnel from a given area. This would involve aircraft landing, loading 1-4 simulated casualties, and then departing. About 1-2 aircraft would be used for CASEVAC training. Personnel used to simulate wounded troops for CASEVAC training would be transported to the designated AMZ by ground transportation or other rotary-wing aircraft.

FARP training. Ground refueling would occur at existing FARPs in Lava and Sand Hill Training Areas (TAs). These FARPs are existing, heavily-used strips that are maintained for the purpose of a variety of fixed wing and rotary wing landing, takeoff, arming, and refueling activities. Use of the FARPs for AMZ training would be confined to the landing strip. This would involve 1-8 aircraft landing at one of the

designated FARPs. The MV-22 and rotary-wing aircraft would provide fuel to ground vehicles or other aircraft, or would receive fuel from an on-site refueling system. Fuel transfer would be done via a closed-loop, spill-resistant system.

Figure 2-5.
Machine Gun Mounted in the Ramp Floor of an MV-22

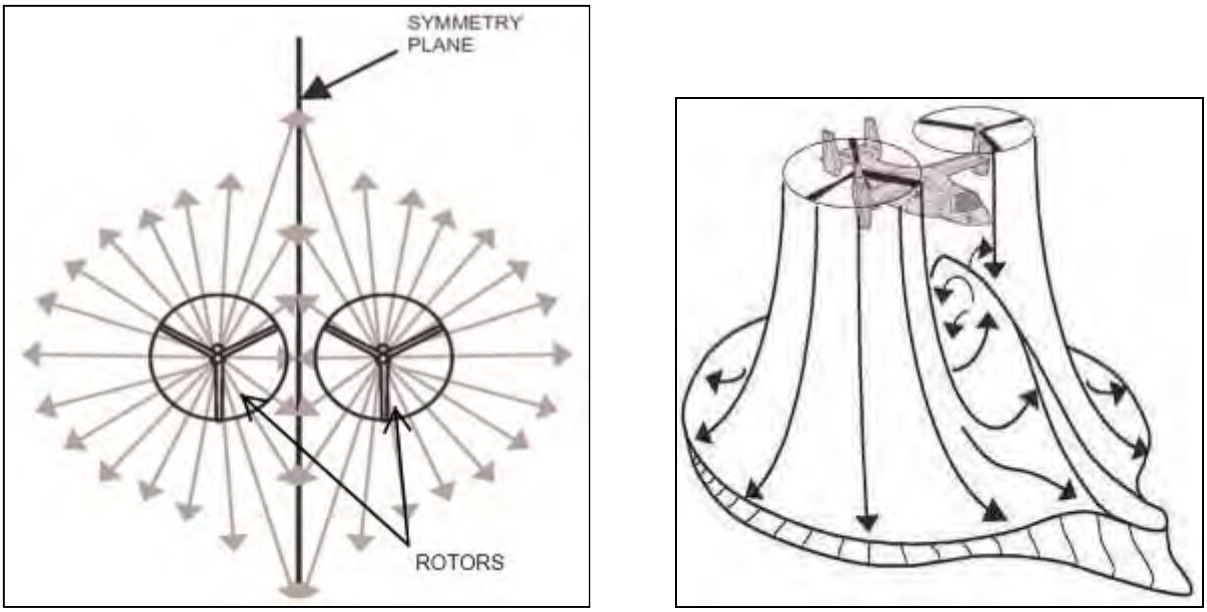
Weapons training. The MV-22 and rotary-wing aircraft have a ramp-positioned gun mount and a machine gun (Figure 2-5), and some have side-mounted guns (CH-53E). The ramp-positioned guns can be fired at angles approaching the horizon (-2°) down to 66° below the horizon. The guns fire 7.62-millimeter (mm) or .50 caliber ammunition at rates of 750-950 rounds per minute. Shooting in the vicinity of the AMZs would be limited. About 60 of the 267 average busy-month sorties would use the weapons. It would be done in conversion mode, within 3 miles of the AMZ at altitudes of 1,000 feet AGL and below. About 100-400 rounds of ammunition would be used per sortie; thus, approximately 6,000-24,000 rounds would be used in a busy month. Existing targets within a designated Aerial Gunnery Range or a range that offers targets of opportunity (e.g., tank hulks or previously built targets) would be used. No new targets would be built or placed in the range specifically for use under this project.

2.2.2.4 Wind Patterns beneath Hovering Aircraft

The area beneath hovering aircraft is a high-velocity, gusty wind environment. Downward gusts (or "downwash") are generated when high velocity air exits the rotor plain, traveling downward until it strikes the ground and changes direction (outwash), collectively known as rotor wash. Rotor wash from the MV-22 would be up to 10% greater than from the CH-53E and three to four times greater than from the CH-46E (DoN 2009).

There are general downward flow patterns (or "wake flow") seen around MV-22 aircraft while hovering (Figure 2-6a). Within 100 feet AGL, wind velocity at the ground changes little with hover altitude and can average 60 knots with gusts to 90 knots (DoN 2006). The wake typically flows outward at the ground when hovering at low-altitude. Average wind velocities decrease with horizontal distance from the aircraft to 20 knots and gusts to 40 knots at approximately 156 feet from the aircraft (DoN 2006). Wakes from the two-rotor system such as the MV-22 can flow toward each other, causing an upward draft (or "fountain flow") beneath the aircraft (Figure 2-6b). These patterns are unaffected by ambient winds unless wind speeds are greater than 20 knots.

Hot exhaust from the engines occurs directly underneath the aircraft in hover mode. When the aircraft has landed, temperatures at the ground surface immediately below the exhaust vents would be 150 degrees Fahrenheit (°F) above ambient air temperatures (DoN 2006). Temperature increases at the ground surface due to exhaust would decrease with increased hover altitude; at a hover altitude of 10 feet AGL, the temperatures at the ground surface would be negligible (DoN 2006).



a) Wake Flow *(Note: Symmetry plane indicates center along the length of the aircraft)*
Source: DoN 2006

b) Fountain Flow

Figure 2-6. General Wind Flow Pattern beneath Hovering MV-22 Aircraft (not to scale)

2.3 ALTERNATIVES ANALYSIS

2.3.1 Screening Criteria

Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] § 1502.14) and the guidelines contained in Marine Corps Order (MCO) P5090.2A – change 2, dated May 2009, Environmental Compliance and Protection Manual, provide guidance on the consideration of project alternatives and promote the objective evaluation of a range of reasonable alternatives. Reasonable alternatives must meet the stated objectives and purpose and need for the proposed action (Section 1.3 of this EA).

To identify potential locations for AMZs, the USMC performed a systematic siting process. The siting process involved identification of specific criteria based on training and operational requirements, as well as minimizing impacts to the environment. AMZ siting criteria are categorized as either "exclusionary" or "evaluative." Exclusionary criteria are first used to eliminate operationally unsuitable areas from further consideration as potential AMZs. Evaluative criteria are then considered to further qualify potential AMZ sites and to identify and objectively compare specific candidate siting alternatives.

Exclusionary screening criteria were used to identify potential AMZ sites based on operational and training requirements. To be considered a reasonable alternative for meeting the purpose of and need for the proposed action, AMZ sites within an alternative must satisfy the exclusionary criteria. These criteria include:

1) The sites' ability to meet the tactical and support requirements of the operational training design and applicable aviation and ground training standards.

2) Topographic suitability (i.e., grade and soil composition) to support the use of the airframe. Slopes cannot exceed 8%; sites with slopes less than 5% are optimal.

3) Avoidance of areas where foreign objects and debris (FOD) are potentially located (e.g., not near the land fill).

Having identified potential AMZ sites on an exclusionary basis, the siting process subsequently focused on the application of evaluative siting criteria to further refine the site selection analysis. Evaluative criteria for the selection of AMZ sites include the following:

1) Biological resource factors (i.e., attempting to avoid locations of or minimize effects on threatened or endangered species).

2) Cultural resource factors (i.e., attempting to avoid or minimize effects on cultural sites listed or eligible for listing on the National Register of Historic Places [NRHP]).

The siting process for the proposed AMZs identified 73 potential sites that are carried forward for further analysis. Because of the mix of requirements and the need for diversity in training locations, no single AMZ site would fulfill the training and readiness requirements. Up to approximately 50 sites at the Combat Center would be needed to meet operational and training requirements.

2.4 ALTERNATIVES CARRIED FORWARD FOR ANALYSIS

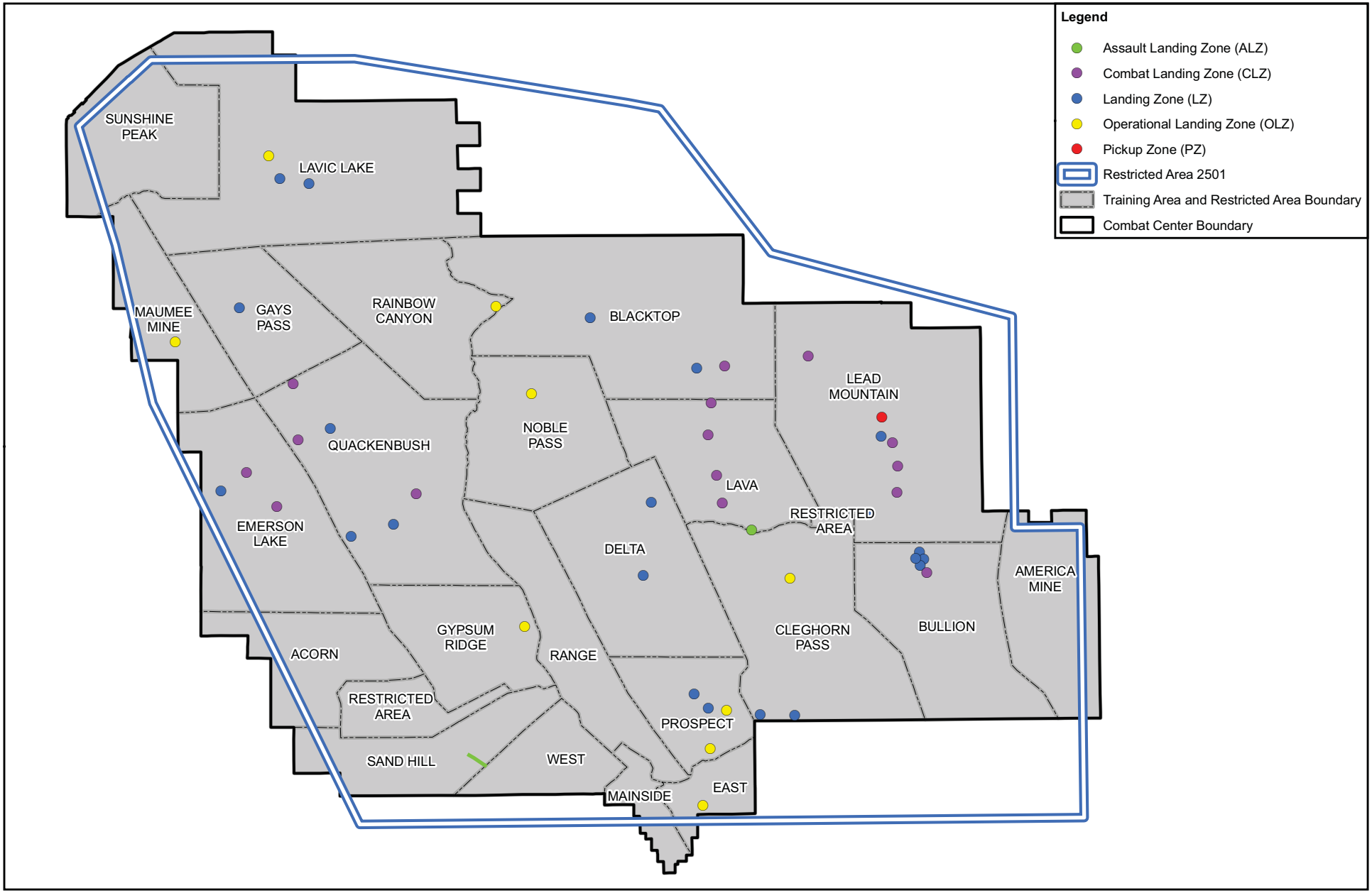
2.4.1 Alternative 1 (Preferred Alternative)

The proposed action involves the development and use of AMZs at the Combat Center for MV-22 and rotary-wing aircraft training. Seventy-three AMZs were initially sited based on training and operational requirements before consideration of biological or cultural resource constraints. Subsequently, 25 AMZs were identified as potentially having biological or cultural resource constraints. The remaining 48 AMZs comprise Alternative 1. Under Alternative 1, the 859 MV-22 and 1,289 CH-53E AMZ area-type sorties would occur at these 48 AMZs (MCAGCC 2009c).

The proposed AMZs include a PZ (193 acres), ALZs (both are existing FARPs ranging in size from 12 to 49 acres), OLZs (ranging in size from 4 to 48 acres), CLZs (4.4 acres), and LZs (ranging in size from 2 to 193 acres). Summary acreages for each category of AMZs are provided in Table 2-2, and specific locations of all AMZs are shown in Figure 2-7. Detailed views of AMZs in the western, central, and eastern portions of the Combat Center are shown in Figures 2-8a, 2-8b, and 2-8c, respectively.

Table 2-2. AMZ Acreages for Alternatives 1 and 2

Type of AMZ	Alternative 1		Alternative 2	
	Number	Total Acreage	Number	Total Acreage
PZ	1	193.00	1	193.00
ALZ (FARP)	2	61.77	2	61.77
OLZ	9	388.36	21	928.36
CLZ	15	65.40	18	78.48
LZ	21	693.83	31	931.52
Total	**48**	**1,402.36**	**73**	**2,193.13**



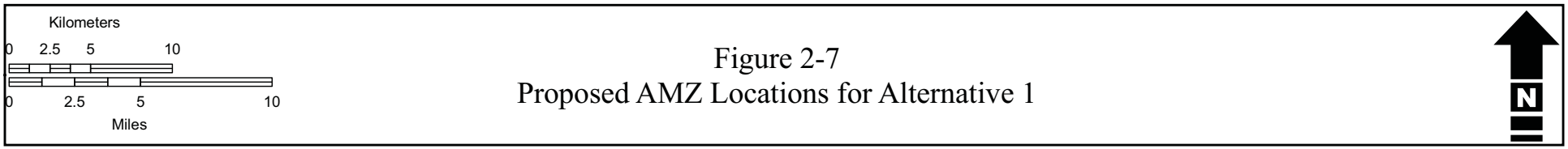
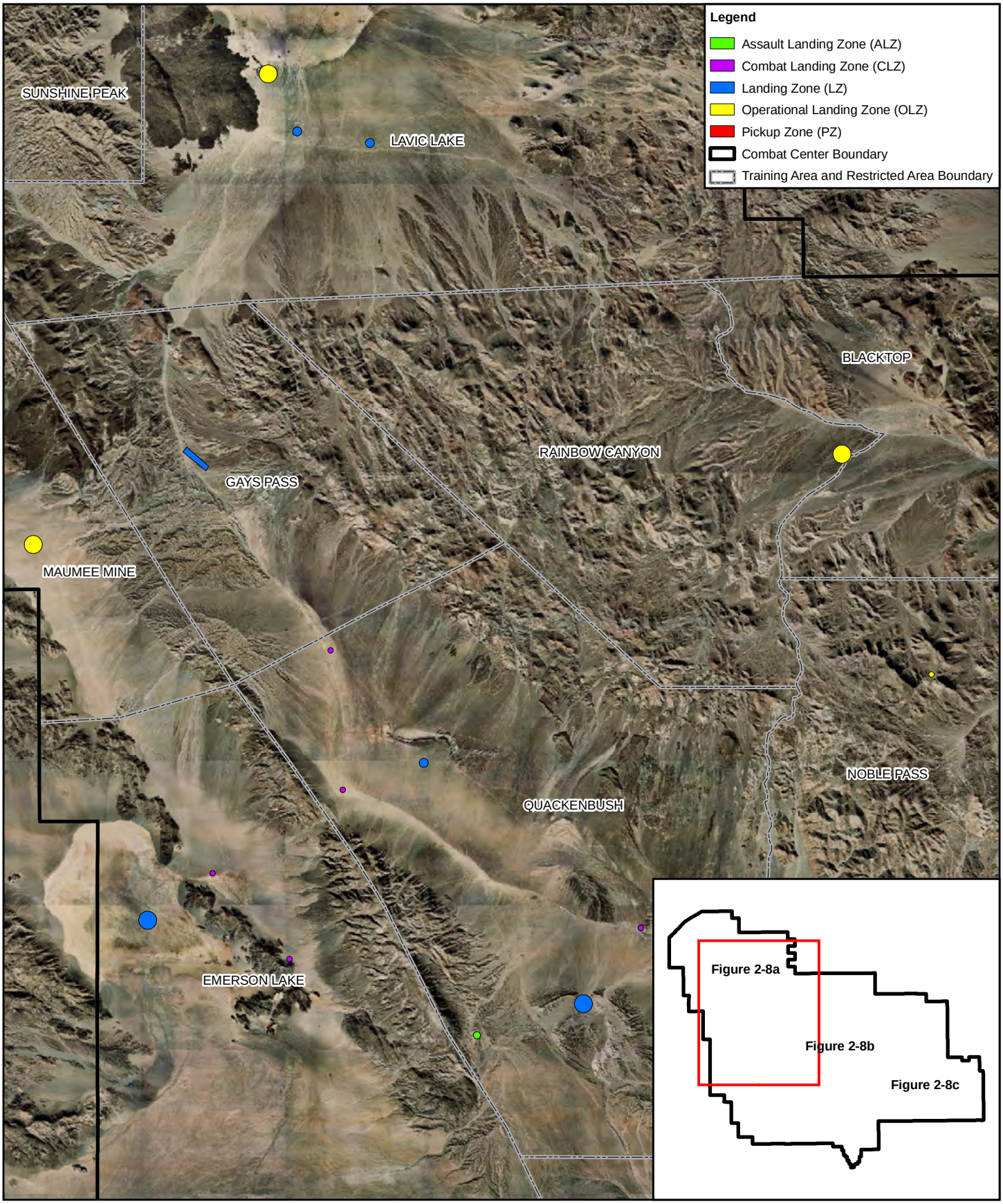


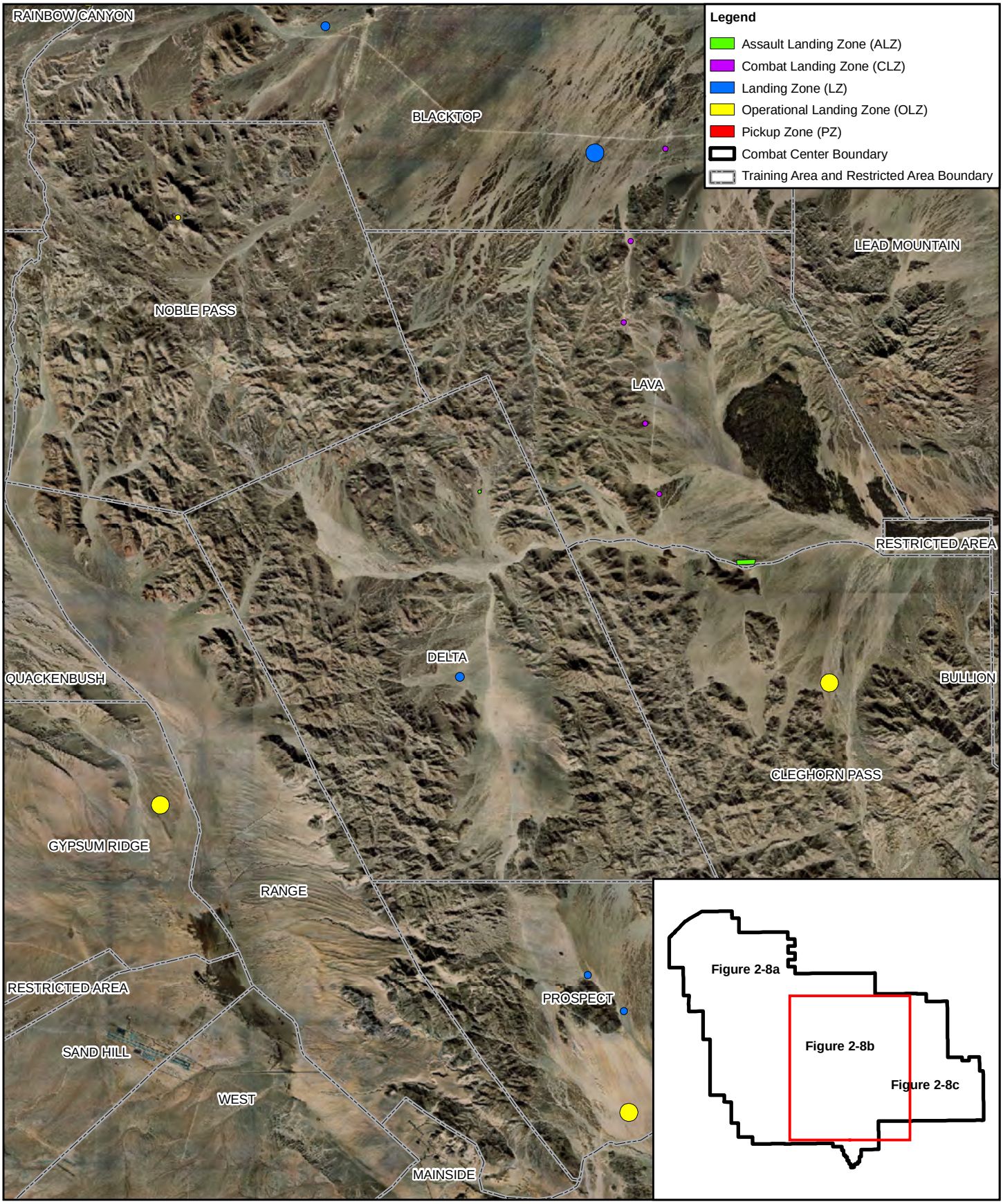
Figure 2-7
Proposed AMZ Locations for Alternative 1



Kilometers
0 0.75 1.5 3
0 0.75 1.5 3
Miles

Figure 2-8a
Alternative 1 Locations: West

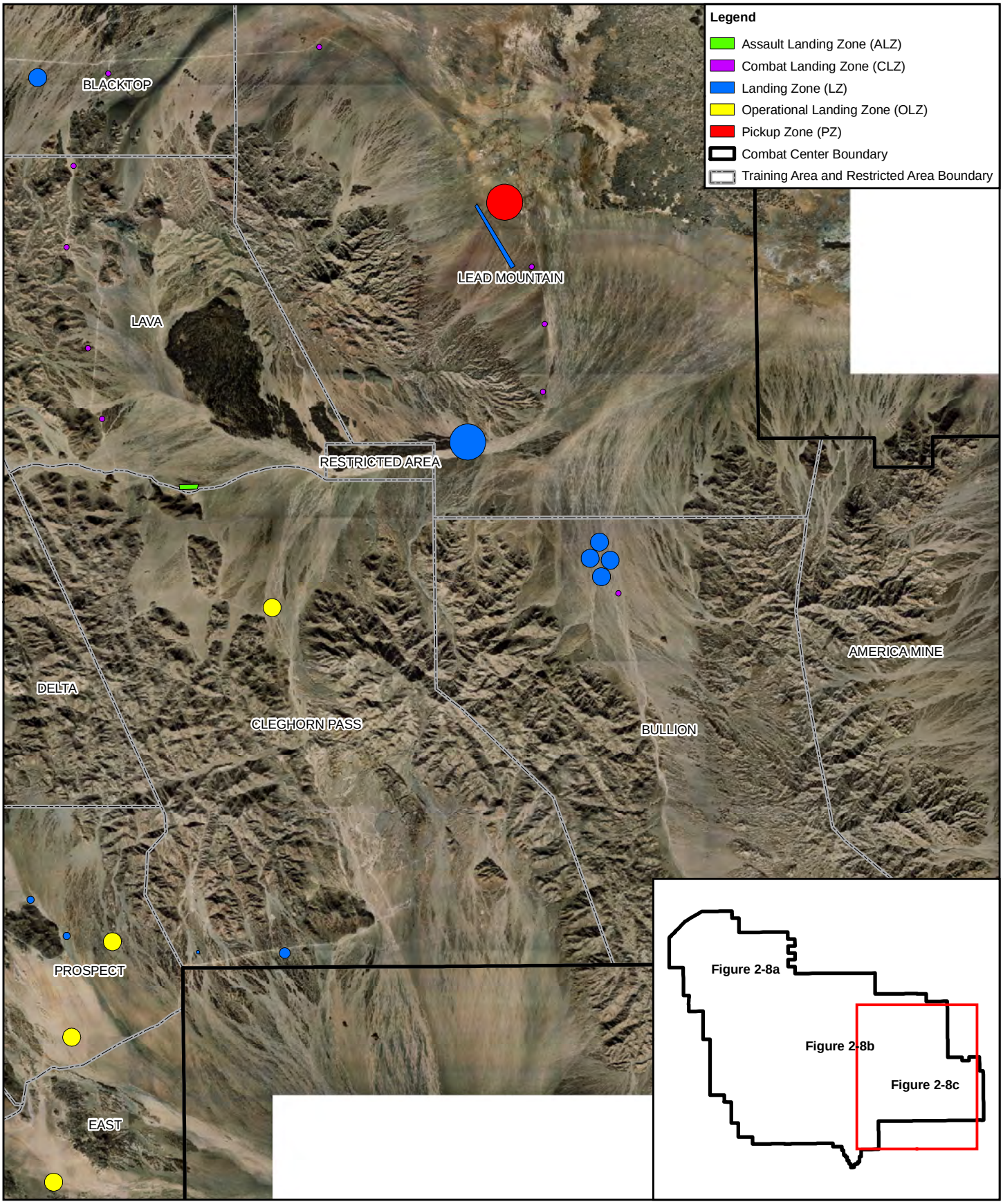
N



Kilometers
0 0.75 1.5 3
0 0.75 1.5 3
Miles

Figure 2-8b
Alternative 1 Locations: Central

N



Kilometers
0 0.75 1.5 3
0 0.75 1.5 3
Miles

Figure 2-8c
Alternative 1 Locations: East

N

2.4.2 Alternative 2

Alternative 2 would involve 73 AMZs: the 48 AMZs from Alternative 1 plus the additional 25 AMZs identified as potentially having biological or cultural resource constraints (see Section 2.4.1). Consequently, Alternative 2 has 12 more OLZs, 3 more CLZs, and 10 more LZs than Alternative 1. Summary acreages for each category of AMZs are provided in Section 2.4.1 (see Table 2-2), and specific locations of all AMZs are shown in Figure 2-9. Detailed views of AMZs in the western, central, and eastern portions of the Combat Center are shown in Figures 2-10a, 2-10b, and 2-10c, respectively. As indicated in Table 2-2, the additional 25 AMZs in Alternative 2 would account for an additional 790.77 acres when compared to Alternative 1. Under Alternative 2, the 859 MV-22 and 1,289 CH-53E AMZ area-type sorties would occur at all 73 AMZs (MCAGCC 2009c).

2.4.3 No-Action Alternative

Under the No-Action Alternative, the proposed AMZ training activities for MV-22 aircrews would not occur, thereby constraining the Marine Corps' ability to integrate the MV-22 airframe into the existing rotary-wing tactical and ground training activities at the Combat Center. The No-Action Alternative would therefore fail to satisfy the purpose and need for the proposed action; however, as required by NEPA, the No-Action Alternative is carried forward for analysis in this EA.

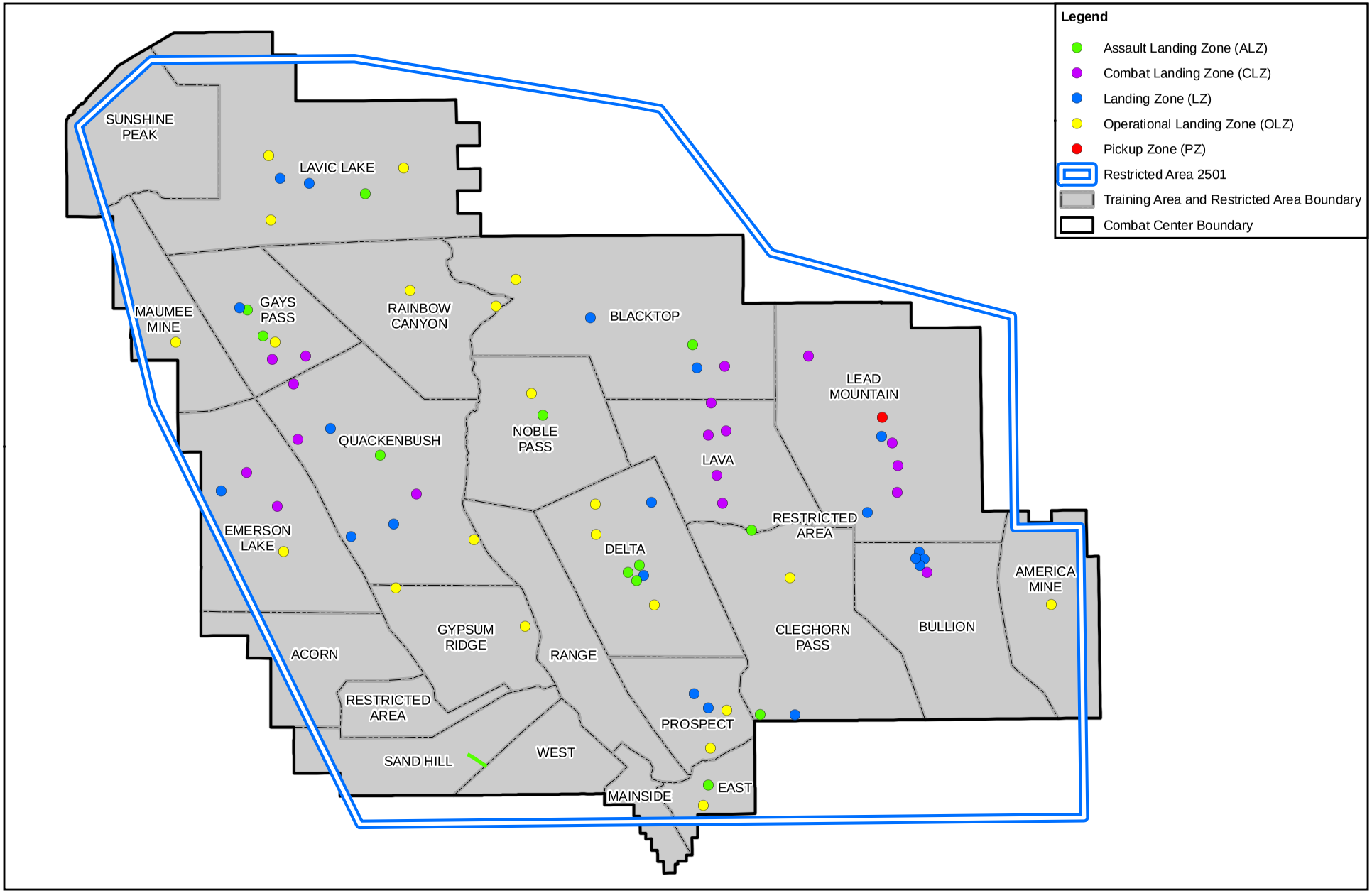
2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

Reasonable alternatives include those that are practical or feasible from a technical and economic standpoint. One alternative was considered but eliminated from further analysis because it did not meet the purpose of and need for the proposed action. The action alternative that was considered and eliminated was: use of designated AMZs in only a portion of the Combat Center. This alternative was eliminated because it would not support the requirement to train a MAGTF with a minimum of a Brigade-sized maneuver element as directed by the Training and Education Command (TECOM) and Commandant of the Marine Corps (CMC) guidance for full-scale MAGTF combined arms exercises, including the Enhanced Mohave Viper training exercise. Specific AMZ sites also were eliminated due to the lack of appropriate topography to support AMZ operations.

2.6 SPECIAL CONSERVATION MEASURES

The proposed action would include implementation of the following Special Conservation Measures (SCMs) to avoid or minimize any potential impact to biological resources, particularly the threatened desert tortoise. Measures 1 through 8 are based on the Base-wide Biological Opinion (BO) (1-8-99F-41; U.S. Fish and Wildlife Service [USFWS] 2002). Measure 9 is based on the wildland fire incident reporting, review, and adaptive management presented in the West Coast Basing EIS (DoN 2009).

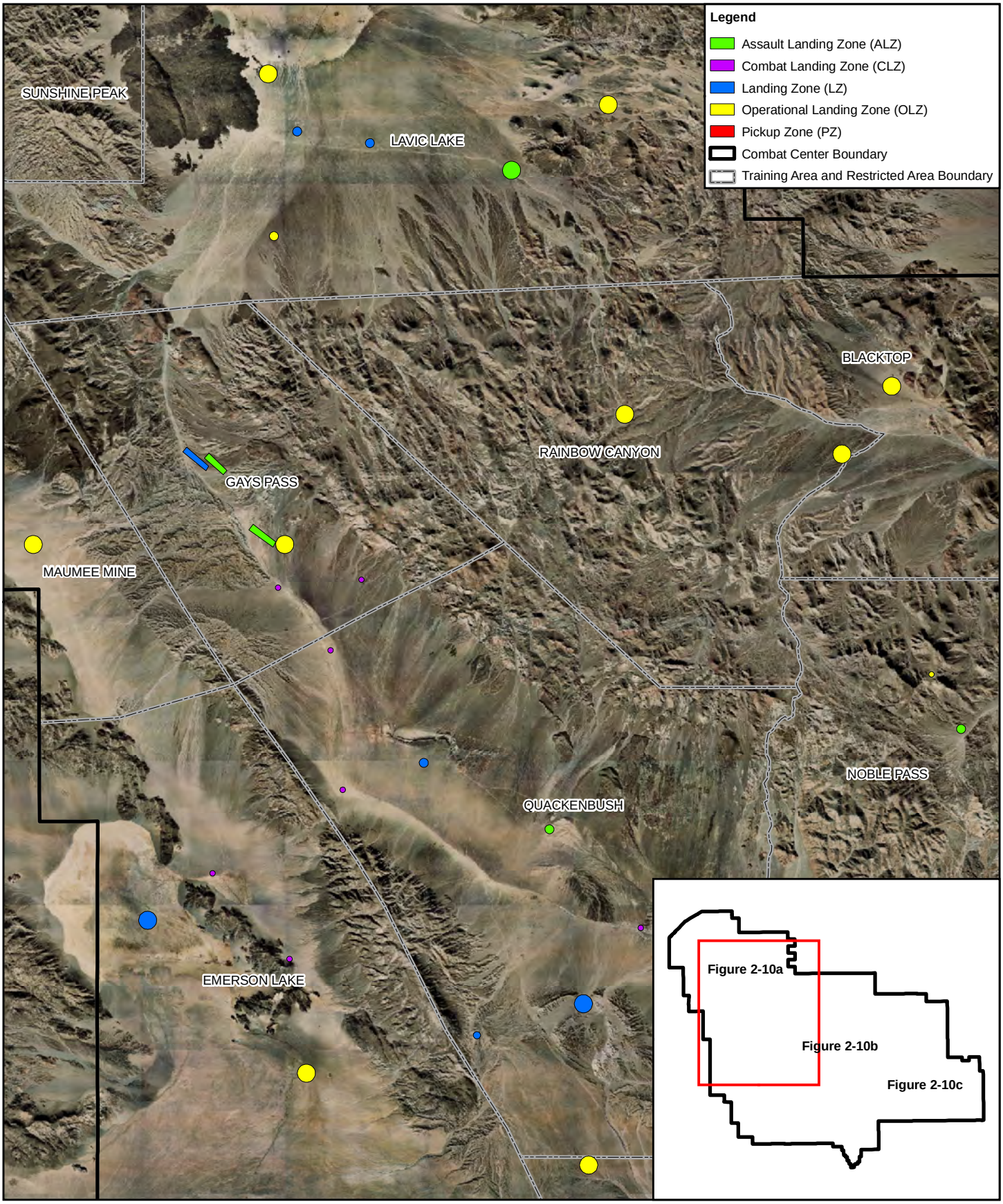
1. The Commanding General of the Combat Center would appoint an official representative who would be responsible for compliance with all protective measures agreed upon by the USMC and the USFWS. This person would receive and investigate reports of non-compliance with the Endangered Species Act (ESA), including the terms and conditions of the 2002 BO, and would have the authority to stop all activities that may be in violation of the ESA or these measures.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Figure 2-9
Proposed AMZ Locations for Alternative 2

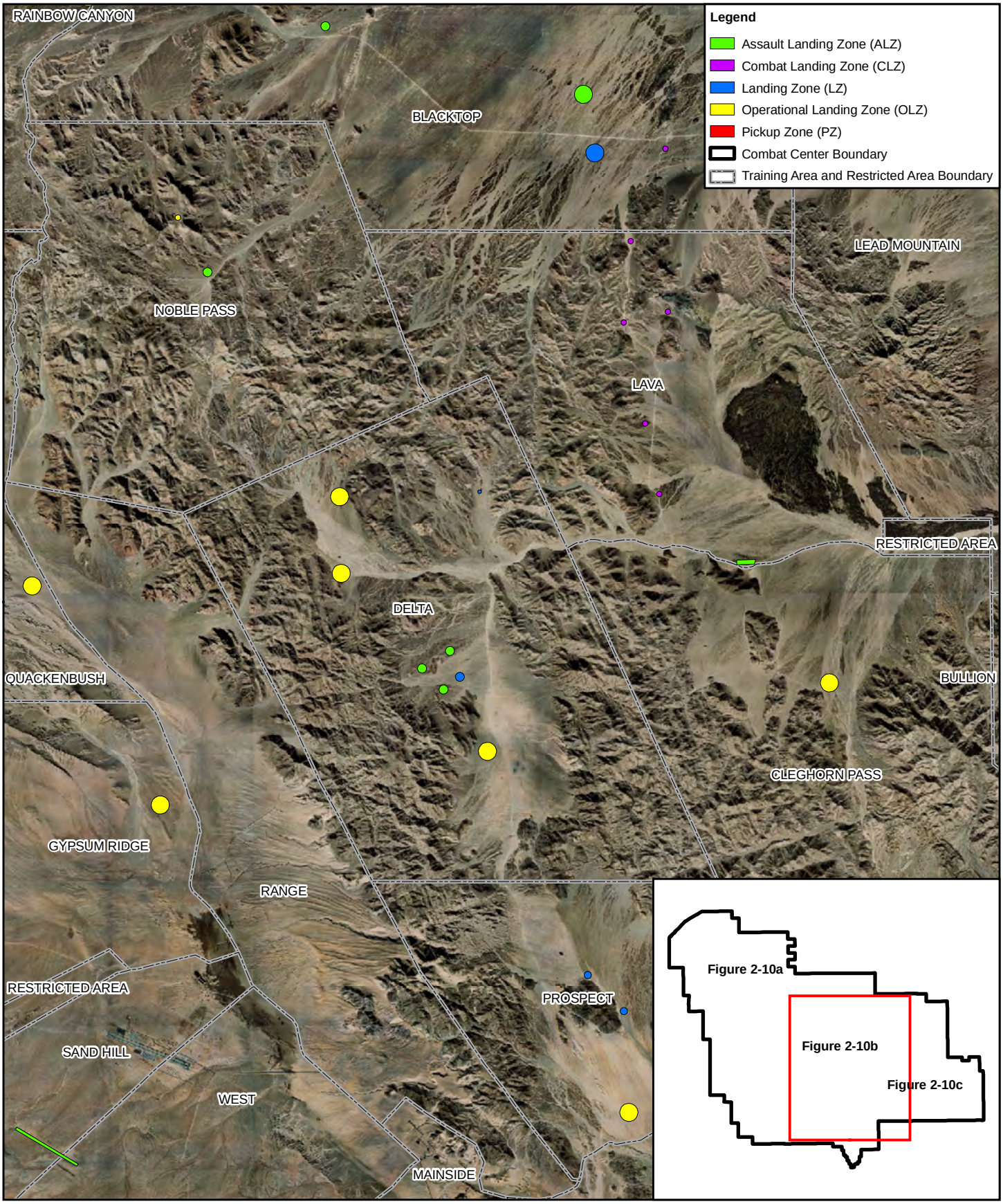
N



Kilometers
0 0.75 1.5 3
0 0.75 1.5 3
Miles

Figure 2-10a
Alternative 2 Locations: West

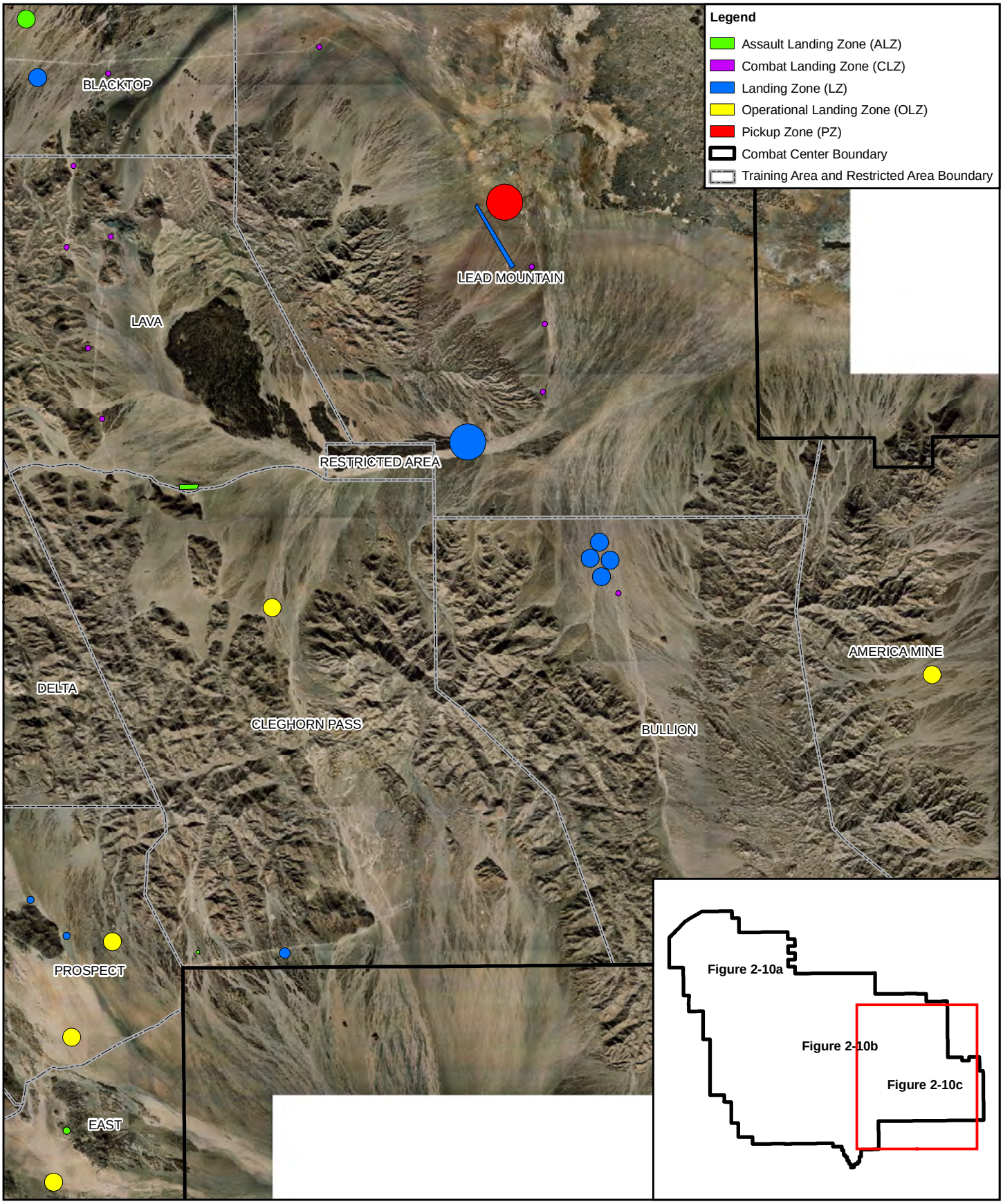
N



Kilometers
0 0.75 1.5 3
0 0.75 1.5 3
Miles

Figure 2-10b
Alternative 2 Locations: Central

N



Kilometers
0 0.75 1.5 3
0 0.75 1.5 3
Miles

Figure 2-10c
Alternative 2 Locations: East

N

2. The USMC would continue its desert tortoise education program for military and civilian personnel, including all military personnel coming aboard to train and all contractors working outside of Mainside Cantonment Area. The program would include, at a minimum, discussions of the occurrence of the desert tortoise, its sensitivity to human activities, legal protection for the species under ESA, penalties for violation of federal laws intended to protect the desert tortoise, its general activity patterns, reporting requirements, Command-specific in-house protective measures, and measures that individual users of the Combat Center can take to promote the conservation of desert tortoises. All personnel would be informed of their responsibility to report any form of injury or mortality of desert tortoises to the Installation Representative. The Combat Center would continue developing education and compliance aids such as the Desert Tortoise Alert Cards and Desert Tortoise Brochure.

3. To the extent possible, military activity that causes increased surface disturbance from that which already exists would be concentrated on areas, such as pre-designated hardened sites or within 656 feet of main supply routes, that have already been delineated as highly disturbed with very low densities of desert tortoises.

4. To the extent possible, ground-disturbing activities would not be conducted in areas where desert tortoises are known to occur in moderate to high density. Areas that have already been restricted would continue to be managed in that manner.

5. The USMC would continue to improve its program to place signs promoting awareness of desert tortoises in key locations, which would encourage users not to stray off established main and secondary routes.

6. Explosive Ordnance Division personnel would assist in monitoring injury and mortality of desert tortoises as part of their clean-up sweeps.

7. As funding allows, the USMC would continue its research and management programs, such as studies on headstarting success, predation, disease incidence and effects, other anthropogenic impacts, and population and habitat assessments.

8. The USFWS would be notified in writing by the Installation Representative within three working days of the discovery of any desert tortoise killed or injured in the course of military training, construction, or maintenance. The written report would include the date and time of the injury, death or discovery, the location of the carcass, a photograph (if possible), and the circumstances of injury or death (if known). Dead animals would usually be left in situ. Injured animals would be taken to a veterinarian to be identified by the USFWS or a rehabilitator licensed by the State of California.

9. To reduce potential impacts resulting from training-related fires: 1) exhaust deflectors would be employed during landings and takeoffs at undeveloped AMZs; 2) operators would minimize the time on the ground with engines running at undeveloped AMZs; and 3) fire incident reporting, including reporting to Natural Resources and Environmental Affairs (NREA), and review of conditions under which fire started would be used as part of an adaptive fire management strategy, which allows for periodic review and modification of fire management measures in place, including but not limited to training restrictions. In addition, future revisions of the Integrated Natural Resources Management Plan (INRMP) would incorporate appropriate guidelines and updates for the MV-22.

2.7 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

This EA analyzes the potential resource-specific environmental consequences of implementing Alternative 1, Alternative 2, or the No-Action Alternative. If any potential impacts for the chosen alternative would be significant and could not be avoided or reduced to below a level of significance, then the preparation of an EIS would be required. A summary of environmental consequences for Alternative 1 (Preferred Alternative), Alternative 2, and the No-Action Alternative is presented in Table 2-3. As shown in Table 2-3, no significant environmental impacts would occur with implementation of Alternative 1. Implementation of Alternative 2 would result in potentially significant impacts to biological and cultural resources; however, through implementation of special conservation measures, avoidance, or mitigation measures as discussed in Sections 4.1.2.2 and 4.2.2.2 of this EA, these potentially significant impacts would be reduced to below a level of significance.

Table 2-3. Summary of Environmental Consequences

Resource Area	Alternative 1	Alternative 2	No-Action Alternative
Biological Resources	○	◑	○
Cultural Resources	○	◑	○
Air Quality	○	○	○
Noise	○	○	○

Notes: ○ = Negligible or no adverse impacts; ◑ = Adverse but not significant impacts; + = Beneficial impacts; ● = Significant impacts.

CHAPTER 3.
AFFECTED ENVIRONMENT

As noted in Chapter 2 of this EA, no site improvements or construction of facilities would occur at any of the AMZs, and they would not require any construction or clearance of approach-departure clearance zones. Also, the proposed action does not involve an increase in personnel at the Combat Center. Proposed AMZ training activities are similar to ongoing MV-22 and rotary-wing aircraft training that currently occurs throughout the Combat Center. Transit of MV-22 aircraft to the Combat Center is addressed in the West Coast Basing EIS (DoN 2009). The MV-22, CH-46E, and CH-53E have chaff/flare dispenser systems for use as countermeasures. Chaff and flares are already used at the Combat Center during aircraft operations, and no new use would be associated with the proposed action. Aerial refueling would be conducted in accordance with established procedures and ground refueling would be conducted at existing FARPs currently used for this purpose. Aircraft maintenance would occur at established maintenance facilities on the Combat Center. Ground activities associated with current rotary-wing aircraft training occur throughout the Combat Center and have been analyzed in previous NEPA documentation (DoN 2003); no new ground activities would be conducted with implementation of the proposed action. Therefore, these activities are not analyzed in this EA.

Chapter 3 describes the existing environmental conditions in the project area at the Combat Center for resources potentially affected by implementation of the proposed action, as described in Chapter 2. Information in Chapter 3 represents baseline conditions against which the proposed action is evaluated to identify potential environmental impacts (refer to Chapter 4).

NEPA, CEQ regulations, and DoN and USMC procedures for implementing NEPA specify that an EA should only focus on those environmental resource areas potentially subject to impacts. In addition, the level of analysis should be commensurate with the anticipated level of impact. Accordingly, the discussion of the affected environment and associated environmental analysis presented herein focuses on biological resources, cultural resources, air quality, and noise. Conversely, the following resources were not carried forward for analysis in this EA, as potential impacts were considered to be negligible or non-existent:

- ***Geological Resources.*** The Combat Center is located in a highly active seismic region within proximity to the San Andreas Fault to the southwest, the Pinto Mountains Fault to the south, and the Garlock Fault to the north. The Combat Center has approximately 50 named and unnamed inactive faults within its boundary (MCAGCC 2007a). However, the proposed action would not involve AMZ site improvements or the construction of new facilities and the proposed training activities would not affect unique geological features or result in increased soil erosion. In addition, proposed AMZ training activities are similar to ongoing MV-22 and rotary-wing aircraft training that currently occurs throughout the Combat Center. Consequently, implementation of the proposed action would not impact geological resources.
- ***Water Resources.*** Surface water is scarce at the Combat Center. The average annual precipitation totals approximately 4 inches. Rainfall quickly percolates into the soil and any standing or flowing water is ephemeral (i.e., occurs only after rain events). The proposed action would not involve AMZ site improvements or the construction of facilities; therefore, drainage patterns during rain events would not be affected. The 16 watersheds within the Combat Center overlay two groundwater basins (MCAGCC 2007a) and groundwater is the sole source of potable

water for the Combat Center. However, the proposed action would not involve facilities construction or an increase in personnel that would place an additional demand on water resources. In addition, proposed AMZ training activities are similar to ongoing MV-22 and rotary-wing aircraft training that currently occurs throughout the Combat Center. Consequently, implementation of the proposed action would not impact surface water or groundwater resources.

- ***Utilities***. The proposed action would not involve AMZ site improvements, construction of facilities, or an increase in personnel that would place an additional demand on the spectrum of utilities including electricity, potable water, sanitary sewer, phone, information technology, and gas transmission lines at the Combat Center. In addition, proposed AMZ training activities are similar to ongoing MV-22 and rotary-wing aircraft training that currently occurs throughout the Combat Center. Consequently, implementation of the proposed action would not impact utilities.
- ***Community Services***. The proposed action would not involve AMZ site improvements, construction of facilities, or an increase in personnel. Therefore, implementation of the proposed action would not place an additional demand on community services such as fire protection, police protection, health care services, or public schools. In addition, proposed AMZ training activities are similar to ongoing MV-22 and rotary-wing aircraft training that currently occurs throughout the Combat Center. Consequently, implementation of the proposed action would not impact community services.
- ***Land Use***. The Combat Center is divided into 22 training areas plus Mainside. Each training area varies by size, use, terrain type, and training restrictions. The training activities associated with the proposed action would continue to use these established training areas and no changes to existing land use would occur. In addition, proposed AMZ training activities are similar to ongoing MV-22 and rotary-wing aircraft training that currently occurs throughout the Combat Center. Consequently, implementation of the proposed action would not impact land use.
- ***Visual Resources***. The proposed action would not involve AMZ site improvements, construction of facilities, or an increase in personnel. Implementation of the proposed action would not adversely affect visual resources since the proposed action would be conducted in established training areas. Proposed AMZ training activities are similar to ongoing MV-22 and rotary-wing aircraft training that currently occurs throughout the Combat Center. Therefore, the visual character of individual training areas at the Combat Center would not change. Consequently, implementation of the proposed action would not impact visual resources.
- ***Transportation and Circulation***. The proposed action would not involve AMZ site improvements, construction of facilities, or an increase in personnel that would place an additional demand on the transportation and circulation network. In addition, proposed AMZ training activities are similar to ongoing MV-22 and rotary-wing aircraft training that currently occurs throughout the Combat Center. Ground activities associated with current rotary-wing aircraft training currently occur throughout the Combat Center and have been analyzed in previous NEPA documentation (DoN 2003); no new ground activities are part of the proposed action. Consequently, implementation of the proposed action would not impact the transportation and circulation network.
- ***Public Health and Safety***. Transit of MV-22 aircraft to the Combat Center is addressed in the West Coast Basing EIS and is not analyzed in this EA; therefore, aircraft activities associated with the proposed action would occur within installation boundaries. All AMZ locations are

located away from military personnel population centers at the Combat Center. Management and control of hazardous materials and wastes at the Combat Center would continue to be guided by the Integrated Contingency and Operations Plan (MCAGCC 2002). All rules and regulations governing range safety, range access, hazardous materials, and hazardous wastes would continue to be followed. This includes range clearance activities conducted in accordance with Combat Center Order P3500.4F (MCAGCC 2000) and Combat Center Order P3120.4C (MCAGCC 1993). Chaff and flares are already used at the Combat Center during aircraft operations, and no new use would be associated with the proposed action. Aerial refueling would be conducted in accordance with established procedures and ground refueling would be conducted at existing FARPs currently used for this purpose. Maintenance would occur at established maintenance facilities on the Combat Center or at other installations. In addition, proposed AMZ training activities are similar to ongoing MV-22 and rotary-wing aircraft training that currently occurs throughout the Combat Center. Consequently, implementation of the proposed action would not impact public health and safety or result in a hazardous materials and wastes impact.

- ***Socioeconomics and Environmental Justice***. Implementation of the proposed action would not affect socioeconomic resources and would comply with Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority and Low-income Populations* and EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. The proposed action would not involve AMZ site improvements, construction of facilities, or an increase in personnel. Also, the proposed action would occur at existing training areas within the boundaries of the Combat Center. Therefore, no impacts to schools, children, or minority populations would occur, and the proposed action would have no direct or indirect effects to the economy. In addition, proposed AMZ training activities are similar to ongoing MV-22 and rotary-wing aircraft training that currently occurs throughout the Combat Center. As no permanent population centers, low-income communities, or minority communities exist in the project vicinity, no communities would be susceptible to adverse socioeconomic or environmental justice impacts.

3.1 BIOLOGICAL RESOURCES

3.1.1 Definition of Resource

Biological resources include plant and animal species and the habitats within which they occur. Although the existence and preservation of biological resources are inherently valuable, these resources also provide aesthetic, recreational, and socioeconomic values to society. This analysis focuses on species that are important to the function of the ecosystem, are of special societal importance, or are protected under federal or state law. For the purposes of this EA, these resources are divided into three categories as follows:

- *Vegetation* includes plant communities and their dominant constituent species within the project area. Other land classifications, including aquatic and disturbed habitats and developed areas, are also discussed in this section. Special-status plant species are discussed in more detail below.
- *Wildlife* includes the characteristic animal species that occur in the project area. Special consideration is given to bird species protected under the federal Migratory Bird Treaty Act (MBTA) and EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*. Special-status animal species are discussed in more detail below.

- *Special-status species* are defined as plant and animal species that are listed, have been proposed for listing, or are candidates for listing as threatened or endangered under the federal ESA, the California ESA, and other species of concern as recognized by state or federal agencies.

3.1.2 Existing Conditions

3.1.2.1 Vegetation

The Combat Center is in the south-central region of the Mojave Desert and vegetation on the Combat Center is typical of the arid, upland desert climate of the region. The most recent vegetation classification and mapping report for the Combat Center (Agri Chemical & Supply, Inc. 2008), based on the classification system developed by Sawyer and Keeler-Wolf in *A Manual of California Vegetation* (1995), describes a total of 31 plant assemblages which can be grouped into 10 vegetation series (Table 3-1). These series, along with four additional land classifications (developed, disturbed, playa, and water), account for the approximate 600,000 acres of land cover within the Combat Center.

Table 3-1. Vegetation Series at the Combat Center by Acreage and Percent Land Cover

Series Name	Acres	% Land Cover
Vegetation		
Creosote Scrub	439,992	73.33
Mojave Yucca	52,299	8.72
Saltbush	34,407	5.73
Big Galleta	28,813	4.80
Catclaw Acacia	20,709	3.45
Brittlebush	5,640	0.94
White Bursage	2,886	0.48
Joshua Tree	1,919	0.32
Indian Ricegrass	1,036	0.17
Mesquite	349	0.06
Other Land		
Playa	7,750	1.29
Developed	2,407	0.40
Disturbed	1,662	0.28
Water	188	0.03

Source: Agri Chemical & Supply, Inc. 2008.

Vegetation Series

The *Creosote Scrub* series (Figure 3-1) incorporates several plant assemblages that are dominated by creosote bush (*Larrea tridentata*). This is the dominant vegetation series on the Combat Center, occupying over 73% of the land. This vegetation series occurs on a wide variety of terrain ranging from plains and alluvial fans (bajadas) to the steep slopes of mountains and hills (MCAGCC 2007a). Co-dominant species within this series include white bursage (*Ambrosia dumosa*), cheesebush (*Hymenoclea salsola*), and brittlebush (*Encelia farinosa*). Other important species occurring in this series include bush

Figure 3-1. Creosote Scrub Vegetation at Potential AMZ Site (Source: CMBC 2010)

encelia (*Encelia frutescens*), sweetbush (*Bebbia juncea*), spiny senna (*Senna armata)*, and rhatany (*Krameria* spp.).

The *Mojave Yucca* series occupies just less than 9% of the Combat Center and is composed of upland assemblages that primarily occur on rocky to gravelly hills and mesas, bajadas, and mountain slopes (Agri Chemical & Supply, Inc. 2008). This series is characterized by the presence of *Yucca schidigera*, but is primarily dominated by other shrubs, including creosote bush, white bursage, spiny senna, and cheesebush. Other important species in the Mojave Yucca series include rhatany, Mormon tea (*Ephedra* spp.), bladder sage (*Salazaria mexicana*), California buckwheat (*Eriogonum fasciculatum*), and various species of cacti.

The *Saltbush* series is composed of plant assemblages that occur on or near alkaline flats, playa margins, and volcanic substrates adjacent to major washes and drainages. This series occurs on approximately 6% of the Combat Center and is dominated by saltbush (*Atriplex* spp.), creosote bush, and white bursage (Agri Chemical & Supply, Inc. 2008). Other common species include bush seepweed (*Suaeda moquinii*), *Encelia* spp., and spiny senna.

The *Big Galleta* series is a grass-dominated group of plant assemblages occupying just less than 5% of the Combat Center (Agri Chemical & Supply, Inc. 2008). These assemblages occur on dunes or slopes and flats with deep sand, as well as sandy drains within wash channels. Although big galleta (*Pleuraphis rigida*) is a dominant species within this series, other co-dominants are creosote bush and white bursage. Other species that may be present are bush encelia, cheesebush, rhatany, spiny senna, *Atriplex* spp., and indigo bush (*Psorothamnus* spp.).

The *Catclaw Acacia* series occurs strictly in desert washes. Dominant species in this series include catclaw acacia (*Acacia greggii*), smoketree (*Psorothamnus spinosa*), creosote bush, cheesebush, all-scale (*Atriplex polycarpa*), and desert willow (*Chilopsis linearis*) (Agri Chemical & Supply, Inc. 2008). Many other shrub species are co-dominants in this series and species composition varies by plant assemblage.

The *Brittlebush* series primarily occurs on slopes of low mountains and hills, especially on volcanic substrates, and is characterized by sparse vegetation (Agri Chemical & Supply, Inc. 2008). Brittlebush is the dominant species in this series with creosote bush and white bursage as important components.

The *White Bursage* series typically occurs in upland areas on flats with coarsely sandy to gravelly soil, and can also be found in soil pockets of lava flows. White bursage and bush encelia are co-dominant species in this series. Creosote bush is an important constituent, as this series often overlaps with the Creosote Scrub series in sand and dune areas (Agri Chemical & Supply, Inc. 2008).

The *Joshua Tree* series occurs on coarsely sandy to gravelly flats or hills in upland areas. Joshua tree (*Yucca brevifolia*) is the characteristic species in this series, but is usually not dominant. Creosote bush and white bursage are usually co-dominant, with rhatany, spiny senna, and big galleta as important constituent species (Agri Chemical & Supply, Inc. 2008).

The *Indian Ricegrass* series occurs in swales or on flats with deep sand in upland areas. Creosote bush is usually co-dominant with Indian ricegrass (*Achnatherum hymenoides*) in this series, with big galleta often overlapping (Agri Chemical & Supply, Inc. 2008).

The *Mesquite* series occurs in lowland areas, primarily on silty to sandy alkaline flats and playa margins. Honey mesquite (*Prosopis glandulosa* var. *torreyana*) is usually the dominant species and tends to occur in clustered mounds (Agri Chemical & Supply, Inc. 2008). All-scale, bush seepweed, fourwing saltbush

(*Atriplex canescens*), and creosote bush are important constituent species occurring primarily in the spaces between mesquite mounds.

The 73 potential AMZ sites were surveyed by Circle Mountain Biological Consultants (CMBC) and NREA beginning in October and ending in December 2009 (refer to Appendix A). The two primary vegetation series occurring within the survey areas were Creosote Scrub (most sites) and Saltbush (lower elevation areas to the east and sites associated with playas). Figure 3-2 shows the potential AMZ sites and the vegetation series within which they are located.

Other Land Classifications

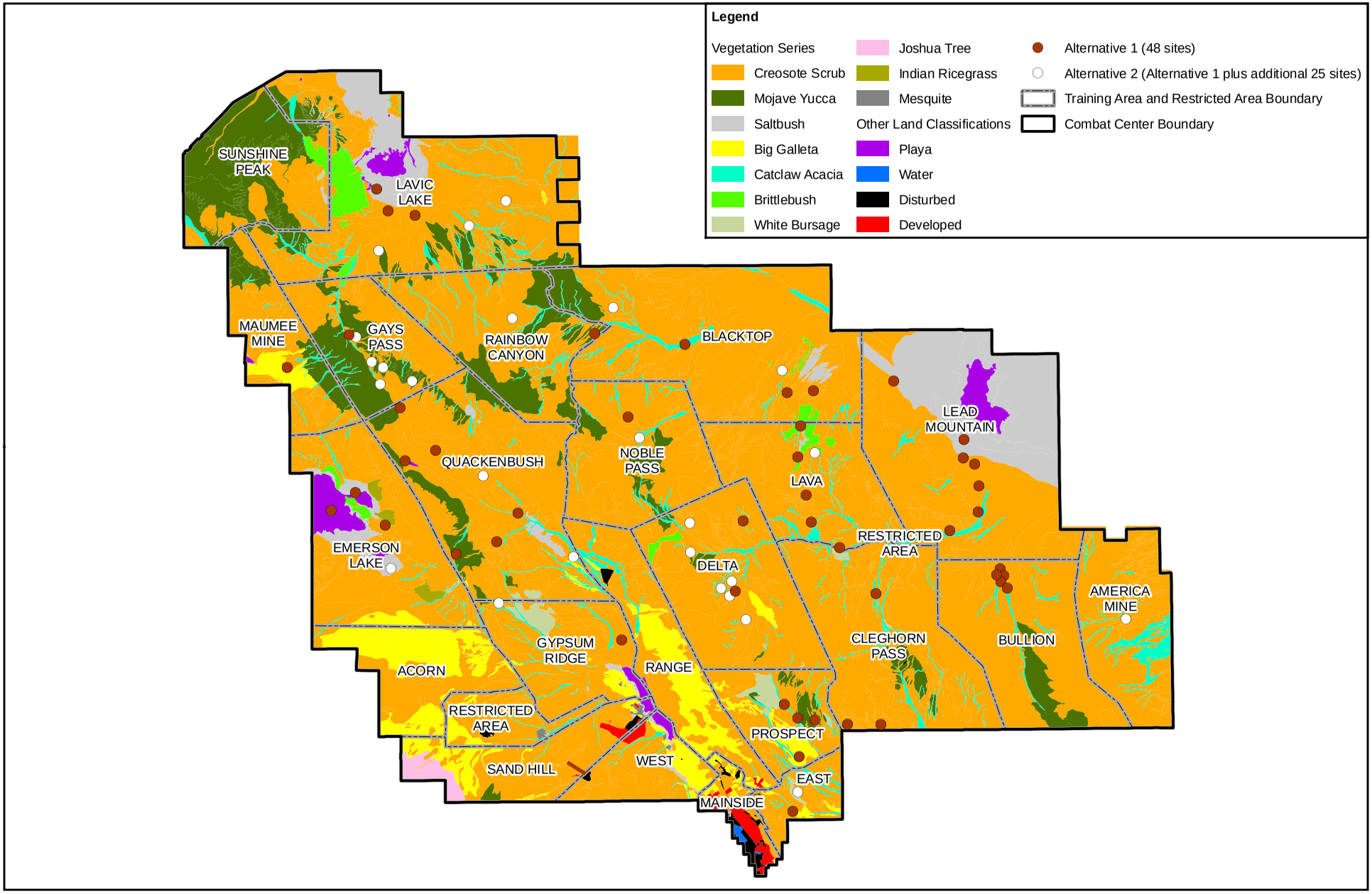
Playas are dry or intermittently dry lake beds. Surface drainage at the Combat Center is internal; most runoff flows inward, from all directions, into playas (MCAGCC 2007a). As collected water evaporates from playas, alkali salts tend to accumulate near surface soils. This strongly influences what plant species tend to grow near playa margins. There are 14 playas throughout the Combat Center totaling approximately 7,750 acres. The two most prominent and heavily impacted playas are Mesquite Lake (located near Mainside) and Deadman Lake (located in Sand Hill, Gypsum Ridge, and West Training Areas) (MCAGCC 2007a).

Water is a limited resource at the Combat Center, as the only permanent surface water consists of manmade water bodies in the vicinity of Mainside. These include stormwater retention ponds to the northeast of Mesquite Lake, golf course ponds, and several sewage lagoons located near Deadman and Mesquite lakes, Camp Wilson, and the golf course (MCAGCC 2007a). These bodies of water are used often by migratory birds. There are seasonal seeps and springs that occur on the Combat Center, but occurrence is rare and dependent on precipitation and exposed bedrock in wash areas (MCAGCC 2007a).

Developed areas are highly modified and usually altered by anthropogenic structures. Substrates not covered by structures are often impervious and void of any natural vegetation. Vegetation that is present usually consists of weeds or horticultural species, but may include areas of impacted native vegetation. The "landscaped" areas of the base are restricted to Mainside. Mainside vegetation consists of a variety of ornamental trees, shrubs, and ground cover, most of which are non-native, drought-tolerant plants commonly used in landscaped areas in Mojave Desert communities (DoN 2009).

Disturbed areas are heavily impacted, but not permanently modified. Some areas of the training ranges, primarily in flat valleys and bajadas, have been disturbed intensively by military activities with consequent degradation of vegetation. In addition, natural vegetation has decreased significantly in the Surprise Spring area due to the lowering of the water table via wells that supply the base with potable water (DoN 2009).

Several non-native plant species have populated Mainside and training areas, such as salt cedar (*Tamarix ramosissima* and *T. aphylla*), Mediterranean grass (*Schismus barbatus*), Russian-thistle or tumbleweed (*Salsola tragus*), and Sahara mustard (*Brassica tournefortii*) (MCAGCC 2007a). The recent spread of non-native species presents a threat to sensitive native plant communities, as often these species outcompete native species for resources and land cover. Also, many invasive species tend to establish large monocultures that carry heavy fuel loads. Sahara mustard and non-native grasses such as brome (*Bromus spp.*) and Mediterranean grass are examples of species that have become established at the Combat Center and which may result in sufficiently dense vegetation after high rainfall years to carry a fire, possibly causing long-term adverse effects on the Mojave Desert ecosystem and biodiversity contained within the installation and surrounding areas (MCAGCC 2007a).



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles
Source: AgriChemical & Supply, Inc. 2008

Figure 3-2
Vegetation Series and Potential AMZ Sites at the Combat Center

N

3.1.2.2 Wildlife

Wildlife species found at the Combat Center are typical of Mojave Desert fauna with the exception of a variety of non desert-adapted species inhabiting anthropogenically modified areas around Mainside (MCAGCC 2007a). Up to 256 species of vertebrate animals that are permanent or seasonal residents have been reported at the Combat Center, with the majority having only been observed at the golf course and water treatment facilities (Cutler et al. 1999; MCAGCC 2007a).

Faunal species found at the Combat Center include 2 amphibian, 21 reptile, 24 mammal, and approximately 200 bird species. Up to 87 resident bird species have been identified at the Combat Center, with the remainder of species being migrants or vagrants (Cutler et al. 1999). Bird species richness and overall abundance is likely to be greater in years following high winter/spring precipitation. Therefore, the number of bird species occurring on the Combat Center should be expected to change annually.

Birds are among the most commonly seen species at the Combat Center and occur throughout the entirety of the installation. Washes and springs provide habitat for the greatest concentration of desert bird species, as these areas tend to have water, more complex vegetative assemblages than most desert plant communities. With no known perennial seeps or springs on the Combat Center, most bird sightings occur in developed areas of Mainside, including the golf course and wastewater treatment ponds (MCAGCC 2007a). The MBTA of 1918 provides for the protection of designated birds. This act prohibits actions that may have negative effects on migratory birds, most notably the killing, collection or transport of birds. MCAGCC maintains plans and actions to comply with the MBTA and EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, while meeting mission objectives (MCAGCC 2007a).

The lack of naturally occurring perennial water also limits the presence of native fish species. The introduced mosquito fish (*Gambusia affinis*) occurs in some of the manmade treatment ponds; however, no other fish species are known to occur on the installation (MCAGCC 2007a).

In 1991, the California Department of Fish and Game and MAGTF Training Command worked together to relocate a herd of 20 bighorn sheep (*Ovis canadensis*) (5 rams and 15 ewes) to the Combat Center (MCAGCC 2007a). The sheep were relocated to the Bullion Mountains as part of a reintroduction program. MAGTF Training Command, the California Department of Fish and Game, and the Society for the Conservation of Bighorn Sheep have formed a partnership for the monitoring of this population. Although population counts have not taken place since 1997, MAGTF Training Command currently has plans to jointly monitor the Combat Center's bighorn sheep population with the California Department of Fish and Game to assess status, distribution, and abundance (MCAGCC 2007a).

In the CMBC and NREA surveys of the 73 potential AMZ sites, 12 reptile, 38 bird, and 12 mammal species were identified within the sites (CMBC 2010; Appendix A of this EA). The majority of species that were identified in the surveys are commonly observed on the Combat Center. All special-status species observed by CMBC (CMBC 2010) are discussed in Section 3.1.2.3.

3.1.2.3 Special-Status Species

<u>Vegetation</u>

No federally or state-listed plant species are known to occur at the Combat Center. However, nine sensitive plant taxa are known to occur on the installation (MCAGCC 2007a), including three species on the California Native Plant Society (CNPS) List 1B or 2 (Table 3-2). Species on CNPS Lists 1B and 2 may meet the criteria for federal listing but have not yet been formally listed. White-margined

beardtongue (*Penstemon albomarginatus*) is included on CNPS List 1B (plants rare and endangered in California and elsewhere), and crucifixion thorn (*Castela emoryi*) and jackass clover (*Wislizenia refracta* ssp. *refracta*) are on CNPS List 2 (plants rare and endangered in California but more common elsewhere).

Table 3-2. Special-Status Plant Species Known to Occur at the Combat Center

Scientific Name	Common Name	Federal Status	State Status	CNPS Status
Allium parishii	Parish's onion	None	None	4.3
Castela emoryi	crucifixion thorn	None	None	2.3
Cryptantha holoptera	winged cryptantha	None	None	4.3
Cynanchum utahense	Utah swallow-wort	None	None	4.2
Coryphantha alversonii (*Escobaria vivipara* var. *alversonii*)	foxtail cactus	None	None	4.3
Galium angustifolium ssp.*gracillimum*	narrowleaf bedstraw	None	None	4.2
Muilla coronata	crowned muilla	None	None	4.2
Penstemon albomarginatus	white-margined beardtongue	None	None	1B.1
Wislizenia refracta ssp. *refracta*	jackass clover	None	None	2.2

Definitions: CNPS Status
1B Plants rare, threatened, or endangered in California and elsewhere
2 Plants rare, threatened, or endangered in California, but more common elsewhere
3 Plants about which more information is needed (a review list)
4 Plants of limited distribution (a watch list)
CNPS Threat Code extensions
.1 – Seriously endangered in California
.2 – Fairly endangered in California
.3 – Not very endangered in California

Sources: California Department of Fish and Game (CDFG) 2009; MCAGCC 2007a.

White-margined beardtongue is a perennial herb that occurs on stabilized desert dunes and desert scrub with sandy soils. Only one population of this species is known to occur on the Combat Center in the Lavic Lake Training Area, with only two individuals located in recent surveys (Agri Chemical & Supply, Inc. 2006). This single population is located approximately 5 miles north of the nearest proposed AMZ site.

Crucifixion thorn is a deciduous perennial shrub that occurs in gravelly soils on playas and Mojave and Sonoran desert scrub (CNPS 2010). There are four known populations of crucifixion thorn found in the northwest portion of the Combat Center, the largest occurring at the border of the Lavic Lake and Sunshine Peak Training Areas (Agri Chemical & Supply, Inc. 2006). All known populations are far from any of the proposed AMZ sites, except for one population found on the western portion of the Blacktop Training Area which is relatively close to a proposed OLZ. No crucifixion thorn was observed within this AMZ site in recent surveys (CMBC 2010).

Jackass clover is a low-stature, herbaceous plant generally found in sandy washes, roadsides, and alkaline flats in the Mojave and northern Sonoran Deserts. There is one large, well established population known to occur on the Combat Center at Surprise Spring in the Sand Hill Training Area (Agri Chemical & Supply, Inc. 2006). This population is far from all proposed AMZ sites.

In surveys conducted by CMBC and NREA of the 73 potential AMZ sites, foxtail cactus was the only special-status plant species encountered (CNBC 2010; Appendix A of this EA). This species was observed on 13 sites, primarily in the eastern training areas. There was no recorded occurrence of foxtail cactus in any of the northwestern training areas. In rare plant surveys conducted by Agri Chemical & Supply, Inc. (2006), foxtail cactus was not surveyed for because it was widespread and well documented on the Combat Center.

Wildlife

More than 33 special-status animal species have been observed in surveys at the Combat Center (Cutler et al. 1999; MCAGCC 2007a). Table 3-3 reflects the current status of special-status animal species known to occur at the Combat Center. Some species previously identified as species of concern are no longer listed as such. Many of these species are migratory or seasonal residents and have only been recorded near the manmade water bodies of Mainside. The desert tortoise (*Gopherus agassizii*) is the only resident species protected under the ESA that has been documented within the boundaries of the Combat Center (MCAGCC 2007a) and is described in further detail below.

The golden eagle (*Aquila chrysaetos*), which is protected under the Federal Bald and Golden Eagle Protection Act and is a California fully protected species, has been observed on several different occasions. It is believed that a nesting pair inhabits the Delta Training Area (DoN 2009).

The western snowy plover (*Charadrius alexandrinus nivosus*), willow flycatcher (*Empidonax traillii*), and Bell's vireo (*Vireo bellii*) are uncommon migrants that have been observed at water sources and landscaped areas (Cutler et al. 1999; MCAGCC 2007a), but which are unlikely to occur in other areas of the Combat Center. All subspecies of willow flycatcher are state-listed as endangered, but only the southwestern subspecies (*Empidonax traillii extimus*) is federally-listed as endangered. The Pacific coast population of snowy plover is federally-listed as threatened, while both the coastal and interior populations are of state special concern. There are two subspecies of Bell's vireo known to occur in California, but only the least Bell's vireo (*Vireo bellii pusillus*) is federally- and state-listed as endangered. These subspecies/populations are very difficult to distinguish outside of their breeding habitat, and observations at the Combat Center have only identified these birds to the species level (MCAGCC 2007a). It is unlikely that the Combat Center would support viable resident populations of these species and they have not been observed within training areas.

In the CMBC and NREA surveys of the 73 potential AMZ sites, nine special-status animal species were observed (refer to Table 3-3 and Appendix A). All sites exclusive to Alternative 2 had desert tortoise presence/sign on or within 100 meters of the site.

Table 3-3. Special-Status Animal Species Known to Occur at the Combat Center

Common Name	Scientific Name	Federal Status	State Status
Residents			
Mojave Fringe-toed Lizard[1]	*Uma scoparia*	None	CSSC
Desert Tortoise[1]	*Gopherus agassizii*	Threatened	Threatened
Loggerhead Shrike[1]	*Lanius ludovicianus*	BCC	CSSC
Le Conte's Thrasher[1]	*Toxostoma lecontei*	BCC	CSSC
Northern Harrier[1]	*Circus cyaneus*	None	CSSC
Golden Eagle[1]	*Aquila chrysaetos*	BGEPA; BCC	FP 3511
Prairie Falcon[1]	*Falco mexicanus*	BCC	WL
American Peregrine Falcon	*Falco peregrinus anatum*	BCC	Delisted (2009)
Burrowing Owl[1]	*Athene cunicularia*	BCC	CSSC
Long-eared Owl	*Asio otus*	None	CSSC
California Leaf-nosed Bat	*Macrotus californicus*	None	CSSC
Western Mastiff Bat	*Eumops perotis californicus*	None	CSSC
Pallid Bat	*Antrozous pallidus*	None	CSSC
Townsend's Big-eared Bat	*Corynorhinus townsendii*	None	CSSC
Pallid San Diego Pocket Mouse	*Chaetodipus fallax pallidus*	None	CSSC
Non-residents			
Willow Flycatcher[2]	*Empidonax traillii*	Endangered (*E.t. extimus*)	Endangered (all subspecies)
Bell's Vireo[3]	*Vireo bellii*	Endangered (*V.b. pusillus*)	Endangered (*V.b. pusillus*)
Western Snowy Plover[4]	*Charadrius alexandrinus nivosus*	Threatened (Pacific population)	CSSC
Gilded Flicker	*Colaptes chrysoides*	BCC	Endangered
Bank Swallow	*Riparia riparia*	None	Threatened
Short-eared Owl[1]	*Asio flammeus*	None	CSSC
Yellow Warbler	*Dendroica petechia*	BCC	CSSC
Black Tern	*Chlidonias niger*	None	CSSC
Vaux's Swift	*Chaetura vauxi*	None	CSSC
All raptors		None	FP 3503

Notes: [1] Species encountered in surveys of 73 potential AMZ sites by CMBC and NREA (CMBC 2010; Appendix A of this EA).
[2] All subspecies are state-listed as endangered. The subspecies *E.t. extimus* (southwestern willow flycatcher) is federally-listed as endangered. It is not known what subspecies occurs at the Combat Center.
[3] Least Bell's vireo (*V.b. pusillus*) is state- and federally-listed as endangered. It is not known what subspecies occurs at the Combat Center.
[4] Only the Pacific coast population is federally-listed as endangered. Both coastal and interior populations are CSSC. It is not known what population migrates through the Combat Center.

Definitions: BCC – Bird of Conservation Concern (within the Sonoran/Mojave Range)
BGEPA - Bald and Golden Eagle Protection Act of 1940 – full protection of both species
CSSC - California Species of Special Concern.
WL – California Department of Fish and Game Watch List
FP 3511 - Fully protected in accordance with Section 3511 of the California Fish and Game Code.
FP 3505.5 - Fully protected in accordance with Section 3503.5 of the California Fish and Game Code - prohibits the take of any birds, nests or eggs of bird in the orders Falconiformes and Strigiformes

Sources: Cutler et al. 1999; CDFG 2009, 2010; DoN 2009; MCAGCC 2007a; USFWS 2008.

The desert tortoise (Figure 3-3) was listed as threatened by the California Department of Fish and Game in 1989, and the Mojave Desert population was listed as threatened by the USFWS in 1990. The decline in desert tortoise numbers is thought to be due to a number of causes, including loss of habitat, upper respiratory tract disease, predation by ravens on young tortoises, off-highway vehicle use, livestock grazing, and direct disturbance and collection by humans (MCAGCC 2007a).

Figure 3-3. Adult Desert Tortoise in Coversite
(Source: CMBC 2010)

Currently, much focus is being put on the control and management of Common Raven populations in desert areas, as predation by this species is considered to be one of the greatest threats to the long-term survival and recovery of the desert tortoise (MCAGCC 2009a). NREA personnel at the Combat Center are working with the Raven Management Group to address the raven problem from a regional perspective (MCAGCC 2007a).

Desert tortoises present on the installation occur predominantly in creosote scrub habitat at elevations below 4,300 feet above mean sea level. The desert tortoise spends much of the year underground to avoid extreme temperatures during summer and winter. It constructs and maintains burrows, of which there may be several within an individual's home range. The desert tortoise is active above ground during the spring, summer, and autumn when daytime temperatures are below 90°F. Most activity occurs during spring and early summer (MCAGCC 2007a).

The Combat Center is within the southern Mojave subdivision of the Western Recovery Unit for the desert tortoise. The Combat Center has no designated critical habitat. However, it shares a six-mile boundary with the Ord-Rodman Critical Habitat to the northwest, and the Pinto Mountain critical habitat area is six miles southeast of the installation (MCAGCC 2007a). A “Special Use Area” of approximately 27 square kilometers, which has moderate to high densities of desert tortoises, was established in the Sand Hill Training Area to protect natural resources (Combat Center Order 5090.1C). Desert tortoises benefit from this designation, as no vehicle training is allowed off-road in this area. The Combat Center's Desert Tortoise Management Plan recommends that consideration be given to expanding protected tortoise habitat in the Sand Hill Training Area (DoN 2009).

The Combat Center prepared a Biological Assessment of the effects of training and land use on the desert tortoise. This assessment was used by the USFWS to issue a BO (1-8-99F-41) (USFWS 2002) that identified the terms and conditions under which the USMC may operate on the Combat Center while remaining in compliance with the ESA. The BO addresses the military mission, and conservation and protection of the desert tortoise.

In the CMBC and NREA surveys of the 73 potential AMZ sites, 25 were found to have desert tortoise sign (e.g., scat, burrows, coversites, carcasses, egg shell fragments, tracks) on or within 100 meters of the AMZ site (CMBC 2010; Appendix A of this EA). These 25 sites were eliminated from consideration under Alternative 1. The 47 sites that had no tortoise sign on or within 100 meters are proposed for use under Alternative 1. An ALZ in the Sand Hill Training Area (FARP 2 West; Figure 3-4) did show signs of tortoise presence within the survey area, however, this site is a heavily used, graded landing strip and tortoise sign was not found on the actual runway that would be utilized by aircraft. Therefore, the FARP 2 West site was included as an AMZ site for Alternative 1.

Figure 3-4. FARP 2 West in the Sand Hill Training Area

3.2 CULTURAL RESOURCES

3.2.1 Definition of Resource

Cultural resources include buildings, structures, sites, districts, and objects eligible for or included in the NRHP, cultural items, Indian sacred sites, archaeological artifact collections, and archaeological resources (Secretary of the Navy Instruction 4000.35 a). Cultural resources can be divided into three major categories: archaeological resources, architectural resources, and traditional cultural resources.

Archaeological resources are material remains of past human life that are capable of contributing to scientific or humanistic understanding of past human behavior, cultural adaptation, and related topics through the application of scientific or scholarly techniques. Archaeological resources can include village sites, temporary camps, lithic scatters, roasting pits/hearths, milling features, rock art (both petroglyphs and pictographs), rock features, and burials.

Architectural resources include real properties, sites, buildings, structures, works of engineering, industrial facilities, fortifications, and landscapes.

Traditional cultural resources are tangible places or objects that are important in maintaining the cultural identity of a community or group and can include archaeological sites, buildings, neighborhoods, prominent topographic features, habitats, plants, animals, and minerals.

Historic properties are cultural resources that meet one or more criteria for eligibility to the NRHP. Under the National Historic Preservation Act (NHPA) of 1966 as amended, only significant cultural resources warrant consideration with regard to adverse impacts from a federal agency's proposed action. To be considered significant, archaeological or architectural resources must meet one or more criteria as defined in 36 CFR § 60.4 for inclusion in the NRHP. Resources generally must be more than 50 years

old to be considered for protection under the NHPA. However, more recent structures associated with significant national events may warrant protection if they are "exceptionally significant."

Several other federal laws and regulations have been established to manage cultural resources, including the Archaeological and Historic Resources Preservation Act (1974), the Archaeological Resources Protection Act (1979), and the Native American Graves Protection and Repatriation Act (1990). In addition, coordination with federally recognized Native American tribes must occur in accordance with the American Indian Religious Freedom Act (1978); EO 13007, *Sacred Sites*; and EO 13175, *Consultation and Coordination with Indian Tribal Governments*.

Cultural resources located within the jurisdiction of the Combat Center are managed in accordance with the laws, regulations and guidance summarized above as well as DoD Instruction 4715.16 (Cultural Resources Management) and MCO P5090.2A, Change 2 (Environmental Compliance and Protection Manual). In addition, the MCAGCC *Integrated Cultural Resources Management Plan* (MCAGCC 2007b), which was prepared in accordance with a Programmatic Agreement (USMC 2007b) with the Advisory Council on Historic Preservation and the California State Historic Preservation Office (SHPO), provides specific guidance for the installation.

The area of potential effect (APE) for cultural resources includes areas of potential ground disturbance from rotor wash associated with hovering and landing of aircraft within the proposed AMZs located throughout the Combat Center (refer to Figures 2-7 and 2-9). No construction or other site modifications are associated with proposed activities.

3.2.2 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 the Marine Corps appear to have been variously used and occupied by the Serrano, Chemehuevi, and Mohave 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 1900s, when they moved to the Indian Reservation at Morongo.

Beginning with the 1849 California Gold Rush and lasting until World War II, the Twentynine Palms region attracted miners and, since the 1920s, homesteaders. The military presence in the Twentynine Palms area began in 1941 with the establishment of Condor Field, a U.S. Army glider-training base. The base was officially established as a Marine Corps Training Center in 1952, and became known as the Marine Corps Air Ground Combat Center in 1979.

3.2.2.1 Archaeological Resources

A record search was conducted before archaeological surveys to define which of the proposed AMZs already had adequate archaeological survey coverage and which of the 73 AMZs required surveys. The record search identified 42 AMZs with adequate survey coverage and 31 AMZs requiring new surveys. Due to cultural and/or biological constraints identified during initial surveys, six AMZs were subsequently moved to alternate locations. One of these AMZs already had adequate survey coverage and five of these AMZs required new surveys. The APE only includes those 73 AMZs being carried forward for analysis (i.e., the APE does not include the 6 original AMZs determined to have cultural and/or biological constraints).

Archaeological surveys were conducted in October and November 2009 for 31 of the proposed AMZs (ASM Affiliates 2010). Archaeological surveys of five relocated sites were conducted in December 2009 and January 2010. Most AMZs are circular in shape, but rectangular polygons were surveyed to fully encompass each circular AMZ and aid pedestrian survey. Each polygon was then surveyed in its entirety using 25-meter transects.

The record search identified nine previously identified archaeological sites located within four AMZs (Table 3-4). The new surveys also recorded 35 new isolates in 8 AMZs and identified 3 archaeological sites within 2 AMZs (Table 3-4). Once cultural resources have been identified, they are evaluated to determine if they meet one of the four criteria for significance as defined by 36 CFR § 60.4, including association with an important event, association with an important person, embodiment of a style of architecture representing a particular period in history or work of a master, or the ability to contribute to the existing scientific database. Because sites found within the APE of this project consisted of lithic tools and debitage, only Criterion D was used to assess NRHP eligibility. Criterion D recognizes a site as eligible if it has yielded or may be likely to yield information important in prehistory or history. As indicated in Table 3-4, one site (SBR-13628) is recommend as ineligible (pending SHPO concurrence), three sites are recommended as eligible (SBR-10177, -10179, and -11348) and eight sites (SBR-10176, -11345, -11346, -11673, -11739, -11744, -13635, and -13636) require evaluation fieldwork to determine eligibility status. The evaluation fieldwork would likely consist of surface and subsurface archaeological testing.

Table 3-4. AMZs with Archeological Sites Identified during Record Search and Archaeological Survey

Site	Description	Eligibility Status under NRHP
Previously Surveyed Sites		
SBR-10176	Site with approximately 200 flakes	Requires evaluation
SBR-10177	Site with 3000 plus artifacts and Segregated Reduction Loci	Eligible
SBR-10179	Lithic scatter/multiple Segregated Reduction Loci	Eligible
SBR-11345	Site with 30 flakes	Requires evaluation
SBR-11346	Site with 50 flakes	Requires evaluation
SBR-11348	Large habitation site	Eligible
SBR-11673	Cluster of 109 Segregated Reduction Loci	Requires evaluation
SBR-11739	Medium site with 200-300 artifacts	Requires evaluation
SBR-11744	Medium site with 200-300 artifacts	Requires evaluation
Newly Surveyed Sites		
SBR-13628	Small lithic scatter with 12 flakes	Recommended ineligible
SBR-13635	Small lithic scatter 50 chert flakes	Requires evaluation
SBR-13636	Small lithic scatter with 114 chert flakes	Requires evaluation

Source: ASM Affiliates 2010.

3.2.2.2 Architectural Resources

There are no buildings located within the APE. Therefore, architectural resources are not discussed in this section.

3.2.2.3 Traditional Resources

Seven Native American groups maintain a cultural affinity with the land at the Combat Center. These groups include the Chemehuevi Indian Tribe, the Colorado River Indian Tribes, the Fort Mohave Indian Tribe, the Morongo Band of Mission Indians, the San Manuel Band of Mission Indians, Agua Caliente, and the Twentynine Palms Band of Mission Indians. Consultation with these Native American Tribes began in 1995, and one of the issues discussed is the presence of traditional cultural resources. Although none of the tribes specifically identified traditional cultural resources, they all expressed a desire to be consulted regarding any prehistoric or Native American sites located on the installation (MCAGCC 2007b). There are no known traditional cultural resources located within the APE.

3.3 AIR QUALITY

This section addresses baseline air quality conditions for the project area and includes a description of air quality terminology, regulatory requirements applicable to the proposed alternatives, and current air quality conditions. The affected area for air quality is the Mojave Desert Air Quality Management District (MDAQMD), which includes all of San Bernardino County and portions of Riverside, Los Angeles, and Kern counties.

3.3.1 Definition of Resource

3.3.1.1 Criteria Pollutants and Air Quality Standards

Air quality is defined by ambient air concentrations of specific pollutants determined by the U.S. Environmental Protection Agency (USEPA) to be of concern with respect to the health and welfare of the general public. Seven major pollutants of concern, called "criteria pollutants," are carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), suspended particulate matter less than or equal to 10 microns in diameter (PM_{10}), fine particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and lead (Pb). SO_2 and NO_2 are commonly referred to and reported as oxides of sulfur (SO_x) and oxides of nitrogen (NO_x), respectively. The USEPA has established National Ambient Air Quality Standards (NAAQS) for these pollutants. Areas that violate a federal air quality standard are designated as non-attainment areas.

Ambient air quality refers to the atmospheric concentration of a specific compound (amount of pollutants in a specified volume of air) that occurs at a particular geographic location. The ambient air quality levels measured at a particular location are determined by the interactions of emissions, meteorology, and chemistry. Emission considerations include the types, amounts, and locations of pollutants emitted into the atmosphere. Meteorological considerations include wind and precipitation patterns affecting the distribution, dilution, and removal of pollutant emissions. Chemical reactions can transform pollutant emissions into other chemical substances. Ambient air quality data are generally reported as a mass per unit volume (e.g., micrograms per cubic meter of air) or as a volume fraction (e.g., parts per million [ppm] by volume).

Pollutant emissions typically refer to the amount of pollutants or pollutant precursors introduced into the atmosphere by a source or group of sources. Pollutant emissions contribute to the ambient air concentrations of criteria pollutants, either by directly affecting the pollutant concentrations measured in the ambient air or by interacting in the atmosphere to form criteria pollutants. Primary pollutants, such as CO, SO_2, Pb, and some particulates, are emitted directly into the atmosphere from emission sources.

Secondary pollutants, such as O_3, NO_2, and some particulates, are formed through atmospheric chemical reactions that are influenced by meteorology, ultraviolet light, and other atmospheric processes. PM_{10} and

$PM_{2.5}$ are generated as primary pollutants by various mechanical processes (for example, abrasion, erosion, mixing, or atomization) or combustion processes. However, PM_{10} and $PM_{2.5}$ can also be formed as secondary pollutants through chemical reactions or by gaseous pollutants condensing into fine aerosols. In general, emissions that are considered "precursors" to secondary pollutants in the atmosphere (such as volatile organic carbons [VOCs] and NO_x, which are considered precursors for O_3), are the pollutants for which emissions are evaluated to control the level of O_3 in the ambient air.

Existing air quality at a given location can be described by the concentrations of various pollutants in the atmosphere. Pollutants are defined as two general types: (1) "criteria" pollutants and (2) toxic compounds. Criteria pollutants have national and/or state ambient air quality standards. The USEPA establishes the NAAQS, while the California Air Resources Board (CARB) establishes the state standards, termed the California Ambient Air Quality Standards (CAAQS). The NAAQS represent maximum acceptable concentrations that generally may not be exceeded more than once per year, except the annual standards, which may never be exceeded. The CAAQS represent maximum acceptable pollutant concentrations that are not to be equaled or exceeded. The national and state ambient air quality standards are shown in Figure 3-5. In California, CARB is responsible for enforcing both the federal and state air pollution standards.

3.3.1.2 Toxic Air Contaminants

Toxic compounds are toxic air pollutants that have been determined to present some level of acute or chronic health risk (cancer or non-cancer) to the general public. These pollutants may be emitted in trace amounts from various types of sources, including combustion sources.

3.3.1.3 Greenhouse Gas Emissions

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. These emissions occur from natural processes as well as human activities. The accumulation of GHGs in the atmosphere regulates, in part, the earth's temperature. Scientific evidence suggests a trend of increasing global temperature over the past century potentially due to an increase in GHG emissions from human activities. Potential climate change associated with GHGs may produce negative economic and social consequences across the globe.

The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Examples of GHGs created and emitted primarily through human activities include fluorinated gases (hydrofluorocarbons and perfluorocarbons) and sulfur hexafluoride. Each GHG is assigned a global warming potential (GWP). The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. The GWP rating system is standardized to CO_2, which has a value of one. For example, CH_4 has a GWP of 21, which means that it has a global warming effect 21 times greater than CO_2 on an equal-mass basis. Total GHG emissions from a source are often reported as a CO_2 equivalent (CO_2e). The CO_2e is calculated by multiplying the emission of each GHG by its GWP and adding the results together to produce a single, combined emission rate representing all GHGs. On a national scale, federal agencies are addressing emissions of GHGs by reductions mandated in federal laws and Executive Orders. Most recently, EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, and EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, were enacted to address GHG in detail, including GHG emissions inventory, reduction, and reporting. Several states have promulgated laws as a means to reduce statewide levels of GHG emissions. In particular, the California Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32) directs the State of California to reduce statewide GHG emissions to 1990 levels by the year 2020. As part of its efforts to evaluate its requirements under AB 32, the Marine Corps Installations West has developed its *Greenhouse Gas Assessment for Marine Corps Installations West* (USMC 2009).

POLLUTANT	AVERAGING TIME	CALIFORNIA STANDARDS(1)	NATIONAL STANDARDS(2)	
			Primary	Secondary
Ozone (O_3)	8 Hour	0.070 ppm (137 μg/m^3)	0.075 ppm (147 μg/m^3)	Same as Primary Standards
	1 Hour	0.09 ppm (180 μg/m^3)	•	
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	•
	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (57 μg/m^3)	0.053 ppm (100 μg/m^3)	Same as Primary Standard
	1 Hour	0.18 ppm (339 μg/m^3)	0.100 ppm	•
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	•	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	•	•	0.5 ppm (1300 μg/m^3)
	1 Hour	0.25 ppm (655 μg/m^3)	•	•
Respirable Particulate Matter ≤ 10 Microns in Diameter (PM_{10})	Annual Arithmetic Mean	20 μg/m^3	•	Same as Primary Standards
	24 Hour	50 μg/m^3	150 μg/m^3	
Respirable Particulate Matter ≤ 2.5 Microns in Diameter ($PM_{2.5}$)	Annual Arithmetic Mean	12 μg/m^3	15.0 μg/m^3	Same as Primary Standards
	24 Hour	No Separate Standard	35 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
	Rolling 3-Month Average	•	0.15 μg/m^3	
Hydrogen Sulfide (H_2S)	1 Hour	0.03 ppm (42 μg/m^3)	•	•
Vinyl Chloride (chloroethene)	24 Hour	0.01 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/m^3 – micrograms per cubic meter mg/m^3 – milligrams per cubic meter • – no standard established

(1) CO, SO_2 (1- and 24-hour), NO_2, O_3, PM_{10}, 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.

Source: CARB 2010a.

Figure 3-5
California and National Ambient Air Quality Standards

In an effort to reduce energy consumption, reduce dependence on petroleum, and increase the use of renewable energy resources in accordance with the goals set by EO 13123 and the Energy Policy Act of 2005, the DoN and USMC have implemented a number of renewable energy projects. The types of projects currently in operation within the Naval Facilities Engineering Command (NAVFAC) Southwest region include thermal and photovoltaic solar systems, geothermal power plants, and wind generators. The military also purchases one-half of the biodiesel fuel sold in California. The DoN continues to promote and install new renewable energy projects within the NAVFAC Southwest region.

The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Therefore, the impact of GHG emissions (associated with the project) to global climate change is discussed in the context of cumulative impacts in Chapter 5 of this EA and the supporting data is provided in Appendix B.

3.3.2 Regulatory Setting

3.3.2.1 Federal Requirements

Section 176(c) of the 1990 CAA Amendments contains the General Conformity Rule (40 CFR §§ 51.850-860 and 40 CFR §§ 93.150-160). The General Conformity Rule (updated March 24, 2010) requires any federal agency responsible for an action in a non-attainment or maintenance area to determine that the action conforms to the applicable SIP (USEPA 2010c). This means that federally supported or funded activities will not (1) cause or contribute to any new air quality standard violation, (2) increase the frequency or severity of any existing standard violation, or (3) delay the timely attainment of any standard, interim emission reduction, or other milestone. The rule allows for approximately 30 exemptions that are assumed to conform to an applicable SIP. Emissions of attainment pollutants are exempt from conformity analyses. Actions would conform to a SIP if their annual direct and indirect emissions remain less than the applicable *de minimis* thresholds. Formal conformity determinations are required for any actions that exceed these thresholds. The Combat Center and AMZ are located within the Mojave Desert Air Basin (MDAB). The applicable *de minimis* levels for the MDAB are listed in Table 3-5.

Table 3-5. Applicable Criteria Pollutant *de minimis* Levels for the MDAB (tons/year)

VOCs[1]	NO_x[1]	CO[2]	SO_x[2]	PM_{10}[3]	$PM_{2.5}$[2]
25	25	NA	NA	100	NA

Notes: [1] The MDAB is in severe nonattainment of the 8-hour O_3 NAAQS; VOCs and NO_x are precursors to the formation of O_3.
[2] NA = *de minimis* levels area not applicable since the MDAB is in attainment of the CO, SO_2, and $PM_{2.5}$ NAAQS.
[3] MDAB is in moderate nonattainment of the PM_{10} NAAQS.
Sources: CARB 2010b; USEPA 2010a; MDAQMD 2010.

3.3.2.2 State Regulations

The California CAA of 1988, as amended in 1992, outlines a program to attain the CAAQS for ozone, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), PM_{10}, $PM_{2.5}$, and CO by the earliest practical date. Since the CAAQS are more stringent than the NAAQS, emissions reductions beyond what would be required to show attainment for the NAAQS would be needed to show compliance with the CAAQS. CARB delegates the authority to regulate stationary source emissions to local air quality management districts. CARB requires these agencies to develop their own strategies for achieving compliance with the NAAQS

and CAAQS, but maintains regulatory authority over those strategies, as well as all mobile source emissions throughout the state. As discussed below, the MDAQMD is the local agency responsible for enforcement of air quality regulations in the project region.

3.3.2.3 Local Regulations

The MDAQMD is responsible for regulating stationary sources of air emissions within the MDAB. The MDAQMD has developed air quality plans designed to reduce emissions to a level that will bring the MDAB into attainment of the ambient air quality standards as its portion of the California SIP (MDAQMD 2010). The most recent attainment plan for the Mojave Desert is the 2008 *Federal 8-hour Ozone Attainment Plan (Western Mojave Desert Non-attainment Area)* (MDAQMD 2008). Control measures for stationary sources proposed in the air quality plans and adopted by the MDAQMD are incorporated into the Rules and Regulations of the MDAQMD (MDAQMD 2010).

3.3.3 Existing Conditions

Identifying the region of influence (ROI) for air quality requires knowledge of the pollutant type, source emission rates, the proximity of project emission sources to other sources, and local and regional meteorology. For inert pollutants (other than O_3 and its precursors), the region of influence is generally limited to a few miles downwind from a source. The region of influence for O_3 may extend much farther downwind than for inert pollutants because in the presence of solar radiation, the maximum effect of precursor emissions on O_3 levels usually occurs several hours after they are emitted and many miles from the source of emissions.

The project region analyzed under this proposal includes the AMZs at the Combat Center which are located within the MDAB. The ROI for air quality analysis is defined as the entire MDAB, which includes the eastern portions of Kern, San Bernardino, Riverside, and Los Angeles Counties. The AMZs are subject to both the NAAQS and the CAAQS. Areas in which ambient air concentrations of a pollutant are higher than the NAAQS and/or CAAQS are considered to be non-attainment for that pollutant. The portions of the MDAB that encompass the project region are classified as severe-17 O_3 and moderate PM_{10} nonattainment areas (USEPA 2010a).

3.3.3.1 Climate and Meteorology

The climate of the project region is classified as arid continental, characterized by hot summers, mild winters, low humidity, and large diurnal variations in temperature. This arid condition produces low soil moisture and a high potential for fugitive dust emissions (PM_{10}), which is one of the main air pollution problems in the region. Data collected at the town of Twentynine Palms are used to describe the climatic conditions of the project region (Western Region Climate Center 2010).

<u>Precipitation</u>

The project region is within the Mojave Desert, which is one of the driest regions in the U.S. This condition occurs because (1) the region is at the southern extent of the track of wintertime North Pacific storms, (2) the rain shadow effects of the Coast Ranges block the flow of moisture into the region from the Pacific Ocean, and (3) the region is at the western fringe of the summertime monsoon regime, whose moisture sources originate from the Gulf of Mexico and Gulf of California. The annual average precipitation at Twentynine Palms is about 4 inches. Monsoon rains, which generally occur between the months of July through September, produce about 43% of the annual rainfall at Twentynine Palms.

Temperature

The average high and low temperatures at Twentynine Palms during the summer months range from about 105 to 64°F. The average high and low temperatures during the winter months range from 74 to 35°F. The low humidity in the region is responsible for the large diurnal variations in temperature.

Prevailing Winds

Concurrent with the presence of the Eastern Pacific High west of California, a thermal low pressure system persists in the interior desert region due to intense solar heating. The resulting pressure gradient between these two systems produces a west to northwest air flow across the Twentynine Palms region for most of the year. Average daily wind speeds range from a low of about 6 knots in the fall to 8 knots in the spring and summer.

3.3.3.2 Regional and Local Air Pollutant Sources

CARB periodically updates emissions for the MDAB for purposes of forecasting future emissions, analyzing emission control measures, and for use in regional air quality modeling. The largest regional sources of air emissions, including O_3, NO_2, and CO, are on-road vehicles. The year 2008 inventory determined that on-road vehicles emitted 29% of the VOCs, 48% of the NO_x, and 59% of the CO emissions within the MDAB (CARB 2010c). Other large sources of VOCs are use of surface coatings and solvents. Combustion sources like vehicles, diesel engines, and industrial facilities produce both the fine primary particulate matter (i.e., PM_{10} and $PM_{2.5}$) and fine particulate precursor pollutants, such as NO_x, which react in the atmosphere to produce secondary fine particulates. Coarser particles are directly emitted from soil-disturbing activities such as construction, mining, agriculture, and on- and off-road vehicular road dust, as well as from wind-blown dust.

3.3.3.3 Baseline Air Quality

Representative air quality data for the Combat Center for the period 2004-2008 are shown in Table 3-6. Ozone concentrations are generally the highest during the summer months, coinciding with the period of maximum regional insulation. Maximum ozone concentrations tend to be regionally distributed, since precursor emissions become homogeneously dispersed in the atmosphere. Inert pollutants, such as CO, tend to have the highest concentrations during the colder months of the year, when light winds and nighttime/early morning surface-based temperature inversions inhibit atmospheric dispersion. Due to the general lack of dispersion, therefore, maximum inert pollutant concentrations are usually found near an emission source.

Table 3-6. Representative Air Quality Data for the Combat Center (2004-2008)

Air Quality Indicator	2004	2005	2006	2007	2008
Ozone (O3)[1]					
Peak 1-hour value (ppm)	0.137	0.131	0.125	0.129	0.140
Days above CAAQS (0.090 ppm)[2, 3]	35	38	37	37	36
Peak 8-hour value (ppm)	0.107	0.112	0.105	0.106	0.110
Days above NAAQS (0.075 ppm)[2, 3]	69	59	66	81	72
Particulate matter less than or equal to 10 microns in diameter (PM_{10})[4]					
Peak 24-hour value (μg/m^3)	56	61	62	358	72
Days above NAAQS (150 μg/m^3)	0	0	0	1	0
Days above CAAQS (50 μg/m^3)	1	1	2	4	2
Annual Average value (ppm)	28.0	28.9	33.0	38.4	27.0
Particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$)[4]					
Peak 24-hour value (μg/m^3)	34	27	22	28	17
Days above NAAQS (35 μg/m^3)[4]	1	1	0	0	0
Annual Average value (ppm)	10.7	9.6	10.3	9.6	NA[5]
Carbon Monoxide (CO) [4]					
Peak 8-hour value (ppm)	1.70	1.63	1.56	1.61	1.04
Days above NAAQS/CAAQS (9 ppm)	0	0	0	0	0
Nitrogen Dioxide (NO_2) [4]					
Peak 1-hour value (ppm)	0.080	0.077	0.079	0.071	0.074
Days above CAAQS (0.18 ppm)	0	0	0	0	0
Annual Average value (ppm)	0.021	0.019	0.020	0.018	0.016

Notes: [1] Data from the Joshua Tree monitoring station.
[2] The federal O_3 standard was revised downward in 2008 to 0.075 ppm.
[3] The federal eight-hour ozone standard was previously defined as 0.08 ppm (1 significant digit). Measurements were rounded up or down to determine compliance with the standard; therefore a measurement of 0.084 ppm is rounded to 0.08 ppm. The 8-hour ozone ambient air quality standards are met at an ambient air quality monitoring site when the average of the annual fourth-highest daily maximum 8-hour average ozone concentration is less than or equal to the standard.
[4] Data from the Victorville monitoring station. The federal $PM_{2.5}$ standard was revised downward in 2007 to 35 μg/m^3.
[5] NA – Data not available.
ppm = parts per million; μg/m^3 = micrograms per cubic meter
Source: CARB 2010d.

3.3.3.4 Sources of Emissions

Sources of emissions in the project area include various stationary sources, ground support equipment, and mobile sources, including personal and government-owned vehicles. Nearby stationary sources include stationary engines used for generators and compressors, fuel storage and handling facilities, boilers, and gasoline stations. Motor vehicles represent the primary source of emissions near the project area. In addition, fugitive dust (PM_{10}) emissions generated during training events and as a result of vehicle activity on nearby unpaved roads also affects air quality in the area. Table 3-7 includes the estimated emissions for the Combat Center from the 2008 Air Emissions Inventory. This inventory also includes AB 2588 air toxics listed in *the Emissions Inventory Criteria and Guidelines Report for the Air Toxics "Hot Spots" Program* and Hazardous Air Pollutants (HAPs) listed under Section 112(b) of the California CAA (MCAGCC 2009b).

Table 3-7. 2008 Air Emissions Inventory for the Combat Center (tons)

Emission Source	VOCs	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$	AB 2588
Mobile Sources	23.5	244.1	99.4	24.0	12.3	12.2	1.8
Stationary Sources	2.44	24.16	6.15	0.41	3.45	3.43	5.86

Source: MCAGCC 2009b.

3.4 NOISE

3.4.1 Definition of Resource

The predominant noise sources at the Combat Center consist of aircraft operations. For this EA, noise at the airspace and ranges includes aircraft operations but does not include ordnance delivery events. Other components such as construction and vehicle traffic would produce noise, but such noise is a transitory and negligible contribution to the overall noise environment.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air or water, and are sensed by the human ear. Noise is defined as unwanted or annoying sound that interferes with or disrupts normal human activities. Although exposure to very high noise levels can cause hearing loss, the principal human response to noise is annoyance (refer to Appendix C). The response of different individuals to similar noise events is diverse and is influenced by the type of noise, the perceived importance of the noise, its appropriateness in the setting, the time of day, the type of activity during which the noise occurs, and the sensitivity of the individual. Noise may also affect wildlife through disruption of resting, foraging, migrating, and other life-cycle activities.

Aircraft are not the only sources of noise in an urban or suburban environment, where interstate and local roadway traffic, rail, industrial, and neighborhood sources also contribute to or detract from the everyday quality of life. Nevertheless, aircraft are readily identified by their noise output and are typically given special attention. Consequently, aircraft noise often dominates analyses of environmental impacts. Additional background information on noise, including its effect on many facets of the environment, is provided in Appendix C.

Noise and sound are expressed in logarithmic units of decibels (dB). A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions (Figure 3-6). Normal speech has a sound level of approximately 60 dB; sound levels above 120 dB begin to cause discomfort inside the human ear. Sound levels between 130 and 140 dB may cause pain (Berglund and Lindvall 1995). The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB.

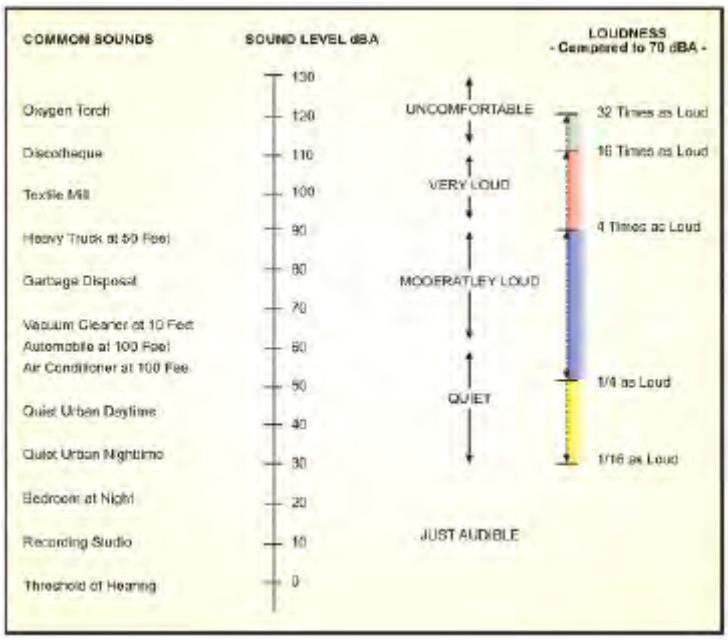


Figure 3-6. Typical A-Weighted Sound Levels of Common Sounds
Sources: Harris 1979 and
Federal Interagency Committee on Noise (FICON) 1992.

On average, a person perceives a doubling (or halving) of the sound's loudness when there is a 10 dB increase in sound level.

All sounds have a spectral content, which means their magnitude or level changes with frequency, where frequency is measured in cycles per second or hertz (Hz). To mimic the human ear's non-linear sensitivity and perception of different frequencies of sound, the spectral content is weighted. For example, environmental noise measurements are usually on an "A-weighted" scale that filters out very low and very high frequencies to replicate human sensitivity. It is common to add the "A" to the measurement unit to identify that the measurement has been made with this filtering process (dBA). In this document, the dB unit refers to A-weighted sound levels.

In accordance with DoD guidelines and standard practice for environmental impact analysis documents, the noise analysis herein utilizes the following (A-weighted) noise descriptors or metrics: Maximum Sound Level (ALM), Sound Exposure Level (SEL), and Community Noise Equivalent Level (CNEL). ALM and SEL describe single noise events, whereas CNEL is a time-averaged metric describing the cumulative noise environment of individual noise events over longer periods, usually up to 24 hours. CNEL accounts for single-event noise levels and also weight or penalize those levels depending on the time period in which they occur, weighting evening (7:00 p.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) sounds up to 10 dB. CNEL, which includes penalties for evening (5 dBA) and night (10 dBA) operations, is specific to California.

The Onset-Rate Adjusted Monthly variant of CNEL, denoted $CNEL_{mr}$ is specifically used for describing cumulative aircraft noise exposure from airspace and range operations. Each descriptor, along with other noise metrics, is described in more detail in Appendix C.

It is important to note that all metrics and associated noise models draw from a database of actual aircraft noise measurements. As such, they describe and compare noise conditions without requiring noise monitoring.

3.4.2 Existing Conditions

This section describes the existing conditions of the Combat Center airspace and ranges. Aircraft using the Combat Center range complex also operate out of the EAF; however, the noise exposure at the EAF is not the focus of this EA. The existing aircraft noise environment at the EAF is identical to the baseline condition from the MV-22 West Coast Basing EIS (DoN 2009). Under the baseline conditions at the EAF, the CNEL contours are wholly contained within the Combat Center boundary; no off-base people or housing units are located within the noise contours.

3.4.2.1 Airspace and Ranges

The existing aircraft noise environment at the Combat Center range complex was initially based on the baseline condition from the MV-22 West Coast Basing EIS (DoN 2009). For consistency purposes, the baseline condition was updated to include the CH-46E and CH-53E use of AMZs. The addition of the CH-46E and CH-53E AMZ operations increased the total annual flight operations under the baseline condition from approximately 27,400 to 29,600 resulting in an 8% increase relative to the MV-22 West Coast Basing EIS baseline.

The modeling was categorized into three groups: route-type operations, area-type operations distributed to large flight areas, and area-type operations assigned to AMZs. The following factors were considered in the analysis of noise levels from existing operations at the Combat Center: flight operations, flight

areas and/or tracks, flight profiles and climatological data. These factors are described in detail in Appendix C. Modeled flight operations are summarized below.

3.4.2.2 Flight Operations

The baseline condition for the Combat Center modeled approximately 1,200 route-type operations annually. Route modeling consists of two aerial refueling tracks in the Bristol Military Operations Area (MOA), one flown at an altitude of 19,000 feet above mean sea level and the other flown at 22,000 feet above mean sea level.

All of the existing route operations are by fixed-wing aircraft (KC-130, F/A-18C/D, and AV-8B), with the modeled activity evenly split between the 19,000 foot aerial refueling track and the 22,000 foot aerial refueling track. Of the total modeled route-type operations, CNEL evening and nighttime flight operations account for 12% and 3%, respectively. Typical route-type CH-46E flight profile altitudes ranged from 0 to 5,000 feet AGL, with an average speed of 110 knots.

The baseline condition also modeled approximately 28,000 area-type operations annually. Modeled areas consist of:

- Bristol MOA/Air Traffic Control Assigned Airspace (ATCAA);
- Sundance MOA;
- Restricted Area 2501N, including Lavic Lake and Blacktop training ranges;
- Restricted Area 2501S;
- Restricted Area 2501E, including America Mine and Lead Mountain TAs; and
- Restricted Area 2501W, including Emerson Lake Training Area.

Most of the existing area operations are by helicopters (primarily by AH-1W Super Cobra and CH-46E Sea Knight) and about 30% of these operations are to Restricted Area 2501S. The remaining operations are approximately equally divided to Restricted Area 2501N, E, and W. Of the total modeled area-type operations, CNEL evening and nighttime flight operations account for 12% and 3%, respectively. Typical large area-type CH-46E flight profile altitudes ranged from 0 to 1,000 feet AGL, with an average speed of 100 knots and an average sortie duration of 6 to 18 minutes.

The baseline condition also modeled 2,148 area-type operations assigned to AMZs, as these types of activities are currently conducted by rotary–wing aircraft at the Combat Center (MCAGCC 2010a). Modeled AMZs consist of the following 5 types: OLZ, ALZ, CLZ, LZ, and PZ.

The area-type AMZ operations were modeled as 60-minute sortie durations comprised of two distinct components for helicopters – hover/landing and transit. The AMZ sites were modeled as 750-foot diameter circular areas centered at each of the 73 AMZs. This circular area was considered the hover/land area for modeling purposes. The CH-46E altitudes range from 0 to 300 feet AGL, at an average speed of 50 knots, and an average of 15 minutes spent at each modeled AMZ land/hover area. The remaining sortie duration of 45 minutes is considered the transit portion to and from the modeled AMZs. The transit portion was distributed in the entire Restricted Area 2501 airspace with altitudes ranging from 300 to 5,000 feet AGL, at an average speed of 110 knots. The CH-53E was modeled identically to the CH-46E but with a transit speed of 120 knots (MCAGCC 2010b).

$CNEL_{mr}$ is a noise metric based on average daily operations flown in a busy month (i.e., 267 sorties and approximately 17 flying days), so daily operations were calculated by dividing the number of annual

operations by 12, then by the number of flying days per busy month. Area-type and route-type operations at the Combat Center were modeled with 30 flying days per busy month while the area-type AMZ operations were with 17 flying days per busy month.

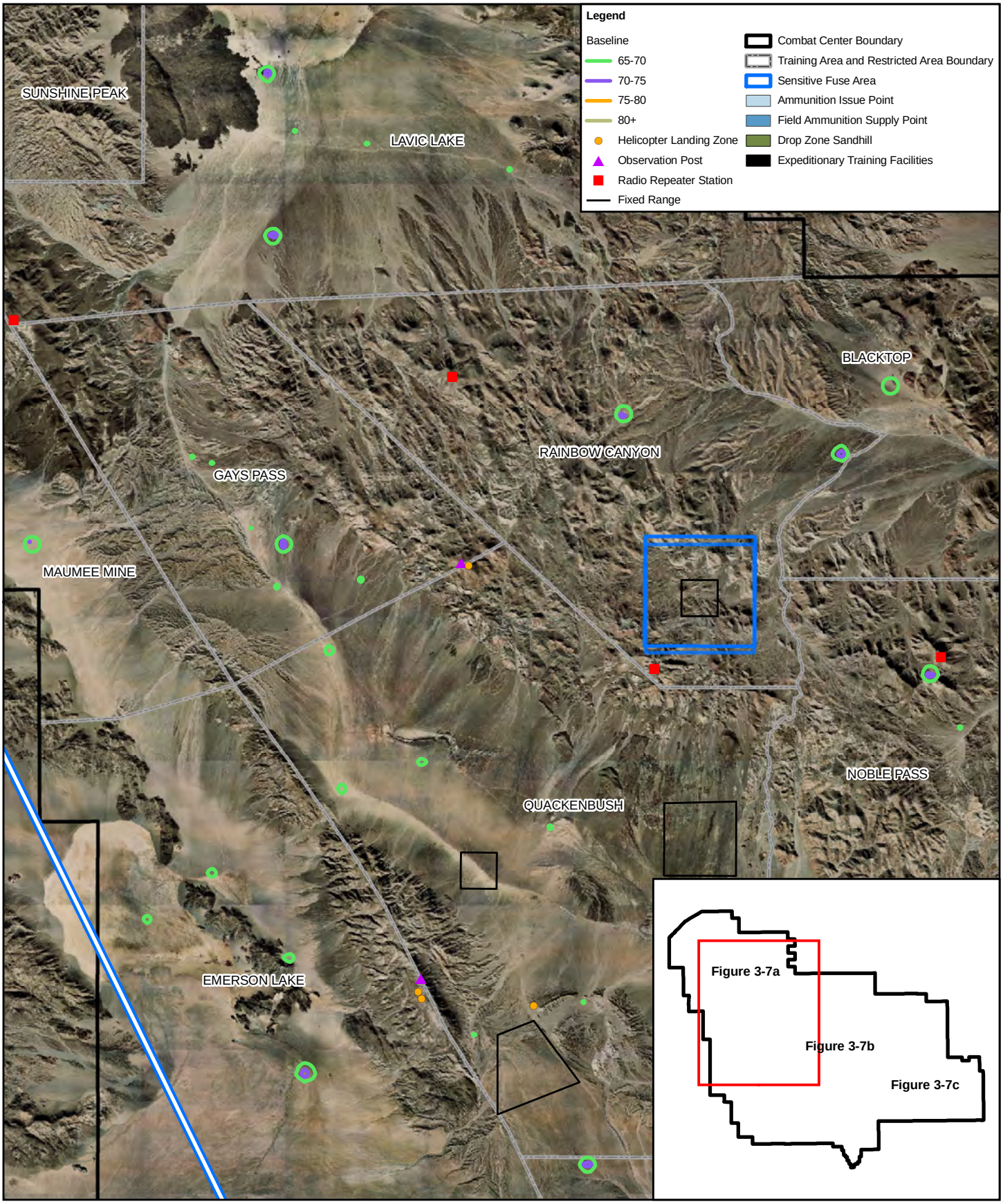
3.4.2.3 Noise Exposure

Figures 3-7a, 3-7b, and 3-7c show the 65-85 dB $CNEL_{mr}$ contours, in 5-dB increments, for the baseline scenario. The maximum $CNEL_{mr}$ of 80 dB occurs at PZ 1. FARP 1 East Lava and FARP 2 West Sand Hill AMZs experience maximum $CNEL_{mr}$ of 75-80 dB. A total of 60 out of 73 AMZ sites experience sound levels greater than or equal to 65 dB $CNEL_{mr}$ as listed in Table 3-8 below. Thirteen of the AMZ sites have maximum $CNEL_{mr}$ less than 65 dB. The noise caused by AMZ operations is contained to the vicinity directly surrounding each AMZ, and the 65 dB $CNEL_{mr}$ contour around each AMZ approximates a circle in shape and does not exceed approximately 3,000 feet in diameter.

Table 3-8. Number of AMZ Sites by Band of $CNEL_{mr}$ for Baseline

$CNEL_{mr}$ Band (dBA)*	Baseline Number of AMZs
65-70	37
70-75	20
75-80	2
80-85	1
85+	0
Total (65+)	**60**

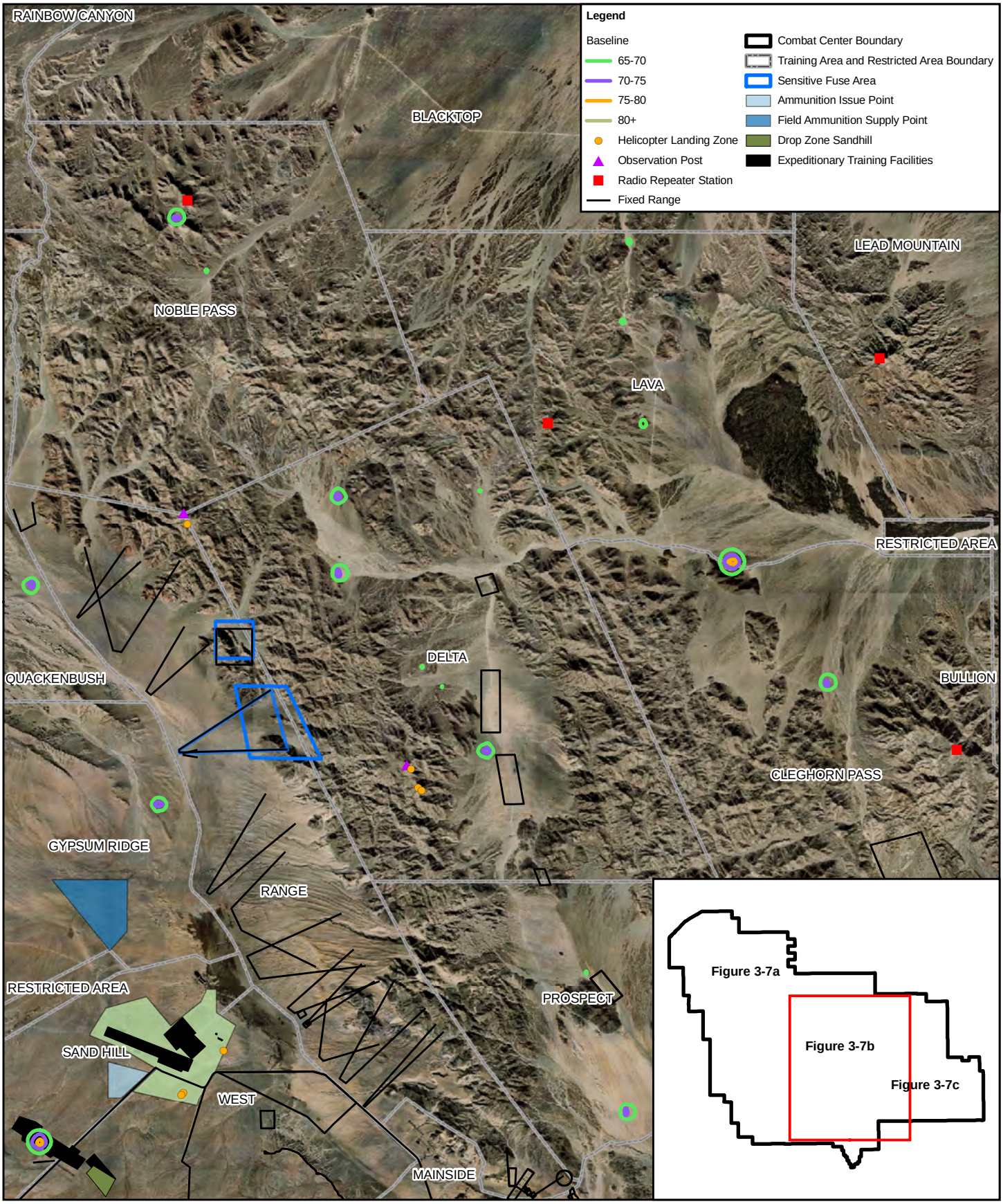
Note: Exclusive of upper bound for each band; each band count is exclusive (i.e., no double-counting).



Kilometers
0 0.75 1.5 3
0 0.75 1.5 3
Miles

Figure 3-7a
Existing Aircraft Noise Contours: West

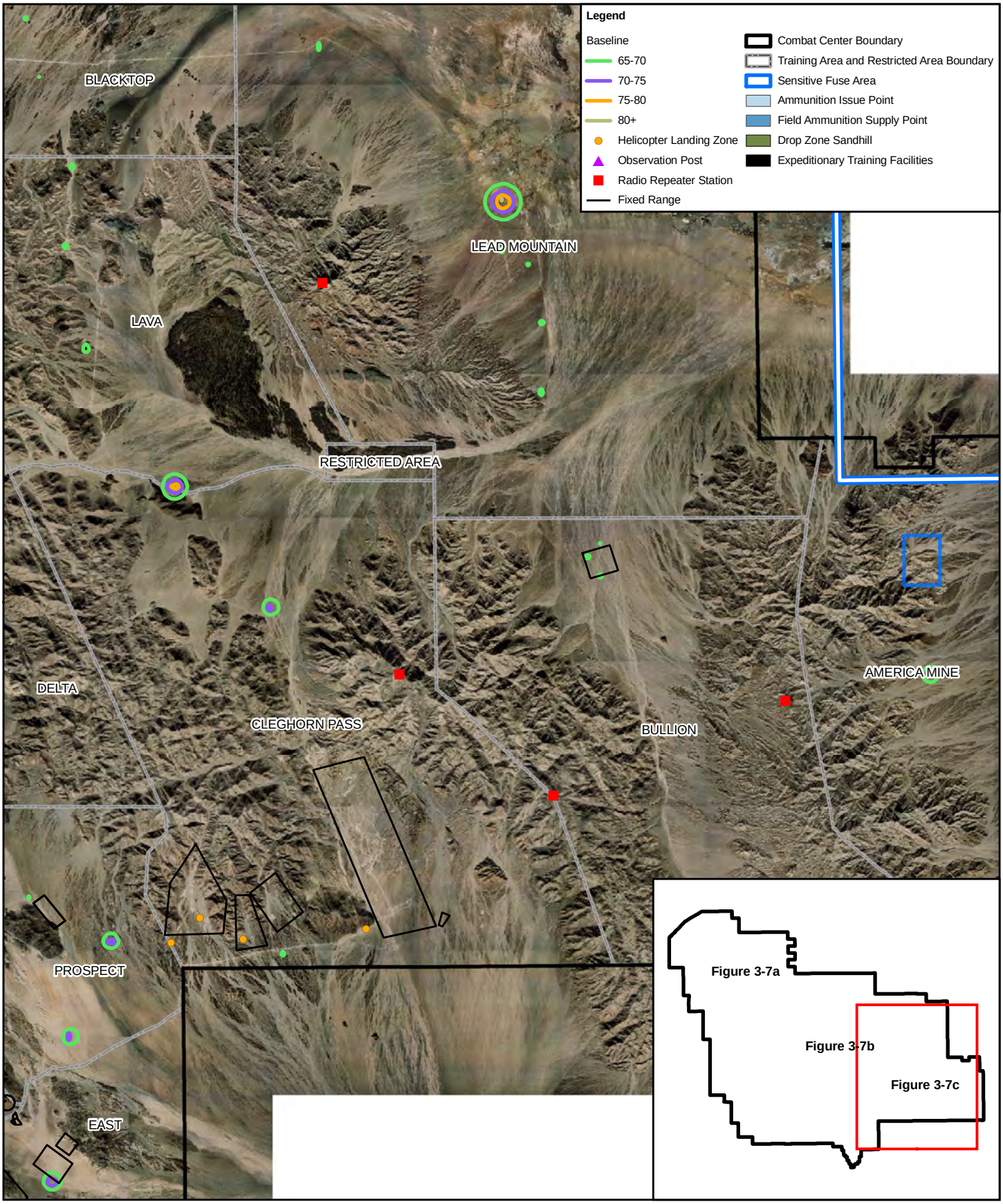
N



Kilometers
0 0.75 1.5 3
0 0.75 1.5 3
Miles

Figure 3-7b
Existing Aircraft Noise Contours: Central

N



Kilometers
0 0.75 1.5 3
0 0.75 1.5 3
Miles

Figure 3-7c
Existing Aircraft Noise Contours: East

N

CHAPTER 4.
ENVIRONMENTAL CONSEQUENCES

This chapter describes potential environmental consequences associated with implementation of the proposed alternatives. CEQ regulations implementing NEPA state that the environmental consequences discussion shall include direct and indirect impacts as well as their significance. This discussion addresses all resource areas described in Chapter 3.

4.1 BIOLOGICAL RESOURCES

4.1.1 Approach to Analysis

The significance of potential impacts to biological resources is based on: 1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource; 2) the proportion of the resource that would be affected relative to its occurrence in the region; 3) the sensitivity of the resource to proposed activities; and 4) the duration or ecological ramifications of the impact(s). Impacts to biological resources would be significant if species or habitats of concern were adversely affected over relatively large areas or if disturbances caused reductions in population size or distribution of a special-status species.

This section analyzes the potential for impacts to biological resources from implementation of the proposed alternatives. This analysis focuses on how utilization of the potential AMZ sites by MV-22 and rotary-wing aircraft may affect biological resources. Possible impacts to biological resources would be due to downdraft (dust and soil erosion) from vertical takeoffs, landings, and hovering; fire; bird-aircraft strikes; aircraft landing on slow-moving wildlife (e.g., desert tortoises); and disturbance to wildlife from noise and visual effects from aircraft overflight.

4.1.2 Impacts

4.1.2.1 Alternative 1

Vegetation

Alternative 1 includes the use of 48 AMZ sites comprising approximately 1,400 acres on the Combat Center. No new construction or infrastructure improvements are proposed as part of this alternative; therefore, there would be no direct loss of vegetation or wildlife habitat due to construction activities.

Use of the 48 AMZ sites proposed for Alternative 1 by MV-22 and rotary-wing aircraft would result in loose debris and fine sediment being removed and blown laterally by downdraft and outwash in the vicinity of take-offs, landings, and near-surface hovering (refer to Figure 2-6 for typical wind flow patterns). Rotor wash from the MV-22 would be up to 10% greater than from the CH-53E and three to four times greater than from the CH-46E (DoN 2009). These wind velocities could reach 90 knots directly below the MV-22 when hovering within 100 feet AGL (DoN 2006). This impact is unlikely to affect established perennial vegetation, which is relatively sparse on the proposed sites. The redistribution of loose materials and fine sediments would locally alter microhabitat conditions, possibly affecting the distribution of annual species and recruitment of perennial species on a small scale. However, substantial changes in vegetation communities on the sites would not be expected. The same processes occur as a result of natural wind and water (in washes), as well as by other types of aircraft training activities. The AMZ sites are located in training areas that have a history of similar training activities, and incorporation of the MV-22 would represent a negligible change in the overall training environment within these areas. In addition, the total number of operations under the proposed action

would be approximately 15% less than baseline conditions. Therefore, there would be no significant impacts to vegetation associated with take-offs, landings, and low-level hovering.

Operation of the MV-22, itself, has not been identified as a cause of frequent fires. According to a recent DoN review, there has been only one documented fire (caused by an engine which had inoperative exhaust deflectors) after 44,000 MV-22 flight hours at bases and ranges across the U.S. (DoN 2009). Upon landing, temperatures at the ground surface immediately below properly operating exhaust vents would be 150°F above ambient air temperatures (DoN 2006). Studies involving auto-ignition temperatures have shown that dry grasses spontaneously ignite between temperatures of 342°F and 428°F (Café 1992; Grotkjaer et al. 2003). Under normal operations, the exhaust of the MV-22 would not create ground temperatures high enough to support combustion of plant-based materials.

Although the potential to start fires exists with MV-22 and rotary-wing aircraft operations, the likelihood appears to be very low. Fire potential would be highest in areas with an abundance of fine fuels. Under natural conditions, it is likely that the dominant creosote scrub vegetation at the Combat Center is too sparse to carry fire due to wide plant spacing and the scarcity of native grasses. However, the recent spread of non-native species through Mojave Desert habitats, as discussed in Section 3.1.2.1, could result in sufficiently dense vegetation after high rainfall years to carry a small, low-intensity fire.

MAGTF Training Command has programs for managing invasive species on the Combat Center and has developed a Wildland Fire Management Plan in recognition of the fire hazard posed by many non-native species and the long-term adverse ecological consequences of fire in desert scrub vegetation (DoN 2009). This management plan was prepared to coincide with the training mission and the use of AMZs. As part of the management plan, many of the non-native species that occur on the Combat Center and are capable of carrying a fire are being targeted for removal and/or control. As discussed in SCM 9 (refer to Section 2.6), specific fire prevention and management protocols would be adopted to reduce the risk of fire associated with use of the MV-22. Because of the low likelihood of fire related to use of MV-22 and rotary-wing aircraft, and the plans in place for invasive species and fire management, AMZ use under Alternative 1 is not likely to increase the frequency and/or extent of wildland fires; therefore, no significant impacts to vegetation would occur under Alternative 1.

Wildlife

The use of any aircraft near undeveloped areas has the potential to add noise and visual stressors to the natural environment and cause a response by wildlife. Impacts to wildlife due to aircraft audio and visual stressors include: "startle reflex" induced running or flight, increased expenditure of energy during critical periods, decreased time and energy spent on life functions such as seeking food or mates, increased susceptibility to predation, and interruption of breeding or nursing (Efroymson et al. 2000; Larkin 1996).

Although there are no specific studies evaluating the effects of MV-22 operations on wildlife species, this aircraft would perform similar to helicopters, such as the CH-46E that it is replacing (DoN 2009). Noise modeling for the MV-22 shows SELs and maximum sound levels (L_{max}) in cruising flight to be less than the CH-46E. During arrivals, SELs from MV-22 would be slightly less than those from CH-46E; however, the L_{max} would be somewhat greater for MV-22 (DoN 2009).

The type of noise that can stimulate the startle reflex tends to vary among animal species. Studies have indicated that sudden, loud noises associated with visual stimuli produce the most intense reactions (Efroymson et al. 2000). Rotary-wing aircraft such as helicopters are believed to generally induce the startle reflex more frequently than fixed-wing aircraft (DoN 2009). In the case of the MV-22, the aircraft

would function more like a fixed-wing aircraft while in transit, with onset of sound building up relatively gradually and the rotating blades forming a blur rather than being seen as rotating parts, reducing the potential for a startle effect (DoN 2009).

Effects related to downdraft and noise would diminish with distance from the aircraft. Exposure to elevated noise levels would generally be localized around the actual landings, take-offs, and low-level hovering at the AMZs, diminishing with distance from the aircraft. The MV-22 would operate in an airfield environment similar to the current operational environment at the Combat Center and would follow established local approach and departure patterns (DoN 2009). With the change from CH-46E to MV-22 training, there would be a substantial decrease in overall operation levels within the range training areas. Use of the MV-22 would not occur in any new or undisturbed areas of the Combat Center, and the MV-22 would perform similar to helicopters, such as the CH-46E. Wildlife would not be expected to react or modify behavior as a result of Alternative 1 compared to existing training activities on the Combat Center. Therefore, no significant impacts to wildlife would occur under Alternative 1.

The proposed sites are not known or expected to support large numbers of migratory birds because they are fairly level, sparsely vegetated, and subject to ongoing Marine Corps training activities. Areas most likely to support breeding (e.g., cliffs, washes or other areas of dense vegetation, or wetlands) would not be affected. As a result, no significant impacts to migratory bird populations would occur.

Surface disturbance by rotor wash may affect microhabitat conditions for wildlife through effects on cover, foraging, or burrowing conditions for individuals, particularly small mammals and reptiles. These small-scale shifts in microhabitats would be localized, intermittent, and no different than those caused by the rotor wash of existing helicopter training. Therefore, they would be unlikely to affect the abundance or distribution of wildlife populations and, hence, would not be significant.

A Bird Airstrike Hazard (BASH) plan for the Combat Center was completed in 2003. In general, it determined that the Combat Center and the EAF have a low risk of airstrikes due to the remoteness of the airfield from any source of permanent water (MCAGCC 2007a). The change from CH-46E to MV-22 training would result in a decrease in overall operational levels, and the MV-22 would be incorporated into existing training scenarios. As a result, there would not be a substantial increase in the potential for bird-aircraft strikes compared with existing conditions. Therefore, no significant impacts to wildlife from bird-aircraft strikes would occur under Alternative 1.

Special-Status Species

There are no federally or state-listed plant species known to occur at the Combat Center. Foxtail cactus is the only non-listed sensitive plant species known to occur on any of the AMZs (CMBC 2010), and this species is widespread and common on the Combat Center (Agri Chemical & Supply, Inc. 2006). Also, aircraft hovering and landings would be focused in areas devoid of vegetation, thus avoiding the direct removal of plants. Therefore, no significant impacts to special-status plant species would occur under Alternative 1.

The desert tortoise is the only federally-listed resident animal species at the Combat Center. AMZ sites for Alternative 1 were chosen based on the absence of desert tortoise or desert tortoise sign (e.g., scat, burrows, coversites, carcasses, egg shell fragments, tracks) (refer to Appendix A) within 100 meters of the site. Thus, the likelihood of tortoises occurring or migrating through these sites once training activities commence would be very low. The only exception to the 100 meter selection criteria was the ALZ in the Sand Hill Training Area (FARP 2 West), which showed signs of tortoise presence within the survey area. However, this site is a heavily used, graded landing strip and tortoise sign was not found on

the actual runway that would be utilized by aircraft. Also, training activities under Alternative 1 would not increase beyond current levels of use at this site and, as a result, no effects are expected on desert tortoises in adjacent areas.

MV-22 and rotary-wing aircraft activities would result in localized disturbance of surface material and soil at the AMZs, where the aircraft would hover and land. However, with the exception of the FARP 2 West site, tortoises and tortoise sign were not found within the localized areas of the AMZs. The FARP 2 West site is a graded, heavily used landing strip and as such, the additional intermittent activity associated with the proposed action at this site is not expected to increase dust above current levels. Tortoises are unlikely to occur on the barren surface of the FARP 2 West landing strip. The likelihood of an MV-22 or rotary-wing aircraft striking an individual tortoise during take-offs and landings would be so low as to be discountable. The likelihood of heat related injuries from MV-22 exhaust during landings would be extremely low, as high temperatures would only occur directly beneath aircraft and quickly dissipate outward; no impact is anticipated. Based on the absence of tortoises at all but one of the AMZs, and nature of the FARP 2 West site and its ongoing use in a manner similar to baseline conditions, noise associated with MV-22 or rotary-wing aircraft training is not expected to affect desert tortoises (DoN 2009; Efroymson et al. 2000).

Alternative 1 does not include any construction and would not change the current levels of on-ground training activities. As a result this alternative would not result in a change in operations that would affect undisturbed tortoise habitat or result in increased mortality to desert tortoises. Implementation of SCMs as discussed in Section 2.6 would reduce the likelihood of training related impacts to desert tortoise within the AMZs and meet management standards established by the Base-wide BO (1-8-99F-41; USFWS 2002). Therefore, there would be no increased potential for adverse effects on desert tortoises under Alternative 1, and no significant impacts would occur.

Certain subspecies/populations of Bell's vireo, willow flycatcher, and snowy plover are federally- and/or state-listed. It is not known what subspecies/populations occur at the Combat Center. These species are not residents and have only been observed seasonally in developed areas of the Combat Center (e.g., golf course, landscaped areas, and water and sewage treatment ponds). They are not known to occur within the training areas. Given this, and the fact that MV-22 and rotary-wing aircraft operations would not be substantially different than operations associated with current training exercises and the airspace tempo under the proposed action would be lower than baseline conditions, there would be no effects on these species. Therefore, no impacts would occur under Alternative 1.

4.1.2.2 Alternative 2

<u>Vegetation</u>

Training regimes and operations under Alternative 2 would be similar to those under Alternative 1. Alternative 2 would consist of the establishment and use of 73 AMZ sites (all Alternative 1 sites, plus an additional 25) comprising approximately 2,190 acres on the Combat Center.

Like Alternative 1, surface disturbance would be localized and unlikely to permanently affect plant communities or associated habitats in a magnitude different than existing aircraft. Also, the likelihood of increased fire potential would be low. Although effects on vegetation would occur on a larger geographic scale than under Alternative 1 (i.e., at 73 AMZ sites instead of 48), direct impacts to vegetation would be similar to those under Alternative 1. Therefore, no significant impacts to vegetation would occur under Alternative 2.

Wildlife

Because use of the MV-22 would not occur in any new or undisturbed areas of the Combat Center and because the MV-22 would perform similar to helicopters, such as the CH-46E, wildlife would not be expected to react or modify behavior as a result of the proposed project compared to existing conditions. Although effects on wildlife due to noise, downdraft, and bird-aircraft strikes would occur on a larger geographic scale than Alternative 1 (i.e., at 73 AMZ sites instead of 48), impacts would be similar to those under Alternative 1. Therefore, no significant impacts to wildlife would occur under Alternative 2.

Special-Status Species

Like Alternative 1, foxtail cactus is the only non-listed sensitive plant species known to occur on any of the AMZs, and this species is widespread and common on the Combat Center. Also, aircraft hovering and landings would be focused in areas devoid of vegetation, thus avoiding the direct trampling of plants. Therefore, no significant impacts to special-status plant species would occur under Alternative 2.

Alternative 2 consists of the 48 AMZ sites considered for Alternative 1, plus 25 additional sites. These 25 sites were all found to have desert tortoise and/or sign of desert tortoise presence on or within 100 meters of the site (CMBC 2010; Appendix A). Desert tortoise occupancy and use of these sites proves a high likelihood for tortoise presence in the future. Use of the 25 additional AMZs under Alternative 2 would likely have direct and indirect adverse effects on desert tortoise habitat and individuals currently utilizing resources in those areas.

Alternative 2, as proposed, may affect and would likely adversely affect the threatened desert tortoise. If this alternative were to be identified as the preferred alternative, formal Section 7 consultation with USFWS would occur to identify necessary and sufficient measures to reduce the impacts to below a level of significance.

As with Alternative 1, there would be no effects on Bell's vireo, willow flycatcher, and snowy plover as these species are not known to occur within the training areas of the Combat Center.

4.1.2.3 No-Action Alternative

Under the No-Action Alternative, the proposed AMZ training activities for MV-22 aircrews would not occur, and existing conditions would remain unchanged. Therefore, no significant impacts to biological resources would occur as a result of implementation of the No-Action Alternative.

4.2 CULTURAL RESOURCES

4.2.1 Approach to Analysis

Cultural resources are subject to review under both federal and state laws and regulations. Section 106 of the NHPA of 1966, as amended, empowers the Advisory Council on Historic Preservation to comment on federally initiated, licensed, or permitted projects affecting cultural sites listed or eligible for inclusion on the NRHP. Once cultural resources have been identified, they are evaluated to determine if they meet one of the four criteria for significance as defined by 36 CFR § 60.4, including association with an important event, association with an important person, embodiment of a style of architecture representing a particular period in history or work of a master, or the ability to contribute to the existing scientific database. Because sites found within the APE of this project consisted of lithic tools and debitage, only Criterion D was used to assess NRHP eligibility. Criterion D recognizes a site as eligible if it has yielded or may be likely to yield information important in prehistory or history. Only cultural resources determined to be significant (i.e., eligible to the NRHP) are protected under the NHPA.

Analysis of potential impacts to cultural resources considers both direct and indirect impacts. Direct impacts may be the result of physically altering, damaging, or destroying all or part of a resource, altering characteristics of the surrounding environment that contribute to the importance of the resource, introducing visual or audible elements that are out of character for the period the resource represents (thereby altering the setting), or neglecting the resource to the extent that it deteriorates or is destroyed. Direct impacts can be assessed by identifying the type and location of a proposed action and by determining the exact locations of cultural resources that could be affected. Indirect impacts are those that may result from a change in activity levels or other occurrence that is a byproduct of a proposed action, such as the effect of increased vehicular or pedestrian traffic in the vicinity of the resource.

Because no site preparation or building renovations are involved with the proposed action, the following impact analysis focuses on ground disturbing activities associated with rotor wash that could affect NRHP-eligible resources (known and unknown).

4.2.2 Impacts

4.2.2.1 Alternative 1

Under Alternative 1, ground disturbance from hovering and landing of aircraft could occur within the APE due to dust and debris being scattered and/or becoming airborne from aircraft rotor wash. Rotor wash from the MV-22 would be up to 10% greater than from the CH-53E and three to four times greater than from the CH-46E (DoN 2009). The MV-22 has a rotor wash of 50 knots at a lateral distance of 150 feet when hovering at 20 feet AGL. Artifacts lying on the surface in the immediate vicinity of the hovering aircraft may be disturbed during landing, take-off, and hovering immediately above the ground. The extent of this disturbance would depend on local soil characteristics, presence of vegetation, and size/weight of artifacts. However, no NRHP-eligible archaeological, architectural, or traditional cultural resources have been identified in the Alternative 1 APE (refer to Table 3-4). Six isolates were identified in the APE of four AMZs, but these are recommended as ineligible under NRHP (ASM Affiliates 2010).

Furthermore, according to the Combat Center's Cultural Resources Manager, Alternative 1 has been determined to have "no effect" on cultural resources that may be eligible for listing in the NRHP in conformance with the Programmatic Agreement and *Integrated Cultural Resources Management Plan* (MCAGCC 2010c). Therefore, no significant impacts to cultural resources would occur under Alternative 1.

4.2.2.2 Alternative 2

Under Alternative 2, ground disturbance associated with rotor wash would be the same as described under Alternative 1. A records search and new surveys identified 12 archaeological sites located within 6 AMZs. One site (SBR-13628) is recommend as ineligible (pending SHPO concurrence), three sites are recommended as eligible (SBR-10177, -10179, and -11348) and eight sites (SBR-10176, -11345, -11346, -11673, -11739, -11744, -13635, and -13636) require evaluation fieldwork to determine eligibility status (refer to Table 3-4). For the eight unevaluated sites, evaluation fieldwork would likely consist of surface and subsurface archaeological testing. No NRHP-eligible architectural or traditional cultural resources have been identified in the Alternative 2 APE.

Because three sites are considered eligible and NRHP eligibility has not been determined for eight archaeological sites, there would be a potentially significant impact to cultural resources if Alternative 2 were to be identified as the preferred alternative. Unevaluated archaeological sites at proposed AMZs would undergo evaluation fieldwork before implementation of training activities under Alternative 2. For any sites known to be eligible or determined to be eligible following evaluation, the Combat Center

would follow procedures outlined in the Programmatic Agreement (USMC 2007b) and *Integrated Cultural Resources Management Plan* (MCAGCC 2007b), and impacts would be mitigated. Mitigation would include either avoidance or data recovery. With implementation of the above mentioned procedures and mitigation measures, impacts to cultural resources would be reduced to below a level of significance.

4.2.2.3 No-Action Alternative

Under the No-Action Alternative, the proposed AMZ training activities for MV-22 aircrews would not occur, and existing conditions would remain unchanged. Therefore, no significant impacts to cultural resources would occur as a result of implementation of the No-Action Alternative.

4.3 AIR QUALITY

4.3.1 Approach to Analysis

Air quality impacts were reviewed for significance in relation to federal, state, and local air pollution standards and regulations. For the purposes of the present analysis, if project emissions were projected to exceed a threshold requiring a conformity determination in the MDAB (i.e., 25 tons per year of VOC or NO_x, or 100 tons per year of PM_{10}), further analysis was conducted to determine whether impacts were significant. In such cases, if emissions conform to the approved SIP, then no significant impacts would occur.

In the case of criteria pollutants for which the region is in attainment of NAAQS, the analysis looked at whether the magnitude and location of project emissions reasonably would be expected to cause a significant adverse impact to air quality.

Only aircraft operational activity within the airspace that would be used below 3,000 feet AGL is analyzed in this section. No construction would occur under the project alternatives; therefore, only emissions associated with aircraft activity have been estimated.

The potential effects of proposed GHG emissions are by nature global and result in cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Therefore, the impact of proposed GHG emissions to climate change is discussed in the context of cumulative impacts in Chapter 5 of this EA. Appendix B presents estimates of GHG emissions generated by each alternative.

4.3.2 Impacts

4.3.2.1 Baseline Emissions

As part of the baseline operations at the AMZs, the CH-46E and CH-53E rotary-wing aircraft would conduct training operations identified in Chapter 2 of the EA. The proposed action would involve training activities with the MV-22 aircraft, which would replace the existing CH-46E aircraft, as well as training with the CH-53E aircraft. As discussed in Chapter 1, while training activities would involve additional sources, including ordnance use, aerial refueling, ground refueling, and ground activities in support of training, these uses would not differ from existing conditions, and no net emissions increase or decrease would result. Accordingly, the analysis of baseline emissions and emissions associated with the proposed action focuses on aircraft emissions.

The methodology for estimating aircraft emissions involves evaluating the type of activity, the number of hours of operation, the type of engine, and the mode of operation for each type of aircraft. Emissions occurring above 3,000 feet were considered to be above the atmospheric inversion layer and would not

impact the local air quality. Specific operational modes for aircraft were identified by the Navy for training in which aircraft are involved. Emissions for aircraft activities for existing aircraft were then calculated based on the Navy's Aircraft Environmental Support Office (AESO) data for specific aircraft models (AESO 2000a, 2000b, 2001a, 2001b, 2001c, 2001d). Baseline training activities include the following:

- Aerial Delivery
- External Loads
- Helicopter Insertion and Extraction
- Weapons Training

Detailed descriptions of these training operations are provided in Chapter 2. Table 4-1 provides a summary of annual emissions for baseline operations at the AMZs.

Table 4-1. Annual Emissions Due to Baseline Operations at the AMZs

Aircraft	Air Pollutant Emissions (tons)					
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$
CH-46E	6.17	1.39	1.27	0.14	0.61	0.60
CH-53E	4.24	15.58	0.31	0.78	4.29	4.25
Baseline Annual Emissions	**10.41**	**16.97**	**1.59**	**0.91**	**4.90**	**4.85**

4.3.2.2 Alternative 1

The proposed action involves the development and use of AMZs at the Combat Center for MV-22 and rotary-wing aircraft training. Alternative 1 would include 48 AMZs that do not have biological or cultural resource constraints. Training would include up to 2,148 sorties for all AMZs. Training activities under the proposed action would include the same activities as listed above for baseline training activities.

Air quality impacts associated with Alternative 1 were determined by comparing the net change in emissions between current operations at the Combat Center and proposed operations associated with aircraft participating in training activities at the AMZs. Existing and proposed sources affected by the replacement action would be limited to aircraft operations.

Table 4-2 presents a summary of the annual operational emissions that would occur from Alternative 1 at the AMZs. These data show that replacement of the CH-46E operations with the MV-22 would result in a net reduction in emissions from baseline for CO and VOCs, and a net increase in emissions for NO_x, SO_x, PM_{10}, and $PM_{2.5}$. The net increase in emissions of nonattainment pollutants (NO_x, VOCs, and PM_{10}) would all be below their conformity *de minimis* thresholds. Therefore, air quality impacts associated with these emissions would not be significant. A Record of Non-Applicability (RONA) for CAA Conformity along with details of emission source data and calculations used to estimate operational emissions are included in Appendix B of this EA.

Table 4-2. Annual Emissions Due to Implementation of Alternative 1 at the AMZs

Aircraft	Air Pollutant Emissions (tons)					
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$
MV-22	0.60	11.96	0.01	0.37	1.47	1.46
CH-53E	4.24	15.58	0.31	0.78	4.29	4.25
Annual Emissions	4.84	27.54	0.32	1.15	5.76	5.70
Baseline Emissions	10.41	16.97	1.59	0.91	4.90	4.85
Net Change from Baseline	**-5.56**	**10.57**	**-1.26**	**0.24**	**0.86**	**0.85**
de minimis Thresholds	NA	25	25	NA	100	NA
Exceeds *de minimis* Thresholds?	NA	No	NA	NA	No	NA

Notes: [1] The MDAB is in severe nonattainment of the 8-hour O_3 NAAQS; VOCs and NO_x are precursors to the formation of O_3.
[2] The MDAB is in moderate nonattainment of the PM_{10} NAAQS and is in attainment of the NAAQS for all other criteria pollutants.
– indicates a reduction in emissions.
Sources: CARB 2010b, CARB 2010e; USEPA 2010a.

Proposed operations would emit toxic air contaminant that could potentially impact public health. The main sources of toxic air contaminants from Alternative 1 would include aircraft. Toxic air contaminants generally are subsets of VOC and PM_{10} emissions; emissions of VOCs would decrease from baseline conditions under Alternative 1, and the increase in PM_{10} emissions is less than 1 ton per year, which would result in a negligible amount of toxic air contaminant emissions. The main sources of proposed toxic air contaminants are mostly mobile and intermittent in nature and, therefore, they would produce minimal impacts of toxic air contaminants in a localized area. As a result, operational activities associated with Alternative 1 would produce no significant impacts to public health.

4.3.2.3 Alternative 2

Under Alternative 2, AMZ training would be conducted at additional AMZs than under Alternative 1. However, the proposed number of 2,148 annual sorties would be the same for both alternatives. As a result, emissions associated with Alternative 2 would be equal to those estimated under Alternative 1, and no significant impacts to air quality would occur.

4.3.2.4 Conformity Applicability Analysis

The estimated emissions associated with the proposed action would be below the *de minimis* threshold levels for CAA conformity. Therefore, the proposed action would conform to the MDAB SIP and would not trigger a conformity determination under Section 176(c) of the CAA. The USMC has prepared a RONA (refer to Appendix B of this EA) in accordance with CAA Conformity Guidance.

4.3.2.5 No-Action Alternative

Under the No-Action Alternative, the proposed AMZ training activities for MV-22 aircrews would not occur, and existing conditions would remain unchanged. Emissions associated with the No-Action Alternative would be less than those estimated under Alternatives 1 and 2 since there would be no MV-22 AMZ training activities. Therefore, no significant impacts to air quality would occur as a result of implementation of the No-Action Alternative.

4.4 NOISE

4.4.1 Approach to Analysis

Noise, often defined as unwanted sound, is one of the most common environmental issues associated with many human activities, especially military exercises and operations. Concerns regarding noise relate to certain potential impacts such as hearing loss, non-auditory health effects, annoyance, speech interference, sleep interference, and effects on domestic animals, wildlife, structures, terrain, and historic and archaeological sites.

The primary factor considered in determining the significance of noise effects includes the extent or degree to which implementation of the proposed action or alternatives would affect baseline noise environments. The primary issue of concern with regard to noise is the potential for impacts to humans and terrestrial wildlife. Noise impacts would occur if implementation of the proposed action or alternatives would directly or indirectly:

- increase ambient CNEL at noise-sensitive land uses beyond the "normally acceptable" land use compatibility criteria (typically 65 dB CNEL for residential, education, and health care land uses); or
- establish noise-sensitive land use (residential, educational, and health care uses) in areas exposed to ambient noise levels that are higher than the applicable land use compatibility criteria (typically 65 dB CNEL).

Less stringent guidelines are applied to temporary noise sources that are restricted to daytime hours (such as most construction and demolition activities) unless they affect noise-sensitive land uses and result in CNEL more than 10 dB above the respective land use compatibility criteria.

Modeled activity is summarized below, and Appendix C contains detailed data on the modeling of flight and run-up activity for the AMZs, including numbers of flight operations/sorties, runway utilization, flight tracks/routes, track utilization, flight profiles, climatological data, pre-flight run-ups, and maintenance run-ups. The effects of noise on wildlife are discussed in Biological Resources (refer to Section 4.1).

4.4.2 Impacts

4.4.2.1 Alternative 1

<u>EAF</u>

MV-22 and rotary-wing aircraft activities at the EAF are not part of the proposed action. The proposed aircraft noise environment at the EAF would be identical to the proposed action as described within the MV-22 West Coast Basing EIS (DoN 2009). For purposes of this EA, flight operations at the EAF modeled for the proposed action of the MV-22 West Coast Basing EIS would be sufficient to support the MV-22 AMZ operations under either of the proposed alternatives. The EIS analysis concluded that the 65 dB CNEL contour would be wholly contained within the Combat Center boundary, so there would be no off-base residents or housing units within the 65 dB CNEL contour. Therefore, no significant noise impacts associated with the EAF would occur with implementation of Alternative 1.

<u>Airspace and Ranges</u>

For the purposes of this EA, it was assumed that all CH-46E AMZ operations would be replaced by MV-22s on a one-to-one basis. The MV-22 aircraft would conduct an estimated 859 annual sorties, 107

of which would occur during a busy month with 17 operating days.

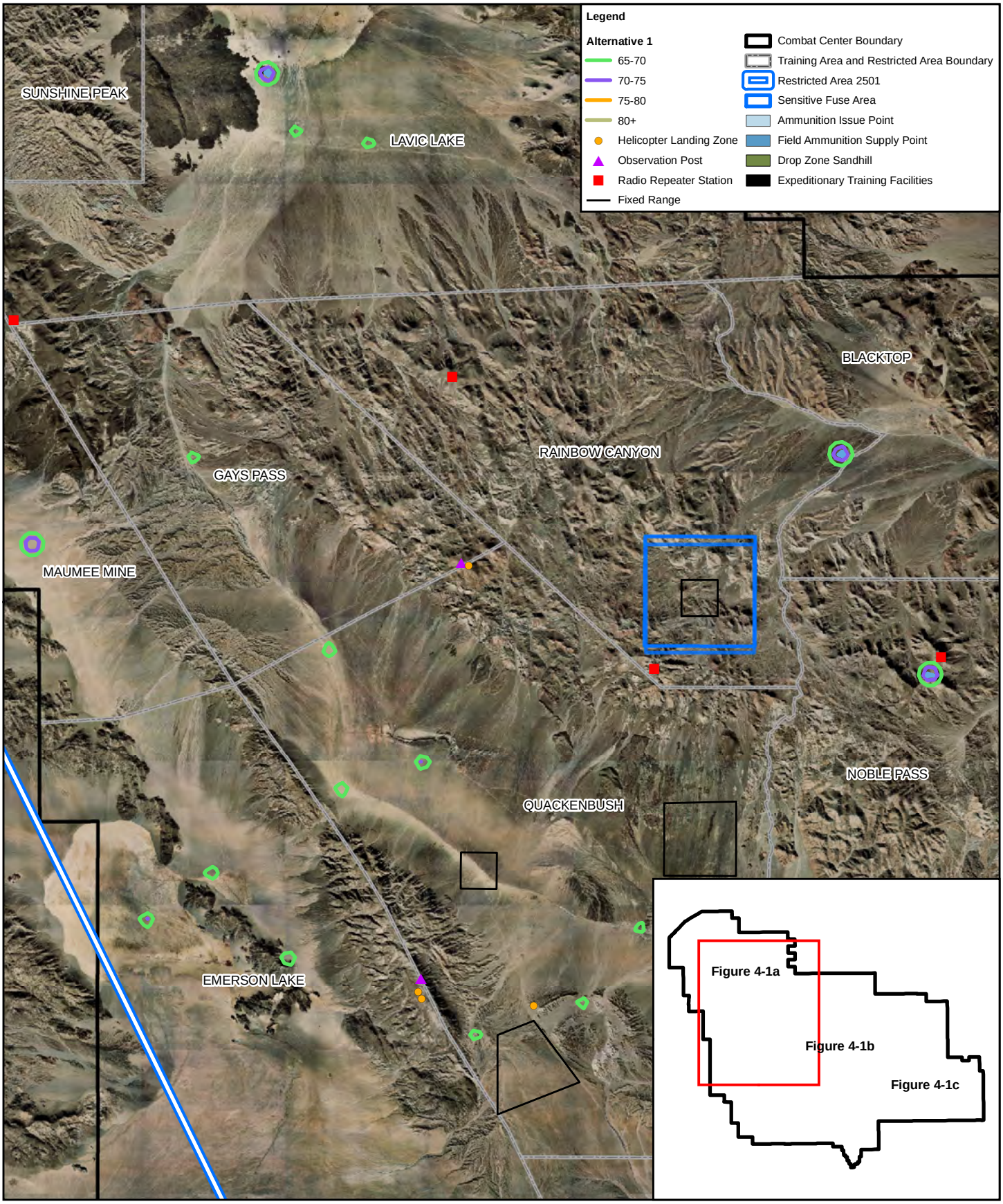
Proposed annual MV-22 route-type operations would total approximately 450, with 39% occurring during the CNEL evening period and 13% occurring during the CNEL nighttime period. All of the MV-22 route-type operations at the Combat Center would be on the perimeter route. Operations on the perimeter route would include High Light Level and Low Light Level Night Vision Goggle training and Tactical Air Combat training throughout Restricted Area 2501.

The MV-22 AMZ area-type operations would be similar to the baseline CH-46E and CH-53E operations with sortie durations of 60 minutes each. AMZ area-type operations are modeled with three distinct flight profiles: landing/hover, conversion mode (MV-22 only), and transit mode. The landing/hover portion would occur inside a 750-foot diameter circle at the intended AMZ. Landing/hover would occur at altitudes set from 50 to 300 feet AGL at an average speed of 50 knots for an average duration of 15 minutes of the total sortie time. The conversion portion would occur within 1 kilometer of the intended landing point. Conversion mode altitudes would range from 50 to 1,000 feet AGL at an average speed of 110 knots for an average duration of 15 minutes of the total sortie time. The MV-22 transit mode altitudes would range from 300 to 10,000 feet AGL at an average speed of 230 knots, and an average duration of 30 minutes of the total sortie time (MCAGCC 2010b).

Under Alternative 1, the 859 MV-22 and 1,289 CH-53E AMZ area-type sorties would occur only at 48 of the 73 AMZ sites modeled in the baseline scenario (MCAGCC 2009c). The Alternative 1 condition modeled approximately 1,600 route-type operations annually. Of the total modeled route-type operations, CNEL evening and nighttime flight operations would account for 17% and 4%, respectively. Alternative 1 would also include approximately 23,000 area-type flight operations with CNEL evening and nighttime flight operations, accounting for 13% and 4%, respectively. Because the MV-22 aircraft is replacing the CH-46E aircraft over time, the total number of operations under Alternative 1 would be approximately 15% less than baseline conditions (refer to Section 2.2.2.2).

Figures 4-1a, 4-1b, and 4-1c show the 65-85 dB $CNEL_{mr}$ contours, in 5-dB increments, for Alternative 1. The maximum $CNEL_{mr}$ of 82 dB would occur at PZ 1. Ten AMZ sites, including FARP 1 and FARP 2, would experience a maximum $CNEL_{mr}$ of 75-80 dB. All 48 AMZ sites would experience sound levels greater than or equal to 65 dB $CNEL_{mr}$ as detailed in Table 4-3. None of the AMZ sites would have $CNEL_{mr}$ less than 65 dB. The noise caused by AMZ operations would be most audible in the area directly surrounding each AMZ. The 65 dB $CNEL_{mr}$ contour around each AMZ would be circular and would not exceed approximately 4,000 feet in diameter.

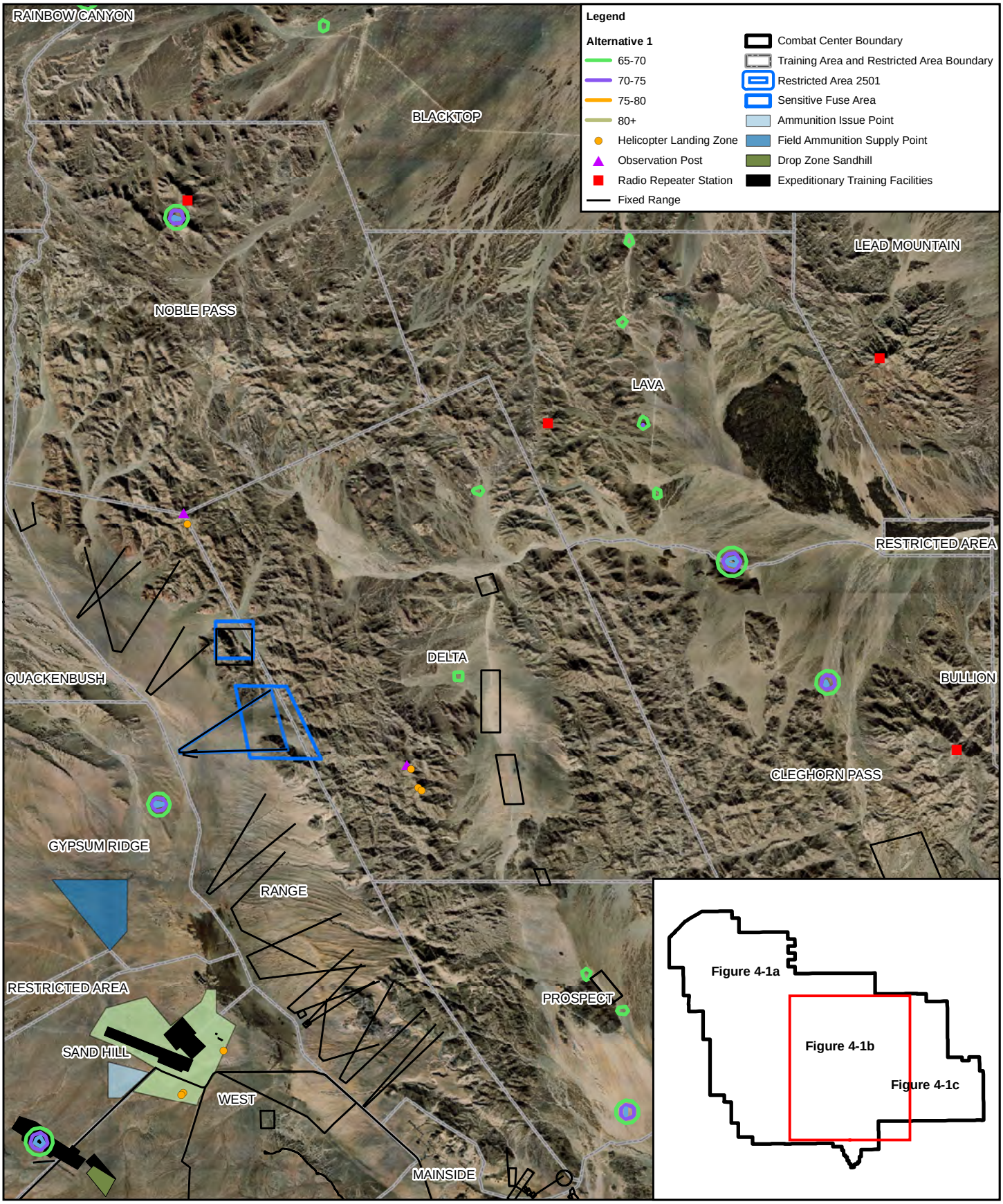
Under Alternative 1, there would be no increase in the number of AMZs exposed to 80-85 dB $CNEL_{mr}$ (Table 4-3). The number of AMZs exposed to 75-80 dB $CNEL_{mr}$ would increase by 8 from the baseline condition. The number of AMZ sites exposed to $CNEL_{mr}$ greater than or equal to 65 dB would decrease by 12 from the baseline condition. This would be a relatively small increase in noise for the 75-80 dB $CNEL_{mr}$ band and would not occur in areas with sensitive human receptors. There would be decreases in noise for the lower $CNEL_{mr}$ bands. No off-range residents or housing units would be exposed to aircraft noise greater than or equal to 65 dB $CNEL_{mr}$. Therefore, no significant noise impacts would occur under Alternative 1. The effects of noise on wildlife are discussed in Biological Resources (refer to Section 4.1).



Kilometers
0 0.75 1.5 3
0 0.75 1.5 3
Miles

Figure 4-1a
Alternative 1 Aircraft Noise Contours: West

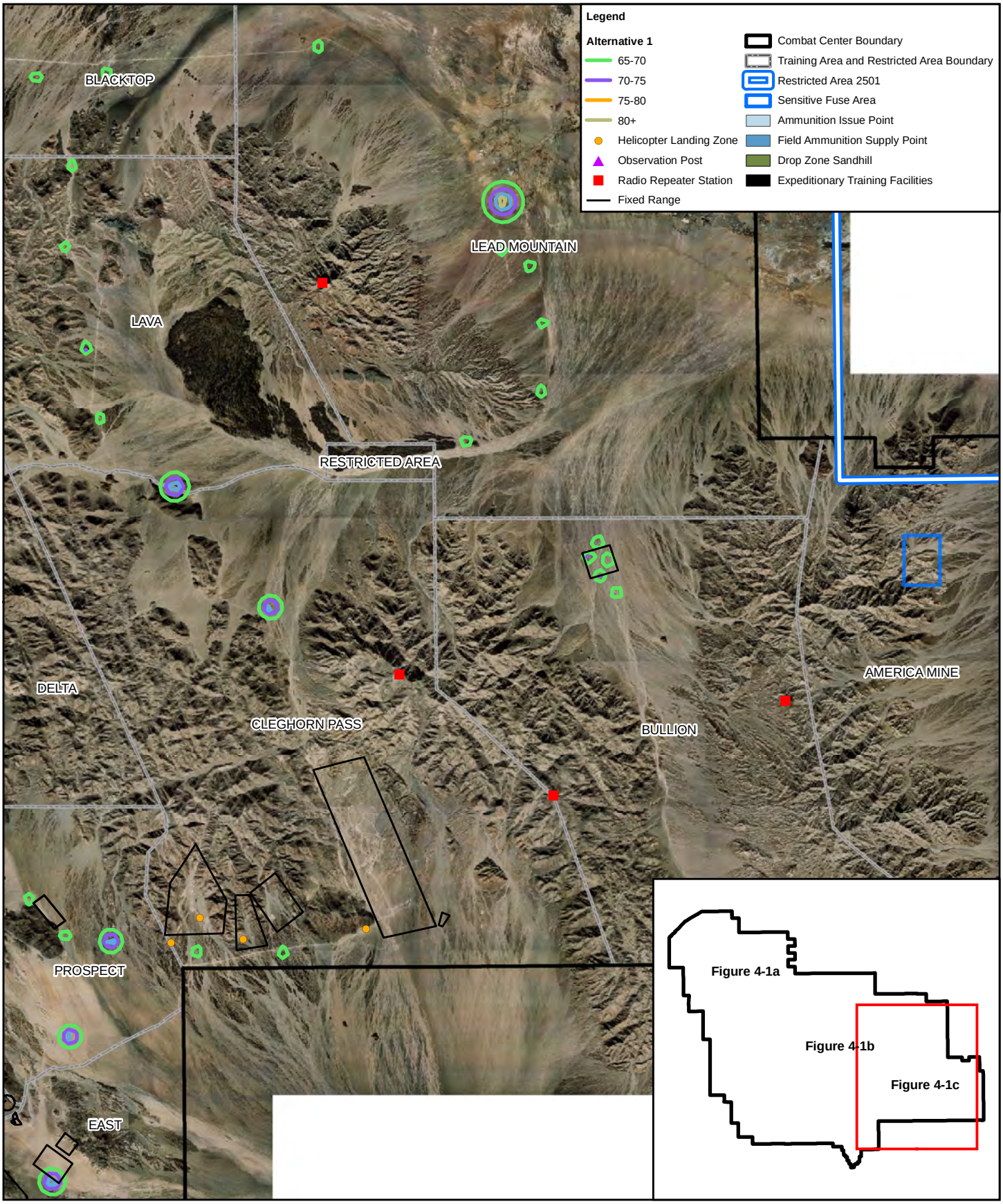
N



Kilometers
0 0.75 1.5 3
0 0.75 1.5 3
Miles

Figure 4-1b
Alternative 1 Aircraft Noise Contours: Central

N



Kilometers
0 0.75 1.5 3
0 0.75 1.5 3
Miles

Figure 4-1c
Alternative 1 Aircraft Noise Contours: East

N

Table 4-3. Number of AMZ Sites by Band of $CNEL_{mr}$ Range for Baseline, Alternative 1, and Alternative 2

$CNEL_{mr}$ Band (dBA) (1)	Baseline Number of AMZs	Alternative 1 (2)		Alternative 2	
		Number of AMZs	Change from Baseline	Number of AMZs	Change from Baseline
65-70	37	30	-7	48	11
70-75	20	7	-13	20	0
75-80	2	10	8	3	1
80-85	1	1	0	1	0
85+	0	0	0	0	0
Total (65+)	**63**	**48**	**-12**	**72**	**12**

Notes: (1) Exclusive of upper bound for each band; each band count is exclusive (i.e., no double-counting).
(2) MV-22 and CH-53 would use 48 AMZs.

4.4.2.2 Alternative 2

EAF

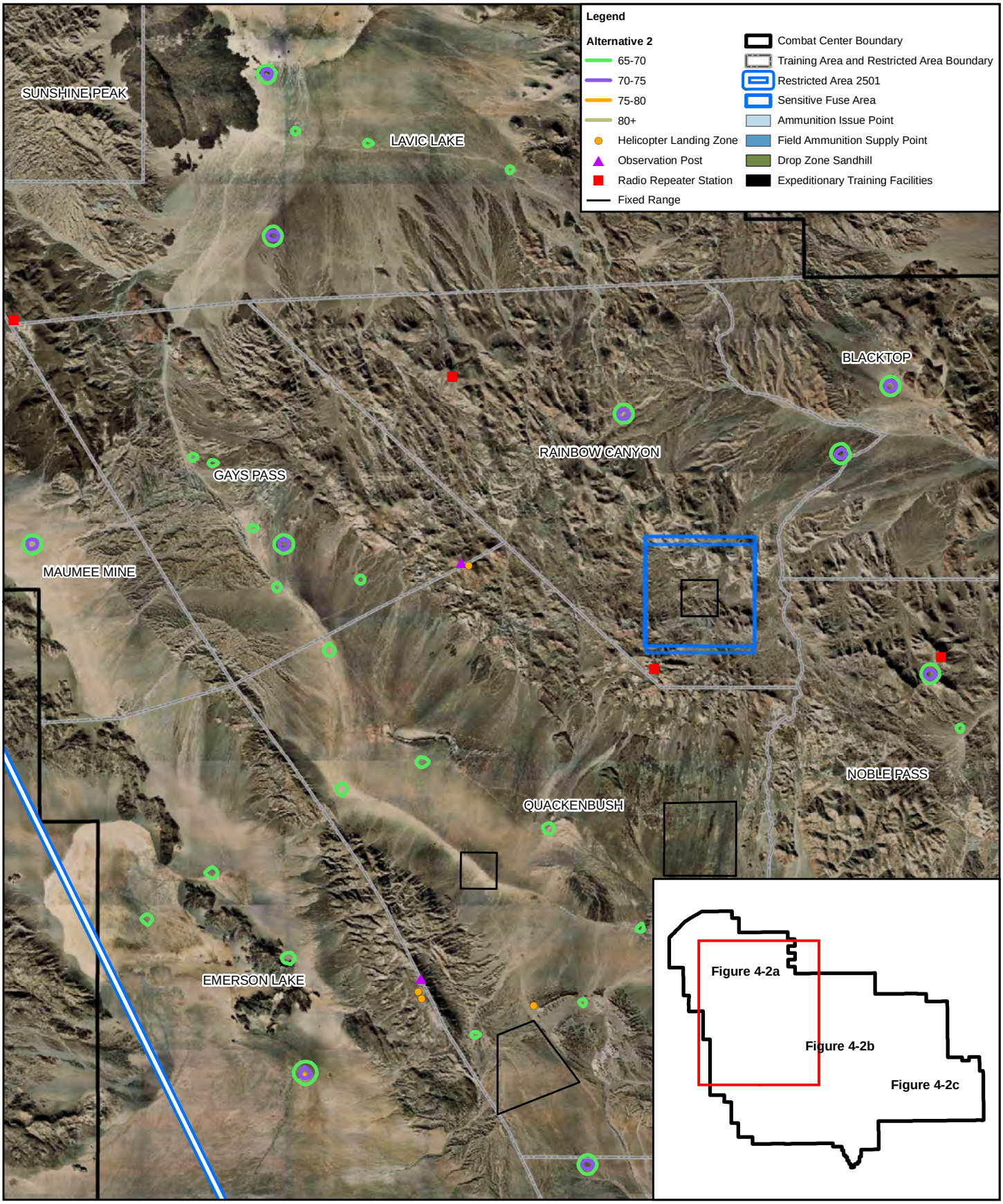
The proposed aircraft noise environment at the EAF would be identical to the effects described under Alternative 1. Therefore, no significant noise impacts would occur with implementation of Alternative 2.

Airspace and Ranges

For Alternative 2, the airspace and ranges would include an identical number of proposed sorties as Alternative 1 (i.e., 1,600 route-type operations and approximately 23,000 area-type flight operations). However, the 859 MV-22 and 1,289 CH-53E AMZ area-type sorties would be distributed over a greater number of AMZ sites (73 AMZ sites) modeled in the baseline scenario (MCAGCC 2009c). See Section 4.4.2.1 for more detailed discussion of the modeling parameters. Because the MV-22 aircraft is replacing the CH-46E aircraft over time, the total number of operations under Alternative 2 would be approximately 15% less than baseline conditions (refer to Section 2.2.2.2).

Figures 4-2a, 4-2b, and 4-2c show the 65-85 dB $CNEL_{mr}$ contours, in 5-dB increments for the Alternative 2 scenario. The maximum $CNEL_{mr}$ of 82 dB would occur at PZ 1. FARP 1 East Lava, FARP 2 West Sand Hill, and OLZ 1 would experience maximum $CNEL_{mr}$ of 75-80 dB. A total of 72 out of 73 AMZ sites would experience sound levels greater than or equal to 65 dB $CNEL_{mr,}$ as shown in Table 4-3. One of the AMZ sites would have $CNEL_{mr}$ less than 65 dB. The noise caused by AMZ operations would be audible in the area surrounding each AMZ. The 65 dB $CNEL_{mr}$ contour around each AMZ would be circular in shape and would not exceed approximately 4,000 feet in diameter.

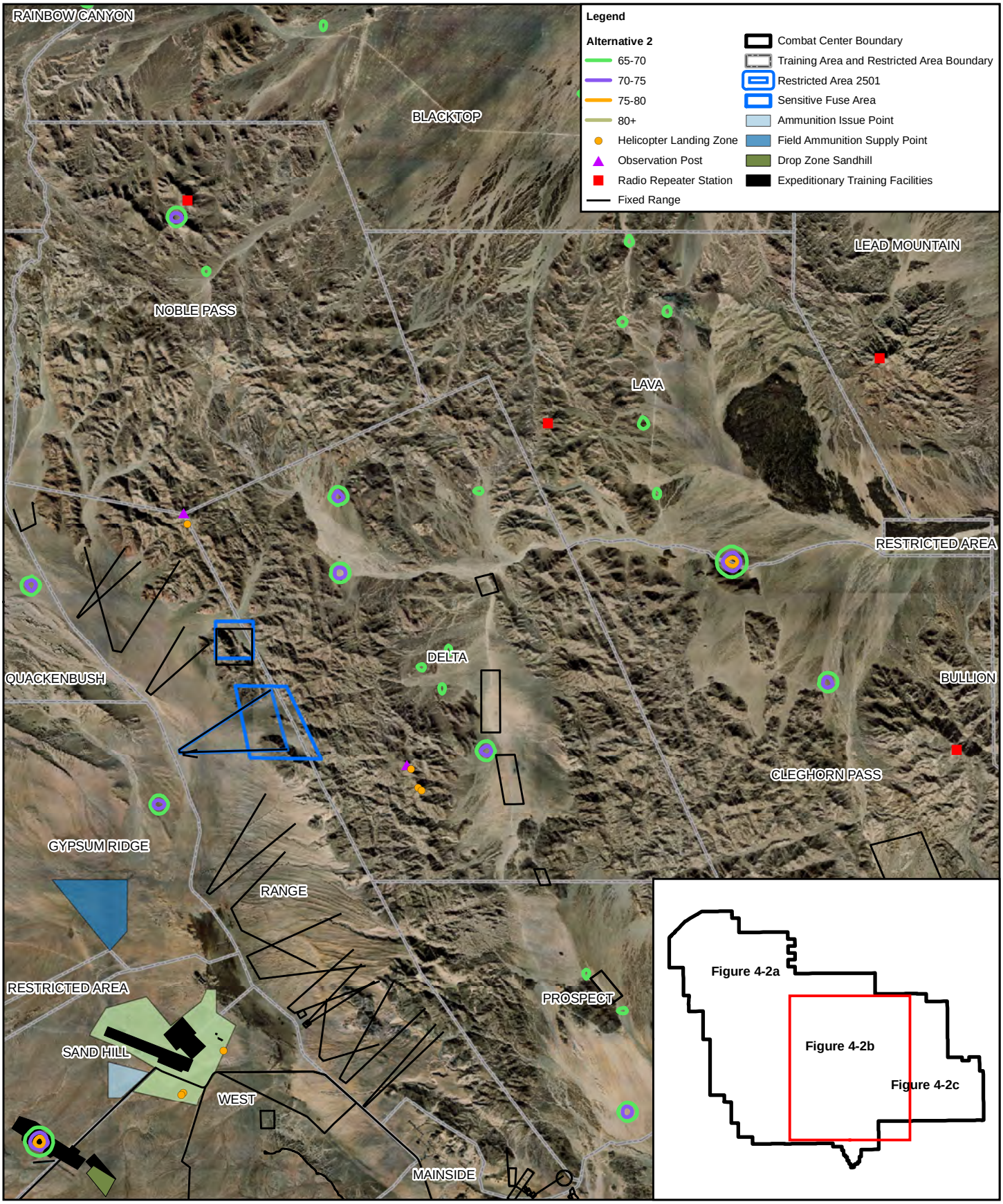
Under Alternative 2, there would be an increase of 1 site exposed to 75-80 dB $CNEL_{mr}$ but no increase in the number of AMZs exposed to 80-85 dB $CNEL_{mr}$ relative to the baseline condition (Table 4-3). The number of AMZ sites exposed to $CNEL_{mr}$ greater than or equal to 65 dB would increase by 12 from the baseline condition. This would be a relatively a small increase in noise and would not occur in areas with sensitive human receptors. No off-range residents or housing units would be exposed to aircraft noise greater than or equal to 65 dB $CNEL_{mr}$. Therefore, no significant noise impacts would occur under Alternative 2. The effects of noise on wildlife is discussed in Biological Resources (refer to Section 4.1).



Kilometers
0 0.75 1.5 3
0 0.75 1.5 3
Miles

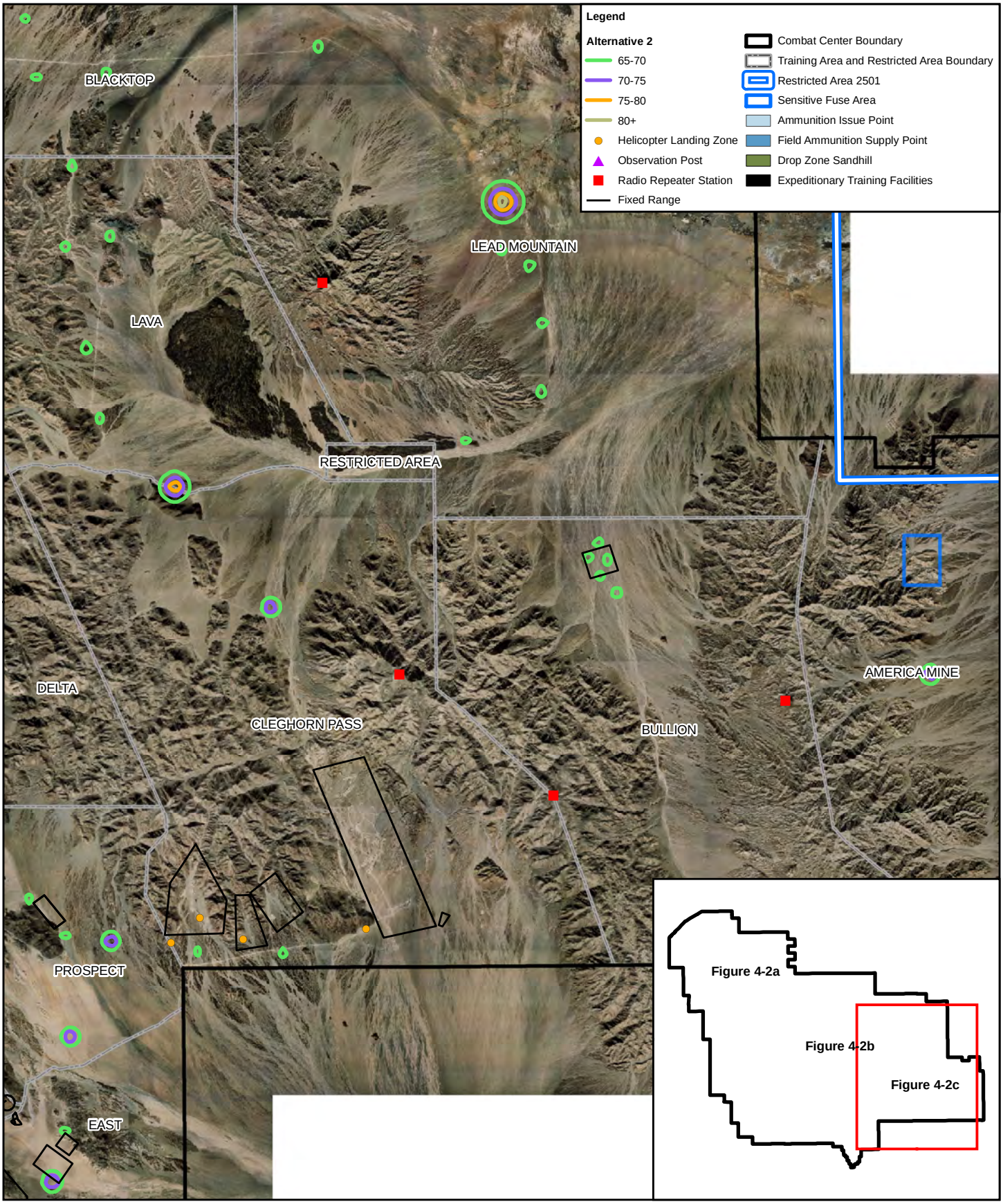
Figure 4-2a
Alternative 2 Aircraft Noise Contours: West

N



Kilometers
0 0.75 1.5 3
0 0.75 1.5 3
Miles

Figure 4-2b
Alternative 2 Aircraft Noise Contours: Central



Kilometers
0 0.75 1.5 3
0 0.75 1.5 3
Miles

Figure 4-2c
Alternative 2 Aircraft Noise Contours: East

N

4.4.2.3 No-Action Alternative

Under the No-Action Alternative, the proposed AMZ training activities for MV-22 aircrews would not occur, and existing conditions would remain unchanged. Therefore, no significant noise impacts would occur as a result of implementation of the No-Action Alternative.

CHAPTER 5.
OTHER CONSIDERATIONS REQUIRED BY NEPA

This chapter addresses additional considerations required by NEPA, including cumulative effects; possible conflicts between the action and the objectives of federal, regional, state, and local plans, policies, and controls; irreversible and irretrievable commitment of resources, and short-term vs. long-term productivity.

5.1 ANALYSIS OF CUMULATIVE IMPACTS

The analysis of cumulative impacts (or cumulative effects)[1] follows the objectives of NEPA of 1969 and CEQ regulations (40 CFR Parts 1500-1508) that provide the implementing procedures for NEPA. The CEQ regulations define cumulative impacts as:

> "the impact on the environment which results from the incremental impact 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. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (40 CFR § 1508.7).

The CEQ also provides guidance on cumulative impacts analysis in *Considering Cumulative Effects Under the National Environmental Policy Act* (CEQ 1997). Noting that environmental impacts result from a diversity of sources and processes, this CEQ guidance observes that "no universally accepted framework for cumulative effects analysis exists," while noting that certain general principles have gained acceptance. One such principle provides that "cumulative effects analysis should be conducted within the context of resource, ecosystem, and community thresholds—levels of stress beyond which the desired condition degrades." Thus, "each resource, ecosystem, and human community must be analyzed in terms of its ability to accommodate additional effects, based on its own time and space parameters." Therefore, cumulative effects analysis normally will encompass geographic boundaries beyond the immediate area of the proposed action, and a time frame including past actions and foreseeable future actions, to capture these additional effects. Bounding the cumulative effects analysis is a complex undertaking, appropriately limited by practical considerations. Thus, CEQ guidelines observe, "[i]t is not practical to analyze cumulative effects of an action on the universe; the list of environmental effects must focus on those that are truly meaningful."

5.1.1 Geographic Boundaries for Cumulative Impacts Analysis

Geographic boundaries for analyses of cumulative impacts in this EA vary for different environmental resources. For example, for air quality, the potentially affected air basin is the appropriate boundary for assessment of cumulative impacts from releases of pollutants into the atmosphere. The cumulative impacts analysis focuses on projects that directly overlap with the proposed alternatives (i.e., occur in similar locations and potentially impact similar resources). For the purposes of this analysis, the

[1] CEQ Regulations provide that the terms "cumulative impacts" and "cumulative effects" are synonymous and can be used interchangeably (40 CFR § 1508.8(b)).

cumulative region for the proposed action consists of the entire Combat Center (refer to Chapter 1, and Figure 1-3).

5.1.2 Other Present and Reasonably Foreseeable Future Actions

Identifiable effects of other present and reasonably foreseeable actions are analyzed and evaluated to the extent they may be additive to impacts of the proposed action. In general, the Marine Corps need not list or analyze the effects of individual past actions; cumulative impacts analysis appropriately focuses on aggregate effects of past actions. Reasonably foreseeable future actions that may have impacts additive to the effects of the proposed alternatives are also analyzed. As part of the evaluation of cumulative impacts, a review of other projects in the vicinity of the proposed alternatives was conducted. Cumulative projects that could interact directly or indirectly with the proposed alternatives are discussed below. Other testing and training activities at the Combat Center that do not have the potential to interact cumulatively with the proposed action are not addressed in this EA.

Proposed Increase in End Strength and Temporary Facility Bed-down

An EA was completed in October 2007 to evaluate the environmental impacts associated with the USMC's Grow the Force Initiative; a proposed increase in end strength of 2,125 personnel and associated dependents at the Combat Center. The proposed action included the construction of temporary supporting facilities in the Mainside area to support the increase in personnel, and the subsequent removal once permanent facilities had been constructed. Resources that were evaluated for impact included biological resources, cultural resources, air quality, socioeconomics, transportation and circulation, utilities, and public health and safety. Based on the results of the analysis, it was determined that there would be no significant impacts to the environment with implementation of the action. A Finding of No Significant Impact was signed on 13 December 2007. The construction of temporary facilities and their subsequent removal will not have any temporal overlap with activities under the proposed action.

Permanent Facilities Bed-Down of Increased End-Strength

An EA was completed in September 2009 to evaluate the environmental impacts associated with construction of permanent facilities and infrastructure at the Combat Center to support the USMC's Grow the Force Initiative. Resources that were evaluated for impact included geological resources, biological resources, cultural resources, air quality, socioeconomics, utilities and community services, transportation and circulation, and public health and safety. Based on the results of the analysis, it was determined that there would be no significant impacts to the environment with implementation of the action. A Finding of No Significant Impact was signed on 29 September 2009. The construction of permanent facilities is likely to have temporal but little spatial overlap with the activities under the proposed action.

Land Acquisition/Airspace Establishment to Support Large-Scale Marine Air Ground Task Force Live-Fire and Maneuver Training

An EIS is currently being prepared to analyze the impacts from the proposed extension of existing installation operating areas through acquisition of additional training lands, modification and establishment of military special use airspace, and implementation of Marine Expeditionary Brigade (MEB)-level sustained, combined-arms, live-fire, and maneuver training exercises within current and proposed operating areas at the Combat Center. The EIS is expected to be completed in 2012. Anticipated resource areas of concern include biological resources, cultural resources, air quality, socioeconomics, recreation, land use, public health and safety, and airspace management.

West Coast Basing of the F-35B

An EIS is currently being prepared to analyze the impacts from the west coast basing of the F-35B aircraft. The F-35B aircraft would replace 126 legacy F/A-18A/B/C/D Hornet and 56 AV-8B Harrier aircraft in the Third Marine Air Wing and Fourth Marine Air Wing. The proposed action addressed in this EIS would include:

- basing of 11 operational F-35B Joint Strike Fighter squadrons (176 aircraft), and 1 F-35B Operational Test and Evaluation (OT&E) squadron (8 aircraft) on the West Coast of the United States;
- construction and/or renovation of airfield facilities and infrastructure necessary to accommodate and maintain the F-35B squadrons;
- changes to personnel to accommodate squadron staffing; and
- conducting F-35B readiness and training operations to attain and maintain proficiency in the operational employment of the F-35B and special exercise operations.

This EIS addresses six basing alternatives, none of which are at the Combat Center. However, the proposed action includes occasional use of airspace overlaying the Combat Center: Restricted Area 2501 North, South, East, and West; Bristol ATCAA and MOA; and Sundance MOA. The frequency of airspace use would be equivalent to or less than current use by the aircraft that the F-35B is replacing. The publication of the Notice of Intent in the Federal Register occurred on 15 January 2009.

West Coast Basing of the MV-22

West Coast Basing of the MV-22 will require construction components for expanded apron space and hangar upgrades, similar to the West Coast Basing of the F-35B. MV-22 aircraft from MCAS Miramar and MCAS Pendleton would utilize MCAS Yuma as transients during training operations. The Marine Corps estimates these MV-22s would fly about 3,900 operations annually at the Twentynine Palms EAF and in the associated airspaces, replacing transient helicopter traffic. Transition from the helicopters to the MV-22 is scheduled to occur between 2010 and 2020. A Final EIS was prepared for this action with a Record of Decision (ROD) signed on 19 November 2009.

General Military Construction Projects

The remaining cumulative effects projects listed in Table 5-1 are general military construction (MILCON) projects that would occur in the Mainside area of the Combat Center between the 2012 and 2015 timeframe. These projects are not well-defined at this time, and very little information is available to characterize the potential effects of each project. NEPA documentation has not yet been initiated for these projects. Appendix D provides additional details about each MILCON project, including the proposed size of each structure or infrastructure footprint and any project-specific site improvements or design features.

Table 5-1. General Military Construction Projects

Project Number	Project Title	Approximate Size	Fiscal Year
P-175	Consolidated Emergency Response Center	29,504 sf	2012
P-504	Consolidated Community Support Facility	114,356 sf	2012
P-641	Addition East Gym 1588	19,999 sf	2012
P-926B	Library/Lifelong Learning Center, Phase II	21,000 sf	2012
P-987	Addition to Temporary Lodging Facility	8,860 sf	2012
P-194	Convert Building 2025 to Wheeled Vehicle Maintenance Facility	22,680 sf	2013
P-602	Training Integration Center	41,635 sf	2013
P-617	Waste Handling and Recovery Complex	36,575 sf	2013
P-900	Marine Corps Communication and Electronic Classroom	91,762 sf	2013
P-921	Electronic/Communications Maintenance & Storage Facility	34,853 sf	2013
P-927	Marine Corps Communication and Electronic Classroom	91,106 sf	2013
P-988	MCAGCC Gate Reconfiguration, AT/FP Upgrades	2,497 sf	2013
P-190	MCAGCC Band Facility	15,389 sf	2014
P-191	Addition to Camp Wilson Gym (Building 5411)	3,208 sf	2014
P-192	Deadman Lake Sub-Basin Well Field	n/a	2014
P-571	Roads Southeast Access	167,439 sy	2014
P-618	Multi-Purpose Administration Building	29,084 sf	2014
P-662	Expeditionary Fighting Vehicle Maintenance Facility	67,371 sf	2014
P-808	Concrete Ramp, F/W; EAF	742,904 sf	2014
P-902	MCCES Bulk Supply Warehouse	12,109 sf	2014
P-903	MCCES Consolidated Radar Classroom	32,292 sf	2014
P-980	Substation SCADA System	n/a	2014
P-603	Vehicle Training and Equipment Facility	27,706 sf	2015
P-810	Concrete Taxiway	943,326 sf	2015
P-978	Rifle Range Water Distribution System	n/a	2015

Notes: sf = square feet; sy = square yards; n/a = not applicable.

5.1.3 Potential Cumulative Impacts by Environmental Resource Area

5.1.3.1 Biological Resources

Implementation of the proposed action would result in localized disturbances to Mojave Desert habitats and associated plants and wildlife at each of the AMZs. The affected areas comprise approximately 1,400 acres, but the impacts would be limited to noise, wind (rotor wash), and light ground disturbance from landings and dismounted training. There would be no new construction or removal of perennial vegetation or geologic features, and the affected areas already experience considerable use for Marine Corps training activities. Hence the impacts to biological resources would not be significant. Consultation with USFWS regarding the threatened desert tortoise may include the implementation of additional measures to lessen impacts. The construction projects described above in Section 5.1.2 would undergo separate environmental reviews under NEPA and ESA, which would ensure that biological resource impacts are avoided, minimized, and/or compensated to the extent practicable. The full consideration of alternatives with lesser impacts, and the implementation of conservation measures similar to those described in Section 2.6 of this EA, has been and would continue to be a component of projects affecting Mojave Desert biota. Regional conservation plans, in particular the INRMP for the Combat Center and the West Mojave Plan, would continue to function to minimize potential cumulative impacts to desert ecosystems. Cumulatively, while individual plants and animals may be affected by any particular project, the overall distribution or abundance of populations and habitats and ecosystem functions and values would not be significantly affected.

The potential expansion of the Combat Center operating area for large-scale training exercises would potentially impact biological resources, including the desert tortoise, over a large area (impacts are currently being analyzed in the MCAGCC Land Acquisition and Airspace Establishment EIS); however, any potential effects would be reviewed in consultation with USFWS and other appropriate authorities, and appropriate mitigation measures would be applied to avoid, minimize, or compensate for any potential impacts to biological resources (particularly special-status species). In general, the impacts from such training exercises would be similar to those that have been closely monitored for years within current Combat Center operating areas. The Combat Center would expand stewardship under the INRMP to biological resources in any new expansion areas. Therefore, implementation of the proposed action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts to biological resources.

5.1.3.2 Cultural Resources

Implementation of the proposed action would not result in significant impacts to cultural resources. Projects that include ground disturbance from construction activities or aircraft operations (e.g., rotor wash at landing areas) have the potential to impact prehistoric archaeological resources. However, for each project, measures have been designed to minimize and avoid impacts to archaeological sites that are eligible for listing under NRHP, sites that require further evaluation, and/or sites that are of concern to the Native American community. The Marine Corps has entered into a Programmatic Agreement (USMC 2007b) with the California SHPO, the Advisory Council of Historic Preservation, and other consulting parties to resolve adverse effects from the proposed action and other projects.

Projects such as F-35B West Coast Basing, Grow the Force Initiative, and the proposed MCAGCC Land Acquisition and Airspace Establishment have the potential to impact cultural resources. Federal projects with potential for significant impacts to cultural resources would undergo Section 106 review under the NHPA and any potentially significant impacts would be mitigated, usually through avoidance when possible, or data recovery. However, archaeological sites are a limited resource and, therefore, any impact on an archaeological site that is eligible or potentially eligible for listing under NRHP and/or is of concern to the Native American community may contribute to a cumulative impact.

However, under the proposed action, there would be no effect on archaeological sites listed as eligible or potentially eligible under NRHP. Therefore, implementation of the proposed action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts to cultural resources.

5.1.3.3 Air Quality

<u>Criteria Pollutants</u>

The ROI considered in this air quality cumulative analysis includes the MDAB. The main impacts to air quality from the proposed action that could contribute to cumulative impacts would be associated training operations. There would be no construction and, therefore, no construction-related emissions associated with the proposed action.

Cumulative impacts resulting from the proposed action, in conjunction with impacts from other projects discussed herein, would potentially occur during construction and operational activities within the ROI. Proposed training operations would produce emissions that would remain below applicable conformity emission significance thresholds. Any concurrent emissions-generating action that occurs in the vicinity of proposed training operations would potentially contribute to the ambient impacts of these emissions. Since proposed training operations would not produce a significant amount of emissions, the combination of proposed operations and future project air quality impacts would not contribute to an exceedance of an

ambient air quality standard. Therefore, implementation of the proposed action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts to air quality.

Greenhouse Gases

The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Therefore, an appreciable impact on global climate change would only occur when proposed GHG emissions combine with GHG emissions from other man-made activities on a global scale.

Currently, there are no formally adopted or published NEPA thresholds for GHG emissions. On 18 February 2010, the CEQ released draft guidance for addressing climate change in NEPA documents (CEQ 2010). The draft guidance, which has been issued for public review and comment, recommends quantification of GHG emissions, and proposes a reference point of 25,000 metric tons of CO_2e emissions. The CEQ indicates that use of 25,000 metric tons of CO_2e emissions as a reference point would provide federal agencies with a useful indicator, rather than an absolute standard of significance, for agencies to provide action-specific evaluation of GHG emissions and disclosure of potential impacts.

Formulating such thresholds is problematic, as it is difficult to determine what level of proposed emissions would substantially contribute to global climate change. In the absence of formally-adopted thresholds of significance, this EA compares GHG emissions that would occur from the proposed action with the 25,000 metric ton level, as well as comparing the net GHG emissions associated with the proposed action to the U.S. GHG baseline inventory of 2006 to determine the relative increase in proposed GHG emissions.

Table 5-2 summarizes the annual GHG emissions associated with aircraft operations for the baseline, as well as emissions associated with implementation of the proposed action. As discussed in Section 4.3, project emissions would be the same under Alternative 2 as estimated for Alternative 1. Appendix B presents estimates of GHG emissions generated by the proposed action. These data show that the ratio of annual CO_2e emissions estimated for the proposed action to CO_2e emissions generated from all sources in the U.S. in 2006 is approximately 0.00174/7,054 million metric tons (USEPA 2010b). Therefore, CO_2e emissions associated with the proposed action would amount to approximately 0.00002% of the total CO_2e emissions generated by the U.S. Emissions under the proposed action are also below the 25,000 metric tons of CO_2e level proposed in the draft NEPA guidance by the CEQ. Under the proposed action, cumulative impacts to global climate change would not be significant.

Table 5-2. Estimated Annual GHG Emissions – Proposed Action

Scenario/Activity	Metric Tons per Year[1]			
	CO_2	CH_4	N_2O	CO_2e
Baseline Emissions – CH-46E	987	0.03	0.03	997
Baseline Emissions – CH-53E	5,487	0.15	0.18	5,545
Baseline Total	**6,474**	**0.18**	**0.21**	**6,542**
Proposed Action Emissions – MV-22	2,709	0.07	0.08	2,737
Proposed Action Emissions – CH-53E	5,487	0.15	0.18	5,545
Proposed Action Total	**8,196**	**0.23**	**0.26**	**8,282**
Net Increase	**1,722**	**0.05**	**0.05**	**1,740**
Draft NEPA Threshold [2]				**25,000**
U.S. 2006 Baseline Emissions (10^6 metric tons) [3]	-	-	-	7,054.2
Proposed Emissions as a % of U.S. Emissions	-	-	-	0.00002

Notes: [1]CO_2e = (CO_2 * 1) + (CH4* 21) + (N2O * 310)
Source: [2]CEQ 2010; [3]USEPA 2010b.

Although the proposed action would not cause significant cumulative impacts associated with global climate change, this important topic warrants discussion of Marine Corps and DoN leadership in broad-based programs to reduce energy consumption and shift to renewable and alternative fuels, thereby reducing emissions of carbon dioxide and other GHGs.

The Commandant of the Marine Corps' *Facilities Energy and Water Management Program Campaign Plan* (2009) declares that energy conservation is "an issue of combat readiness." The Commandant issues his Commanders Intent to implement measures to conserve energy, supporting "our Nation's pledge to reduce green house gas emissions and dependence on foreign oil." The campaign plan identifies long-term goals to reduce energy intensity and increase the percentage of renewable electrical energy consumed. He mandates that all "acquisitions of relevant products will meet ENERGY STAR and Federal Energy Management Program requirements." He directs "an integrated approach to optimize energy performance to meet federal building performance requirements and achieve a Leadership in Energy & Environmental Design rating of silver for new construction and major renovation projects."

The Commandant requires his Base Commanders to "evaluate the effectiveness of incorporating emerging technologies" including integrated photovoltaics, cool roofs, daylighting, ground source heat pumps, heat recovery ventilation, high efficiency chillers, occupancy sensors, premium efficiency motors, radiant heating, solar water heating, and variable air volume systems. "The Marine Corps is committed to taking a leadership position in on-site renewable power development with the assistance of private sector financing and development expertise."

Marine Corps Installations West has undertaken a study to evaluate and address GHG emissions, documented in the draft *Greenhouse Gas Assessment for Marine Corps Installations West* (USMC 2009). The study summarizes the regulatory requirements relating to GHG emissions, provides estimates of emissions, and documents Early Action GHG reduction measures being implemented by the Marine Corps at the Combat Center. The study provides the basis for recommended GHG management policies at Marine Corps Installations West.

5.1.3.4 Noise

Implementation of the proposed action would not result in significant noise impacts. The Grow the Force Initiative, in conjunction with the proposed action, is not anticipated to cause significant cumulative noise impacts because it would be required to incorporate similar types of plans, policies, and procedures into project design, and comply with similar regulations, as described for the proposed action.

The proposed MCAGCC Land Acquisition and Airspace Establishment would likely increase noise levels due to increased training activity but is also anticipated to disperse the activity (and therefore the noise) over larger areas. Due to the lack of significant impact to the Combat Center under the proposed action, the proposed action's contribution to cumulative noise impacts at the Combat Center are not anticipated to be significant.

The West Coast Basing of the F-35B Joint Strike Fighter is anticipated to add to the proposed noise environment in the vicinity of the Combat Center. The F-35B West Coast Basing EIS will address noise studies and estimate noise impacts from a range of alternative basing scenarios. Early studies indicate the F-35B aircraft generates more noise than the F/A-18 C/D Hornets and the AV-8B Harriers; however, these studies also indicate the F-35B would fly higher than the aircraft it would replace. If the noise studies from the F-35B West Coast Basing EIS estimate additional noise beyond existing baselines, F-35B and MV-22 noise could have a cumulative impact. It is anticipated that the F-35B, like the F/A-18 and AV-8 jets it would replace, would be the dominant source for defining noise impacts at any

installation where collocated with MV-22 or rotary-wing aircraft. However, the frequency of airspace use over the Combat Center would be equivalent to or less than current use by the aircraft that the F-35B is replacing. Therefore, implementation of the proposed action, in conjunction with other similar actions in the ROI, would not result in significant cumulative noise impact.

5.1.3.5 Conclusion

Implementation of the proposed action in conjunction with the other identified projects would not represent a significant cumulative impact on environmental or human resources addressed in this EA. Appropriate regulatory requirements and SCMs would be applied during proposed AMZ training activities. Not all of the projects would occur simultaneously and, when viewed collectively, there is nothing inherently incompatible between these projects and the proposed action, nor is there anything to indicate that the proposed action would exacerbate or otherwise collectively increase the potential for impacts to the environment. Therefore, based on current information, cumulative impacts of the proposed action would not be significant.

5.2 POSSIBLE CONFLICTS BETWEEN THE ACTION AND THE OBJECTIVES OF FEDERAL, REGIONAL, STATE, AND LOCAL PLANS, POLICIES, AND CONTROLS

Implementation of the proposed action would be consistent with federal, regional, state and local plans, policies, and controls to the extent required by federal law and regulation. No potential conflicts have been identified. Refer to Table 1-1 for applicable laws and regulations considered.

5.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

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 non-renewable resources such as metal and fuel, and other natural or cultural resources. These resources are irretrievable in that they would be used for this project when they could have been used for other purposes. Human labor is also considered an irretrievable resource. Another impact that falls under this category is the unavoidable destruction of natural resources that could limit the range of potential uses of that particular environment.

Implementation of the proposed action would involve the consumption of fuel, oil, and lubricants for training activities. However, relatively small quantities of these types of resources would be required. In addition, construction materials (wood, metal, concrete) would not be required for the proposed action. Therefore, implementation of the proposed action at the installation would not result in a significant commitment of irreversible or irretrievable resources.

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

NEPA requires an analysis of the relationship between a project's short-term impacts to 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 a single development option reduces future flexibility in pursuing other options, or that giving over a parcel of land or other resource to a certain use eliminates the possibility of other uses being performed at that site.

The proposed action would, irreversibly, dedicate parcels of land, equipment, and other resources to a particular use during an extended period of time. However, these impacts are considered negligible, as the geographic areas associated with the proposed action are designated for and have historically accommodated the types of uses proposed. No new permanent land uses would be introduced or excluded at the installation as a result of this action. Therefore, the proposed action would not result in any impacts that would permanently narrow the range of beneficial uses of the environment.

CHAPTER 6.
REFERENCES

AESO. 2000a. *Aircraft Emissions Estimates: CH-53 Landing and Take-off Cycle and In-Frame Engine Maintenance Testing Using JP-5*. AESO Memorandum Report No. 9822 Revision C. Naval Aviation Depot – North Island. February.

_____. 2000b. *Aircraft Emission Estimates: CH-53 Mission Operations Using JP-5*. AESO Memorandum Report No. 9960 Revision B. Naval Aviation Depot – North Island. April.

_____. 2001a. *Aircraft Emissions Estimates: CH-46 Landing and Take-off Cycle and In-Frame Engine Maintenance Testing Using JP-5*. AESO Memorandum Report No. 9816 Revision F. Naval Aviation Depot – North Island. January.

_____. 2001b. *Aircraft Emission Estimates: CH-46 Mission Operations Using JP-5*. AESO Memorandum Report No. 9959B. Naval Aviation Depot – North Island. January.

_____. 2001c. *Aircraft Emissions Estimates: V-22 Landing and Take-off Cycle and In-Frame Engine Maintenance Testing Using JP-5*. AESO Memorandum Report No. 9946 Revision E. Naval Aviation Depot – North Island. January.

_____. 2001d. *Aircraft Emission Estimates: V-22 Mission Operations Using JP-5*. AESO Memorandum Report No. 9965 Revision B. Naval Aviation Depot – North Island. January.

Agri Chemical & Supply, Inc. 2006. Sensitive Plant Surveys on MCAGCC Twentynine Palms, CA, Final Report. July.

_____. 2008. Vegetation Classification and Mapping of Marine Corps Air Ground Combat Center Twentynine Palms, CA, Final Report. N68711-04-D-3604 Task Order 0010. August.

ASM Affiliates. 2010. Final Archeological Resources Survey Report: Aerial Maneuver Zone (AMZ) Project at the Marine Air Ground Task Force Training Command, Marine Corps Air Ground Compact Center, Twentynine Palms, San Bernardino County, California. March

Café, Tony. 1992. Physical Constants for Investigators. Reproduced from: Journal of Australian Fire Investigators. Website available at: http://www.tcforensic.com.au/docs/article10.html. Accessed 7 April 2010.

CARB. 2010a. Ambient Air Quality Standards. Website available at: http://www.arb.ca.gov/research/aaqs/aaqs2.pdf. Accessed on 25 February.

_____. 2010b. State Nonattainment Designations. Website available at: http://www.arb.ca.gov/desig/adm/adm.htm. Accessed on 25 February.

_____. 2010c. 2008 Estimated Annual Average Emissions - Mojave Desert Air Basin. Website available at: http://www.arb.ca.gov/app/emsinv/emseic1_query.php?F_DIV=-4&F_YR=2008&F_SEASON=A&SP=2009&F_AREA=AB&F_AB=MD&F_DD=Y. Accessed on 25 February.

_____. 2010d. Air Quality Data. Website available at: http://www.arb.ca.gov/adam/cgi-bin/db2www/adamtop4b.d2w/start. Accessed on 25 February.

_____. 2010e. Almanac Emission Projection Data. 2010 Estimated Annual Average Emissions for the MDAQMD. Website available at: http://www.arb.ca.gov/app/emsinv/emssumcat.php. Accessed on 25 February.

CDFG. 2009. Special Animals List. California Natural Diversity Database. July. Website available at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/spanimals.pdf.

_____. 2010. State and Federally Listed Endangered & Threatened Animals of California. California Natural Diversity Database. January. Website available at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEAnimals.pdf.

CEQ. 1997. Considering Cumulative Effects Under the National Environmental Policy Act. Council on Environmental Quality, Executive Office of the President. January.

_____. 2010. Memorandum For Heads of Federal Departments and Agencies. Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions. 18 February.

CMBC. 2010. Final Biological Resources Survey Report: 81 Aerial Maneuver Zone (AMZ) Sites at the Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center (MAGTFTC, MCAGCC), Twentynine Palms, California, San Bernardino County, California. March.

CNPS. 2010. Inventory of Rare and Endangered Plants. Website available at: http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi. Accessed on 18 February.

_____. 2010. Memorandum for Head of Federal Departments and Agencies. Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions. 18 February.

Cutler, T.L., D.J. Griffin, and P.R. Krausman. 1999. A Wildlife Inventory and Management Recommendations for the Marine Corps Air Ground Combat Center, Twentynine Palms, California. Report prepared for Department of the Navy. April.

DoN. 1989. NATOPS Flight Manual, Navy Model CH-53E Helicopter, NAVAIR A1-H53AE-NFM-000. August 1.

_____. 1998. NATOPS Flight Manual, Navy Model CH-46E Helicopter, NAVAIR A1-H46AE-NFM-000. July 31.

_____. 2003. Final Programmatic Environmental Assessment, Ongoing and Proposed Training Activities at Marine Corps Air Ground Combat Center Twentynine Palms, CA. NAVFAC Southwest. May.

_____. 2006. NATOPS Flight Manual, Navy Model MV-22B Tiltrotor, NAVAIR A1-V22AB-NFM-000. October 1.

_____. 2009. Final Environmental Impact Statement for the West Coast Basing of the MV-22. October.

_____. 2010. Data on Aircraft in the Current Naval Aviation Inventory. Naval Historical Center. Website available at: http://www.history.navy.mil/branches/org4-4.htm. Accessed on 8 April.

Efroymson, Rebecca A., W.H. Rose, S. Nemeth, and G.W. Suter II. 2000. Ecological Risk Assessment Framework for Low-Altitude Overflights by Fixed-Wing and Rotary-Wing Military Aircraft. Research sponsored by the Strategic Environmental Research and Development Program of the U. S. Department of Defense. Publication No. 5010, Environmental Sciences Division, ORNL.

FAA. 2008. Order JO 7400.2G Procedures for Handling Airspace Matters. April.

FICON. 1992. Federal Agency Review of Selected Airport 6 Noise Analysis Issues. August.

Grotkjaer, T., K. Dam-Johansen, A.D. Jensen, and P. Glarborg. 2003. An Experimental Study of Biomass Ignition. *Fuel* 82 (10): 825-833.

Harris, C.M. 1979. Handbook of Noise Control, 2nd Ed. New York: McGraw-Hill.

Larkin, Ronald P. 1996. Effects of military noise on wildlife: a literature review. Illinois Natural History Survey, Center for Wildlife Ecology.

MCAGCC. 1993. Combat Center Order P3120.4C. Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center Twentynine Palms, CA.

_____. 2000. Combat Center Order P3500.4F. Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center Twentynine Palms, CA.

_____. 2002. Integrated Contingency and Operations Plan, Marine Air Ground Task Force Training Command. Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center Twentynine Palms, CA.

_____. 2007a. Integrated Natural Resources Management Plan 2007 – 2011. Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center, Twentynine Palms, CA.

_____. 2007b. Integrated Cultural Resources Management Plan for Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center, Twentynine Palms" FY07 through FY11. Effective Date: 20 December 2007.

_____. 2009a. Final Biological Assessment, Construction of Electrical System Upgrade for Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center Twentynine Palms, CA. November.

_____. 2009b. Calendar year 2008 Comprehensive Emissions Inventory Report for Marine Corps Air Ground Combat Center, Twentynine Palms, CA. Prepared by URS. August.

_____. 2009c. Electronic mail from Maj. Harmon (Twentynine Palms) to Sullivan, Kimberly E. CIV NAVFAC SW; Kerr CIV Scott A; Smith; Maj Craig L; Frederick LtCol Thomas E. Regarding 29 Palms AMZ Noise Data Validation. 7 December.

_____. 2010a. Electronic mail from Maj. Harmon (Twentynine Palms) to Peer Amble (TEC). Regarding AMZ DOPAA structure w/ additional airframes. 8 January.

_____. 2010b. Electronic mail from Peer Amble (TEC) to Joseph Czech (Wyle). Regarding update to Noise Data Validation package. 7 January 2010.

_____. 2010c. Personal communications via email with Dr. M. Cottrell, MCAGCC NREA, Cultural Resources Manager. 15 March.

MDAQMD. 2008. MDAQMD Federal 8-Hour Ozone Attainment Plan (Western Mojave Desert Non-attainment Area). Website available at: http://www.arb.ca.gov/planning/sip/planarea/wmdaqmp/wmd2008ozone.pdf. Adopted on 9 June 2008. Accessed on 25 February 2010.

_____. 2010. MDAQMD Rule Book. Website available at: http://www.mdaqmd.ca.gov/index.aspx?page=138. Accessed on 25 February.

Sawyer, J.O. and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. California Native Plant Society, Sacramento, CA.

USEPA. 2010a. The Green Book Nonattainment Areas for Criteria Pollutants. Website available at: http://www.epa.gov/air/oaqps/greenbk/index.html. Accessed on 25 February.

_____. 2010b. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006 – Executive Summary Website available at: http://www.epa.gov/climatechange/emissions/downloads/08_ES.pdf. Accessed on 25 February.

_____. 2010c. General Conformity Regulatory Actions. Website available at: http://www.epa.gov/oar/genconform/regs.htm. Accessed on 6 April.

USFWS. 2002. Biological Opinion for the base-Wide Training Operations and Routine maintenance Program at the United States Marine Corps Air Ground Combat Center, Twentynine Palms, San Bernardino County, California (I-8-99-F-41).

_____. 2008. Birds of Conservation Concern 2008. Division of Migratory Bird Management. December. Website available at: http://www.fws.gov/migratorybirds/NewReportsPublications/SpecialTopics/BCC2008/BCC2008.pdf.

USMC. 2006a. NAVMC Directive 3500.88, CH-46E Training and Readiness (T&R) Manual. 25 January.

_____. 2006b. NAVMC Directive 3500.89, CH-53 Training and Readiness (T&R) Manual. 20 January.

_____. 2007a. NAVMC Directive 3500.11, MV-22 Training and Readiness (T&R) Manual. 6 February.

_____. 2007b. Programmatic Agreement Between the United States Marine Corps and the California State Historic Regarding Operation, Maintenance, Training, and Construction at the United States Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center, Twentynine Palms, CA. 9 April.

_____. 2009. Marine Corps Installations West. Greenhouse Gas Assessment for Marine Corps Installations West. 2009.

Western Region Climate Center. 2010. Website available at: www.wrcc.dri.edu. Accessed on 25 February.

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APPENDIX A
BIOLOGICAL RESOURCES SURVEY REPORT

Final Biological Resources Survey Report:
81 Aerial Maneuver Zone (AMZ) Sites at the
Marine Air Ground Task Force Training Command,
Marine Corps Air Ground Combat Center (MAGTFTC, MCAGCC),
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Executive Summary

Circle Mountain Biological Consultants, Inc. (CMBC) was contracted to perform focused surveys for desert tortoise (*Gopherus agassizii*) and general biological resource assessments on 76 Aerial Maneuver Zone (AMZ) sites at the Marine Air Ground Task Force Training Command, Marine Corps Air Ground Compact Center (MAGTFTC, MCAGCC) at Twentynine Palms, San Bernardino County, California. An additional 5 alternate sites surveyed by Natural Resources and Environmental Affairs (NREA) staff are also included. CMBC's and NREA's focused tortoise surveys and general biological resource assessments provide baseline data to support an Environmental Assessment for the proposed project.

Between 9 October and 17 December 2009, CMBC completed the focused tortoise surveys and general biological assessments, following the tortoise survey protocol identified by the U.S. Fish and Wildlife Service in April 2009. In addition to surveying each site along transects spaced at 10-meter (30-foot) intervals, the protocol recommends that three 10-meter belt transects be surveyed in adjacent areas. Information collected for each site included site name; dates and times of surveys; surveyors; weather conditions at the beginning and ending of the surveys; UTM coordinates for corner points; common and special-status plants and animals; and descriptions of tortoise sign (e.g., scat, burrows, coversites, carcasses, egg shell fragments, tracks), including photographic exhibits.

Based on DeLorme Topo USA® 7.0 software, elevations on the 81 sites range from approximately 1,140 meters on OLZ10 at the top of Noble Mesa down to 188 meters on PZ1 adjacent to the dry lake located west of Amboy Crater lava flows. CMBC identified a total of 62 perennial shrubs and grasses. The two primary plant communities distributed throughout the sites are creosote bush scrub on most sites and saltbush scrub in lower elevational areas to the east and on sites associated with dry lake playas. CMBC identified 12 reptile, 38 bird, and 12 mammal species during the surveys. Special-status plant and animal species detected during the surveys, other than desert tortoise, included one plant, one lizard, eight bird, and one mammal species.

CMBC conducted focused surveys on 76 sites. Of these sites, 22 had no tortoise sign on or adjacent to the site, 26 had tortoise sign only in areas adjacent to the site, and 28 had tortoise sign within the actual site. NREA conducted focused surveys on 5 sites. Of these sites, 3 had no tortoise sign on or adjacent to the site, 1 had tortoise sign only in areas adjacent to the site, and 1 had tortoise sign within the actual site. There seems to be no particular regional pattern of occurrence for tortoises among the 81 total sites. Excepting CP30LZ2, all other sites on the northwestern part of the base either have tortoise sign on them or in adjacent areas. Similarly, tortoise sign was detected on or adjacent to all 16 sites on the southern and central portions of the base. Tortoise sign was not found on those sites where impacts associated with ground maneuvers were most severe.

This report documents the presence or absence of tortoise sign on and adjacent to 81 potential AMZ sites. The MAGTFTC, MCAGCC prefers to avoid or minimize impacts to desert tortoises and their habitat. This could be achieved by using the survey results to choose AMZs found to have no sign on or adjacent to the sites. The further the AMZ sites are removed from tortoise sign, the lower the likelihood that tortoises might utilize resources near those sites.

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Final Biological Resources Survey Report: 81 Aerial Maneuver Zone (AMZ) Sites at the Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center (MAGTFTC, MCAGCC), Twentynine Palms, California, San Bernardino County, California

1.0. Introduction

1.1. Purpose and Need for Study. Circle Mountain Biological Consultants, Inc. (CMBC) was contracted to perform focused surveys for desert tortoise (*Gopherus agassizii*) and general biological resource assessments on 76 Aerial Maneuver Zone (AMZ) sites at Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center (MAGTFTC, MCAGCC) at Twentynine Palms, San Bernardino County, California (see Figure 1). An additional 5 alternate sites surveyed by Natural Resources and Environmental Affairs (NREA) staff are also included within this report. CMBC's and NREA's focused tortoise surveys and general biological resource assessments provide baseline data to support an Environmental Assessment for the proposed project.

2.0. Methods

2.1. Site Descriptions and Locations. The 81 sites surveyed comprise approximately 3,309 acres (5.17 mi^2) (Table 1, Figure 1). The sites were distributed throughout MAGTFTC, MCAGCC among the 17 Training Areas listed in column three. Of the 81 sites, 73 were circular, 6 were rectangular, and 2 sites were polygons. To facilitate surveys and conform to U.S. Fish and Wildlife Service (USFWS) survey protocol (USFWS 2009), the 73 circular AMZs were encompassed within square survey areas. The radii of the circular AMZs and the corresponding acreages of the square survey areas are provided in the second column in Table 1, below. The coordinates for all sites (center points for circles; corners for polygons) are provided in the compendium that accompanies this report.

TABLE 1. NAMES, SIZES, AND TRAINING AREAS FOR ALL 81 AMZS

Site #	Radius/Acreage	Training Area
ALZ1	250 m/62 acres	Bullion
ALZ2	250 m/62 acres	Bullion
ALZ3	250 m/62 acres	Bullion
ALZ4	250 m/62 acres	Bullion
ALZ5	250 m/62 acres	Blacktop
ALZ6	250 m/62 acres	Blacktop
ALZ7	Rectangular/150 m x 700 m/26 acres	Gays Pass
ALZ8	Rectangular/150 m x 800 m/30 acres	Gays Pass
ALZ9	Rectangular/150 m x 800 m/30 acres	Gays Pass
CLZ1	75 m/6 acres	Lead Mountain
CLZ2	75 m/6 acres	Blacktop
CLZ3	75 m/6 acres	Lava
CLZ4	75 m/6 acres	Lava
CLZ5	75 m/6 acres	Lava
CLZ6	75 m/6 acres	Lava
CLZ7	75 m/6 acres	Lead Mountain

TABLE 1 (CONT.). NAMES, SIZES, AND TRAINING AREAS FOR ALL 81 AMZS		
Site #	**Radius/Acreage**	**Training Area**
CLZ8	75 m/6 acres	Lead Mountain
CLZ9	75 m/6 acres	Bullion
CLZ10	75 m/6 acres	Lead Mountain
CLZ11	75 m/6 acres	Lava
CLZ12	75 m/6 acres	Quackenbush
CLZ13	75 m/6 acres	Emerson Lake
CLZ14	75 m/6 acres	Emerson Lake
CLZ15	75 m/6 acres	Quackenbush
CLZ16	75 m/6 acres	Quackenbush
CLZ17	75 m/6 acres	Gays Pass
CLZ18	75 m/6 acres	Gays Pass
CP30LZ1	125 m/15 acres	Lavic Lake
CP30LZ2	125 m/15 acres	Lavic Lake
CP40LZ1	125 m/15 acres	Noble Pass
CP49LZ1	125 m/15 acres	Blacktop
FARP1EAST	Rectangular/100 x 500 m/12 acres	Lava
FARP2WEST	Rectangular/100 x 2000 m/49 acres	Sand Hill
MAWTSLZ1	250 m/62 acres	Emerson Lake
MAWTSLZ2	250 m/62 acres	Lavic Lake
MAWTSLZ3	250 m/62 acres	Quackenbush
MAWTSLZ4	500 m/250 acres	Lead Mountain
MAWTSLZ4 ALTERNATE SITE	500 m/250 acres	Lead Mountain
MAWTSLZ5	Rectangular/100 x 2000 m/49 acres	Lead Mountain
OLZ1	250 m/62 acres	Emerson Lake
OLZ2	250 m/62 acres	Maumee Mine
OLZ3	250 m/62 acres	Gays Pass
OLZ4	250 m/62 acres	Lavic Lake
OLZ5	250 m/62 acres	Lavic Lake
OLZ6	250 m/62 acres	Lavic Lake
OLZ7	250 m/62 acres	Rainbow Canyon
OLZ8	250 m/62 acres	Rainbow Canyon
OLZ8 ALTERNATE SITE	250 m/62 acres	Rainbow Canyon
OLZ9	250 m/62 acres	Blacktop
OLZ9 ALTERNATE SITE	250 m/62 acres	Blacktop
OLZ10	75 m/6 acres	Noble Pass
OLZ10 ALTERNATE SITE	Polygon/9 acres	Noble Pass
OLZ11	250 m/62 acres	Quackenbush
OLZ12	250 m/62 acres	Gypsum Ridge
OLZ13	250 m/62 acres	Gypsum Ridge
OLZ14	250 m/62 acres	Delta
OLZ15	250 m/62 acres	Delta
OLZ16	250 m/62 acres	Delta
OLZ17	250 m/62 acres	East
OLZ18	250 m/62 acres	Prospect
OLZ19	250 m/62 acres	Prospect
OLZ19 ALTERNATE SITE	250 m/62 acres	Prospect
OLZ20	250 m/62 acres	Cleghorn Pass
OLZ21	250 m/62 acres	America Mine
PZ1	500 m/250 acres	Lead Mountain

TABLE 1 (CONT.). NAMES, SIZES, AND TRAINING AREAS FOR ALL 81 AMZS		
Site #	**Radius/Acreage**	**Training Area**
R200LZ1	100 m/10 acres	East
R205LZ1	100 m/10 acres	Prospect
R205LZ2	100 m/10 acres	Prospect
R220LZ1	100 m/10 acres	Quackenbush
R220LZ1 ALTERNATE SITE	Polygon/8 acres	Quackenbush
R230LZ1	125 m/15 acres	Delta
R230LZ1 ALTERNATE SITE	125 m/15 acres	Delta
R230LZ2	125 m/15 acres	Delta
R230LZ2 ALTERNATE SITE	125 m/15 acres	Delta
R230LZ3	125 m/15 acres	Delta
R230LZ4	125 m/15 acres	Delta
R400LZ1	50 m/2.5 acres	Cleghorn Pass
R401LZ1	50 m/2.5 acres	Delta
R410LZ1	150 m/22 acres	Cleghorn Pass
R620LZ1	125 m/15 acres	Quackenbush
R620LZ2	125 m/15 acres	Quackenbush
81 Sites	**3,309 acres/5.17 mi^2**	**17 Training Areas**

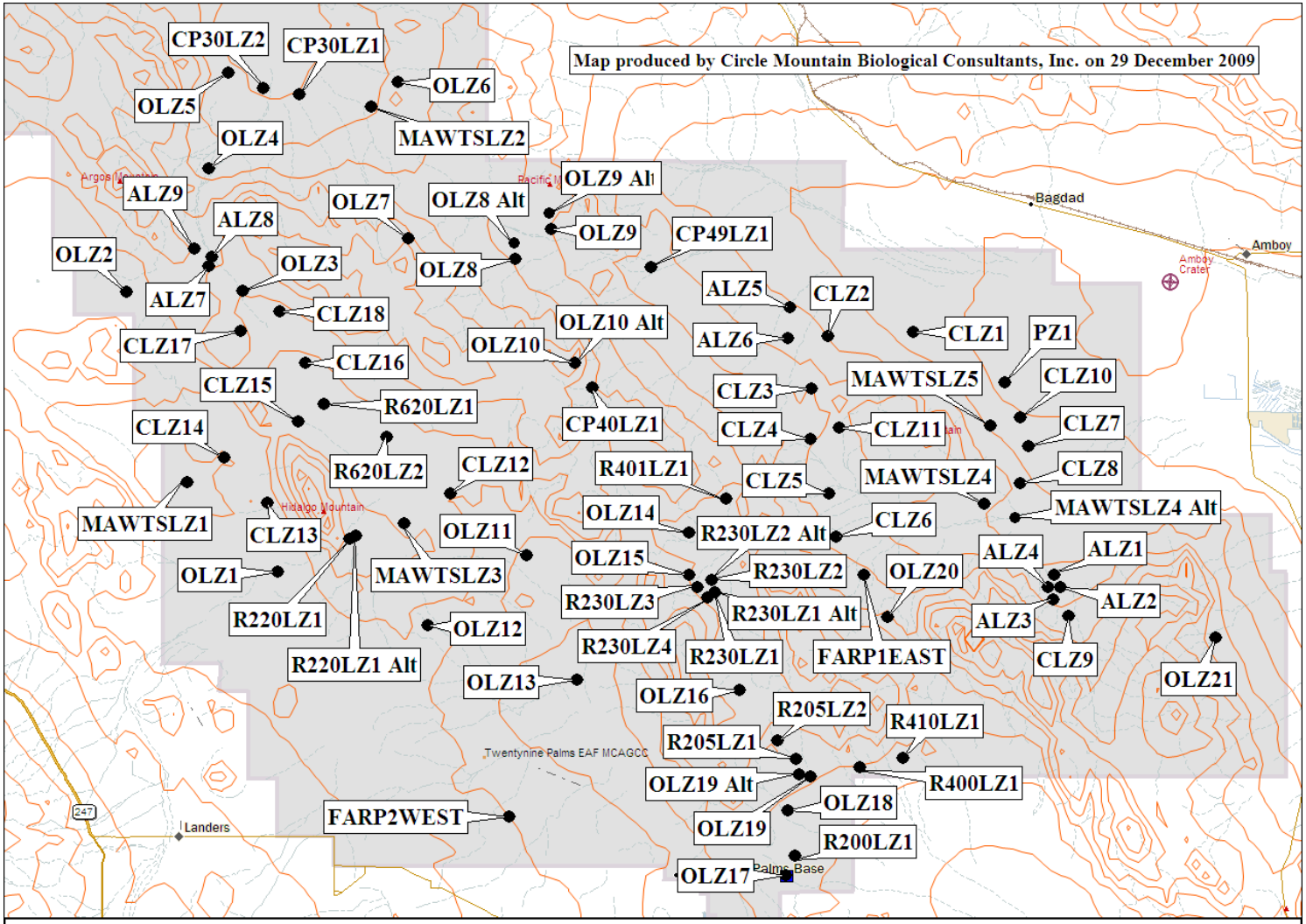


Figure 1. Index Map for 81 Aerial Maneuver Zone Sites at MAGTFTC, MCAGCC

2.2. Field Survey. CMBC followed the survey protocol identified by the USFWS (2009) for detection of desert tortoises. This protocol recommends that if neither tortoises nor their sign (e.g., scat, burrows, coversites, carcasses, egg shell fragments, tracks) are encountered during site surveys and the project or any portion of project is ≤ 0.8 km^2 (200 acres), three additional 10-meter belt transects at 200-meter, 400-meter, and 600-meter intervals encircling the project perimeter should be surveyed. Appendix C provides additional, detailed information on how the field data were collected. The resulting field data sheets are included in their entirety in the compendium.

All sites were surveyed along transects spaced at 10-meter intervals. Peripheral transects (also referred to as "zone of influence" transects) were modified to facilitate site assessments and provide sufficient data to facilitate the selection of alternate sites where tortoises would not be affected (Table 2). Areas adjacent to the first 34 sites were surveyed along transects spaced at 200-, 400-, and 600-meter intervals. Although these intervals were identified in the USFWS 2009 survey protocol, surveying them often resulted in assessing mountainous areas that were unlike the level-terrain habitats that would potentially be affected by aircraft landings.

On 28 October 2009, after conferring with the Ventura office of USFWS, NREA adopted CMBC's proposal to modify the zone of influence (ZOI) transects for the next 42 sites. The modification in the ZOI would consist of the following: (1) On sites where tortoise sign is found, CMBC would survey six transects spaced at 40-meter intervals. (2) On sites where no tortoise sign is found, CMBC would survey three transects at 80-meter intervals. The ZOI that were surveyed by NREA (five alternate sites) either did not occur (OLZ9; too much cultural and natural resource conflict to justify site use), were spaced at 10 m intervals around the site on Noble Mesa (OLZ10: but not on the 60 degree slopes), and at either 33, 67 and 100-meter intervals (R220LZ1) or intervals of 50 and 100-meter (R230LZ1, R230LZ2) (Table 2).

Where tortoise sign was found on-site, the revised transect spacing would help NREA assess in which direction the site could be moved to maintain proximity to the training area while avoiding tortoises. Where no tortoise sign was found on-site, the three transects surveyed at 80-meter intervals would help NREA assess the likelihood of tortoise immigration onto those sites devoid of tortoise sign. In either case, these more proximate surveys would assess conditions on a given site without assessing heterogeneous habitats far removed from the sites (i.e., 200 to 600 meters away).

For sites surveyed by CMBC, the first 13 (MAWTSLZ4 through OLZ2 in Table 2) only the dominant perennial shrubs and grasses were documented. For the remaining 63 sites all perennial plants and all animals observed were documented. For the sites surveyed by NREA, all perennial plants, annual plants, and animals observed were documented. These data can be found in the compendium.

Although detecting other special-status animal species designated by the USFWS and/or California Department of Fish and Game (CDFG) was not a goal of the focused tortoise surveys, various data on such designated species for the 81 sites surveyed were recorded. Common plant and animal species and special-status animal species identified during CMBC's surveys are listed in Appendix A and B, respectively, and are also listed for each site in the data sheets included in the compendium that accompanies this report. The plant species recorded by NREA are listed solely in the project compendium.

After the original 73 sites were surveyed (between 9 October and 13 November 2009), three alternative sites (MAWTSLZ4, OLZ8, and OLZ19) were identified and surveyed (between 14 and 17 December 2009). The same methodologies were used for these sites, except additional transects were surveyed contiguous to the alternate sites to ensure the final sites were at least 100 meters from any tortoise sign. NREA staff surveyed an additional five alternate sites (R220LZ1, OLZ10, OLZ9, R230LZ1, R230LZ2), between 13 November and 30 December 2009, which is also reported herein.

Since the ZOI methods changed slightly over time, general survey descriptions are reported chronologically (Table 2), and include the time required to survey sites and ZOI. Survey Team 1 was led by Ed LaRue and included Michael Radakovich and Shawn Gonzales; Team 2 was led by Ellen Schafhauser and included Patricia Seamount and Michael Gallagher; the NREA teams were lead by Dr. Henen and included various surveyors as listed in the compendium.

TABLE 2. Effort and chronology for surveying 81 potential sites for AMZs at MAGTFTC, MCAGCC in 2009

Site	Date	Effort	Team	ZOI Intervals
MAWTSLZ4	10/9 & 11/11/09	72.0	Teams 1 & 2	6 @ 40 m
PZ1	10/10/09	60.0	Teams 1 & 2	200, 400, 600 m
CLZ1	10/11/09	6.0	Team 1	200, 400, 600 m
CLZ7	10/11/09	5.25	Team 1	200, 400, 600 m
CLZ8	10/11/09	7.5	Team 1	200, 400, 600 m
CLZ10	10/12/09	6.0	Team 2	200, 400, 600 m
CLZ9	10/12/09	7.5	Team 2	200, 400, 600 m
ALZ1	10/12/09	21.0	Team 1	200, 400, 600 m
ALZ2	10/12/09	16.5	Teams 1 & 2	200, 400, 600 m
ALZ3	10/13/09	10.5	Team 2	200, 400, 600 m
ALZ4	10/13/09	22.5	Teams 1 & 2	200, 400, 600 m
OLZ21	10/14/09	32.0	Teams 1 & 2	200, 400, 600 m
OLZ2	10/15/09	24.0	Teams 1 & 2	200, 400, 600 m
OLZ4	10/15/09	27.0	Teams 1 & 2	200, 400, 600 m
OLZ5	10/16/09	24.75	Team 2	200, 400, 600 m
OLZ6	10/16/09	25.5	Team 1	200, 400, 600 m
OLZ17	10/20/09	18.75	Team 2	200, 400, 600 m
R200LZ1	10/20/09	12.5	Teams 1 & 2	200, 400, 600 m
R400LZ1	10/20/09	9.0	Team 1	200, 400, 600 m
R410LZ1	10/20/09	12.0	Team 1	200, 400, 600 m
CLZ13	10/21/09	10.5	Team 1	200, 400, 600 m
CLZ14	10/21/09	7.5	Team 1	200, 400, 600 m
MAWTSLZ1	10/21/09	0 (lakebed)	Team 1	No survey
OLZ1	10/21/09	21.75	Team 2	200, 400, 600 m
CLZ17	10/22/09	6.0	Team 1	200, 400, 600 m
CP30LZ1	10/22/09	9.0	Team 1	200, 400, 600 m
OLZ3	10/22 & 28/09	27.0	Teams 1 & 2	200, 400, 600 m
OLZ13	10/23/09	27.0	Team 2	200, 400, 600 m
OLZ12	10/23/09	16.5	Team 1	200, 400, 600 m
CLZ12	10/27/09	12.75	Team 2	200, 400, 600 m
MAWTSLZ3	10/27/09	18.0	Team 1	200, 400, 600 m
OLZ11	10/27/09	17.25	Team 2	200, 400, 600 m
R220LZ1	10/27/09	10.5	Team 1	200, 400, 600 m

TABLE 2 (CONT.).

Site	Date	Effort	Team	ZOI Intervals
CLZ15	10/28/09	3.75	Team 1	200, 400, 600 m
CLZ16	10/28/09	4.5	Team 1	200, 400, 600 m
CLZ18	10/28/09	6.75	Team 1	3 @ 80 m
R620LZ2	10/28/09	7.5	Team 2	6 @ 40 m
ALZ7	10/29/09	17.25	Team 2	6 @ 40 m
ALZ9	10/29/09	15.75	Team 1	3 @ 80 m
R620LZ1	10/29/09	9.0	Team 2	3 @ 80 m
ALZ8	10/29 & 30/09	18.75	Team 1	6 @ 40 m
CP30LZ2	10/30/09	8.25	Team 2	3 @ 80 m
MAWTSLZ2	10/30/09	15.0	Team 1	3 @ 80 m
OLZ7	10/31/09	27.75	Team 2	3 @ 80 m
OLZ8	10/31/09	21.75	Team 1	6 @ 40 m
CP49LZ1	10/31 & 11/1/09	6.75	Team 1	3 @ 80 m
ALZ5	11/1/09	15.0	Team 1	3 @ 80 m
CLZ2	11/1/09	3.75	Team 1	3 @ 80 m
OLZ9	11/1/09	24.0	Team 2	6 @ 40 m
ALZ6	11/2/09	19.5	Team 2	3 @ 80 m
CLZ3	11/2/09	6.0	Team 1	3 @ 80 m
CLZ4	11/2/09	6.75	Team 1	3 @ 80 m
CLZ5	11/2/09	8.25	Team 2	3 @ 80 m
CLZ6	11/2/09	4.5	Team 1	3 @ 80 m
CLZ11	11/2/09	6.0	Team 1	6 @ 40 m
OLZ14	11/3/09	16.5	Team 1	6 @ 40 m
OLZ15	11/3/09	26.25	Team 2	6 @ 40 m
OLZ18	11/4/09	16.5	Team 2	3 @ 80 m
OLZ19	11/4/09	20.25	Team 1	6 @ 40 m
R205LZ1	11/4/09	6.0	Team 1	3 @ 80 m
R205LZ2	11/4/09	6.0	Team 2	3 @ 80 m
OLZ16	11/5/09	26.25	Team 2	6 @ 40 m
R230LZ1	11/5/09	11.25	Team 1	6 @ 40 m
R230LZ2	11/5/09	9.75	Team 1	6 @ 40 m
CP40LZ1	11/10/09	10.5	Team 2	3 @ 80 m
FARP1EAST	11/12/09	6.0	Team 1	3 @ 80 m
FARP2WEST	11/10 & 13/09	21.0	Teams 1 & 2	3 @ 80 m
MAWTSLZ5	11/11/09	22.5	Teams 1 & 2	3 @ 80 m
OLZ10	11/11/09	15.0	Team 1	3 @ 80 m
OLZ20	11/12/09	17.25	Team 2	3 @ 80 m
R401LZ1	11/12/09	4.5	Team 1	3 @ 80 m
R230LZ4	11/13/09	11.25	Team 2	6 @ 40 m
R230LZ3	11/13/09	11.25	Team 1	6 @ 40 m
R220LZ1 ALT	11/13/09	3.25	NREA Team	33, 67, 100 m
OLZ10 ALT	11/13/09	2.5	NREA Team	None
MAWTSLZ4 ALT	12/14,15,17/09	54.75	Team 1	3 @ 80 m
OLZ19 ALT	12/16/09	21.0	Team 1	3 @ 80 m
OLZ9 ALT	12/16 & 29/09	37.5	NREA Team	None
OLZ8 ALT	12/17/09	14.25	Team 1	3 @ 80 m
R230LZ1 ALT	12/29/09	6.25	NREA Team	50 & 100 m
R230LZ2 ALT	12/30/09	7.5	NREA Team	50 & 100 m
81 Sites	**10/9 thru 12/30**	**1,261 Hours**	**3 Teams**	**N/A**

Notes: Effort was recorded in person-hours per site, including ZOI transects.
Survey teams (Team) were CMBC teams (1, 2 or 1 & 2) or NREA teams (NREA).

Hand-held Kestrel units were used to record weather conditions at the beginning and end of each site survey, including temperatures measured in degrees Celsius approximately 5 centimeters (2.5 inches) above the ground; miles per hour and direction of average and maximum wind speeds; and percent cloud cover. All weather data are included in the compendium.

Various Magellan and Garmin hand-held, global positioning system (GPS) units were used to survey straight transects and record Universal Transverse Mercador (UTM) coordinates (WGS84) for site boundaries, locations of desert tortoise sign, and other pertinent information, which are included in the associated compendium. A digital camera was used to take representative photographs of each site and pertinent desert tortoise sign (i.e., tortoises, carcasses, and burrows) with locations and directions of exhibits shown in the associated figures included in the compendium. Appendix C provides more detailed information on how data were collected.

3.0. Results and Discussion

3.1. Biological Resources. The occurrences of common plant and animal species identified during the surveys are influenced by multiple factors such as elevation, topography, soil substrates, and historic and ongoing impacts associated with vehicle maneuvers. Based on DeLorme Topo USA® 7.0 software, elevations on the 81 sites ranged from approximately 1,140 meters on OLZ10 at the top of Noble Mesa down to 188 meters on PZ1 adjacent to the dry lake located west of Amboy Crater lava flows (see individual data sheets in the compendium for site-specific elevations).

3.1.1. *Common Flora*. CMBC identified 62 species of perennial shrubs and grasses on 76 sites (Appendix A). NREA reported most of the same species that CMBC detected, but they also noted a few other annual species (see Compendium). The two primary plant communities distributed throughout the sites were creosote bush scrub on most sites and saltbush scrub in lower elevational areas to the east and on sites associated with dry lake playas. Typical dominant species in creosote bush scrub included creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), cheesebush (*Hymenoclea salsola*), senna (*Senna armata*), and white rhatany (*Krameria grayi*). Dominant species in saltbush scrub typically included one or more of the following plants in the chenopod family: four-winged saltbush (*Atriplex canescens*), desert holly (*Atriplex hymenelytra*), allscale (*Atriplex polycarpa*), and Torrey's sea-blight (*Suaeda moquinii*).

Where washes were a primary component of the habitat, dominant species also included one or more of the following plants: rayless encelia (*Encelia fructescens*), wash rabbitbrush (*Chrysothamnus paniculatus*), desert willow (*Chilopsis linearis* ssp. *arcuata*), bladderpod (*Isomeris arborea*), milkweed (*Asclepias subulata*), catclaw acacia (*Acacia greggii*), honey mesquite (*Prosopis glandulosa var. torreyana*), smoke tree (*Psorothamnus spinosus*), desert lavender (*Hyptis emoryi)*, paper-bag bush (*Salazaria mexicana*), brickellbush (*Brickellia incana*), sweetbush (*Bebbia juncea*), and sandpaper plant (*Petalonyx thurberi*).

Certain plants showed affinities for certain substrates or levels of disturbance. For example, dicoria (*Dicoria canescens*), odora (*Porophyllum gracile*), croton (*Croton californicus*), big galleta (*Pleuraphis rigida*), devil's lantern (*Oenothera deltoides*), and Indian ricegrass (*Achnatherum hymenoides*) were typically associated with sandier substrates. Desert brickellbush (*Brickellia desertorum*), matchweed (*Gutierrezia sarothrae*), Parish's golden-eye (*Viguiera deltoidea* var. *parishii*), desert aster (*Xylorhiza tortifolia*), blackbush (*Coleogyne ramosissima*), desert tobacco (*Nicotiana obtusifolia*), and thick-leaf ground-cherry (*Physalis crassifolia*) were typically associated with rockier substrates. Plants associated with more degraded habitats included desert mallow (*Sphaeralcea ambigua*), honeysweet (*Tidestromia oblongifolia*), rubber rabbitbrush (*Chrysothamnus nauseosus*), velvet rosettes (*Psathyrotes ramosissima*), and Russian thistle (*Salsola tragus*).

Seven cactus species were identified including Alverson's foxtail cactus (*Coryphantha alversonii*), cottontop cactus (*Echinocactus polycephalus*), hedgehog cactus (*Echinocereus engelmannii*), Yaqui mammillaria (*Mammillaria tetrancistra*), beavertail cactus (*Opuntia basilaris*), silver cholla (*Opuntia echinocarpa*), and pencil cholla (*Opuntia ramosissima*). Mojave yuccas (*Yucca schidigera*) were common in some places and Joshua trees (*Yucca brevifolia*) were common in relatively higher elevations. Other species not prevalent enough to be considered dominants included desert tea (*Ephedra californica*), Nevada joint-fir (*Ephedra nevadensis*), desert goldenhead (*Acamptopappus sphaerocephalus*), Acton encelia (*Encelia actoni*), Mohave horsebrush (*Tetradymia stenolepis*), bush peppergrass (*Lepidium fremontii*), ditaxis (*Ditaxis neomexicana*), indigo bush (*Psorothamnus arborescens*), Pima rhatany (*Krameria erecta*), turpentine-broom (*Thamnosma montana*), and Anderson's box-thorn (*Lycium andersonii*).

3.1.2. *Common Fauna*. The 12 reptile, 38 bird, and 12 mammal species identified during CMBC's surveys are listed in Appendix B. Common lizard species observed or otherwise detected by diagnostic scat included desert iguana (*Dipsosaurus dorsalis*), common chuckwalla (*Sauromalus obesus*), zebra-tailed lizard (*Callisaurus draconoides*), side-blotched lizard (*Uta stansburiana*), desert horned lizard (*Phrynosoma platyrhinos*), and western whiptail (*Cnemidophorus tigris*). Although the surveys were relatively late in the year, a few snakes were observed, including western patch-nosed snake (*Salvadora hexalepis*), long-nosed snake (*Rhinocheilus lecontei*), speckled rattlesnake (*Crotalus mitchellii*), and sidewinder (*Crotalus cerastes*).

Most of the 38 bird species identified were common year-round residents that nest on the base, including chukar (*Alectoris chukar*), Gambel's quail (*Callipepla gambelii*), mourning dove (*Zenaida macroura*), greater roadrunner (*Geococcyx californianus*), northern flicker (*Colaptes auratus*), Say's phoebe (*Sayornis saya*), horned lark (*Eremophila alpestris*), common raven (*Corvus corax*), verdin (*Auriparus flavipes*), cactus wren (*Campylorhynchus brunneicapillus*), rock wren (*Salpinctes obsoletus*), phainopepla (*Phainopepla nitens*), black-throated sparrow (*Amphispiza bilineata*), sage sparrow (*Amphispiza belli*), western meadowlark (*Sturnella neglecta*), yellow-headed blackbird (*Xanthocephalus xanthocephalus*), and house finch (*Carpodacus mexicanus*). Common resident raptors included red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), common barn owl (*Tyto alba*), and great horned owl (*Bubo virginianus*).

Those bird species that were seasonal visitors included lesser nighthawk (*Chordeiles acutipennis*), ash-throated flycatcher (*Myiarchus cinerascens*), barn swallow (*Hirundo rustica*), ruby-crowned kinglet (*Regulus calendula*), blue-gray gnatcatcher (*Polioptila caerula*), yellow-rumped warbler (*Dendroica coronata*), and white-crowned sparrow (*Zonotrichia leucophrys*).

Of the 12 mammal species identified, small burrowing mammals included round-tailed ground squirrel (*Spermophilus tereticaudis*), antelope ground squirrel (*Ammospermophilus leucurus*), Botta pocket gopher (*Thomomys bottae*), kangaroo rat (*Dipodomys* sp.), and desert wood rat (*Neotoma lepida*). Medium-sized mammals included black-tailed hare (*Lepus californicus*) and Audubon cottontail (*Sylvilagus audubonii*). Predators included coyote (*Canis latrans*), kit fox (*Vulpes macrotis*), American badger (*Taxidea taxus*), and bobcat (*Lynx rufus*).

3.1.3. *Special-Status Species*. U.S. Fish and Wildlife Service (2002), California Department of Fish and Game (2009), and California Native Plant Society (2009) maintain lists of plants and/or animals considered rare, threatened, or endangered, which are herein collectively referred to as "special-status species." The bird species listed below are considered Birds of Conservation Concern by the USFWS (2002) and/or Bird Species of Special Concern by the CDFG (2009). Special-status plant and animal species observed during the surveys included one plant, one lizard, eight bird, and one mammal species, as follow:

Plants
Alverson's foxtail cactus (*Coryphantha alversonii*)

Reptiles
Mohave fringe-toed lizard (*Uma scoparia*)

Birds
Cooper's hawk (*Accipiter cooperii*)
Golden eagle (*Aquila chrysaetos*)
Prairie falcon (*Falco mexicanus*)
Burrowing owl (*Athene cunicularia*)
Northern harrier (*Circus cyaneus*)
Short-eared owl (*Asio flammeus*)
LeConte's thrasher (*Toxostoma lecontei*)
Loggerhead shrike (*Lanius ludovicianus*)

Mammals
Desert bighorn sheep (*Ovis canadensis*)

Specific data for these species' occurrences on sites where they were observed or detected are included in the data sheets in the compendium that accompanies this report. Most locality information is general, except for fringe-toed lizards, burrowing owls, and desert bighorn sheep where specific UTM coordinates are given for each occurrence.

3.2. Desert Tortoise. Table 3 summarizes desert tortoise survey results for all 81 sites. The first column in Table 3 lists the 25 sites where no tortoise sign was found either on-site or in adjacent areas. Given that all 81 sites were surveyed by the same methodology, along transects spaced at 10-meter intervals, these are the subset of sites where no tortoise sign was found either on-site or in adjacent areas. Since 1992, when the original survey protocol was published (USFWS 1992), USFWS has interpreted the absence of tortoise sign to signify the absence of tortoises. As such, these are the 25 sites where the likelihood of tortoise occurrence, either as newly established residents or incidental migrants through the sites, is low or nonexistent.

Figure 2 provides a graphical summary of the desert tortoise survey results by AMZ location within MAGTFTC, MCAGCC.

Table 4 lists the 27 sites where tortoise sign was found only in adjacent areas and provides descriptions of the types of sign found. Abbreviations associated with scat include *TYA* for "This Year Adult" and *NTYA* for "Not This Year Adult" (see Appendix C for more information). Following the site number in the first column are eight columns corresponding to zone of influence transects spaced at 40, 80, 120, 160, 200, 240, 400, and 600-meter intervals surveyed by CMBC.

Table 5 lists the 29 sites where tortoise sign was found on-site and provides descriptions of the types of sign found. Similar to Table 4, the last eight columns include the tortoise sign found adjacent to each site on zone of influence transects at the intervals given. For scat abbreviations, in addition to TYA and NTYA, there is also *TYSA* which signifies "This Year Subadult Scat" (see Appendix C for more information). With the exception of MAWTSLZ2, where only carcasses were found, sign of living tortoises was found in adjacent areas of every site where sign was found on-site.

There seems to be no particular regional pattern of occurrence for tortoises among the 81 sites (Figure 2). Excepting CP30LZ2, all other sites on the northwestern part of the base either had tortoise sign on them or in adjacent areas. Similarly, tortoise sign was detected on or adjacent to all 16 sites on the southern and central portions of the base. There seems to be a clear association between maneuvers and the absence of tortoise sign: tortoise sign was not found on those sites where impacts associated with ground maneuvers were most severe.

TABLE 3. SUMMARY OF 81 SITES WHERE TORTOISE SIGN WAS AND WAS NOT FOUND		
No Tortoise Sign (n=25)	**Sign in Adjacent Areas Only (n=27)**	**Tortoise Sign On the Site (n=29)**
ALZ3	ALZ1	ALZ4
ALZ6	ALZ2	ALZ7
CLZ2	ALZ5	ALZ8
CLZ3	ALZ9	CLZ11
CLZ7	CLZ1	CLZ18
CLZ8	CLZ4	FARP2WEST
CLZ9	CLZ5	MAWTSLZ2
CLZ10	CLZ6	MAWTSLZ4
CLZ14	CLZ12	OLZ3
CLZ15	CLZ13	OLZ4
CLZ16	CLZ17	OLZ6
CP30LZ2	CP30LZ1	OLZ7
CP49LZ1	CP40LZ1	OLZ8
FARP1EAST	MAWTSLZ3	OLZ9
MAWTSLZ1	OLZ2	OLZ11
MAWTSLZ5	OLZ5	OLZ12
OLZ1	OLZ17	OLZ14
OLZ10	OLZ18	OLZ15
OLZ13	R205LZ1	OLZ16
OLZ20	R205LZ2	OLZ19
PZ1	R400LZ1	OLZ21
R620LZ1	R401LZ1	R200LZ1
R220LZ1 ALT	R410LZ1	R220LZ1
OLZ10 ALT	MAWTSLZ4 ALT	R230LZ1
R230LZ1 ALT	OLZ19 ALT	R230LZ2
	OLZ8 ALT	R230LZ3
	R230LZ2 ALT	R230LZ4
		R620LZ2
		OLZ9 ALT

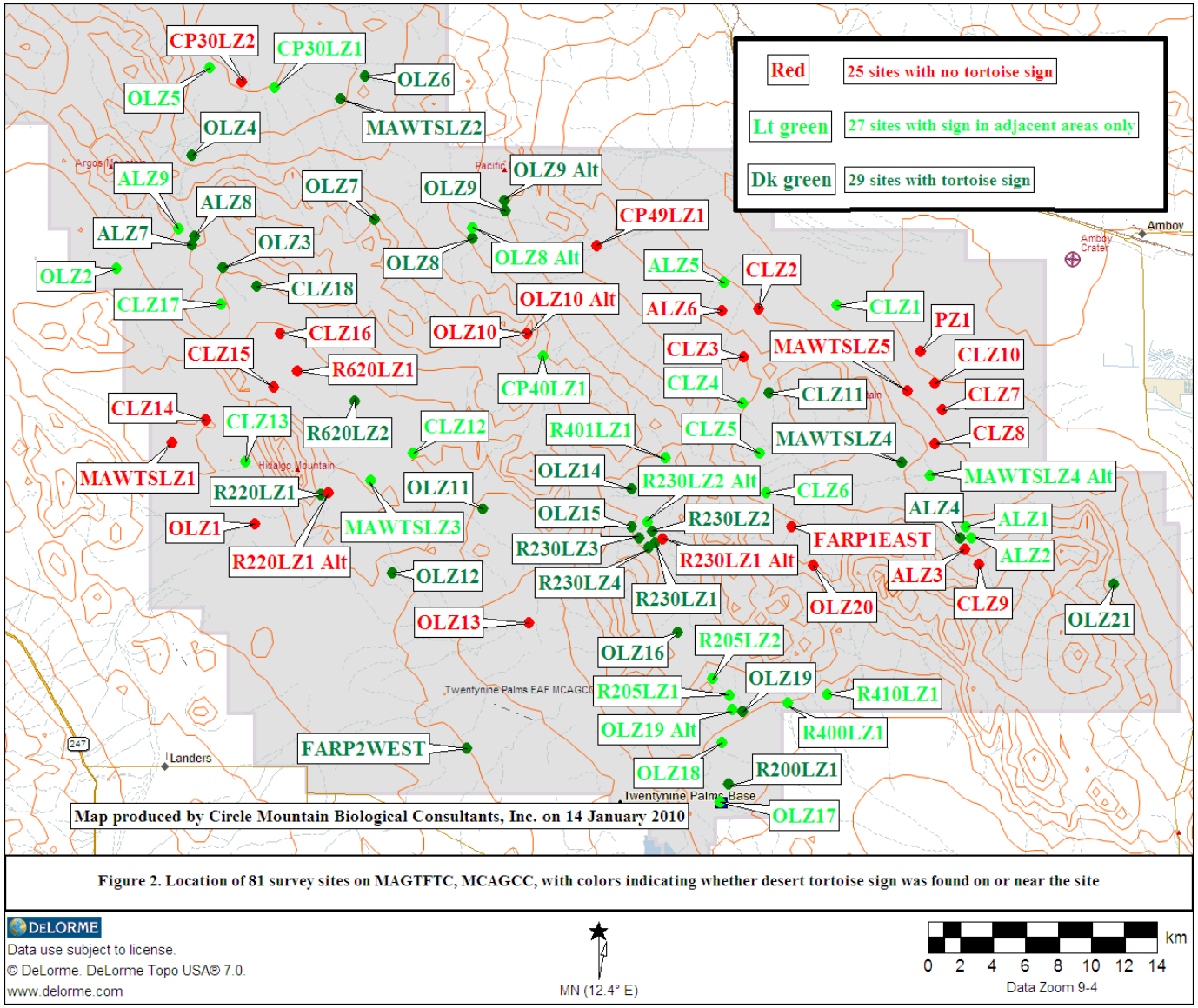


Figure 2. Location of 81 survey sites on MAGTFTC, MCAGCC, with colors indicating whether desert tortoise sign was found on or near the site

TABLE 4. Location of desert tortoise sign near sites where tortoise sign was found adjacent to, but not on, the surveyed sites (n=27).

Site	Values are sign type and direction (e.g., NE) relative to the site. See Appendix C for more information on abbreviations.							
	40m	80m	120m	160m	200m	240m	400m	600m
ALZ1							1 burrow N	
ALZ2								1 TYA E
ALZ5		1 burrow N		1 carcass N				
ALZ9				1 burrow N		1 TYA S 1NTYA W		
CLZ1								1 carcass N
CLZ4				1 burrow NW 1 NTYA SW		1 burrow N		
CLZ5		1 coversite SW				1 TYA W		
CLZ6				1 burrow N				
CLZ12				2 tortoises S, E 2 burrows S, E 1 coversite E 5 TYA W		5 TYA S,W,SW 1 carcass SE		
CLZ13							2 burrows NE 1 carcass NE	
CLZ17					1 TYA E 1 TYA SE		1 burrow SW 1 carcass N	1 burrow S 4 TYA S 1NTYA S
CP30LZ1							1 carcass NW	1 carcass S 1 burrow SW
CP40LZ1		1 NTYA N						
MAWTSLZ3	1 TYA N				1 burrow W 1 coversite W 2 TYA S		3 TYA S	1 tortoise W 1 burrow W 2 TYA N
OLZ2								2 TYA E
OLZ5								1 carcass
OLZ17					1 burrow S		1 tortoise SE 1 burrow SE 2 TYA S, SE 1 NTYA S	1 burrow SE 1 NTYA S 1 carcass S
OLZ18						1 burrow E with tracks		
R205LZ1								1 burrow E
R205LZ2				1 burrow W 1 NTYA SE		2 burrows SE 1 TYA NW 1 NTYA S		
R400LZ1					1 coversite N		2 coversites E	5 coversite W 2 carcasses W
R401LZ1				1 carcass NW		1 TYA NW 1 NTYA NW		
R410LZ1					1 coversite N 3 TYA N 1 NTYA N		2 TYA NW 1 carcass NW	1 coversite N 1 TYA NE 1 TYA SW
MAWTSLZ4 ALT			2 TYA W 1 NTYA NW					
OLZ19 ALT				1 TYA E 1 carcass S		1 carcass SE		
OLZ8 ALT			1 carcass W		1 NTYA W			
R230LZ2 ALT		1 burrow N				1 carcass 300m S		

TABLE 5. Location of desert tortoise sign on and adjacent to sites where tortoise sign was found on the sites (n=29).

Site	Tortoise Sign On-site	Values are sign type and direction (e.g., NE) relative to the site. See Appendix C for more information on abbreviations.							
		40m	80m	120m	160m	200m	240m	400m	600m
ALZ4	Adult dead > 4 yrs							1 TYA W	
ALZ7	1 tortoise 3 burrows 2 active coversites	1 burrow N	1 tortoise N 3 burrows N		1 tortoise S 1 burrow S 1 TYA E	1 burrow S 1 carcass N 1 carcass S	1 burrow S 1 TYA N		
ALZ8	1 burrow 2 fresh, 4 older scat 1 carcass		1 TYA W	1 burrow N	1 carcass N	1 burrow N	2 burrows N 1 coversite N		
CLZ11	1 burrow 1 fresh, 1 older scat		1 NTYA E 1 carcass S			1 carcass NE			
CLZ18	2 carcasses		1 burrow S				1 burrow N 1 carcass SE		
FARP2 WEST	10 burrows 23 fresh, 6 older scat 1 carcass		1 burrow W 1 burrow N 3 TYA NW 1 TYA W 1 carcass NW 1 tracks N		1 burrow N 1 burrow E 1 TYA E 2 TYA N 1 carcass NW		2 TYA E 1 carcass NW		
MAWTSLZ2	1 carcass		1 carcass W						
MAWTSLZ4	1 tortoise 2 burrows 1 active coversite 7 fresh, 3 older scat 2 carcasses 2 sets of tracks	1 TYA N 1 carcass N	3 coversites N 1 carcass E	1 TYA N		1 TYA N 2 TYA E	1 TYA N 1 NTYA E		

TABLE 5 (cont.).

Site	Tortoise Sign On-site	Values are sign type and direction (e.g., NE) relative to the site. See Appendix C for more information on abbreviations.							
		40m	80m	120m	160m	200m	240m	400m	600m
OLZ3	2 burrows 1 fresh scat 1 carcass Egg shell fragments					1 tortoise N 1 carcass W 1 burrow S 1 TYA S			1 burrow N 1 burrow NE 1 TYA E 1 carcass N
OLZ4	1 burrow 2 older scat 3 carcasses							1 burrow S 1 NTYA S	1 burrow S 1 burrow E
OLZ6	1 tortoise 8 burrows 11 fresh scat, 9 older scat 6 carcasses Egg shell fragments	2 TYA NE 1 TYSA NE				2 burrows W 1 TYA SW		1 tortoise N 3 burrows NE 1 TYA N 1 TYA SW 1 TYA S 2 carcasses S	5 NTYA N
OLZ7	1 carcass	1 NTYA E	1 tortoise W 1 tortoise N 1 burrow W 1 coversite N 1 carcass E		1 tortoise E 1 coversite E 2 burrows E 1 NTYA SW 1 TYA E				
OLZ8	3 burrows 3 active coversites 5 older scat 3 carcasses		2 TYA SE 1 carcass SW	2 NTYA S 1 carcass W	1 burrow S 2 coversites S 1 TYA S 1 NTYA SW	1 coversite S 1 carcass SW	1 burrow S		
OLZ9	2 burrows 1 active coversite 2 fresh, 1 older scat 1 carcass				1 TYA W 1 NTYA W				
OLZ11	1 tortoise 1 fresh scat 2 carcasses								1 burrow NW 1 TYA W 2 TYA SW 2 carcasses W
OLZ12	4 fresh scat 2 carcasses					2 burrows SE 1 burrow SW 1 TYA S 1 NTYA S		2 TYA E 1 TYA SW 1 carcass NW	1 burrow SE 1 TYA SE 1 carcass NW

TABLE 5 (cont.).

Site	Tortoise Sign On-site	Values are sign type and direction (e.g., NE) relative to the site. See Appendix C for more information on abbreviations.							
		40m	80m	120m	160m	200m	240m	400m	600m
OLZ14	1 tortoise 1 burrow 13 fresh, 3 older scat 1 carcass	1 TYA W 1 carcass N	1 TYA N 1 carcass S				1 TYA N		
OLZ15	3 older scat 1 carcass			1 NTYA W 1 carcass E 1 carcass W 1 carcass SW			1 carcass S		
OLZ16	1 burrow 1 fresh, 1 older scat						1 TYA SW 1 NTYA W 1 set tracks		
OLZ19	4 burrows 13 fresh, 9 older scat 7 carcasses	1 burrow W 1 carcass W	1 TYA W	1 NTYA NE 1 TYA N 1 NTYA S	1 coversite SW 1 TYA E 1 TYA N 1 TYA W 1 TYA S	2 TYA W	1 burrow W 2 TYA E 1 TYA N 1 TYA W 2 TYA S		
OLZ21	2 coversites 2 fresh scat							1 burrow S 6 TYA S	1 tortoise SE 1 burrow SE 1 coversite SE 1 TYA W 1 carcass N
R200LZ1	1 burrow								3 burrows E 1 TYA NE 1 TYA E
R220LZ1	3 burrows 15 fresh scat					1 burrow S 2 TYA W 1 TYSA W		1 burrow E 1 burrow N 1 TYA E 1 NTYA E 1 NTYA SE 1 TYA S 2 NTYA SW 3 TYA SW 1 TYA N 1 carcass E	1 burrow N 1 TYA E 5 TYA S 1 carcass NE

TABLE 5 (CONT.).

Site	Tortoise Sign On-site	Values are sign type and direction (e.g., NE) relative to the site. See Appendix C for more information on abbreviations.							
		40m	80m	120m	160m	200m	240m	400m	600m
R230LZ1	3 fresh, 2 older scat 1 carcass	1 burrow SE	1 burrow S	1 carcass W	1 TYSA S		2 coversite S 1 TYA NW 1 NTYA NW 2 carcass S		
R230LZ2	2 fresh scat	1 TYA S	2 coversites S 1 NTYA S			1 coversite E			
R230LZ3	2 coversites 1 fresh, 7 older scat 1 carcass		1 NTYA SE	2 TYA E	1 NTYA NW	1 coversite S 1 coversite E 1 NTYA E	1 burrow N 1 TYA SE 1 NTYA NW 1 NTYA W		
R230LZ4	2 coversites 3 fresh scat	1 coversite S	3 NTYA N	1 coversite W 2 TYA N 1 NTYA W	1 TYA W 1 NTYSA W 1 carcass SW	1 TYA N 4 NTYA W 1 TYA SE	2 coversite S 1 coversite N 1 NTYA SE 1 TYA NE 1 carcass S		
R620LZ2	1 burrow 1 fresh scat	1 tortoise E 1 burrow E			1 NTYA W				
OLZ9 ALT	4 burrows 3 carcasses		1 burrow 75m W	1 burrow 117m W					

4.0. Conclusions

This report documents the presence or absence of tortoise sign on the 73 sites initially selected as potential AMZs and 8 alternate sites. The MAGTFTC, MCAGCC prefers to avoid or minimize impacts to desert tortoises and their habitat. This could be achieved, with the survey results, by choosing potential sites without sign and no sign adjacent to the sites. The further the sites are removed from tortoise sign, the lower the likelihood that tortoises might find or use resources near these sites.

5.0. Literature Cited

Beauchamp, R. 1986. *A Flora of San Diego County, California.* Sweetwater River Press. National City, CA.

Berry, K. and A.P. Woodman. 1984. Keys and figures for estimating time since death for shell-skeletal remains of desert tortoises. Taken from three papers authored by Berry and Woodman in 1984.

California Department of Fish and Game. 2009. Special Animals (901 Taxa). Animal species list published and updated by State of California, The Resources Agency, Department of Fish and Game, Biogeographic Data Branch, California Natural Diversity Data Base. Dated March 2009. Sacramento, CA. 56 pp.

California Native Plant Society (CNPS). 2009. Inventory of Rare and Endangered Plants (online edition, v7-09b). California Native Plant Society. Sacramento, CA.

Hickman, J. Editor. 1993. *The Jepson Manual: Higher Plants of California.* University of California Press. Berkeley, CA.

Holland, R. 1986. Preliminary descriptions of the terrestrial natural communities of California. California Department of Fish and Game. Sacramento, CA.

Ingles, L. 1965. *Mammals of the Pacific States: California, Oregon, Washington.* Stanford University Press. Stanford, CA.

Jaeger, E. 1969. *Desert Wild Flowers.* Stanford University Press. Stanford, CA.

Munz, P. 1974. *A Flora of Southern California.* University of California Press. Berkeley, CA.

Sawyer, J. and T. Keeler-Wolf. 1995. *A Manual of California Vegetation.* California Native Plant Society. Sacramento, CA.

Sibley, D. 2000. National Audubon Society, the Sibley Guide to Birds. First Edition. New York, N.Y.

Stebbins, R. 2003. *A Field Guide to Western Reptiles and Amphibians.* Third Edition. The Peterson Field Guide Series. Houghton Mifflin Company. New York, NY.

U.S. Fish and Wildlife Service. 1992. Field survey protocol for any nonfederal action that may occur within the range of the desert tortoise. Ventura, CA.

U.S. Fish and Wildlife Service. 2002. Birds of Conservation Concern. Division of Migratory Bird Management. Arlington, VA.

U.S. Fish and Wildlife Service. 2009. Preparing for any action that may occur within the range of the Mojave desert tortoise (*Gopherus agassizii*). USFWS Desert Tortoise Recovery Office. Reno, NV.

Appendix A. Plant Species Detected

The following plant species were identified on one or more of the 76 sites surveyed by CMBC and described in this report. One plant species designated with a special status by the California Native Plant Society (CNPS) was found and is signified by "(SC)" following the common name. Scientific names of plants identified on a given site are included in the compendium that accompanies this report.

GNETAE	GNETAE
Ephedraceae	**Joint-fir family**
Ephedra californica	Desert tea
Ephedra nevadensis	Nevada joint-fir
ANGIOSPERMAE: DICOTYLEDONES	DICOT FLOWERING PLANTS
Amaranthaceae	**Amaranth family**
Tidestromia oblongifolia	Honeysweet
Asclepiadaceae	**Milkweed family**
Asclepias subulata	Milkweed
Asteraceae	**Sunflower family**
Acamptopappus sphaerocephalus	Desert goldenhead
Ambrosia dumosa	Burrobush
Bebbia juncea	Sweetbush
Brickellia desertorum	Desert brickellbush
Brickellia incana	Brickellbush
Chrysothamnus nauseosus	Rubber rabbitbrush
Chrysothamnus paniculatus	Wash rabbitbrush
Dicoria canescens	Dicoria
Encelia actoni	Acton encelia
Encelia fructescens	Rayless encelia
Gutierrezia sarothrae	Matchweed
Hymenoclea salsola	Cheesebush
Porophyllum gracile	Odora
Psathyrotes ramosissima	Velvet rosettes
Tetradymia stenolepis	Mohave horsebrush
Trixis californica	California trixis
Viguiera deltoidea var. *parishii*	Parish's golden-eye
Xylorhiza (Machaeranthera) tortifolia	Desert aster
Bignoniaceae	**Bigonia family**
Chilopsis linearis ssp. *arcuata*	Desert willow

Brassicaceae	**Mustard family**
Lepidium fremontii	Bush peppergrass
Cactaceae	**Cactus family**
Coryphantha alversonii	Alverson's foxtail cactus (SC)
Echinocactus polycephalus	Cottontop cactus
Echinocereus engelmannii	Hedgehog cactus
Mammillaria tetrancistra	Yaqui mammillaria
Opuntia basilaris	Beavertail cactus
Opuntia echinocarpa	Silver cholla
Opuntia ramosissima	Pencil cholla
Capparaceae	**Caper family**
Isomeris arborea	Bladderpod
Chenopodiaceae	**Goosefoot family**
Atriplex canescens	Four-winged saltbush
Atriplex hymenelytra	Desert holly
Atriplex polycarpa	Allscale
Suaeda moquinii	Torrey's sea-blight
Euphorbiaceae	**Spurge family**
Croton californicus	Croton
Ditaxis neomexicana	Ditaxis
Fabaceae	**Pea family**
Acacia greggii	Catclaw acacia
Prosopis glandulosa	Honey mesquite
Psorothamnus arborescens	Indigo bush
Psorothamnus spinosus	Smoke tree
Senna (Cassia) armata	Senna
Krameriaceae	**Krameria family**
Krameria erecta	Pima rhatany
Krameria grayi	White rhatany
Lamiaceae	**Mint family**
Hyptis emoryi	Desert lavender
Salazaria mexicana	Paper-bag bush
Loasaceae	**Stick-leaf family**
Petalonyx thurberi	Sandpaper plant
Malvaceae	**Mallow family**
Sphaeralcea ambigua	Desert mallow

Onagraceae	**Evening-primrose family**
Oenothera deltoides	Devil's lantern
Polygonaceae	**Buckwheat family**
Eriogonum plumatella	Yucca buckwheat
Rosaceae	**Rose family**
Coleogyne ramosissima	Blackbush
Rubiaceae	**Madder family**
Galium aparine	Common bedstraw
Thamnosma montana	Turpentine-broom
Solanaceae	**Nightshade family**
Lycium andersonii	Anderson's box-thorn
Nicotiana obtusifolia (trigonophylla)	Desert tobacco
Physalis crassifolia	Thick-leaf ground-cherry
Zygophyllaceae	**Caltrop family**
Larrea tridentata	Creosote bush
ANGIOSPERMAE: MONOCOTYLEDONES	MONOCOT FLOWERING PLANTS
Liliaceae	**Lily family**
Yucca brevifolia	Joshua tree
Yucca schidigera	Mojave yucca
Poaceae	**Grass family**
Achnatherum (Oryzopsis) hymenoides	Indian ricegrass
Pleuraphis (Hilaria) rigida	Big galleta

Some species may not have been detected because of the seasonal nature of their occurrence. Common names are taken from Beauchamp (1986), Hickman (1993), Jaeger (1969), and Munz (1974).

Appendix B. Animal Species Detected

The following animal species were identified on or adjacent to one or more of the 76 sites surveyed by CMBC and described in this report. Common names of animals identified on a given site are included in the compendium that accompanies this report. Animal species designated with a special status by either the USFWS and/or CDFG are signified by "(SC)" following the common names.

REPTILIA	REPTILES
Testudinidae	**Land tortoises**
Gopherus agassizii	Desert tortoise (SC)
Iguanidae	**Iguanids**
Dipsosaurus dorsalis	Desert iguana
Sauromalus obesus	Common chuckwalla
Callisaurus draconoides	Zebra-tailed lizard
Uma scoparia	Mohave fringe-toed lizard (SC)
Uta stansburiana	Side-blotched lizard
Phrynosoma platyrhinos	Desert horned lizard
Teiidae	**Whiptails**
Cnemidophorus tigris	Western whiptail
Colubridae	**Colubrids**
Salvadora hexalepis	Western patch-nosed snake
Rhinocheilus lecontei	Long-nosed snake
Viperidae	**Vipers**
Crotalus mitchellii	Speckled rattlesnake
Crotalus cerastes	Sidewinder
AVES	BIRDS
Accipitridae	**Hawks, eagles, harriers**
Circus cyaneus	Northern harrier (SC)
Accipiter cooperii	Cooper's hawk (SC)
Buteo jamaicensis	Red-tailed hawk
Aquila chrysaetos	Golden eagle (SC)
Falconidae	**Falcons**
Falco sparverius	American kestrel
Falco mexicanus	Prairie falcon (SC)
Phasianidae	**Grouse and quail**
Alectoris chukar	Chukar
Callipepla gambelii	Gambel's quail
Columbidae	**Pigeons and doves**
Zenaida macroura	Mourning dove

Cuculidae	**Cuckoos**
Geococcyx californianus	Greater roadrunner
Tytonidae	**Barn Owls**
Tyto alba	Common barn owl
Strigidae	**Typical owls**
Bubo virginianus	Great horned owl
Athene cunicularia	Burrowing owl (SC)
Asio falmmeus	Short-eared owl (SC)
Camprimulgidae	**Nightjars**
Chordeiles acutipennis	Lesser nighthawk
Picidae	**Woodpeckers**
Colaptes auratus	Northern flicker
Tyrannidae	**Tyrant flycatchers**
Sayornis saya	Say's phoebe
Myiarchus cinerascens	Ash-throated flycatcher
Alaudidae	**Larks**
Eremophila alpestris	Horned lark
Hirundinidae	**Swallows**
Hirundo rustica	Barn swallow
Corvidae	**Crows and jays**
Corvus corax	Common raven
Remizidae	**Verdins**
Auriparus flavipes	Verdin
Troglodytidae	**Wrens**
Campylorhynchus brunneicapillus	Cactus wren
Salpinctes obsoletus	Rock wren
Muscicapidae	**Thrushes and allies**
Regulus calendula	Ruby-crowned kinglet
Polioptila caerula	Blue-gray gnatcatcher
Polioptila melanura	Black-tailed gnatcatcher
Mimidae	**Mockingbirds and thrashers**
Toxostoma lecontei	LeConte's thrasher (SC)
Ptilogonatidae	**Silky flycatchers**
Phainopepla nitens	Phainopepla
Laniidae	**Shrikes**
Lanius ludovicianus	Loggerhead shrike (SC)

Emberizidae	**Sparrows, warblers, tanagers**
Dendroica coronata	Yellow-rumped warbler
Amphispiza bilineata	Black-throated sparrow
Amphispiza belli	Sage sparrow
Zonotrichia leucophrys	White-crowned sparrow
Sturnella neglecta	Western meadowlark
Xanthocephalus xanthocephalus	Yellow-headed blackbird
Fringillidae	**Finches**
Carpodacus mexicanus	House finch
Carduelis psaltria	Lesser goldfinch
MAMMALIA	MAMMALS
Leporidae	**Hares and rabbits**
Lepus californicus	Black-tailed hare
Sylvilagus audubonii	Audubon cottontail
Sciuridae	**Squirrels**
Spermophilus tereticaudis	Round-tailed ground squirrel
Ammospermophilus leucurus	Antelope ground squirrel
Geomyidae	**Pocket gophers**
Thomomys bottae	Botta pocket gopher
Heteromyidae	**Pocket mice**
Dipodomys sp.	Kangaroo rat
Cricetidae	**Rats and mice**
Neotoma lepida	Desert wood rat
Canidae	**Foxes, wolves and coyotes**
Canis latrans	Coyote
Vulpes macrotis	Kit fox
Mustelidae	**Weasels and skunks**
Taxidea taxus	American badger
Felidae	**Cats**
Lynx rufus	Bobcat
Bovidae	**Sheep and goats**
Ovis canadensis	Desert bighorn sheep (SC)

Nomenclature follows Stebbins, *A Field Guide to Western Reptiles and Amphibians* (2003), third edition; Sibley, National Audubon Society, the Sibley Guide to Birds (2000), first edition; and Ingles, Mammals of the Pacific States (1965), second edition.

Appendix C. Field Data Sheet Template with Explanations

Circle Mountain Biological Consultants, Inc. has used a standard data sheet for the past 10 years that was modified to accommodate the data required by the USFWS revised survey protocol of April 2009 and to record data particular to this survey effort. The template for this data sheet follows, with explanations for each number (**1** through **18**) given on the subsequent pages. The associated compendium includes 76 data sheets with each of the following 18 cells completed.

AMZ SITE #	DATE	Figure Exhibits	Elevation	FIELD TIME BEGIN END	SURVEYORS
1	2	3	4	5	6

WEATHER CONDITIONS (Start/End)	UTM (WGS84) (Starting corner bold)			
TEMP: WIND: ↑ CLOUD: 7	NE→	NW→	**SE→N**	SW→
TEMP: WIND: ↑ CLOUD:	8			

PLANTS:	9
REPTILES:	10
BIRDS:	11
MAMMALS:	12
SPECIAL-STATUS SPECIES:	13

DESERT TORTOISE SCAT (Red = On-site; Blue = off-site)

SCAT	EAST	NORTH		SCAT	EAST	NORTH
2NTYA	0601929	3810572	14	NTYSA	0601840	3810471
3TYA	0602161	3810439		TYSA	0601682	3810832

TORTOISES (Red = On-site; Blue = off-site)				UTM COORDINATES	
Exhibit #	AGE CLASS/ GENDER	MCL (mm)	COMMENTS 15	EAST	NORTH
2	Adult/Female	260 mm	Observed in wash at 1010, 28°C	0601754	3810542

CARCASSES (Red = On-site; Blue = off-site)				UTM COORDINATES	
Exhibit #	AGE CLASS/ GENDER	TIME OF DEATH	DESCRIPTION 16	EAST	NORTH
4	Adult/Female?	> 4 years	Front ½ plastron	0601314	3810360

BURROWS (Red = On-site; Blue = off-site)					UTM COORDINATES	
Exhibit #	WIDTH	DEPTH	CLASS	COMMENTS 17	EAST	NORTH
3	260 mm	1.0 m	Class 3	Dirt burrow with TYA	0601805	3810061
11	240 mm	0.5 m+	NA	Active coversite w/ TYA	0601889	3810539

Site Impact Summary: 18

1. AMZ SITE#: The alphanumeric names are given to identify each of the 81 sites (i.e., 73 original sites and 8 alternate sites) which alphabetically range from ALZ1 to R230LZ2 Alternate Site.

2. Date: The date(s) on which a given site was surveyed.

3. Figure & Exhibits: Tortoise sign, if any, found on a given site is mapped in figure(s) referenced in this cell. Each figure includes summary statements for the tortoise sign found on-site and in adjacent areas. In addition to tortoise sign, each figure shows locations of transects surveyed, a summary statement for observable human impacts (see point 18, below), and locations of exhibits. The completed data sheets, figures, and exhibits (overview of the site, tortoises, and tortoise burrows) are included in the compendium.

4. Elevation: An elevation near the center of each site is given in meters as determined by using Topo USA 7.0 software, which does not account for upper and lower elevation differences throughout a given site, particularly those in rugged terrain.

5. Field Time: Includes the beginning and ending times for each survey, which includes foot travel access to a given site but not the drive time.

6. Surveyors: The last names for the surveyors are given, which correspond to Ed LaRue, Ellen Schafhauser, Patricia Seamount, Michael Gallagher, Michael Radakovich, and Shawn Gonzales. The last names of the NREA surveyors are given for the last five alternate sites surveyed. Non-NREA surveys were performed by two three-person teams, led by LaRue with Radakovich and Gonzales (Team 1) and led by Schafhauser with Seamount and Gallagher (Team 2). LaRue recorded all data for sites surveyed by Team 1 and Schafhauser recorded all data for sites surveyed by Team 2. Henen was responsible for all data collected by the NREA teams. Although all surveyors independently recorded data during zone of influence transects, LaRue, Schafhauser, and Henen later incorporated these data into master data sheets and recorded all data when all surveyors were on a given site.

7. Weather Conditions: First, all weather data were collected at the beginning and ending of each site survey. *Temperature*, recorded in degrees Celsius, was taken at five centimeters above the ground, in newly created shade, using Kestrel hand-held meters. *Wind* included average up to (↑) maximum wind speeds in miles per hour with the direction recorded. *Cloud* is the percent of cloud cover occurring at the beginning and ending of each survey.

8. UTM Coordinates: As required by MAGTFTC, MCAGCC all UTM coordinates were recorded in the WGS84 map datum using various brands of hand-held GPS units. Although 67 of the 73 original AMZ sites are circular, square sites were surveyed and the corresponding corner UTM coordinates are recorded in the eight cells in the data sheet, with easting coordinates in the top row and northing coordinates in the bottom row. At least two of the five NREA sites were neither square nor circular; associated UTMs are given and shapes are mapped in corresponding figures. In the template example, "**SE→N**" is given in bold font, indicating that the biologists started the survey at the southeast corner and proceeded north, then continued surveying the site along transects oriented along a north-south axis.

9. Plants: CMBC recorded perennial shrubs and grasses for each site, with the exceptions described in the text in the methodology section; no annual plants were recorded. NREA recorded both perennial and annual plants on the five sites they surveyed. Importantly, only the perennials found *on-site* were recorded; species observed in adjacent areas only were not recorded. Note that some scientific names are given in **bold font**, which is indicative of the dominant perennial plants (in terms of abundance and ground cover) found on-site. The common names associated with the scientific names given in the data sheets are included in Appendix A. CMBC did not include NREA plants in Appendix A.

10, 11, 12. Animals: Unlike plants, where only those species observed on-site were recorded, given their significantly higher mobility, all animals observed both on-site and off-site were recorded by CMBC. For mammals, biologists also recorded the number of wood rat middens inspected for tortoise scat and carcass fragments, which are often cached in the middens.

13. Special-Status Species: U.S. Fish and Wildlife Service (2002) and California Department of Fish and Game (2009a, 2009b) maintain lists of animals considered rare, threatened, or endangered, which herein are collectively referred to as "special-status species." The bird species, for example, are designated as Birds of Conservation Concern by the USFWS (2002) and/or Bird Species of Special Concern by the CDFG (2009a). Although tortoise sign was the primary focus of all surveys, whenever these other designated species were observed, biologists recorded various data for each occurrence. For most species, such as loggerhead shrike, LeConte's thrasher, and golden eagle only the number of individuals were recorded. For other species, in particular western burrowing owl, Nelson's big horn sheep, and Mohave fringe-toed lizard, UTM coordinates were given for the sign types that are described. NREA also recorded some UTM coordinates for Alverson's foxtail cactus, which CMBC considered too numerous to record. Whereas only common names are given for each site in the data sheets, both scientific *and* common names for all special-status species are listed in Appendix B.

14. Desert Tortoise Scat: Importantly, note that all of the tortoise sign is reported in red font for tortoise sign found on-site and in blue font for sign found off-site. UTM coordinates are given for each accumulation of tortoise scat. Three characteristics are recorded for each scat: (a) the number of scat recorded at a given UTM coordinate; where no number is given, only a single scat was observed; (b) the time since deposition, which is *this year* (TY) versus *not this year* (NTY); and (c) the age class of the animal depositing the scat, which is *adult* (A) versus *subadult* (SA); age class is determined by the diameter of the scat (never length), where those scat smaller than 11 mm in diameter were deposited by subadults and those larger than 11 mm were deposited by adults. The following examples indicate abbreviations and color coding used in all data sheets:

TYA = One this year adult scat found on-site
NTYA = One not this year adult scat found off-site
3 TYA = Three this year adult scat found on-site at the UTM coordinates given
TYSA = One this year subadult scat found off-site

15. Tortoises: CMBC was asked by NREA to photograph all tortoises, carcasses, and burrows, so the *exhibit numbers* given in the first column are cross-referenced with applicable figures and photographic exhibits, which are included in the compendium. *Age Class* indicates adult tortoises > 180 millimeters mid-carapace length (MCL) versus subadult tortoises < 180 millimeters MCL. Mid-carapace length is the linear distance along the dorsal (topside) of the tortoise from the front to rear. *Gender* can be determined only for tortoises > 180 MCL and only for tortoises clearly viewed; the genders of most tortoises in burrows cannot be determined. Where *MCL* could be determined, the data were recorded in the third column. *Comments* generally refer to the location of the tortoise when first encountered, including aboveground and (mostly) in burrows. For most tortoises, biologists also recorded the time the tortoise was encountered and temperature measured five centimeters aboveground. *UTM Coordinates* were recorded for all tortoises using map datum WGS84.

16. Carcasses: As with tortoises, the first column indicates the *exhibit number* included in the figures and photographs included in the compendium. *Age Class* and *Gender*, where determinable, are given in the second column. *Time Since Death* is based on the dichotomous key developed by Berry and Woodman (1984). Although their key differentiates carcass time since death into four age groups (i.e., dead < 1 year, dead 1 to 2 years, dead 3 to 4 years, and dead > 4 years), for 20 years CMBC personnel have opted to place time since death into three categories: dead < 1 year, 1 to 4 years, and > 4 years. This approach eliminates the major difficulty of subjectively determining time since death for the two intermediate categories, which are combined in CMBC's data.

Description typically includes the number of carcass pieces, some indication of the parts (i.e., carapace versus plastron), and where possible states the cause of death. In particular, biologists were asked to differentiate between *fractured* carcasses that show some evidence of trauma (i.e. usually straight-line breaks) as when living tortoises or carcasses are crushed by a vehicle versus those that are *uncrushed*, that fell apart through normal disarticulation. *UTM Coordinates* were recorded for all carcasses using map datum WGS84.

17. Burrows: As with tortoises and carcasses, CMBC took photographs of most burrows, with the *Exhibit #* referenced in the first column. *Width* is the estimated measure in millimeters of the burrow opening, which typically reflects the length of the largest tortoise using that burrow. As such, a burrow with a 230-millimeter wide opening is likely being used by a tortoise with a 230 millimeter± MCL, although smaller tortoises may also use larger burrows. *Depth* is the estimated measure in meters of the burrow length, from the opening of the burrow to the visible end. Two conventions are used: (a) if the end of the burrow could be seen, a finite measurement such as "1.0 m" is given; (b) if the end could not be seen, the visible distance into the burrow is recorded and given as "1.0 m+," where, in this example, the plus sign indicates the burrow extends beyond the visible distance of one meter.

With regards to burrow *Class* (e.g., condition), although some biologists use a burrow classification system with seven classes, CMBC does not use the three classes applied to suspect burrows that may not be created by tortoises; only burrows definitely attributable to tortoises were recorded. Four classes were used as follows: Class 1 = Excellent burrow with evidence of recent use; may be occupied where the end of the burrow could not be seen; Class 2 = Good burrow that may have been recently used; Class 3 = Fair burrow with some structural damage but may be used with minimal excavation; and Class 4 = Poor burrow with no evidence of recent use, with structural damage suggesting it may be abandoned, but still definitely created by a tortoise.

For this project, CMBC also differentiates between *dirt burrows*, which are created by tortoise excavation in loose, friable soil versus *coversites*, which are existing crawl spaces, usually associated with caliche caves, which are used by tortoises with minimal excavation. Classes are only assigned to dirt burrows – not coversites – as the classification system suggests the quality of the burrow and its likelihood of being occupied. Biologists inspected hundreds, if not thousands, of potential coversites many of which could readily be used by tortoises. Importantly, only coversites with secondary evidence – usually scat – that tortoises had recently used them were recorded. Thus, a definitive dirt burrow with no secondary tortoise sign would be recorded and classified but only coversites with recent evidence of tortoise use were recorded. *UTM Coordinates* were recorded for all dirt burrows and active coversites using map datum WGS84.

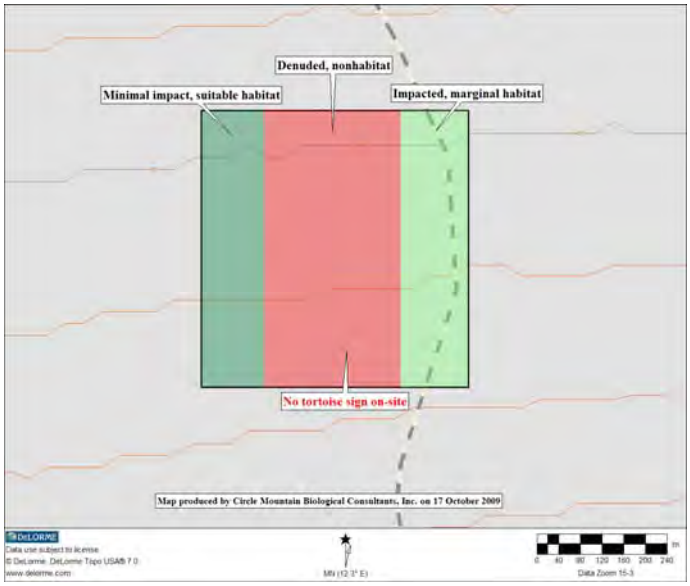
18. Site Impact Summary: Importantly, each site was characterized according to the observable ground disturbances associated with ground-based maneuvers. A particular site may have been heavily affected by air-to-ground munitions that did not substantially affect the vegetation on that site, in which case it may be characterized as "pristine." These characterizations ranged from pristine habitats with little-to-no ground impacts to sites that were entirely denuded by mechanized removal or impacts to vegetation. In addition to an impact summary statement at the bottom of each data sheet, each figure in the compendium depicts one or more of the following color schemes:

= Non-habitat: These red areas identify sites or parts thereof where all vegetation has been removed by continuous, sustained mechanized maneuvers, occurring particularly in the Lead Mountain Training Area. Still other places, such as portions of ALZ1, ALZ2, ALZ3, and ALZ4 in the Bullion Training Area are occupied by military operations in urban terrain where construction of that infrastructure has eliminated all suitable habitats. Finally, there are sites including MAWTSLZ1 on Emerson Dry Lake and nearby CLZ14 on an unnamed dry lake that are considered non-habitat for natural reasons. Tortoises are not likely to occupy these areas although they may pass through some of them.

= Impacted, marginal habitats: These light green areas are intermediate between non-habitat areas described above and pristine areas described below. There are typically light to heavy ground maneuver impacts but persisting vegetation continues to provide ground cover. These are usually suitable habitats that may or may not be occupied. For example, there was a fair amount of tortoise sign on ALZ7, ALZ8, and ALZ9 but habitats were sufficiently impacted to still be considered marginal. If tortoise sign was observed in adjacent areas, there is some potential that one or more tortoises could establish residency on one of these sites and certainly pass through them.

= Minimal impact, suitable habitats: These are the least-impacted habitats, often pristine with minimal or no evidence of ground maneuvers. Consequently, these are the sites most likely to be occupied by tortoises. If a few pieces of tortoise sign were found on-site or in contiguous areas, such sites are said to be "occupiable" (e.g., the original MAWTSLZ4 site), so that only portions of the site may be occupied. If tortoise sign was found throughout a given site, it was characterized as "entire site occupied habitat" (e.g., OLZ6), and tortoises are likely to occupy the entire site. In numerous cases where no tortoise sign was found, the site is said to be "suitable but not occupied."

Although there are many cases where the entire site fits only one classification, there are still others that have a mixture of impacts. In the following example, the western quarter of ALZ1 consists of intact habitats with minimal impact; the central half of the site is occupied by an urban village where habitats have been eliminated; and the eastern quarter consists of habitats with moderate to heavy impacts with persisting, albeit sparsely-dispersed scrub.



Importantly, these habitat characterizations refer to habitat quality, not tortoise occupation. Although no tortoise sign was found on denuded (red) habitats, there are plenty of examples of finding tortoise sign in marginal (light green) habitats and finding no tortoise sign in suitable (dark green) habitats. Therefore, it is important to view the maps for habitat qualities AND tortoise occurrence, which is signified by symbols and corresponding text.

APPENDIX B
AIR QUALITY DATA AND RECORD OF NON-APPLICABILITY

RECORD OF NON-APPLICABILITY (RONA) FOR CLEAN AIR ACT CONFORMITY

Aerial Maneuver Zones for MV-22 and Rotary-Wing Training at the Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center, Twentynine Palms, California

INTRODUCTION

The U.S. Environmental Protection Agency (USEPA) published *Determining Conformity of General Federal Actions to State or Federal Implementation Plans; Final Rule*, in the 30 November 1993, Federal Register (40 CFR Parts 6, 51, and 93). The U.S. Navy published *Interim Guidance on Compliance with the Clean Air Act General Conformity Rule* in Appendix F, OPNAVINST 5090.1C, dated 30 October 2007. These publications provide implementing guidance to document Clean Air Act Conformity Determination requirements.

Federal regulations state that no department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license to permit, or approve any activity that does not conform to an applicable implementation plan. It is the responsibility of the Federal agency to determine whether a Federal action conforms to the applicable implementation plan, before the action is taken (40 CFR Part 1 51.850[a]).

The general conformity rule applies to federal actions proposed within areas which are designated as either nonattainment or maintenance areas for a National Ambient Air Quality Standard (NAAQS) for any of the criteria pollutants. Former nonattainment areas that have attained a NAAQS are designated as maintenance areas. Emissions of pollutants for which an area is in attainment are exempt from conformity analyses.

The proposed action would occur within the Mojave Desert Air Basin (MDAB) which is in severe nonattainment of the 8-hour O_3 NAAQS and is in moderate nonattainment of the PM_{10} NAAQS. The MDAB attains the NAAQS for all other criteria pollutants. Therefore, only project emissions of PM_{10} and O_3 (or its precursors, volatile organic compounds [VOCs] and oxides of nitrogen [NO_x]) are analyzed for conformity rule applicability.

The annual *de minimis* levels for this region are listed in Table 1. Federal actions may be exempt from conformity determinations if they do not exceed designated *de minimis* levels (40 CFR Part 1, Section 51.853[b]).

Table 1. *De minimis* Levels for Criteria Pollutants in the Mojave Desert Air Basin

Criteria Pollutant	*de minimis* Level (tons/year)
Volatile Organic Compounds (VOC)	25
Oxides of Nitrogen (NO_x)	25
Particulate Matter (PM_{10})	100

PROPOSED ACTION

Action Proponent: The U.S. Marine Corps.

Location: Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center, (MAGTFTC, MCAGCC), Twentynine Palms, California.

Proposed Action Name: Aerial Maneuver Zones for MV-22 and Rotary-Wing Training at the Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center, Twentynine Palms, California.

Proposed Action Summary: The proposed action addressed in this RONA involves operating and integrating up to eight MV-22 aircraft squadrons (12 aircraft per squadron) into the current and future rotary-wing tactical and ground training activities as directed by NAVMC Directive 3500.11. This would result in up to 2,148 sorties annually at the Combat Center (a sortie consists of a single military aircraft flight from take-off through landing). The proposed action involves the development and use of aerial maneuver zones (AMZs) at the Combat Center for MV-22 and rotary-wing aircraft training. Training activities would include the following:

- Aerial Delivery
- External Loads
- Helicopter Insertion and Extraction
- Weapons Training

Air Emissions Summary: Emission sources associated with the proposed action involve aircraft operations. No construction is required at the AMZs and no changes in operations for current sources of air emissions are proposed.

The methodology for estimating aircraft emissions involves evaluating the type of activity, the number of hours of operation, the type of engine, and the mode of operation for each type of aircraft. Emissions occurring above 3,000 feet were considered to be above the atmospheric inversion layer and would not impact the local air quality. Specific operational modes for aircraft were identified by the Navy for training in which aircraft are involved. Emissions for aircraft activities for existing aircraft were then calculated based on the Navy's Aircraft Environmental Support Office (AESO) data for specific aircraft models.

Air quality impacts associated with the proposed action were determined by comparing the net change in emissions between current operations at the Combat Center and proposed operations associated with training activities for the aircraft participating in training activities at the AMZs. Existing and proposed sources affected by the replacement action would be limited to aircraft operations.

Based on the air quality analysis for the proposed action, the maximum estimated emissions would be below conformity *de minimis* levels for the MDAB (Table 2).

Table 2. Estimated Annual Emissions Resulting from Implementation of the Proposed Action

Activity	Air Pollutant Emissions (tons)		
	NO_x[1]	VOC[1]	PM_{10}[2]
MV-22	11.96	0.01	1.47
CH-53E	15.58	0.31	4.29
Annual Emissions	27.54	0.32	5.76
Baseline Emissions	16.97	1.59	4.90
Net Change from Baseline	**10.57**	**-1.26**	**0.86**
de minimis Thresholds	25	25	100
Exceeds *de minimis* Thresholds?	No	No	No

Notes: [1] The MDAQ is in severe nonattainment of the 8-hour O_3 NAAQS; VOCs and NO_x are precursors to the formation of O_3.
[2] The MDAB is in moderate nonattainment of the PM_{10} NAAQS and is in attainment of the NAAQS for all other criteria pollutants.
– indicates a reduction in emissions.

Affected Air Basin: Mojave Desert Air Basin

Date RONA prepared: April 13, 2010

RONA Prepared By: MAGTFTC, MCAGCC Twentynine Palms with direct support from TEC Inc.

ATTAINMENT AREA STATUS AND EMISSIONS EVALUATION/CONCLUSION

The MDAB is in severe nonattainment of the 8-hour O_3 NAAQS; VOCs and NO_x are precursors to the formation of O_3. The MDAB is in moderate nonattainment of the PM_{10} NAAQS. Emissions associated with operations for the proposed action were calculated based on standardized methodologies. Emissions were then compared with *de minimis* thresholds for the air basins in which they would occur.

The U.S. Marine Corps concludes that *de minimis* thresholds for applicable criteria pollutants would not be exceeded as a result of implementation of the proposed action. The emissions data supporting that conclusion are shown in Table 2, which provide a summary of the calculations, methodology, data, and references included as an Attachment to this RONA. Therefore, the U.S. Marine Corps concludes that further formal Conformity Determination procedures are not required, resulting in this Record of Non-Applicability.

RONA APPROVAL

To the best of my knowledge, the information presented in this Record of Non-Applicability is correct and accurate and I concur in the finding that the proposed action does not require a formal CAA Conformity Determination.

Signature:_____ Date: MAY 21 2010

H. S. CLARDY, III
Brigadier General, United States Marine Corps

Table 1. Annual Emissions for AMZs - Alternative 1

Aircraft Type	Type of Operation	AESO Assume Operation by Type	Baseline Total No. of Operations	No of Engines	Per Engine Fuel Use lbs/hr	Emission Factors CO	NOx	VOC	SO2	PM10	Emissions (Tons) CO	NOx	VOC	SO2	PM10
Baseline Scenario															
CH-46															
			Minutes												
	Transit	Cruise	**22,188**	**2**	**560**	19.74	3.94	3.43	0.4	1.78	4.09	0.82	0.71	0.08	0.37
	Hover and/or land	Hover	**12,885**	**2**	**630**	15.37	4.25	4.16	0.4	1.78	2.08	0.57	0.56	0.05	0.24
											6.17	**1.39**	**1.27**	**0.14**	**0.61**
CH-53															
			Minutes												
	Transit	Cruise	**33,295**	**3**	**1,488**	2.13	8.08	0.15	0.4	2.21	2.64	10.01	0.19	0.50	2.74
	Hover and/or land	Hover	**19,335**	**3**	**1,452**	2.28	7.94	0.18	0.4	2.21	1.60	5.57	0.13	0.28	1.55
											4.24	**15.58**	**0.31**	**0.78**	**4.29**
											10.41	**16.97**	**1.59**	**0.91**	**4.90**
Proposed															
MV-22			**Minutes**												
	Transit	FW Cruise Mode	**6,958**	**2**	**1,910**	0.52	14.09	0.01	0.40	1.58	0.12	3.12	0.00	0.09	0.35
	Conversion	Helo Cruise Mode	**12,885**	**2**	**1,530**	0.79	11.64	0.01	0.40	1.58	0.26	3.82	0.00	0.13	0.52
	Hover	Hover	**12,885**	**2**	**1,770**	0.6	13.19	0.01	0.4	1.58	0.23	5.01	0.00	0.15	0.60
											0.60	**11.96**	**0.01**	**0.37**	**1.47**
CH-53															
			Minutes												
	Transit	Cruise	**33,295**	**3**	**1,488**	2.13	8.08	0.15	0.4	2.21	2.64	10.01	0.19	0.50	2.74
	Hover and/or land	Hover	**19,335**	**3**	**1,452**	2.28	7.94	0.18	0.4	2.21	1.60	5.57	0.13	0.28	1.55
											4.24	**15.58**	**0.31**	**0.78**	**4.29**
GRAND TOTAL											**4.84**	**27.54**	**0.32**	**1.15**	**5.76**

Date: 17-February-2010

Table 2. Annual Emissions for AMZs - Alternative 2

Aircraft Model	Type of Operation	AESO Assume Operation by Type	Baseline Total Number of "Operations"	No of Engines	Per Engine Fuel Use lbs/hr	Emission Factors CO	NOx	HC	SO2	PM10	Emissions (tons) CO	NOx	HC	SO2	PM10
Baseline Scenario															
CH-46															
			Minutes												
	Transit	Cruise	**22,188**	**2**	**560**	19.74	3.94	3.43	0.4	1.78	4.09	0.82	0.71	0.08	0.37
	Hover and/or land	Hover	**12,885**	**2**	**630**	15.37	4.25	4.16	0.4	1.78	2.08	0.57	0.56	0.05	0.24
											6.17	**1.39**	**1.27**	**0.14**	**0.61**
CH-53															
			Minutes												
	Transit	Cruise	**33,295**	**3**	**1,488**	2.13	8.08	0.15	0.4	2.21	2.64	10.01	0.19	0.50	2.74
	Hover and/or land	Hover	**19,335**	**3**	**1,452**	2.28	7.94	0.18	0.4	2.21	1.60	5.57	0.13	0.28	1.55
											4.24	**15.58**	**0.31**	**0.78**	**4.29**
											10.41	**16.97**	**1.59**	**0.91**	**4.90**
Proposed															
MV-22			**Minutes**												
	Transit	FW Cruise Mode	**6,958**	**2**	**1,910**	0.52	14.09	0.01	0.40	1.58	0.12	3.12	0.00	0.09	0.35
	Conversion	Helo Cruise Mode	**12,885**	**2**	**1,530**	0.79	11.64	0.01	0.40	1.58	0.26	3.82	0.00	0.13	0.52
	Hover	Hover	**12,885**	**2**	**1,770**	0.6	13.19	0.01	0.4	1.58	0.23	5.01	0.00	0.15	0.60
											0.60	**11.96**	**0.01**	**0.37**	**1.47**
CH-53															
			Minutes												
	Transit	Cruise	**33,295**	**3**	**1,488**	2.13	8.08	0.15	0.4	2.21	2.64	10.01	0.19	0.50	2.74
	Hover and/or land	Hover	**19,335**	**3**	**1,452**	2.28	7.94	0.18	0.4	2.21	1.60	5.57	0.13	0.28	1.55
											4.24	**15.58**	**0.31**	**0.78**	**4.29**
GRAND TOTAL											**4.84**	**27.54**	**0.32**	**1.15**	**5.76**

Date: 17-February-2010

Table 3. Annual GHG Emissions for AMZs - Alternative 1

Aircraft Model	Type of Operation	AESO Assume Operation by Type	Baseline Total Number of "Operations"	No of Engines	Per Engine Fuel Use lbs/hr	Emission Indices, lbs/1000 lbs fuel CO2	CH4	N2O	Total Emissions, metric tons/year CO2	CO	NOx	TOTAL
Baseline Scenario												
CH-46												
			Minutes									
	Transit	Cruise	**22,188**	**2**	**560**	3176	0.0872	0.1001	596.67	0.02	0.02	
	Hover and/or land	Hover	**12,885**	**2**	**630**	3182	0.0872	0.1001	390.55	0.01	0.01	
									987.22	**0.03**	**0.03**	**997.42**
CH-53												
			Minutes									
	Transit	Cruise	**33,295**	**3**	**1,488**	3117	0.0872	0.1001	3502.33	0.10	0.11	
	Hover and/or land	Hover	**19,335**	**3**	**1,452**	3117	0.0872	0.1001	1984.67	0.06	0.06	
									5487.00	**0.15**	**0.18**	**5544.83**
									6474.22	**0.18**	**0.21**	**6542.25**
Proposed												
MV-22			**Minutes**									
	Transit	FW Cruise Mode	**6,958**	**2**	**1,910**	3209	0.0872	0.1001	644.81	0.02	0.02	
	Conversion	Helo Cruise Mode	**12,885**	**2**	**1,530**	3212	0.0872	0.1001	957.42	0.03	0.03	
	Hover	Hover	**12,885**	**2**	**1,770**	3210	0.0872	0.1001	1106.91	0.03	0.03	
									2709.13	**0.07**	**0.08**	**2736.85**
CH-53												
			Minutes									
	Transit	Cruise	**33,295**	**3**	**1,488**	3117	0.0872	0.1001	3502.33	0.10	0.11	
	Hover and/or land	Hover	**19,335**	**3**	**1,452**	3117	0.0872	0.1001	1984.67	0.06	0.06	
									5487.00	**0.15**	**0.18**	**5544.83**
GRAND TOTAL						**Total Emissions, tons per year**			**8196.13**	**0.23**	**0.26**	**8281.68**

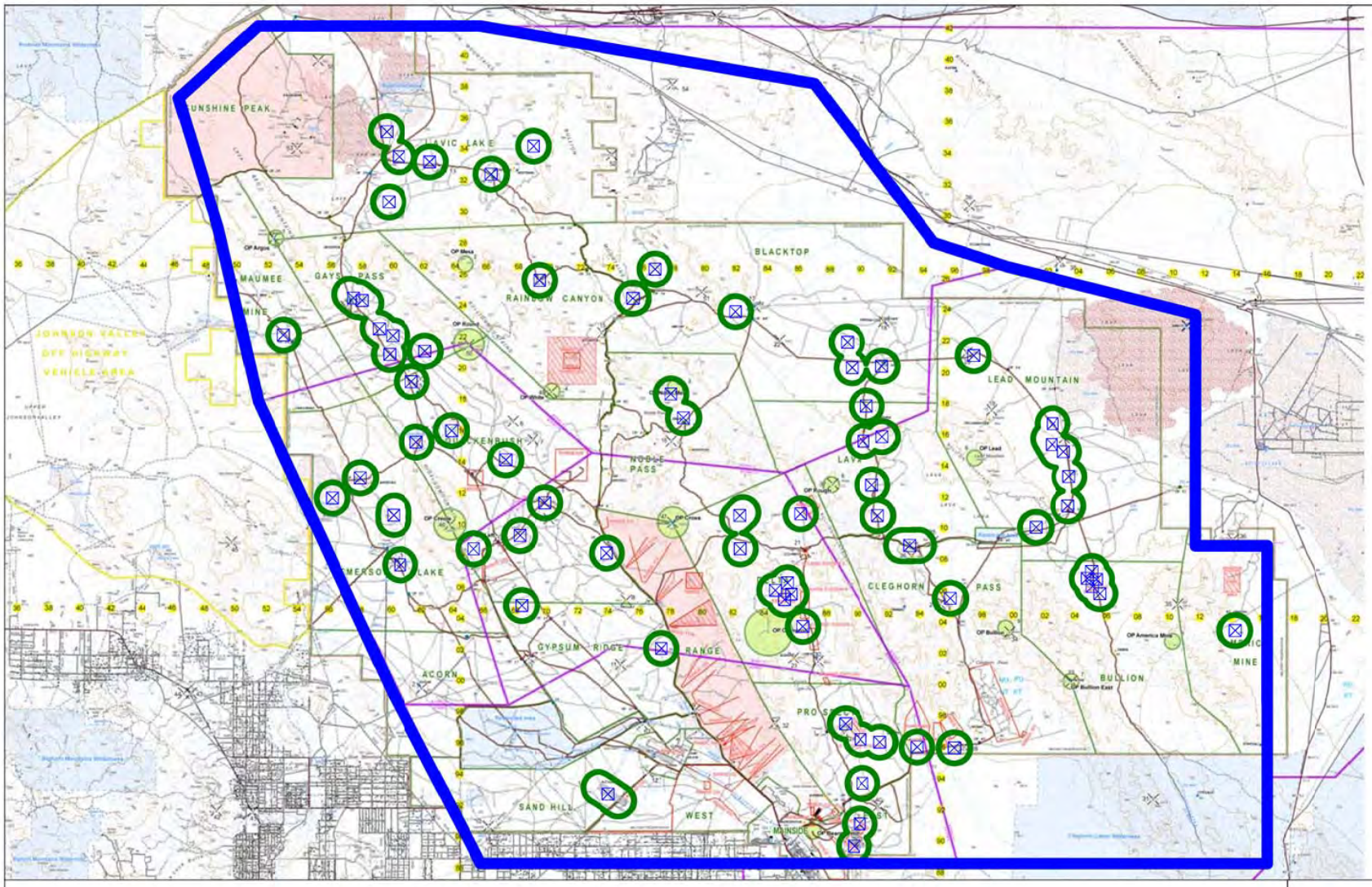
Date: 17-February-2010

Table 4. Annual GHG Emissions for AMZs - Alternative 2

Aircraft Type	Type of Operation	AESO Assume Operation by Type	Baseline Total Number of "Operations"	No of Engines	Per Engine Fuel Use lbs/hr	Emission Indices, lbs/1000 lbs fuel CO2	CH4	N2O	Total Emissions, tons/year CO2	CO	NOx
Baseline Scenario											
CH-46											
			Minutes								
	Transit	Cruise	**22,188**	**2**	**560**	3176	0.0872	0.1001	596.67	0.02	0.02
	Hover and/or land	Hover	**12,885**	**2**	**630**	3182	0.0872	0.1001	390.55	0.01	0.01
									987.22	**0.03**	**0.03**
CH-53											
			Minutes								
	Transit	Cruise	**33,295**	**3**	**1,488**	3117	0.0872	0.1001	3502.33	0.10	0.11
	Hover and/or land	Hover	**19,335**	**3**	**1,452**	3117	0.0872	0.1001	1984.67	0.06	0.06
									5487.00	**0.15**	**0.18**
									6474.22	**0.18**	**0.21**
Proposed											
MV-22											
			Minutes								
	Transit	FW Cruise Mode	**6,958**	**2**	**1,910**	3209	0.0872	0.1001	644.81	0.02	0.02
	Conversion	Helo Cruise Mode	**12,885**	**2**	**1,530**	3212	0.0872	0.1001	957.42	0.03	0.03
	Hover	Hover	**12,885**	**2**	**1,770**	3210	0.0872	0.1001	1106.91	0.03	0.03
									2709.13	**0.07**	**0.08**
CH-53											
			Minutes								
	Transit	Cruise	**33,295**	**3**	**1,488**	3117	0.0872	0.1001	3502.33	0.10	0.11
	Hover and/or land	Hover	**19,335**	**3**	**1,452**	3117	0.0872	0.1001	1984.67	0.06	0.06
									5487.00	**0.15**	**0.18**
GRAND TOTAL						**Total Emissions, tons per year**			**8196.13**	**0.23**	**0.26**

Date: 17-February-2010

APPENDIX C
NOISE TECHNICAL APPENDIX



29 Palms planned AMZ Modeled Areas (December 2, 2009)

Blue Squares = Land/Hover Area center point (modeled area will be 750' diameter circle around AMZ center, Not depicted here)

Green lines = Conversion Area (1 km radius from AMZ center pt or along line)

Blue line = Transition Area

0 20,000 40,000 60,000 80,000 100,000 120,000 140,000 160,000 180,000 200,000 220,000

Scale in Feet 1:360,000 (1 inch = 30,000 feet)

N

Baseline Route Operations at 29 Palms Airspace

Aircraft Type	Routes												Totals			
	Bristol Aerial Refueling Track 19k				Bristol Aerial Refueling Track 22k				Perimeter Route							
	Day	Evening	Night	Total	Day	Evening	Night	Total	Day	Evening	Night	Total	Day	Evening	Night	Total
F/A-18C/D	93	2	-	95	93	2	-	95	-	-	-	-	186	4	-	190
F/A-18E/F	5	-	-	5	5	-	-	5	-	-	-	-	10	-	-	10
F-5E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KC-130	383	25	-	408	383	25	-	408	-	-	-	-	766	50	-	816
AV-8B	63	25	-	88	63	25	-	88	-	-	-	-	126	50	-	176
AH-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UH-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CH-53E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CH-46E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MV-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UAV(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	446	52	-	596	544	52	-	596	-	-	-	-	1,088	104	-	1,192

(1) Unmanned Aerial Vehicle (Not Modeled)

Baseline Area operations at 29 Palms Airspace

Aircraft Type	AMZs [2]			
	Day	Evenin	Night	Total
CH-53E	838	322	129	1289
CH-46E	558	215	86	859
MV-22	-	-	-	-

Aircraft Type	R-2501N				R-2501S				R-2501E				R-2501W				Sundance MOA				Bristol MOA				**Totals**			
	Day	Evenin	Night	Total	Day	Evenin	Night	Total	Day	Evenin	Night	Total	Day	Evenin	Night	Total	Day	Evenin	Night	Total	Day	Evenin	Night	Total	Day	Evening	Night	Total
F/A-18C/D	1,021	17	-	1,038	1,302	22	-	1,324	1,009	16	-	1,025	965	16	-	981	95	2	-	97	220	5	-	225	4,612	78	-	4,690
F/A-18E/F	54	1	-	55	69	1	-	70	53	1	-	54	51	1	-	52	5	-	-	5	12	-	-	12	244	4	-	248
F-5E	36	-	-	36	44	-	-	44	35	-	-	35	33	-	-	33	3	-	-	3	7	-	-	7	158	-	-	158
KC-130	340	18	-	358	433	23	-	456	335	17	-	352	322	17	-	339	32	2	-	34	75	5	-	80	1,537	82	-	1,619
AV-8B	645	250	-	895	821	319	-	1,140	636	247	-	883	611	237	-	848	60	23	-	83	140	54	-	194	2,913	1,130	-	4,043
AH-1	876	214	54	1,144	1,119	275	69	1,463	867	212	53	1,132	829	203	51	1,083	83	20	5	108	192	47	12	251	3,966	971	244	5,181
UH-1	359	-	-	359	458	-	-	458	354	-	-	354	339	-	-	339	34	-	-	34	79	-	-	79	1,623	-	-	1,623
CH-53E	537	18	-	555	684	23	-	707	530	17	-	547	508	17	-	525	50	2	-	52	116	5	-	121	3,263	404	129	3,796
CH-46E	896	161	18	1,075	1,143	206	23	1,372	884	159	17	1,060	846	152	17	1,015	84	15	2	101	195	35	5	235	4,606	943	168	5,717
MV-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UAV[1]	161	18	107	286	206	23	137	366	159	17	106	282	152	17	101	270	15	2	10	27	35	5	23	63	728	82	484	1,294
TOTAL	3,850	697	179	5,801	6,279	892	229	7,400	4,862	686	176	5,724	4,656	660	169	5,485	461	66	17	544	1,071	156	40	1,267	23,650	3,694	1,025	28,369

(1) Unmanned Aerial Vehicle (Not Modeled)
(2) Distribution of AMZ sorties to specific sites detailed in "DOPAA Info from AMZ-DataValidation_Alt1 (2-10-2010).xls"

Proposed Route Operations at 29 Palms Airspace

Aircraft Type	Routes												Totals			
	Bristol Aerial Refueling Track 19k				Bristol Aerial Refueling Track 22k				Perimeter Route[2]							
	Day	Evening	Night	Total	Day	Evening	Night	Total	Day	Evening	Night	Total	Day	Evening	Night	Total
F/A-18C/D	93	2	-	95	93	2	-	95	-	-	-	-	186	4	-	190
F/A-18E/F	5	-	-	5	5	-	-	5	-	-	-	-	10	-	-	10
F-5E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KC-130	383	25	-	408	383	25	-	408	-	-	-	-	766	50	-	816
AV-8B	63	25	-	88	63	25	-	88	-	-	-	-	126	50	-	176
AH-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UH-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CH-53E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CH-46E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MV-22	-	-	-	-	-	-	-	-	221	177	59	457	221	177	59	457
UAV[1]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	544	52	-	596	544	52	-	596	221	177	59	457	1,309	281	59	1,649

(1) Unmanned Aerial Vehicle (Not Modeled)

(2) Includes MV-22 High Light Level (HLL) and Low Light Level (LLL) Night Vision Goggle training and Tactics (TAC) sorties

Proposed Airspace operations at 29 Palms Airspace

Aircraft Type	AMZs [2]			
	Day	Evenin	Night	Total
CH-53E	838	322	129	1289
CH-46E	-	-	-	-
MV-22	558	215	86	859

Aircraft Type	R-2501N				R-2501S				R-2501E				R-2501W				Sundance MOA				Bristol MOA				TOTAL			
	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
F/A-18C/D	1,021	17	-	1,038	1,302	22	-	1,324	1,009	16	-	1,025	965	16	-	981	95	2	-	97	220	5	-	225	4,612	78	-	4,690
F/A-18E/F	54	1	-	55	69	1	-	70	53	1	-	54	51	1	-	52	5	-	-	5	12	-	-	12	244	4	-	248
F-5E	36	-	-	36	44	-	-	44	35	-	-	35	33	-	-	33	3	-	-	3	7	-	-	7	158	-	-	158
KC-130	340	18	-	358	433	23	-	456	335	17	-	352	322	17	-	339	32	2	-	34	75	5	-	80	1,537	82	-	1,619
AV-8B	645	250	-	895	821	319	-	1,140	636	247	-	883	611	237	-	848	60	23	-	83	140	54	-	194	2,913	1,130	-	4,043
AH-1	876	214	54	1,144	1,119	275	69	1,463	867	212	53	1,132	829	203	51	1,083	83	20	5	108	192	47	12	251	3,966	971	244	5,181
UH-1	359	-	-	359	458	-	-	458	354	-	-	354	339	-	-	339	34	-	-	34	79	-	-	79	1,623	-	-	1,623
CH-53E	537	18	-	555	684	23	-	707	530	17	-	547	508	17	-	525	50	2	-	52	116	5	-	121	3,263	404	129	3,796
CH-46E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MV-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	558	215	86	859
UAV[1]	161	18	107	286	206	23	137	366	159	17	106	282	152	17	101	270	15	2	10	27	35	5	23	63	728	82	484	1,294
TOTAL	2,954	536	161	4,726	5,136	686	206	6,028	3,978	527	159	4,664	3,810	508	152	4,470	377	51	15	443	876	121	35	1,032	19,602	2,966	943	23,511

(1) Unmanned Aerial Vehicle (Not Modeled)
(2) Distribution of AMZ sorties to specific sites detailed in "DOPAA Info from AMZ-DataValidation_Alt1 (2-10-2010).xls"

CH-46E Modeled Flight Profile Details

Baseline Scenario only					Busy Month Sorties during each acoustic time period			Transit			Hover/Land		
PRIORITY	AMZ mission destination	AMZ type	Annual Sorties	Busy Month Sorties	Day (0700-1900)	Eve (1900-2200)	Night (2200-0700)	Duration	Speed (KIAS)	Altitude (ft AGL)	Duration	Speed (KIAS)	Altitude (ft AGL)
2	ALZ 1 (CHB2(H) EAST)	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
3	ALZ 8 (CHB2(H) WEST)	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
4	ALZ 9 (CHB2(H) WEST)	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
5	ALZ 7 (CHB2(H) WEST)	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
6	ALZ 3 (CHB3(H) EAST)	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
7	ALZ 5 (CHB3(H) EAST)	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
22	FARP 1 EAST (LAVA)	ALZ	64	8.03	5.22	2.01	0.80	45 mins	110	300 - 5K	15 mins	50	0 - 300
23	FARP 2 WEST (SANDHILL)	ALZ	64	8.03	5.22	2.01	0.80	45 mins	110	300 - 5K	15 mins	50	0 - 300
49	ALZ 2 (CHB2(H) EAST)	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
50	ALZ 4 (CHB3(H) EAST)	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
51	ALZ 6 (CHB3(H) EAST)	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
52	MAWTS LZ 5	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
53	MAWTS LZ 1	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
54	MAWTS LZ 2	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
55	MAWTS LZ 3	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
56	MAWTS LZ 4	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
57	R-410 LZ 1	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
58	R-200 LZ 1	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
59	R-205 LZ 1	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
60	R-205 LZ 2	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
61	R-220 LZ 1	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
62	R-401 LZ 1	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
63	R-400 LZ 1	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
64	R-230 LZ 1	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
65	R-230 LZ 2	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
66	R-620 LZ 1	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
67	R-620 LZ 2	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
68	CP 30 LZ 1	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
69	CP 30 LZ 2	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
70	CP 49 LZ 1	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
71	CP 40 LZ 1	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
72	R-230 LZ 3	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
73	R-230 LZ 4	LZ	4	0.52	0.34	0.13	0.05	45 mins	110	300 - 5K	15 mins	50	0 - 300
24	CLZ 1	CLZ	5	0.59	0.38	0.15	0.06	45 mins	110	300 - 5K	15 mins	50	0 - 300
25	CLZ 2	CLZ	5	0.59	0.38	0.15	0.06	45 mins	110	300 - 5K	15 mins	50	0 - 300
26	CLZ 3	CLZ	5	0.59	0.38	0.15	0.06	45 mins	110	300 - 5K	15 mins	50	0 - 300
27	CLZ 4	CLZ	5	0.59	0.38	0.15	0.06	45 mins	110	300 - 5K	15 mins	50	0 - 300
28	CLZ 5	CLZ	5	0.59	0.38	0.15	0.06	45 mins	110	300 - 5K	15 mins	50	0 - 300
29	CLZ 6	CLZ	5	0.59	0.38	0.15	0.06	45 mins	110	300 - 5K	15 mins	50	0 - 300
30	CLZ 7	CLZ	5	0.59	0.38	0.15	0.06	45 mins	110	300 - 5K	15 mins	50	0 - 300

CH-46E Modeled Flight Profile Details

Baseline Scenario only					Busy Month Sorties during each acoustic time period			Transit			Hover/Land		
PRIORITY	AMZ mission destination	AMZ type	Annual Sorties	Busy Month Sorties	Day (0700-1900)	Eve (1900-2200)	Night (2200-0700)	Duration	Speed (KIAS)	Altitude (ft AGL)	Duration	Speed (KIAS)	Altitude (ft AGL)
31	CLZ 8	CLZ	5	0.59	0.38	0.15	0.06	45 mins	110	300 - 5K	15 mins	50	0 - 300
39	CLZ 9	CLZ	5	0.59	0.38	0.15	0.06	45 mins	110	300 - 5K	15 mins	50	0 - 300
40	CLZ 10	CLZ	5	0.59	0.38	0.15	0.06	45 mins	110	300 - 5K	15 mins	50	0 - 300
41	CLZ 11	CLZ	5	0.59	0.38	0.15	0.06	45 mins	110	300 - 5K	15 mins	50	0 - 300
42	CLZ 12	CLZ	5	0.59	0.38	0.15	0.06	45 mins	110	300 - 5K	15 mins	50	0 - 300
43	CLZ 13	CLZ	5	0.59	0.38	0.15	0.06	45 mins	110	300 - 5K	15 mins	50	0 - 300
44	CLZ 14	CLZ	5	0.59	0.38	0.15	0.06	45 mins	110	300 - 5K	15 mins	50	0 - 300
45	CLZ 15	CLZ	5	0.59	0.38	0.15	0.06	45 mins	110	300 - 5K	15 mins	50	0 - 300
46	CLZ 16	CLZ	5	0.59	0.38	0.15	0.06	45 mins	110	300 - 5K	15 mins	50	0 - 300
47	CLZ 17	CLZ	5	0.59	0.38	0.15	0.06	45 mins	110	300 - 5K	15 mins	50	0 - 300
48	CLZ 18	CLZ	5	0.59	0.38	0.15	0.06	45 mins	110	300 - 5K	15 mins	50	0 - 300
8	OLZ 10 (OP NOBLE)	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
9	OLZ 1	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
10	OLZ 2	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
11	OLZ 3	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
12	OLZ 4	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
13	OLZ 5	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
14	OLZ 6	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
15	OLZ 7	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
16	OLZ 8	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
17	OLZ 9	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
18	OLZ 11	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
19	OLZ 12	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
20	OLZ 13	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
21	OLZ 14	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
32	OLZ 15	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
33	OLZ 16	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
34	OLZ 17	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
35	OLZ 18	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
36	OLZ 19	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
37	OLZ 20	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
38	OLZ 21	OLZ	20	2.55	1.66	0.64	0.25	45 mins	110	300 - 5K	15 mins	50	0 - 300
1	PZ 1 (CHB2(H) EAST)	PZ	86	10.70	6.96	2.68	1.06	45 mins	110	300 - 5K	15 mins	50	0 - 300

CH-53E Modeled Flight Profile Details

Baseline and Alt 2 Scenarios					Busy Month Sorties during each acoustic time period			Transit			Hover/Land		
PRIORITY	AMZ mission destination	AMZ type	Annual Sorties	Busy Month Sorties	Day (0700-1900)	Eve (1900-2200)	Night (2200-0700)	Duration	Speed (KIAS)	Altitude (ft AGL)	Duration	Speed (KIAS)	Altitude (ft AGL)
2	ALZ 1 (CHB2(H) EAST)	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
3	ALZ 8 (CHB2(H) WEST)	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
4	ALZ 9 (CHB2(H) WEST)	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
5	ALZ 7 (CHB2(H) WEST)	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
6	ALZ 3 (CHB3(H) EAST)	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
7	ALZ 5 (CHB3(H) EAST)	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
22	FARP 1 EAST (LAVA)	ALZ	97	12.08	7.85	3.02	1.21	45 mins	120	300 - 5K	15 mins	50	0 - 300
23	FARP 2 WEST (SANDHILL)	ALZ	97	12.08	7.85	3.02	1.21	45 mins	120	300 - 5K	15 mins	50	0 - 300
49	ALZ 2 (CHB2(H) EAST)	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
50	ALZ 4 (CHB3(H) EAST)	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
51	ALZ 6 (CHB3(H) EAST)	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
52	MAWTS LZ 5	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
53	MAWTS LZ 1	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
54	MAWTS LZ 2	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
55	MAWTS LZ 3	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
56	MAWTS LZ 4	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
57	R-410 LZ 1	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
58	R-200 LZ 1	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
59	R-205 LZ 1	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
60	R-205 LZ 2	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
61	R-220 LZ 1	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
62	R-401 LZ 1	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
63	R-400 LZ 1	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
64	R-230 LZ 1	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
65	R-230 LZ 2	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
66	R-620 LZ 1	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
67	R-620 LZ 2	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
68	CP 30 LZ 1	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
69	CP 30 LZ 2	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
70	CP 49 LZ 1	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
71	CP 40 LZ 1	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
72	R-230 LZ 3	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
73	R-230 LZ 4	LZ	6	0.78	0.51	0.20	0.07	45 mins	120	300 - 5K	15 mins	50	0 - 300
24	CLZ 1	CLZ	7	0.89	0.58	0.22	0.09	45 mins	120	300 - 5K	15 mins	50	0 - 300
25	CLZ 2	CLZ	7	0.89	0.58	0.22	0.09	45 mins	120	300 - 5K	15 mins	50	0 - 300
26	CLZ 3	CLZ	7	0.89	0.58	0.22	0.09	45 mins	120	300 - 5K	15 mins	50	0 - 300
27	CLZ 4	CLZ	7	0.89	0.58	0.22	0.09	45 mins	120	300 - 5K	15 mins	50	0 - 300
28	CLZ 5	CLZ	7	0.89	0.58	0.22	0.09	45 mins	120	300 - 5K	15 mins	50	0 - 300
29	CLZ 6	CLZ	7	0.89	0.58	0.22	0.09	45 mins	120	300 - 5K	15 mins	50	0 - 300
30	CLZ 7	CLZ	7	0.89	0.58	0.22	0.09	45 mins	120	300 - 5K	15 mins	50	0 - 300

CH-53E Modeled Flight Profile Details

Baseline and Alt 2 Scenarios					Busy Month Sorties during each acoustic time period			Transit			Hover/Land		
PRIORITY	AMZ mission destination	AMZ type	Annual Sorties	Busy Month Sorties	Day (0700-1900)	Eve (1900-2200)	Night (2200-0700)	Duration	Speed (KIAS)	Altitude (ft AGL)	Duration	Speed (KIAS)	Altitude (ft AGL)
31	CLZ 8	CLZ	7	0.89	0.58	0.22	0.09	45 mins	120	300 - 5K	15 mins	50	0 - 300
39	CLZ 9	CLZ	7	0.89	0.58	0.22	0.09	45 mins	120	300 - 5K	15 mins	50	0 - 300
40	CLZ 10	CLZ	7	0.89	0.58	0.22	0.09	45 mins	120	300 - 5K	15 mins	50	0 - 300
41	CLZ 11	CLZ	7	0.89	0.58	0.22	0.09	45 mins	120	300 - 5K	15 mins	50	0 - 300
42	CLZ 12	CLZ	7	0.89	0.58	0.22	0.09	45 mins	120	300 - 5K	15 mins	50	0 - 300
43	CLZ 13	CLZ	7	0.89	0.58	0.22	0.09	45 mins	120	300 - 5K	15 mins	50	0 - 300
44	CLZ 14	CLZ	7	0.89	0.58	0.22	0.09	45 mins	120	300 - 5K	15 mins	50	0 - 300
45	CLZ 15	CLZ	7	0.89	0.58	0.22	0.09	45 mins	120	300 - 5K	15 mins	50	0 - 300
46	CLZ 16	CLZ	7	0.89	0.58	0.22	0.09	45 mins	120	300 - 5K	15 mins	50	0 - 300
47	CLZ 17	CLZ	7	0.89	0.58	0.22	0.09	45 mins	120	300 - 5K	15 mins	50	0 - 300
48	CLZ 18	CLZ	7	0.89	0.58	0.22	0.09	45 mins	120	300 - 5K	15 mins	50	0 - 300
8	OLZ 10 (OP NOBLE)	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
9	OLZ 1	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
10	OLZ 2	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
11	OLZ 3	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
12	OLZ 4	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
13	OLZ 5	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
14	OLZ 6	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
15	OLZ 7	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
16	OLZ 8	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
17	OLZ 9	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
18	OLZ 11	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
19	OLZ 12	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
20	OLZ 13	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
21	OLZ 14	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
32	OLZ 15	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
33	OLZ 16	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
34	OLZ 17	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
35	OLZ 18	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
36	OLZ 19	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
37	OLZ 20	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
38	OLZ 21	OLZ	31	3.83	2.49	0.96	0.38	45 mins	120	300 - 5K	15 mins	50	0 - 300
1	PZ 1 (CHB2(H) EAST)	PZ	129	16.10	10.47	4.03	1.60	45 mins	120	300 - 5K	15 mins	50	0 - 300

CH-53E Modeled Flight Profile Details (concluded)

Alt 1 Scenario					Busy Month Sorties during each acoustic time period				Transit		Hover/Land	
PRIORITY	AMZ mission destination	AMZ type	Annual Sorties	Busy Month Sorties	Day (0700-1900)	Eve (1900-2200)	Night (2200-0700)	Sortie Duration	Speed (KIAS)	Altitude (ft AGL)	Speed (KIAS)	Altitude (ft AGL)
2	ALZ 1 (CHB2(H) EAST)	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
4	ALZ 9 (CHB2(H) WEST)	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
6	ALZ 3 (CHB3(H) EAST)	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
22	FARP 1 EAST (LAVA)	ALZ	97	12.08	7.85	3.02	1.21	60 mins	120	300 - 5K	50	0 - 300
23	FARP 2 WEST (SANDHILL)	ALZ	97	12.08	7.85	3.02	1.21	60 mins	120	300 - 5K	50	0 - 300
49	ALZ 2 (CHB2(H) EAST)	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
50	ALZ 4 (CHB3(H) EAST)	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
51	ALZ 6 (CHB3(H) EAST)	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
52	MAWTS LZ 5	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
53	MAWTS LZ 1	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
55	MAWTS LZ 3	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
56	MAWTS LZ 4	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
57	R-410 LZ 1	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
59	R-205 LZ 1	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
60	R-205 LZ 2	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
61	R-220 LZ 1	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
62	R-401 LZ 1	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
63	R-400 LZ 1	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
64	R-230 LZ 1	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
66	R-620 LZ 1	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
68	CP 30 LZ 1	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
69	CP 30 LZ 2	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
70	CP 49 LZ 1	LZ	9	1.15	0.75	0.29	0.11	60 mins	120	300 - 5K	50	0 - 300
24	CLZ 1	CLZ	9	1.07	0.70	0.27	0.10	60 mins	120	300 - 5K	50	0 - 300
25	CLZ 2	CLZ	9	1.07	0.70	0.27	0.10	60 mins	120	300 - 5K	50	0 - 300
26	CLZ 3	CLZ	9	1.07	0.70	0.27	0.10	60 mins	120	300 - 5K	50	0 - 300
27	CLZ 4	CLZ	9	1.07	0.70	0.27	0.10	60 mins	120	300 - 5K	50	0 - 300
28	CLZ 5	CLZ	9	1.07	0.70	0.27	0.10	60 mins	120	300 - 5K	50	0 - 300
29	CLZ 6	CLZ	9	1.07	0.70	0.27	0.10	60 mins	120	300 - 5K	50	0 - 300
30	CLZ 7	CLZ	9	1.07	0.70	0.27	0.10	60 mins	120	300 - 5K	50	0 - 300
31	CLZ 8	CLZ	9	1.07	0.70	0.27	0.10	60 mins	120	300 - 5K	50	0 - 300
39	CLZ 9	CLZ	9	1.07	0.70	0.27	0.10	60 mins	120	300 - 5K	50	0 - 300
40	CLZ 10	CLZ	9	1.07	0.70	0.27	0.10	60 mins	120	300 - 5K	50	0 - 300
42	CLZ 12	CLZ	9	1.07	0.70	0.27	0.10	60 mins	120	300 - 5K	50	0 - 300
43	CLZ 13	CLZ	9	1.07	0.70	0.27	0.10	60 mins	120	300 - 5K	50	0 - 300
44	CLZ 14	CLZ	9	1.07	0.70	0.27	0.10	60 mins	120	300 - 5K	50	0 - 300
45	CLZ 15	CLZ	9	1.07	0.70	0.27	0.10	60 mins	120	300 - 5K	50	0 - 300
46	CLZ 16	CLZ	9	1.07	0.70	0.27	0.10	60 mins	120	300 - 5K	50	0 - 300
8	OLZ 10 (OP NOBLE)	OLZ	72	8.94	5.81	2.24	0.89	60 mins	120	300 - 5K	50	0 - 300
10	OLZ 2	OLZ	72	8.94	5.81	2.24	0.89	60 mins	120	300 - 5K	50	0 - 300
13	OLZ 5	OLZ	72	8.94	5.81	2.24	0.89	60 mins	120	300 - 5K	50	0 - 300
16	OLZ 8	OLZ	72	8.94	5.81	2.24	0.89	60 mins	120	300 - 5K	50	0 - 300
20	OLZ 13	OLZ	72	8.94	5.81	2.24	0.89	60 mins	120	300 - 5K	50	0 - 300
34	OLZ 17	OLZ	72	8.94	5.81	2.24	0.89	60 mins	120	300 - 5K	50	0 - 300
35	OLZ 18	OLZ	72	8.94	5.81	2.24	0.89	60 mins	120	300 - 5K	50	0 - 300
36	OLZ 19	OLZ	72	8.94	5.81	2.24	0.89	60 mins	120	300 - 5K	50	0 - 300
37	OLZ 20	OLZ	72	8.94	5.81	2.24	0.89	60 mins	120	300 - 5K	50	0 - 300
1	PZ 1 (CHB2(H) EAST)	PZ	129	16.10	10.47	4.03	1.60	60 mins	120	300 - 5K	50	0 - 300

MV-22B Modeled Flight Profile Details Alternative 1

Proposed Scenario only					Busy Month Sorties during each acoustic time period			Transit			Conversion			Hover/Land		
PRIORITY	AMZ mission destination	AMZ type	Annual Sorties	Busy Month Sorties	Day (0700-1900)	Eve (1900-2200)	Night (2200-0700)	Duration	Speed (KIAS)	Altitude (ft AGL)	Duration	Speed (KIAS)	Altitude (ft AGL)	Duration	Speed (KIAS)	Altitude (ft AGL)
2	ALZ 1 (CHB2(H) EAST)	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
4	ALZ 9 (CHB2(H) WEST)	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
6	ALZ 3 (CHB3(H) EAST)	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
22	FARP 1 EAST (LAVA)	ALZ	64	8.03	5.22	2.01	0.80	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
23	FARP 2 WEST (SANDHILL)	ALZ	64	8.03	5.22	2.01	0.80	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
49	ALZ 2 (CHB2(H) EAST)	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
50	ALZ 4 (CHB3(H) EAST)	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
51	ALZ 6 (CHB3(H) EAST)	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
52	MAWTS LZ 5	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
53	MAWTS LZ 1	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
55	MAWTS LZ 3	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
56	MAWTS LZ 4	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
57	R-410 LZ 1	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
59	R-205 LZ 1	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
60	R-205 LZ 2	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
61	R-220 LZ 1	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
62	R-401 LZ 1	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
63	R-400 LZ 1	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
64	R-230 LZ 1	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
66	R-620 LZ 1	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
68	CP 30 LZ 1	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
69	CP 30 LZ 2	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
70	CP 49 LZ 1	LZ	6	0.76	0.49	0.19	0.08	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
24	CLZ 1	CLZ	6	0.71	0.46	0.18	0.07	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
25	CLZ 2	CLZ	6	0.71	0.46	0.18	0.07	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
26	CLZ 3	CLZ	6	0.71	0.46	0.18	0.07	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
27	CLZ 4	CLZ	6	0.71	0.46	0.18	0.07	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
28	CLZ 5	CLZ	6	0.71	0.46	0.18	0.07	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
29	CLZ 6	CLZ	6	0.71	0.46	0.18	0.07	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
30	CLZ 7	CLZ	6	0.71	0.46	0.18	0.07	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
31	CLZ 8	CLZ	6	0.71	0.46	0.18	0.07	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
39	CLZ 9	CLZ	6	0.71	0.46	0.18	0.07	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
40	CLZ 10	CLZ	6	0.71	0.46	0.18	0.07	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
42	CLZ 12	CLZ	6	0.71	0.46	0.18	0.07	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
43	CLZ 13	CLZ	6	0.71	0.46	0.18	0.07	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
44	CLZ 14	CLZ	6	0.71	0.46	0.18	0.07	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
45	CLZ 15	CLZ	6	0.71	0.46	0.18	0.07	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
46	CLZ 16	CLZ	6	0.71	0.46	0.18	0.07	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
8	OLZ 10 (OP NOBLE)	OLZ	48	5.94	3.86	1.49	0.59	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
10	OLZ 2	OLZ	48	5.94	3.86	1.49	0.59	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
13	OLZ 5	OLZ	48	5.94	3.86	1.49	0.59	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
16	OLZ 8	OLZ	48	5.94	3.86	1.49	0.59	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
20	OLZ 13	OLZ	48	5.94	3.86	1.49	0.59	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
34	OLZ 17	OLZ	48	5.94	3.86	1.49	0.59	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
35	OLZ 18	OLZ	48	5.94	3.86	1.49	0.59	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
36	OLZ 19	OLZ	48	5.94	3.86	1.49	0.59	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
37	OLZ 20	OLZ	48	5.94	3.86	1.49	0.59	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
1	PZ 1 (CHB2(H) EAST)	PZ	86	10.70	6.96	2.68	1.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300

MV-22B Modeled Flight Profile Details Alternative 2

Proposed					Busy Month Sorties during each acoustic time period			Transit			Conversion			Hover/Land		
PRIORITY	AMZ mission destination	AMZ type	Annual Sorties	Busy Month Sorties	Day (0700-1900)	Eve (1900-2200)	Night (2200-0700)	Duration	Speed (KIAS)	Altitude (ft AGL)	Duration	Speed (KIAS)	Altitude (ft AGL)	Duration	Speed (KIAS)	Altitude (ft AGL)
2	ALZ 1 (CHB2(H) EAST)	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
3	ALZ 8 (CHB2(H) WEST)	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
4	ALZ 9 (CHB2(H) WEST)	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
5	ALZ 7 (CHB2(H) WEST)	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
6	ALZ 3 (CHB3(H) EAST)	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
7	ALZ 5 (CHB3(H) EAST)	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
22	FARP 1 EAST (LAVA)	ALZ	64	8.03	5.22	2.01	0.80	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
23	FARP 2 WEST (SANDHILL)	ALZ	64	8.03	5.22	2.01	0.80	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
49	ALZ 2 (CHB2(H) EAST)	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
50	ALZ 4 (CHB3(H) EAST)	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
51	ALZ 6 (CHB3(H) EAST)	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
52	MAWTS LZ 5	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
53	MAWTS LZ 1	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
54	MAWTS LZ 2	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
55	MAWTS LZ 3	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
56	MAWTS LZ 4	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
57	R-410 LZ 1	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
58	R-200 LZ 1	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
59	R-205 LZ 1	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
60	R-205 LZ 2	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
61	R-220 LZ 1	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
62	R-401 LZ 1	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
63	R-400 LZ 1	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
64	R-230 LZ 1	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
65	R-230 LZ 2	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
66	R-620 LZ 1	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
67	R-620 LZ 2	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
68	CP 30 LZ 1	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
69	CP 30 LZ 2	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
70	CP 49 LZ 1	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
71	CP 40 LZ 1	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
72	R-230 LZ 3	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
73	R-230 LZ 4	LZ	4	0.52	0.34	0.13	0.05	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
24	CLZ 1	CLZ	5	0.59	0.38	0.15	0.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
25	CLZ 2	CLZ	5	0.59	0.38	0.15	0.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
26	CLZ 3	CLZ	5	0.59	0.38	0.15	0.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
27	CLZ 4	CLZ	5	0.59	0.38	0.15	0.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
28	CLZ 5	CLZ	5	0.59	0.38	0.15	0.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
29	CLZ 6	CLZ	5	0.59	0.38	0.15	0.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
30	CLZ 7	CLZ	5	0.59	0.38	0.15	0.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
31	CLZ 8	CLZ	5	0.59	0.38	0.15	0.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
39	CLZ 9	CLZ	5	0.59	0.38	0.15	0.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
40	CLZ 10	CLZ	5	0.59	0.38	0.15	0.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
41	CLZ 11	CLZ	5	0.59	0.38	0.15	0.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
42	CLZ 12	CLZ	5	0.59	0.38	0.15	0.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
43	CLZ 13	CLZ	5	0.59	0.38	0.15	0.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
44	CLZ 14	CLZ	5	0.59	0.38	0.15	0.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
45	CLZ 15	CLZ	5	0.59	0.38	0.15	0.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
46	CLZ 16	CLZ	5	0.59	0.38	0.15	0.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
47	CLZ 17	CLZ	5	0.59	0.38	0.15	0.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
48	CLZ 18	CLZ	5	0.59	0.38	0.15	0.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
8	OLZ 10 (OP NOBLE)	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
9	OLZ 1	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
10	OLZ 2	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
11	OLZ 3	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
12	OLZ 4	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300

MV-22B Modeled Flight Profile Details Alternative 2

Proposed					Busy Month Sorties during each acoustic time period			Transit			Conversion			Hover/Land		
PRIORITY	AMZ mission destination	AMZ type	Annual Sorties	Busy Month Sorties	Day (0700-1900)	Eve (1900-2200)	Night (2200-0700)	Duration	Speed (KIAS)	Altitude (ft AGL)	Duration	Speed (KIAS)	Altitude (ft AGL)	Duration	Speed (KIAS)	Altitude (ft AGL)
13	OLZ 5	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
14	OLZ 6	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
15	OLZ 7	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
16	OLZ 8	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
17	OLZ 9	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
18	OLZ 11	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
19	OLZ 12	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
20	OLZ 13	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
21	OLZ 14	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
32	OLZ 15	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
33	OLZ 16	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
34	OLZ 17	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
35	OLZ 18	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
36	OLZ 19	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
37	OLZ 20	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
38	OLZ 21	OLZ	20	2.55	1.66	0.64	0.25	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300
1	PZ 1 (CHB2(H) EAST)	PZ	86	10.70	6.96	2.68	1.06	30 mins	230	300 - 10K	15 mins	110	50 - 1000	15 mins	50	50 - 300

Existing Annual flight Operations for Expeditionary Airfield at MCAGCC 29 Palms from MV-22 West Coast Basing EIS (DoN, 2009

Assumed Category	Aircraft Type		Departure				Non Break Arrival				Overhead Break				Touch and Go (1)				Camp Wilson (1)				Drop Zone Sandhill (1)				Grand Total			
			Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
Jet	F-18A/C		3	4	-	7	-	-	-	-	6	-	-	6	1	2	-	3	-	-	-	-	-	-	-	-	10	6	-	16
	F-18E/F		3	4	-	7	-	-	-	-	6	-	-	6	1	2	-	3	-	-	-	-	-	-	-	-	10	6	-	16
	AV-8B		7	9	-	16	1	1	-	2	14	-	-	14	1	2	-	3	-	-	-	-	-	-	-	-	23	12	-	35
	UC-35(3)		10	12	-	22	11	10	-	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21	22	-	43
	C-20		10	12	-	22	11	10	-	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21	22	-	43
	C-17		3	3	-	6	3	3	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	6	-	12
Prop	C-12		77	94	-	171	90	77	3	170	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	167	171	3	341
	UAV		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	88	132	-	220	88	132	-	220
	E-2/C-2		1	-	-	1	1	-	-	1	-	-	-	-	8	-	-	8	-	-	-	-	-	-	-	-	10	-	-	10
	C-130		1	2	-	3	2	1	-	3	-	-	-	-	2	2	-	4	-	-	-	-	-	-	-	-	5	5	-	10
Helo	CH-53E		93	113	-	206	109	93	4	206	-	-	-	-	9	11	-	20	10	7	-	17	8	12	-	20	229	236	4	469
	CH-46E		144	175	-	319	173	147	7	327	-	-	-	-	6	7	-	13	16	10	-	26	8	12	-	20	347	351	7	705
	MV22B	T&R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		WTI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Desert Talon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AH-1(4)		79	97	-	176	93	79	4	176	-	-	-	-	18	22	-	40	-	-	-	-	-	-	-	-	190	198	4	392
	UH-1		79	97	-	176	93	79	4	176	-	-	-	-	18	22	-	40	-	-	-	-	-	-	-	-	190	198	4	392
	SAR		59	72	-	131	69	59	3	131	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	128	131	3	262
	H-60		10	12	-	22	12	10	-	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22	22	-	44
Modeled Total			431	526	-	957	494	422	19	935	26	-	-	26	54	68	-	122	26	17	-	43	16	24	-	40	1,047	1,057	19	2,123
Not Modeled Total			148	180	-	328	174	147	6	327	-	-	-	-	10	2	-	12	-	-	-	-	88	132	-	220	420	461	6	887
Grand Total			579	706	-	1,285	668	569	25	1,262	26	-	-	26	64	70	-	134	26	17	-	43	104	156	-	260	1,467	1,518	25	3,010

Notes: day = 0700-1900 local; eve = 1900-2200 local; night = 2200-0700 local
(1) Counted here as two (2) operations
(2) Modeled aircraft are shaded
(3) Modeled as Cessna-500
(4) Modeled as UH-1

Proposed Annual flight Operations for Expeditionary Airfield at MCAGCC 29 Palms from MV-22 West Coast Basing EIS (DoN, 2009)

Assumed Category	Aircraft Type		Departure				Non Break Arrival				Overhead Break				Touch and Go (1)				Camp Wilson (1)				Drop Zone Sandhill (1)				Grand Total			
			Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
Jet	F-18A/C		3	4	-	7	-	-	-	-	6	-	-	6	1	2	-	3	-	-	-	-	-	-	-	-	10	6	-	16
	F-18E/F		3	4	-	7	-	-	-	-	6	-	-	6	1	2	-	3	-	-	-	-	-	-	-	-	10	6	-	16
	AV-8B		7	9	-	16	1	1	-	2	14	-	-	14	1	2	-	3	-	-	-	-	-	-	-	-	23	12	-	35
	UC-35		10	12	-	22	11	10	-	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21	22	-	43
	C-20		10	12	-	22	11	10	-	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21	22	-	43
	C-17		3	3	-	6	3	3	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	6	-	12
Prop	C-12		77	94	-	171	90	77	3	170	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	167	171	3	341
	UAV		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	88	132	-	220	88	132	-	220
	E-2/C-2		1	-	-	1	1	-	-	1	-	-	-	-	8	-	-	8	-	-	-	-	-	-	-	-	10	-	-	10
	C-130		1	2	-	3	2	1	-	3	-	-	-	-	2	2	-	4	-	-	-	-	-	-	-	-	5	5	-	10
Helo	CH-53E		93	113	-	206	109	93	4	206	-	-	-	-	9	11	-	20	10	7	-	17	8	12	-	20	229	236	4	469
	CH-46E		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	MV22B	T&R	657	395	101	1,153	125	75	19	219	532	320	82	934	368	222	56	646	-	-	-	-	90	58	18	166	1,772	1,070	276	3,118
		WTI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Desert Talon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AH-1		79	97	-	176	93	79	4	176	-	-	-	-	18	22	-	40	-	-	-	-	-	-	-	-	190	198	4	392
	UH-1		79	97	-	176	93	79	4	176	-	-	-	-	18	22	-	40	-	-	-	-	-	-	-	-	190	198	4	392
	SAR		59	72	-	131	69	59	3	131	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	128	131	3	262
	H-60		10	12	-	22	12	10	-	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22	22	-	44
Modeled Total			944	746	101	1,791	446	350	31	827	558	320	82	960	416	283	56	755	10	7	-	17	98	70	18	186	2,472	1,776	288	4,536
Not Modeled Total			148	180	-	328	174	147	6	327	-	-	-	-	10	2	-	12	-	-	-	-	88	132	-	220	420	461	6	887
Grand Total			1,092	926	101	2,119	620	497	37	1,154	558	320	82	960	426	285	56	767	10	7	-	17	186	202	18	406	2,892	2,237	294	5,423

Notes: day = 0700-1900 local; eve = 1900-2200 local; night = 2200-0700 local
(1) Counted here as two (2) operations
(2) Modeled aircraft are shaded
(3) Modeled as Cessna-500
(4) Modeled as UH-1

APPENDIX D
DESCRIPTION OF CUMULATIVE PROJECTS

Project-specific site improvements or design features, as well as proposed size of each structure or infrastructure footprint for each of the projects, are summarized below for all known and reasonably foreseeable future actions at Mainside that may have impacts additive to the effects of the proposed alternatives.

P-128: Electrical Infrastructure Upgrades, 34.5KV to 115KV

P-128 would construct and extend utilities to the new substation constructed by P-127 in support of planned facilities in the North Mainside build-out area. The project would construct the Leatherneck substation and upgrades to the Hi-Desert and Carodean substations off-base.

The new transmission substation would be constructed with three, regulated transmission sub-station transformers (115 kilovolt [kV] & 34.5kV) and 115kV and 38kV switching and protective devices would be constructed at Building 3083J in the vicinity of the existing Ocotillo switching station. Existing substation upgrades include upgrading the existing Southern California Edison dedicated 34.5kV medium voltage distribution system to a 115kV high voltage transmission system, and adding a new 115kV high voltage transmission loop. In addition, a new 3-phase, 3-wire, 34.5kV medium voltage distribution line on 60-foot (ft) class I poles would be extended.

Supporting Facilities include utility easements for the new utility corridor off-base.

This project is planned to occur in Fiscal Year (FY)10.

P-175: Consolidated Emergency Response Center

P-175 would construct a 29,504-square foot (sf) two-story consolidated emergency response center for the Provost Marshalls Office and main base Fire Department. This project is needed to provide an adequate consolidated facility for the emergency response functions of Marine Corps Air Ground Combat Center (MCAGCC) that can meet all compliance requirements for life/safety/fire/seismic and quality of life standards, and meet the basic anti-terrorism/force protection standards of construction and set back distances from adjacent roadways and parking. Co-location of Police and Fire Departments would provide a continuity of operations in the emergency response and dispatching areas.

The Fire Station would comprise approximately 22,906 sf of the building, while the Provost Marshalls Office would comprise 6,598 sf. Specific building construction would include seven double deep drive thru bays with large roll-up doors for fire apparatus and equipment, individual sleeping rooms with personnel lockers for 3-Engine Company, hose drying space, radio antenna for receiving fire alarms, secured storage room, combination day room and training area, dining room, kitchen, exercise room and medical deep sinks, and floor drain in each bay with oil-water separator, emergency standby generator, vehicle exhaust system, compressed air system, fireman gear lockers, steam generator and medical vault/secure storage container, a reinforced concrete arms vault with the appropriate security measures, prisoner-holding cells, radio antenna equipped with state of the art Space and Naval Warfare Systems Command (SPAWAR) security system for Military Police, administrative areas, and Navy Marine Corps Intranet computer room.

Site improvements would include sidewalks, parking lots for organizational vehicles, roadway access, storm water pollution measures and prevention plans, grading and landscaping. Supporting facilities would include site and building utility and communication connections (water, sanitary sewers, electrical, telephone, local area network and cable television). Electrical systems would include fire alarms, exterior lighting, energy saving electronic monitoring and control system, intrusion detection system, information

systems, and an electrical transformer. Mechanical systems would include plumbing, fire protection, heating ventilation and air conditioning, and fire hydrants.

P-175 would also demolish Buildings 1407, 1408, and 1516 (all replaced fire and provost stations).

This project is planned to occur in FY12.

P-190: MCAGCC Band Facility

P-190 would construct a permanent facility (15,389 sf) to house Marine Corps Band personnel at MCAGCC Twentynine Palms. This project would construct a low-rise, single-story band building. The facility would include large and small group rehearsal rooms, recording/audio control room, individual practice rooms, administrative spaces, library, toilet rooms, storage, and receiving space. Special construction features would include sound attenuation and a loading dock.

Paving and site improvements would include an asphalt-paved area for drilling, 8-foot chain link fencing and gates, non-organizational parking, sidewalks, and a trash enclosure. The pitched standing seam metal roof cannot accommodate the mechanical equipment that used to be located on flat roof systems. Therefore, an enclosed, mechanical yard would be required to house mechanical units.

This project is planned to occur in FY14.

P-191: Addition to Camp Wilson Gym (Building 5411)

P-191 consists of a pre-engineered building (3,208 sf) as an addition to the existing Camp Wilson Gym (Building 5411). The addition is needed to achieve required machine spacing and meet safety requirements of 36 inches between equipment and for pathways. The building would be built adjacent to the southwest wall of Building 5411. The buildings would be accessible through the existing main entrance into Building 5411 and by two 12-ft openings that would be cut into the adjacent walls. The addition would include two unisex heads, each with only a sink and a toilet. White lights would be used to light the building and rubber matting would be used for flooring.

Supporting Facilities would include electrical utilities, water utilities, sanitary sewer utilities, gas utilities, steam, and controls. Paving and Site Improvements would include paved roads and parking, curbs and gutters, specialty walks/pavers, sidewalks, pedestrian and bicycle features, stormwater drainage improvements, and fencing & gates.

This project is planned to occur in FY14.

P-192: Deadman Lake Sub-Basin Well Field

P-192 involves developing the Deadman Lake sub-basin aquifer by drilling and installing three new potable water production wells at 750 gallons/minute, a new three-million gallon ground-level reservoir, four new well and pump control buildings, and approximately 15,000 linear feet of 8-inch potable water transmission lines from three wells to the new reservoir and to the existing potable water transmission lines for blending of groundwater from the Surprise Springs sub-basin aquifer. The development of the Deadman Lake sub-basin and blending would prolong the usefulness of Surprise Springs sub-basin and sustain MCAGCC potable water demands to an estimated 75 years.

Structural fill is required as a special foundation requirement for the ground-level reservoir. Electrical system includes Systems Control and Data Acquisition (SCADA) system, electrical distribution system, exterior lighting, pad-mounted transformers, and emergency back-up generators. Mechanical system includes well controls and valves, blending manifold, and chemical constituent monitoring meters. Paving and site improvements include gravel access roads to well heads and reservoir, chain link fencing

and gates, and anti-terrorism/force protection and Safe Drinking Water Act security requirements at wells, pump houses and reservoir sites.

This project is planned to occur in FY14.

P-194: Convert Building 2025 to Wheeled Vehicle Maintenance Facility

P-194 would renovate and repair Building 2025, a 22,680-sf facility constructed of pre-cast, tilt-up, concrete in 1986. Building 2025 is used to maintain heavy equipment and Humvees. The south side of the building is used for field utility equipment (lights, generators) and a tire shop. A portion of the building is used for tire storage, and there is a sunshade adjacent to Building 2025 where maintenance is currently being conducted when there is not enough space to complete work in the maintenance bays. Building 2025 is in fair condition, but is a large, poorly designed space.

P-194 would convert the existing warehouse space into 12 wheeled vehicle maintenance bays, while the existing office space would be relocated adjacent to the existing toilet rooms. The existing metal stud walls, doors, ceilings and flooring would be demolished and replaced with new 20 gage metal stud walls finished with abuse-resistive drywall. Four openings would be saw cut in the exterior walls on the western and eastern sides of the facility to accommodate new electric roll-up doors. Ramps would be added to the west side of the building, leading to the existing loading dock, to provide access to the new service bays. A new, self-supporting metal canopy would be erected on the west side of the facility, adjacent to the existing tire shop, to provide tire storage. The storage area would be secured with a chain-link fence and gate. Upgrades/improvements would also be made to toilet rooms, mechanical systems, power distribution equipment, heating systems, ventilation systems, interior (air handling unit) and exterior (remote condensing unit) air conditioning units, lighting,

Site improvements would include storm water drainage improvements. Electrical systems would include communications, electrical distribution, exterior lighting, and a 500 kilovolt-ampere (KVA) pad-mounted transformer. Special construction includes a separate hazardous materials containment area, with provisions for proper ventilation, expansion of the vehicle exhaust system, and a crane center to accommodate two 20-25,000 pound (lb) top running cranes, lube systems, and compressed air systems.

This project is planned to occur in FY13.

P-504: Consolidated Community Support Facility

P-504 would construct a 114,356-sf multi-story consolidated family services and community support facility consisting of an administrative facility (32,442 sf), family services center (13,003 sf), religious ministry facility (12,938 sf), and parking structure (55,972 sf). This project is needed to provide community and service support facilities that are centrally located to adequately serve the families and service members stationed at MCAGCC. A consolidated facility, prominently sited in the central core area of the base, would provide the visibility and access to the public that these various programs require. Consolidation would also permit an economy of scale with many common functions shared by the different service groups. The single, new facility, with current energy efficient construction and connection to the central heating and cooling system, would also significantly reduce energy consumption, operating, and maintenance costs over the present demands.

Site improvements would include sidewalks, outdoor amenities, roadway access, earthwork, grading and landscaping. Electrical systems would include fire alarms, energy saving electronic monitoring and control system, and information systems. Mechanical systems would include plumbing, fire protection systems, heating ventilation and air conditioning, connections to a central chilled water plant and high

temperature hot water lines with secondary distribution loops, and installation of an additional modular chiller unit to the existing central chilled water plant. Special construction features would include two elevators with four stops each.

P-504 would also demolish Buildings 1521, 1523, 1525 and 1551 (a total of 58,388 sf of inadequate facilities) permitting the redevelopment of the site. The existing buildings to be demolished were built in 1953 and have uninsulated concrete walls and ceilings. Heating and cooling loads due to infiltration and lack of insulation have made these old facilities inefficient and increasingly costly to operate.

This project is planned to occur in FY12.

P-571: Roads Southeast Access

P-571 would construct additional roads to and from ranges. The following four routes are being considered:

- From the base of Range 500 in Cleghorn Pass training area in a southerly direction to the Bureau of Land Management (BLM) corridor off base, through the corridor in a northeasterly direction through the Bullion Pass into the Bullion Training Area, and intersecting the Bullion main supply route (MSR) within 2500 meters of the southern base boundary (on base).
- From Amboy Road, off base, on the northern side of the Wilderness Area on the southeastern corner of American mine Training Area, in an westerly direction, to the base boundary, then along the southern base boundary in South American mine, to the bullion Training Area, to the Bullion Training Area MSR near the southern Base boundary.
- From Amboy Road into the center of the American Mine training area, (either by the northern jeep trail or by the eastern jeep trail, to the vicinity of Observation Post (OP) Buff (base of ridge) and then as terrain allows into the Bullion Training Area and egressing into Bullion Training Area to the vicinity of OP Frito.
- From OP Crampton road at the base of the mountain and wash to the top of the hill near the old abandoned pre-engineered building via Delta/Prospect/Miner's pass MSRs.

This project is planned to occur in FY14.

P-602: Training Integration Center

P-602 would construct a 41,635-sf multi-story Training Integration Center to provide to provide a consolidated, efficiently configured, processing center and adequate temporary billeting for newly arriving junior enlisted students. The first level of the facility would contain a single primary entrance, duty room/control point with linen issue and storage, administrative processing areas, 250 occupant multi-purpose space, recreation/television viewing areas, multi-media classroom, library and study areas, public restrooms, and equipment storage lockers/rooms. The upper levels would consist of open bay barrack spaces for temporary billeting with central laundry, janitorial and vending spaces. There would be four squad bays per floor; each squad bay would hold 20 students for a total sleeping capacity of 240 students. Each bay would have direct access to its own shower/restroom facilities. Student barracks would comprise 33,583 sf of the facility, while 8,051 sf would comprise the processing center. Community and service core areas would consist of laundry facilities, TV lounge, administrative offices, housekeeping areas and public restrooms.

Site improvements would include sidewalks, outdoor recreation facilities/courts, bus drop off lane, earthwork/grading, storm water management, and water efficient landscaping. Electrical systems would

include fire alarms, energy saving electronic monitoring and control system, and information systems. Mechanical systems would include plumbing, fire protection systems, heating ventilation, and air conditioning. Built-in equipment would include one service elevator. Connections to the high temperature hot water lines with secondary distribution loops would also be constructed.

This project is planned to occur in FY13.

P-603: Vehicle Training and Equipment Facility

P-603 would include alterations and additions to Building 1855 (27,706 sf) to provide the required vehicle maintenance space for the assigned communications vehicles of the Marine Corps Communications Electronics School. P-603 would construct classroom and covered exterior instruction space for drivers of tactical vehicles and communications equipment operators. Permanent facilities would be constructed of concrete and masonry construction, steel roof framing, decking, and 5-ply built-up roofing. The project would include the construction insulated and air conditioned classroom space, a vehicle hoist in the maintenance facility, heads for male and female students, and covered parking space for communications vehicles.

This project is planned to occur in FY15.

P-617: Waste Handling and Recovery Complex

P-617 would construct a material recovery facility complex, consisting of four separate buildings: a general waste sorting facility (6,501 sf), recycled material sorting and bailing facility (8,999 sf), recycled material storage building (7,502 sf), vehicle holding shed (2,357 sf), and a multi-story administrative support facility (11,216 sf) for the Natural Resources and Environmental Affairs Division that includes the Sections of Administrative, Compliance, Pollution Prevention, Hazardous Waste, Natural & Cultural Resources, Total Waste Management, and Range Residue Processing. The project would allow for complete management of solid waste through a material recovery facility complex to remove all recyclables prior to disposal in the expanded compliant sanitary landfill, thus allowing MCAGCC to meet its regulatory requirements by extending the life of the landfill another 15 to 20 years.

Each facility in the complex would be constructed with concrete slab on grade and insulated standing seam metal roofing over steel framing. The two-bay vehicle holding shed would be cantilever type with a photovoltaic system. Site improvements would consist of site preparation, access roads, appropriate site drainage measures for a 100 year flood, oil water separator, concrete and asphalt flatwork, screened perimeter fencing, and staff/employee parking lots. Electrical systems would include exterior lighting, electrical utilities, and outside communications lines. Mechanical systems would include heating/ventilation and air conditioning with the highest Energy Efficiency Ratio per tonnage.

P-617 would also demolish Building 1451 and eight relocatable administrative trailers.

This project is planned to occur in FY13.

P-618: Multi-Purpose Administration Building

P-618 would provide an administration building (29,084 sf) to house the general administration functions that support the Combat Center and replace the six, old, single story buildings that are safety hazards and energy consuming structures. Building 1551 (old hospital) would also be demolished. A three story, permanent facility would be constructed of reinforced steel, concrete framing, and masonry block infill. The project would provide sidewalks, landscaping, irrigation, paved parking, curbs and gutters, exterior lighting and 40 tons of air conditioning.

Supporting facilities include electrical, water, sanitary sewer and gas utilities. Paving and site improvements include signage, landscaping and irrigation, roads, and sidewalks.

This project is planned to occur in FY14.

P-641: Addition East Gym 1588

P-641 would construct a 19,999-sf multi-story addition including renovation to the existing east gymnasium (Building 1588) at MCAGCC Twentynine Palms. The addition would be constructed of reinforced concrete slab-on-grade with perimeter footing and spread beam foundation, reinforced concrete masonry exterior walls, and a standing seam metal roof. Special construction features include sound attenuation and upgrades to the building's existing electrical distribution system to handle the increased load.

Site preparation would include excavation, grading, structural fill and site cleanup. Site improvements would include sidewalks and an additional 160 surface parking spaces. Electrical systems would include communications, fiber optic, electrical distribution, and a 300 KVA transformer to replace the existing 225 KVA transformer. Mechanical systems would include potable water utilities, fire hydrants, mechanical utilities, sanitary sewer utilities, and an Energy Management Control System.

P-641 would also include miscellaneous demolition to permit the expansion of the existing facility, including removal of a store front system, concrete sidewalk, steps, and railing.

This project is planned to occur in FY12.

P-662: Expeditionary Fighting Vehicle Maintenance Facility

This project would construct a new Expeditionary Fighting Vehicle (EFV) Maintenance Facility (67,371 sf) to accommodate 58 EFV tracked and non-tracked vehicles for the 3rd Amphibious Assault Battalion. The primary facility would consist of a 10,514-sf Amphibian Vehicle Maintenance Shop and a 3,868-sf Automotive Organizational Shop. The facilities would be constructed with reinforced concrete masonry block walls, concrete foundation, concrete slab, and a standing seam metal roof over steel trusses. The maintenance facilities would include six Maintenance Bays to perform maintenance on Expeditionary Fighting Vehicles.

This project would also constructs a 39,310-sf Vehicle Holding Shed to protect wheeled and tracked armored vehicles from accelerated deterioration due to extreme environmental conditions and a 9,054-sf Closed Loop Tactical Vehicle Wash Platform with six washracks, including a crane to remove engines to allow for secondary hull cleaning. This project would construct 4,628 sf of office space. Paving and Site Improvements would include paved privately-owned vehicle parking, sidewalks, roadway access, earthwork, grading and landscaping. Anti-terrorism/force protection features include fencing, barriers and gates

This project is planned to occur in FY14.

P-808: Concrete Ramp, F/W; Expeditionary Air Field (EAF)

P-808 would construct a 742,904-sf reinforced concrete aircraft parking apron with areas for hangar access, aircraft re-fueling, supporting yellow gear, and ordnance handling sleds. It would also construct all associated drainage structures and installed all airfield lighting. The project would replace the current apron with permanently installed, reinforced concrete pavement. The project would include all necessary excavation cut and fill, shoulders, drainage structures, environmental mitigation, airfield lighting, service area lighting, and security lighting.

This project is planned to occur in FY14.

P-810: Concrete Taxiway

P-810 would replace the Expeditionary Airfield taxiway and throats constructed of interlocking aluminum matting with 943,326 sf of new, permanently installed, reinforced concrete pavement. The project includes all necessary excavation cut and fill, shoulders, drainage structures, environmental mitigation, airfield lighting, service area lighting, and security lighting as required. This project is planned to occur in FY15.

P-900: Marine Corps Communication and Electronic Classroom

P-900 would construct a 91,762-sf three-story academic and applied instruction facility for the training mission at MCAGCC in direct support of the Marine Corps Communications and Electronic School (MCCES). Community and service core areas would consist of instructor administrative spaces, multipurpose rooms, housekeeping areas and public restrooms. Special building design would include built-in equipment for two freight elevators, one-hour construction walls for computer areas, and raised flooring in all classroom and laboratory areas.

Site improvements would include paved parking, sidewalks, outdoor furniture, lighting, roadway access, earthwork, grading and landscaping. Electrical systems would include fire alarms, energy saving electronic monitoring and control system, and information systems. Mechanical systems include plumbing, fire protection systems, heating ventilation and air conditioning, and connections to a central chilled water plant and relocation of high temperature hot water lines with secondary distribution loops.

P-900 would also demolish two existing classrooms, Buildings 1757 and 1758 (each 30,160 sf).

This project is planned to occur in FY13.

P-902: MCCES Bulk Supply Warehouse

P-902 would provide a new, permanent, single-story, concrete warehouse building (12,109 sf) in direct support of the Marine Corps Communications and Electronic School (MCCES), located within the boundaries of the MCCES campus. The building would consist of concrete foundation, concrete floor slab reinforcement run continuously through both faces of the slab and into beams and columns, tilt-up concrete walls, and sloped standing seam metal roofing. The building would have open web steel joist roof support. Community and service core areas would consist of administrative offices, housekeeping areas and public restrooms.

Supporting facilities work would include site and building utility connections (water, sanitary sewers, electrical, telephone, local area network and cable television). Electrical systems would include fire alarms, energy saving electronic monitoring and control system (EMCS), and information systems. Mechanical systems would include plumbing, fire protection systems, heating ventilation and air conditioning. Paving and site improvements would include loading docks, sidewalks, roadway access, earthwork, grading and landscaping.

This project is planned to occur in FY14.

P-903: MCCES Consolidated Radar Classroom

P-903 would consolidate radar training that is currently located in three obsolete buildings constructed in 1967. This project would construct an approximately 32,292-sf consolidated radar classroom. The project would also construct five external radar sites adjacent to new facility. Buildings 1826, 1828, & 1839 would be demolished as a part of this project.

This project is planned to occur in FY14.

P-921: Electronic/Communications Maintenance & Storage Facility

P-921 would construct a consolidated electronic and communications maintenance shop (10,204 sf) and unit storage facility (24,649 sf). Community and service core areas would consist of administrative offices, maintenance shops, public restrooms, and storage areas.

Site improvements would include a loading dock, concrete pavement for the loading area, sidewalks with curbs and gutters, new roadway access to the west side of the new building, earthwork, grading, landscaping, shaded vehicle yards surrounded with security fences and gates, repair of storm drainage, and repair of existing roadway access. Electrical systems would include fire alarms, energy saving electronic monitoring and control system, and information systems including public address system and security monitoring system. Mechanical systems would include plumbing, fire protection systems, compressed air system and heating ventilation and air conditioning system and repair of existing high temperature hot water lines.

P-921 would demolish Buildings 1721, 1723, 1724, 1725, 1726 and 1727 (totaling 24,113 sf), including necessary asbestos and lead base paint removal and clearing of existing underground utilities.

This project is planned to occur in FY13.

P-926B: Library/Lifelong Learning Center, Phase II

P-926B is Phase II of a two-phase project that constructs a three-story facility to support the library functions at MCAGCC. Phase I of the project is to construct an adjoining three-story Life Long Learning Center (Education Center). P-926B, Phase II, would construct a 21,000-sf library to be used as be utilized as the Command Reference Center and support the increase of personnel MCAGCC. The project would construct library spaces to include large areas for office space, classrooms, book racks, computer rooms, reading rooms, and supporting areas.

Site improvement would include excavation, grading, excess material removal, curbs and gutters, parking and an access road, sidewalks, desert landscaping with irrigation, stormwater control features, pedestrian and bicycle features, and a pedestrian bridge to connect the Library and Learning Center. Special construction would include a fire pump, four stop personnel elevator, and basement excavation and shoring for an elevator maintenance room. Electrical systems would include fire alarms, energy saving Electronic Monitoring and Control System, electrical connection to the grid, exterior lighting and information system connections. The mechanical system would include fire protection systems, high temperature hot water and chilled water systems, and water and sewer connections.

This project is planned to occur in FY12.

P-927: Marine Corps Communication and Electronic Classroom

P-927 would construct a 91,106-sf multi-story academic and applied instruction facility for the training mission at MCAGCC in direct support of training at the Marine Corps Communications and Electronic School. Special design features would include one-hour construction walls for computer areas, raised flooring in all classroom and laboratory areas, and one freight elevator. Community and service core areas would consist of instructor administrative spaces, multipurpose rooms, housekeeping areas and public restrooms. Supporting facilities would include site and building utility connections, i.e., water, sanitary sewers, electrical, telephone, local area network and cable television. The building would

connect to a central chilled water plant and relocate high temperature hot water lines with secondary distribution loops.

Site improvements would include paved parking, sidewalks, outdoor furniture, lighting, roadway access, earthwork, grading and landscaping. Electrical systems would include fire alarms, energy saving electronic monitoring and control system, and information systems. Mechanical systems would include plumbing, fire protection systems, heating ventilation and air conditioning.

P-927 would also demolish two existing classrooms (each 30,160 sf), Buildings 1747 and 1748.

This project is planned to occur in FY13.

P-978: Rifle Range Water Distribution System

P-978 would construct a new 120,000-gallon ground-level reservoir that would provide required demand and pressure for the Rifle Range Area. The projects would also place 3,100 linear feet of new 12-, 8- and 6-inch potable water distribution lines in a new utility corridor connecting the 20-inch water mains to the reservoir and to the Rifle Range Complex Area. Backflow prevention and check valves devices would be installed to standard. The existing 30,000-gallon steel tank would be demolished and the existing 6-inch PVC water line from the 20-inch water main would be abandoned.

Supporting facilities would include a retaining wall constructed to prevent erosion onto the reservoir. Structural fill would be required as a special foundation requirement. Electrical systems would include communication fiber for the SCADA utilities management system, electrical distribution, exterior lighting, and a pad mounted transformer. Mechanical system would be required to reconnect new lines to existing facilities at the Rifle Range Complex. Paving and site improvements would include an access road to the reservoir, chain link fencing and gate, and closed-circuit cameras to meet Safe Drinking Water Act requirements for Anti-Terrorism. The project would provide for site preparation, including excavation and fill for the reservoir and water lines. Demolition of Building 2110 and the existing 30,000-gallon reservoir would be included in this project.

This project is planned to occur in FY15.

P-980: Substation SCADA System

P-980 would provide an Electrical Distribution SCADA system for Mainside of MCAGCC at Twentynine Palms. Construction would include the installation of fiber optic lines and associated equipment from eleven existing substations to existing Main Control Room located in the Heating Plant (Building 1557) via Co-Gen Plant (Building 1574). Construction would include reconfiguration of existing Main Control Room located in the Heating Plant in order to accommodate new SCADA system. The project would also include revising and displaying the substation control wiring and one-line diagram in each of the substations. The one-line diagram would be displayed in a lockable glass case.

This project is planned to occur in FY14.

P-987: Addition to Temporary Lodging Facility

P-987 would construct a two-story, 20-room, 8,860-square foot, detached addition, to the existing facility and a 6,050-square foot macadam parking lot to accommodate the additional occupancy. Other project components include paving and site improvements including parking, sidewalks, earthwork, grading, and landscaping. The Temporary Lodging Facility is required to provide lodging to military members and their families assigned to the Marine Corps Air Ground Combat Center (MCAGCC), while they await assignment to government quarters or locate housing in the local community.

This project is planned to occur in FY12.

P-988: MCAGCC Gate Reconfiguration, ATFP Upgrades

P-988 would construct a new gate house facility (2,497 sf) including vehicle inspection lanes, sentry inspection houses (194 sf) and related supporting facilities at the Main Gate and two auxiliary gates at MCAGCC 29 Palms, California.

Supporting facilities would include a special foundation of borrow and fill of entrance areas, electrical requirements of transformer, electrical distribution, overhead lighting, interior communications and telephone; mechanical utilities includes connection to water, sewer, and natural gas. Site improvements would include grading, asphalt and concrete pavements, concrete curbs, concrete dividers, traffic medians, sidewalks, parking areas, overhead signs, road striping and traffic signs, flag poles, and landscaping and irrigation.

P-988 would demolish existing gate facilities and related asphalt and concrete pavement, concrete curbs and related supporting facilities. The project would also demolish five gate facilities totaling 1,456 square feet: Buildings 900, 901, and 904 (Main Gate), 1000 (Condor Gate), and 3334 (Ocotillo Gate).

This project is planned to occur in FY13.

P-991: Land Expansion Phase 1

P-991 would acquire land that would allow for the expansion of maneuver training land and special use airspace capacity to meet emergent and future maneuver training area requirements. The total proposed acquisition includes both MILCON P-991 and P-992. The cumulative land expansion area being studied is in three areas bordering MCAGCC's western, northeastern, and southeastern boundaries. Based on preliminary assessments, approximately 95% of the land proposed for acquisition is under the Department of the Interior management and is undeveloped. Based on preliminary assessments, non-federal land including private property accounts for approximately 10,000 acres of the total acreage.

This project is planned to occur in FY12.

P-992: Land Expansion Phase 2

P-992 would acquire land that would allow for the expansion of maneuver training land and special use airspace capacity to meet emergent and future maneuver training area requirements. The total proposed acquisition includes both MILCON P-991 and P-992. The cumulative land expansion area being studied is in three areas bordering MCAGCC's western, northeastern, and southeastern boundaries. Based on preliminary assessments, approximately 95% of the land proposed for acquisition is under the Department of the Interior management and is undeveloped. Based on preliminary assessments, nonfederal land including private property accounts for approximately 10,000 acres of the total acreage.

This project is planned to occur in FY13.