Volume I

Final

Environmental Impact Statement

LAND ACQUISITION AND AIRSPACE ESTABLISHMENT

to

Support Large-Scale Marine Air Ground Task Force Live Fire and Maneuver Training

Marine Corps Air Ground Combat Center
Twentynine Palms, CA

July 2012

Final

ENVIRONMENTAL IMPACT STATEMENT

LAND ACQUISITION AND AIRSPACE ESTABLISHMENT

To Support Large-Scale MAGTF Live-Fire and Maneuver Training at the Marine Corps Air Ground Combat Center, Twentynine Palms, CA

July 2012

How to Use This Document

Our goal is to provide you with a reader-friendly document that presents an in-depth, accurate analysis of the proposed action, the various action alternatives, the No-Action Alternative, and their potential environmental consequences. The organization of this Environmental Impact Statement (EIS) is shown below. We have divided it into two volumes for ease of handling and reference.

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Final
ENVIRONMENTAL IMPACT STATEMENT

Lead Agency:	Department of the Navy
Title of Proposed Action:	Land Acquisition and Airspace Establishment To Support Large-Scale MAGTF Live-Fire and Maneuver Training at the Marine Corps Air Ground Combat Center, Twentynine Palms, CA
Affected Jurisdiction:	San Bernardino County, CA
Designation:	Environmental Impact Statement

Abstract

This Environmental Impact Statement (EIS) has been prepared to evaluate the potential environmental impacts associated with the proposed establishment of a large-scale training range facility at the Marine Corps Air Ground Combat Center at Twentynine Palms, California (the "Combat Center") that would accommodate sustained, combined-arms, live-fire, and maneuver training for all elements of a Marine Expeditionary Brigade (MEB). To implement the proposed action, the Marine Corps would acquire additional land adjacent to the Combat Center, establish and modify military Special Use Airspace (SUA) above the proposed MEB-sized training range, and conduct the specified MEB training.

The purpose of the proposed action is to fulfill the Marine Corps' requirement to provide sustained, combined-arms, live-fire, and maneuver field training for MEB-sized Marine Air Ground Task Forces (MAGTFs), each consisting of three battalion task forces and associated command, aviation, and combat logistics support elements. This training requirement, drawn from a November 2006 Marine Requirements Oversight Council decision that validated the need to establish a large-scale MAGTF training area, stems from the Marine Corps strategy to increasingly employ MEBs as the primary contingency response force. The proposed action is needed because existing training facilities, ranges, and live-fire ground and air maneuver areas are inadequate to support the requirement for MEB-sized training exercises.

This EIS 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*.

Potential impacts from six action alternatives and the No-Action Alternative have been analyzed. Potential impacts have been analyzed for land use, recreation, socioeconomics and environmental justice, public health and safety, visual resources, transportation and circulation, airspace management, air quality, noise, biological resources, cultural resources, geological resources, and water resources.

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July 2012

EXECUTIVE SUMMARY

This Environmental Impact Statement (EIS) evaluates the potential environmental impacts associated with the proposed establishment of a large-scale training range facility at the Marine Corps Air Ground Combat Center at Twentynine Palms, CA (hereafter called the "Combat Center") that would accommodate sustained, combined-arms, live-fire, and maneuver training for all elements of a Marine Expeditionary Brigade (MEB), including large-scale MEB Exercises involving three battalion task forces and associated MEB Building Block training[1] for participating units up to a single battalion task force. To implement the proposed action, the Marine Corps would acquire additional land adjacent to the existing Combat Center, establish and modify military Special Use Airspace (SUA) above the proposed MEB-sized training range, and conduct the specified MEB training. This EIS 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 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.*

PURPOSE AND NEED

The purpose of the proposed action is to fulfill the Marine Corps' requirement to provide sustained, combined-arms, live-fire, and maneuver field training for MEB-sized Marine Air Ground Task Forces (MAGTFs), each consisting of three battalion task forces and associated command, aviation, and combat logistics support elements. This training requirement, drawn from a November 2006 Marine Requirements Oversight Council decision that validated the need to establish a large-scale MAGTF training area, stems from the *Marine Corps Strategy 21* commitment to increasingly employ MEBs as the primary contingency response force. Marine Expeditionary Brigades must be capable of performing a variety of missions throughout the spectrum of conflict because they will encounter complex situations containing asymmetric threats, nonlinear battlefields, and unclear delineation between combatants and noncombatants. To overcome these challenges and operate effectively, MEBs must be able to conduct maneuver-intensive operations over extended distances, supported by closely coordinated precision fires, aviation-delivered ordnance, and sustained, focused logistical support. Large-scale MAGTF training currently relies on classroom instruction, command post exercises, and simulation to accomplish staff training requirements. These methods offer limited practical experience and cannot provide realistic training opportunities that enhance the capability to rapidly and effectively integrate all elements of the large-scale MAGTF into a single cohesive force. The task of successfully integrating all elements of a MEB to produce an effective, joint interoperable war-fighting organization can most effectively be accomplished through realistic training that replicates operating conditions these units are likely to encounter.

[1] Marine Corps Order 3502.6, *Marine Corps Force Generation Process*, signed 29 April 2010, requires that pre-deployment training be executed in accordance with a standardized system of four "Building Blocks": Block 1 supports individual training and unit instructor development; Block 2 supports collective training in core capabilities and theater-specific training at the Company level and below; Block 3 supports advanced collective training at the Battalion level; and Block 4 is a graduation predeployment training exercise and assessment. The MEB Exercise represents Block 4 in this system and the MEB Building Block training represents Blocks 1, 2, and 3.

The Marine Corps needs the proposed action because existing facilities, ranges, and live-fire ground and air maneuver areas are inadequate to support the requirement for MEB-sized training exercises. An effective MEB-sized Block 4 assessment exercise requires live-fire and maneuver training space (and associated airspace) for three battalion task forces, while the Marine Corps' largest training site (the Combat Center) can only accommodate live-fire and maneuver training for up to two battalion task forces. In addition, because most of the training areas aboard the Combat Center are fully committed during traditional combined arms training (which occurs over 250 days per year), Block 1-3 training for home station and external units are sometimes diminished in scope, forcing units to add remediation events to combat predeployment training to satisfy prerequisites for combat certification. The proposed action is needed to resolve training range deficiencies so that MEB training can be accommodated in accordance with the 2006 Marine Requirements Oversight Council decision and the pre-deployment readiness directives of MCO 3502.6, and so that Marines are able to train as they will fight.

PROPOSED ACTION AND ALTERNATIVES

The proposed action includes three fundamental and interrelated components:

- ***Acquisition of Land*** contiguous to the existing Combat Center to provide a sufficient area for realistic MEB-sized sustained, combined-arms, live-fire, and maneuver training that meets at least a minimum threshold level of MEB training requirements within appropriate margins of safety.
- ***Modification and Establishment of SUA*** to enable full integration of MEB-sized Aviation Combat Element operations and both air- and ground-delivered live-fire ordnance use within appropriate margins of safety.
- ***Expanded Training*** implemented as a full-scale MEB Exercise conducted twice per year for 24 continuous days each. Current levels of proficiency training (Building Block training) that may be conducted by individual home station and external units (up to a single battalion in size) when MEB Exercises are not being conducted are also analyzed in this EIS.

Alternatives for implementing 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/meet the purpose of and need for the proposed action require detailed analysis.

This EIS examines six action alternatives and the No-Action Alternative. Each of the six action alternatives features integrated land acquisition, airspace modification/establishment, and operational components. Some of these components would be the same across different alternatives. Three of the alternatives include a Restricted Public Access Area (RPAA) to allow civilian recreational use when military training activities are not being conducted. Under all alternatives, established airspace would be returned to Federal Aviation Administration (FAA) control to be made available for commercial and general aviation when not being used by the Marine Corps. Land acquisition under each action alternative would involve up to two "acquisition study areas" out of three such areas (titled in this EIS as "west study area", "east study area", and "south study area") identified for potential acquisition. One alternative (Alternative 5) would involve land acquisition in only one of the three acquisition study areas. None of the action alternatives would involve land acquisition in all three acquisition study areas.

Table ES-1 summarizes each of the action alternatives. Other action alternatives were considered but were not carried forward for analysis in this EIS 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 serves as the baseline for comparison of impacts evaluated in this EIS.

Table ES-1. Summary of Action Alternatives

Proposed Land Acquisition (Acres)[1] by Acquisition Study Area	Proposed Airspace Establishment and Modification	Proposed Expansion of Training
Alternative 1		
West (180,353) South (21,304) Total (201,657)	Establish New Airspace: • Restricted Area R-XXXX • Johnson Valley MOA/ATCAA • Sundance ATCAA • CAX MOA/ATCAA Modify Existing Airspace: • Sundance MOA: expand laterally and vertically • Bristol ATCAA: expand vertically • Turtle MOA/ATCAA: expand vertically	• MEB Exercises: 2 per year for 24 days each. • MEB Work-up: focused on western half of Combat Center and west study area. • MEB Final Exercise: - East-to-west direction of maneuver; - Two task forces assemble east side of Combat Center; one in south study area; all three converge on single MEB objective in west study area. • MEB Building Block training: 4-day evolutions in west study area up to 40 weeks/year and only unit marshalling and maneuver in south study area. • Installation of three communications towers. • Increase of 70 personnel.
Alternative 2		
Partial West (113,558) South (21,304) Total (134,863)	Establish New Airspace: • Restricted Area R-XXXX (reduced) • Johnson Valley MOA/ATCAA (reduced) • Sundance ATCAA • CAX MOA/ATCAA Modify Existing Airspace: • Sundance MOA: expand laterally and vertically • Bristol ATCAA: expand vertically • Turtle MOA/ATCAA: expand vertically	• MEB Exercises: 2 per year for 24 days each. • MEB Work-up: focused on western half of Combat Center and reduced west study area. • MEB Final Exercise: - East-to-west direction of maneuver; - Two task forces assemble east side of Combat Center; one in south study area; all three converge on single MEB objective in reduced west study area. • MEB Building Block training: 4-day evolutions in reduced west study area up to 40 weeks/year and only unit marshalling and maneuver in south study area. • Installation of three communications towers. • Increase of 65 personnel.
Alternative 3		
East (177,276) South (21,304) Total (198,580)	Establish New Airspace: • Sundance ATCAA • CAX Restricted Area Modify Existing Airspace: • Sundance MOA: expand laterally and vertically • Bristol MOA/ATCAA: reclassify as Restricted Area to 40,000 feet MSL • Turtle MOA/ATCAA: expand vertically	• MEB Exercises: 2 per year for 24 days each. • MEB Work-up: focused on eastern half of Combat Center. • MEB Final Exercise: - East-to-west direction of maneuver; - Two task forces assemble in east study area; one in south study area; all three converge on single MEB objective in northwest corner of Combat Center. • MEB Building Block training: 4-day evolutions in east study area up to 40 weeks/year and only unit marshalling and maneuver in south study area. • Installation of two communications towers; construction of four tank crossings on Amboy Road. • Increase of 59 personnel.

Continued on next page

Table ES-1. Summary of Action Alternatives

Proposed Land Acquisition (Acres)[1] by Acquisition Study Area	Proposed Airspace Establishment and Modification	Proposed Expansion of Training
Alternative 4		
West (180,353) South (21,304) Total (201,657)	Airspace configuration identical to Alternative 1	• MEB Exercises: 2 per year for 24 days each. Only non-dud producing ordnance in west study area. Restricted public access to Johnson Valley (except for two 984 x 984-foot [300 x 300-meter] Company Objective areas) permitted approximately 10 months/year. • MEB Work-up: focused on western half of Combat Center. • MEB Final Exercise: - West-to-east direction of maneuver; - Three task forces assemble in west study area; two converge on single MEB objective on east side of Combat Center; one terminates the exercise in the south study area. • MEB Building Block training would occur only within existing Combat Center boundaries (except maneuver/marshalling in south study area). • Installation of three communications towers. • Increase of 77 personnel.
Alternative 5		
West only (180,353)	Airspace configuration identical to Alternative 1	• MEB Exercises: 2 per year for 24 days each. Only non-dud producing ordnance in west study area. Restricted public access to Johnson Valley (except for two 984 x 984-foot [300 x 300-meter] Company Objective areas) permitted approximately 10 months/year. • MEB Work-up: focused on western half of Combat Center. • MEB Final Exercise: - West-to-east direction of maneuver; - Three task forces assemble in west study area; two converge on single MEB objective on east side of Combat Center; one terminates the exercise with training at the existing lands. • MEB Building Block training would occur only within existing Combat Center boundaries. • Installation of three communications towers. • Increase of 77 personnel.

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Table ES-1. Summary of Action Alternatives

Proposed Land Acquisition (Acres)[1] by Acquisition Study Area	Proposed Airspace Establishment and Modification	Proposed Expansion of Training
Alternative 6 (Preferred Alternative)		
West (146,667): - RPAA (38,137) - Exclusive Marine Corps Use (108,530) South (21,304) Total (167,971)	Airspace configuration identical to Alternative 1	• MEB Exercises: 2 per year for 24 days each. Only non-dud producing ordnance in southern portion of west study area. Restricted public access to southern portion of west study area (except for two 984 x 984-foot [300 x 300-meter] Company Objective areas) permitted approximately 10 months/year. • MEB Work-up: western half of Combat Center and part of west study area (exclusive military use area). • MEB Final Exercise: - East-to-west direction of maneuver; - Two task forces assemble east side of Combat Center; one in south study area; all three converge on single MEB objective in west study area (exclusive use parcel). • The RPAA would be used during MEB Exercises only and only non-dud producing ordnance would be used in that area. • MEB Building Block training: 4-day evolutions in the west study area (exclusive military use area only) up to 40 weeks/year and only unit marshalling/maneuver in south study area. • Installation of three communications towers. • Increase of 77 personnel.

Note: [1]Acreage is approximate.
ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; MAGTF = Marine Air Ground Task Force; MEB = Marine Expeditionary Brigade; MOA = Military Operations Area; MSL = Above mean sea level; RPAA = Restricted Public Access Area.

During the 90-day public scoping period (30 October 2008 through 31 January 2009), the Marine Corps utilized several methods to notify the public of opportunities for involvement and methods to comment during scoping. These methods included publishing a Notice of Intent (NOI), mailing scoping letters and postcards, issuing press releases and newspaper advertisements, and creating a public website for the EIS. In addition, three open-house public scoping meetings were held to provide the public the opportunity to review and learn about the Marine Corps' proposal and to express their thoughts regarding the project and alternatives. A total of 19,244 comments were received through letters, emails, written comment sheets, speaker cards, and petitions.

Scoping comments were received from various groups, including regional and local governments, environmental groups, off-highway vehicle (OHV) users, lawyers, and private citizens. The majority of comments were received from OHV users (approximately 71%) and environmental groups (approximately 21%). The main issues of concern raised in comments included impacts to:

- Land Use (prevention of other development opportunities, impacts to other current land uses);
- Recreation (decrease in area available for OHV and other recreational activities);
- Socioeconomics and Environmental Justice (decrease in revenue/employment, loss of access to mining sites, devaluation of surrounding private property, increased costs for law enforcement, decrease in OHV-related sales);

- Visual Resources (loss of natural vistas, major visual resources, and open desert habitat; potential visual impacts resulting from equipment and support structures used during training exercises);
- Noise (increase from additional training exercises and military activities);
- Airspace Management (potential impacts to the SUA for private and commercial pilots);
- Air Quality (increased air emissions, greenhouse gas (GHG) emissions, carbon footprint, dust, and regional haze);
- Biological Resources (impacts to listed, rare, and sensitive species; habitat loss; loss of wildlife corridors/linkages, violation of existing plans and policies for biological resources management);
- Cultural Resources (impacts to artifacts, historic cabins, and historic mining/freighting sites; possible destruction or elimination of historic structures and/or districts; potential violation of tribal concerns and rights); and
- Water Resources (potential to overdraft the groundwater aquifer, changes to groundwater flow patterns, and impacts to groundwater recharge potential; concerns regarding surface water impacts, including erosion and sedimentation, contamination from fuel spills and leaks, contamination from ordnance, and reduction in riparian systems and ephemeral streams; potential increased water withdrawal and acquisition of adjudicated water rights associated with private lands acquired).

The Scoping Summary Report describes the scoping process and summarizes the comments received. The Scoping Summary Report and other EIS information are available on the public website for the EIS: http://www.marines.mil/unit/29palms/las/pages/default.aspx.

This EIS analyzes potential impacts on land use, recreation, socioeconomics and environmental justice, public health and safety, visual resources, transportation and circulation, airspace management, air quality, noise, biological resources, cultural resources, geological resources, and water resources. Cumulative effects of the proposed action in conjunction with other past, present, or reasonably foreseeable future actions are also analyzed.

SPECIAL CONSERVATION MEASURES AND MITIGATION MEASURES

Mitigation is an important mechanism federal agencies can use to minimize the potential adverse environmental impacts associated with their actions. Agencies can use mitigation to reduce environmental impacts in several ways. Mitigation includes:

- Avoiding an impact by not taking a certain action or parts of an action;
- Minimizing an impact by limiting the degree or magnitude of the action and its implementation;
- Rectifying an impact by repairing, rehabilitating, or restoring the affected environment;
- Reducing or eliminating an impact over time, through preservation and maintenance operations during the life of the action; and
- Compensating for an impact by replacing or providing substitute resources or environments.

Many federal agencies rely on mitigation to reduce adverse environmental impacts as part of the planning process for a project, incorporating mitigation as integral components of a proposed project design before making a determination about the significance of the project's environmental impacts. Such mitigation can lead to an environmentally preferred outcome and in some cases reduce the projected impacts of agency actions to below a threshold of significance. Such measures are often incorporated into the proposed action, as part of the planning process, such as agency standardized best management practices

(BMPs) (e.g., to prevent stormwater runoff or fugitive dust emissions at a construction site). For the purposes of this EIS, such measures are referred to as Special Conservation Measures (SCMs). SCMs would be included in the project design and, as an integral component of the proposed action, would be implemented with the proposed action. CEQ regulations also require inclusion of mitigation measures, which are not already included as part of the proposed action. Such mitigation is distinct from SCMs as they represent additional measures, beyond the proposed action, that are being considered for further reducing, avoiding, and/or compensating for adverse effects outlined in this EIS. Proposed SCMs and mitigation measures are summarized below.

SPECIAL CONSERVATION MEASURES

As part of the proposed action (under any of the six action alternatives), the Marine Corps would implement a variety of SCMs, as summarized below, as part of the proposed action to avoid or minimize potential impacts.

Recreation

- Develop an Educational Outreach Plan and distribute educational materials (via website, public meetings, OHV events, etc.) to promote awareness of environmentally sensitive areas, responsible OHV use, and law enforcement penalties for illegal OHV use.
- Assist local governments and community members with posting of appropriate signage (for restricted use/limited use areas) at key points of entry, areas of concern, or areas that have experienced frequent illegal OHV use.
- Coordinate with County of San Bernardino law enforcement officials, other local government officials, OHV community leaders, interested community members, and other interested parties to reduce the illegal OHV use within the communities surrounding the acquisition areas.

Public Health and Safety

Additional focused measures for management of the RPAAs would be implemented under Alternatives 4, 5, or 6 (see Sections 2.5.2 through 2.5.4 of this EIS).

- The Marine Corps would initiate and maintain a persistent informational outreach program with local leaders, communities, and groups to ensure that members of the general public are aware of the change in land ownership or management and public use/access.
- Permanent signage would be staggered across the boundary lines of acquired lands (for any RPAA or exclusive military use areas) at an acceptable interval to make it difficult for anyone to enter the area without having seen a sign. Signage would be maintained.
- Barriers would be used to block access routes to reduce the possibility of unauthorized access (this would apply to both the RPAA and the exclusive military use area). Each exercise force would be required to establish manned roadblocks along all access routes, preventing any public access immediately before and throughout the training period. All barriers and roadblocks would be maintained.
- Increased military presence immediately preceding training would focus on enhancing public awareness. Military police and range personnel, along with other officials located aboard the installation, would increase presence patrols along major access routes and known assembly points in or close to acquired lands that were formerly used for public recreation.

- Before training, overflights would be conducted on two consecutive days to document any identifiable public presence in the acquired land areas, followed by efforts to contact anyone discovered by those overflights and help them to secure their removal from the training area.
- A range sweep would be required before any training events, live-fire or otherwise, and anyone discovered by a sweep would be escorted from the training area before initiation of the training event.
- As part of the permitting process for allowing public use of the RPAA on a case-by-case basis, the Marine Corps would prioritize safety as the primary consideration in permitting decisions; permits would potentially restrict the size, scope, type of activity, and location (relative to parts of the RPAA that are more intensively used during training) of any requested activity so as to minimize risks to the public.

Air Quality

Where applicable during project construction, the Combat Center would implement the following:

- Use water trucks to keep areas of vehicle movement damp enough to minimize the generation of fugitive dust.
- Minimize the amount of disturbed ground area at a given time.
- Minimize ground disturbing activities in proximity to the Combat Center boundary; and
- Discontinue proposed ground disturbing activities within 3 miles upwind of the Combat Center when boundary winds exceed 25 miles (40 kilometers [km]) per hour or when visible dust plumes emanate from the site and then stabilize all disturbed areas with water application.
- Designate personnel to monitor the dust control program and to increase dust suppression measures (e.g., watering), as necessary, to minimize the generation of dust.

Biological Resources

Four SCMs are proposed as part of the project to offset impacts to desert tortoises and desert tortoise habitat[2]. These measures have been developed by the Natural Resources and Environmental Affairs (NREA) Division at the Combat Center in consultation with the USFWS and are described in detail below.

- *New Special Use Areas.* The Combat Center would designate Special Use Areas (refer to text below for definition and categories) within the boundaries of acquired lands for the conservation of desert tortoises. Proposed Special Use Areas vary depending on the Alternative, and are depicted in Figures 2-12 through 2-17. These Special Use Areas would be designated as Category 1 (no mechanized maneuver), with the exception of a portion of the northern Special Use Area in the west study area, which would be designated as Category 2 from the existing road to the study area boundary. In a Category 2 Special Use Area, bivouacs, OHV use, or training involving vehicle activity are discouraged but not prohibited (MAGTF Training Command

[2] Concurrent with USFWS consultation to develop the Biological Opinion, the Marine Corps provided additional analysis on the potential impact of displaced OHV activity on nearby designated and non-designated off-road areas (see Appendix M). The analysis supported the formal consultation with USFWS.

2009). The proposed Special Use Areas are areas that are not identified in training scenarios, but that have habitat supporting moderate densities of desert tortoises. Each Special Use Area would be evaluated for existing desert tortoise population density and size classes, habitat quality, and prevalence of disease, with the intent of identifying the suitability to receive tortoises translocated from areas that would experience moderate to high impact from military training. The population density and health of the resident population would be evaluated and assessed to determine whether desert tortoises from areas adversely affected by training exercises could be beneficially translocated into these Special Use Areas where use would be restricted. These areas would be fenced and signed, if deemed necessary by USFWS, to prevent military vehicle transit into Special Use Areas. These Special Use Areas would be added to the Combat Center Integrated Natural Resources Management Plan (INRMP) and other plans as appropriate.

- *Translocation Program.* The Combat Center would develop a scientifically rigorous program, consistent with current USFWS guidance, to translocate tortoises from high and moderate impact areas before the first MEB exercise (refer to Appendix I for preliminary methodology). Habitat quality, tortoise health, and population assessments would be performed for at least two years, before translocating tortoises from areas proposed for high and moderate impact by military training (i.e., MEB or building block training). The assessments would evaluate translocatee, resident, and control sites and tortoises. Tortoises would be translocated before the first MEB or building block exercise to Special Use Areas based on scientific evaluation of population density estimates, habitat quality, and habitat potential for supporting augmented tortoise populations. Final health assessments would be conducted and radio transmitters would be attached to tortoises before translocation. Resident and control site tortoises would also be assessed (health) and monitored before translocation, with subsets fitted with radio transmitters. Short-term (≤ 5 years) and long-term (up to 25 years) metrics of translocation success would be evaluated and published in peer-reviewed, scientific journals. Before each MEB exercise, high- and moderate-impact areas would be surveyed to clear remaining desert tortoises to translocation sites where short- and long-term monitoring would be conducted.
- *Desert Tortoise "Headstarting" and Population Augmentation.* Based on survey, monitoring, and analysis of designated Special Use Areas, the Combat Center would devise a strategy for population augmentation supported by the Combat Center's ongoing headstart program based at the Tortoise Research and Captive Rearing Site (TRACRS). Population augmentation strategies would be developed with USFWS and would be integrated with translocation and monitoring efforts to provide a comprehensive population sustainment and recovery strategy.
- *Monitoring.* Monitoring would occur over 25 years to ascertain the long-term effects of translocation and augmentation upon resident, translocated, control, and headstarted tortoises. Results of translocation and monitoring efforts would be submitted annually to USFWS, and would be reported annually to other agencies and interested parties in the INRMP report.

In addition, numerous standard or currently implemented SCMs, as described below, would be implemented as part of the proposed action.

- The Combat Center would amend its INRMP to incorporate the conditions for use associated with the new training areas and new/modified airspace.
- The following measures from the 2002 Base-wide Biological Opinion (USFWS 2002), the 2007 INRMP (MAGTF Training Command 2007), and the current Combat Center Order 5090.1D (MAGTF Training Command 2009), would be extended to any acquired lands:

- Before the initiation of military training exercises or mission-related construction projects, a desert tortoise education program would be presented to all personnel who would be on-site. This program would contain information concerning the biology and distribution of the desert tortoise; its legal status and occurrence on the Combat Center; the definition of "take" and associated penalties; the measures designed to reduce the effects on the desert tortoise of training exercises and mission-related construction activities; the means by which Command employees, military personnel, and construction contractors can help facilitate this process; and the procedures to be implemented in case a desert tortoise is encountered.
- Only biologists authorized by the USFWS would be allowed to survey for desert tortoises before proposed action activities, serve as a desert tortoise monitor during training exercises and other mission-related construction activities, and handle desert tortoises (except in circumstances in which the life of the desert tortoise is in immediate danger).
- Desert tortoises would be moved only by an authorized biologist and solely for the purpose of moving the animals out of harm's way, unless the animal is in imminent danger. In such instances, only units having direct radio or telephone communication with Range Control and appropriately briefed Marines would be authorized to move desert tortoises out of immediate danger. Desert tortoises would be moved the minimum distance to ensure their safety.
- All handling of desert tortoises and their eggs and excavation of burrows would be conducted by an authorized biologist in accordance with protocols developed by the Desert Tortoise Council (1999), unless the animal was in imminent danger as noted above.
- If the burrows of the desert tortoise cannot be avoided, they would be examined and excavated by hand, by or under the direct supervision of the authorized biologist. The authorized biologist would examine the burrow to determine whether it contains eggs of the desert tortoise.
- All desert tortoises observed by military personnel or workers within or adjacent to training exercises or mission-related construction projects where they may be killed or injured would be reported immediately to an authorized biologist. The authorized biologist would move the desert tortoise offsite into adjacent undisturbed desert tortoise habitat if it is in imminent danger.
- Any time a vehicle is parked in desert tortoise habitat, the ground around and underneath the vehicle would be inspected for desert tortoises before moving the vehicle. If a desert tortoise is observed beneath the vehicle, an authorized biologist would be contacted. If possible, the desert tortoise would be left to move on its own. Otherwise, the desert tortoise would be removed and relocated by the authorized biologist in accordance with the handling provisions of this Biological Opinion.
- Any excavations associated with construction and maintenance that would be left open in areas that are not being monitored would either be fenced temporarily to exclude desert tortoises, covered at the close of each work day, or provided with ramps so desert tortoises can escape. All excavations would be inspected for desert tortoises before filling.
- If maintenance or construction occurs during a time of year when desert tortoises are active, the authorized biologist would ensure that clearance surveys have been conducted in all work areas within appropriate habitat immediately before the onset of work. The NREA staff would determine whether desert tortoises are likely to be active with consideration of the time of year and the weather conditions at the time and place where work is to be conducted. If

desert tortoises are unlikely to be active, the clearance surveys may be conducted within 48 hours before ground disturbance. When desert tortoise burrows are found, they would be checked for desert tortoises; when desert tortoises are found, the burrows would be flagged. All unoccupied burrows would be flagged in a different manner than the occupied burrows. During the construction period, an authorized biologist would re-check the burrows and remove any desert tortoises that would be endangered by the mission-related construction activity following the Desert Tortoise Council protocols.

- For maintenance or construction activity in areas of suitable habitat that support desert tortoises, the Marine Corps would install temporary fencing around work sites to prevent entry of desert tortoises. Any desert tortoises within the fenced area would then be relocated to nearby suitable habitat, before the start of ground disturbing activities. The presence of authorized biologists on site may be substituted for temporary fencing; NREA staff would determine which protective measure is appropriate, depending on the specific circumstances.
- The NREA office would maintain a record of all observations of desert tortoises encountered at the Combat Center. The information gathered would include the date and time of observation; whether the desert tortoise was handled and whether it voided its bladder; general health of the desert tortoise; and, if it was moved, the locations from and to which the desert tortoise was moved.
- The Marine Corps would provide a written report to the USFWS by January 31 of each year, to document the numbers and locations of desert tortoises injured, killed, and handled; discuss the effectiveness of the Marine Corps' protective measures; and recommend other measures that allow for better protection of the desert tortoise or more workable implementation. The report would also include detailed information on the construction and maintenance projects that NREA personnel reviewed in the previous year; these projects include any actions that NREA staff determines are not likely to adversely affect the desert tortoise and those that are likely to adversely affect the desert tortoise and that are conducted under the auspices of a Biological Opinion.
- If the Marine Corps is required to prepare any additional written reports as a result of biological opinions for activities it conducts at the Combat Center, the information from these reports may be included in this annual report.
- Upon locating desert tortoises killed or injured by military training, construction, or maintenance activities, initial notification within 3 days of their finding must be made in writing to the USFWS's Division of Law Enforcement (370 Amapola Avenue, Suite 113, Torrance, California 90501), and by telephone and writing to the Ventura Field Office (2493 Portola Road Suite B, Ventura, California 93003; tel: 805-644-1766). The report would include the date, time, location of the carcass, a photograph (if possible), cause of death, if known, and any other pertinent information.
- Care would be taken in handling injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible state. Injured animals would be transported to a qualified veterinarian or a rehabilitator licensed by the State of California. Should any treated desert tortoises survive, the USFWS would be contacted regarding the final disposition of the animals.
- The Marine Corps would endeavor to place the remains of intact desert tortoises with educational or research institutions holding the appropriate state and federal permits per their instructions.

- Manage TRACRS to protect nests and hatchling tortoises from predation.
- Monitor tortoise growth and population changes over time to determine facility success.
- Continue non-native predator management.
- Minimize Main Supply Route (MSR) and road proliferation.
- Continue tortoise awareness program.
- Cooperate with other agencies and academic institutions on research conducted on the cause, transmission, testing, and treatment of Upper Respiratory Tract Disease.
- Evaluate desert tortoise habitat condition and health.
- Identify areas of desert tortoise habitat at risk for negative impacts.
- Continue long-term tortoise density and trend-monitoring program.
- Maintain established study plots.
- Monitor long-term study plots on a 2- to 4-year rotation.
- Desert tortoises are not to be picked up unless it is necessary to save the animal's life. If a desert tortoise is impeding training, range control must be notified for additional instructions. If an emergency situation exists, and a tortoise must be moved out of immediate danger, the animal may be moved to an adjacent shaded area (normally plant cover) out of direct sunlight, then notify range control and NREA Division.
- The possession of otherwise legal captive desert tortoises aboard the Combat Center, including base housing, is prohibited. Under no circumstances are legal captive or wild tortoises from off-base to be released into the Combat Center's population.
- The feeding of wildlife on the Combat Center is prohibited. Unauthorized feeding of desert wildlife creates an imbalance in the food chain and reduces the animals' natural fear of humans, which places humans, wildlife, and domestic pets at risk.
- Hunting is prohibited on the Combat Center.
- Recreational use of the Combat Center's training areas is prohibited (with the exception of the proposed RPAAs). Designated locations in the Mainside area are authorized for certain recreational purposes.
- The introduction of any exotic plant life is prohibited on the Combat Center.
- Open fires and the harvesting or cutting of any native vegetation are prohibited.
- The "Cleghorn Lakes Wilderness Area," located to the south of the Cleghorn Pass, Bullion and America Mine Training Areas, is managed by the BLM. Accessing or departing the southeastern ranges through this area is strictly prohibited. No entry is allowed in this protected area. There is no authorized access to the Cleghorn Pass, Bullion or America Mine Training Ranges from a southerly direction.
- The "Ord-Rodman Critical Habitat" for desert tortoise and two associated wilderness areas are adjacent to the Sunshine Peak Training Area. No entry is allowed in these protected areas.
- All training units should limit off-road activity to that which is absolutely necessary to directly support the mission. Off-road maneuver exercises would be planned to emphasize the use of already damaged sites.
- "Neutral Steer" turns of tracked vehicles would be limited to emergency situations only. The Operations and Training Directorate would coordinate with NREA to identify authorized

areas for practicing "Neutral Steer" turns. No unit would practice neutral steers in sensitive areas such as the Sand Hill Training Area.

- Approval must be obtained from both the G-3 Directorate and NREA before clearing land (grading) or conducting any vegetation removal action in the training areas.
- Trenches, defilades, "tank traps" and fighting positions must be filled to original grade and excess material leveled after each use.

- Under Combat Center Order 5090.1D (MAGTF Training Command 2009), Special Use Areas would be designated as appropriate in which bivouacs, OHV use, or training involving vehicle activity, are either restricted (Category 1) or discouraged (Category 2).
- The following conservation measures for non-protected biological resources would be included in the updated Combat Center INRMP, to be prepared following adoption of the Record of Decision (ROD), but before use of newly acquired areas for ground-training.
  - Conduct pre-surface-disturbance mapping surveys to identify noteworthy creosote ring Unusual Plant Assemblages (UPAs) occurring in the west study area. As practicable, fence noteworthy creosote ring UPAs and restrict vehicle access.
  - Although training exercise impacts to Yucca Ring UPAs are not anticipated, if the west study area is acquired, the existing Upper Johnson Valley Yucca Rings Area of Critical Environmental Concern (ACEC) designated in the west portion of the west study area would be managed in a manner consistent with UPA protection.
  - When conducting species surveys or inventories, consider documentation of intact cryptobiotic soils in the survey area. Based on this data, consider avoiding large expanses of intact cryptobiotic soils when designing primary routes of travel for task forces during MEB Exercises.
  - When conducting species surveys or inventories, consider wildlife movement corridors in the lands proposed for acquisition and on the existing Combat Center. Where practicable, route design for roadways constructed under the proposed action would take into consideration these wildlife corridors.
  - Place anti-roosting and anti-nesting devices, as appropriate, on the communications towers to be installed in the acquisition study areas.
  - Survey for potential bat roosting sites in the acquired lands before the initiation of training activities. Based on collected data, consider placement of gates over the entrances of mine sites that are currently occupied or which may provide potential roosting and/or hibernation habitat, especially if an alternative is adopted which includes public access to the mine site.
- The following conservation measures for non-protected biological resources are already in the 2007 Combat Center INRMP, and would be extended to any acquired lands during the INRMP update process along with all other measures in the INRMP.
  - Maintain healthy xeroriparian washes and canyons, which are used by resident and passerine migrant bird species and other wildlife, by minimizing vegetation loss in washes and canyons (i.e., Wood Canyon, southwestern Lavic Lake Training Area, Rainbow Canyon, Petroglyph Wash in Lava Training Area).
  - Expand the small mammal inventory emphasizing the pallid San Diego pocket mouse.
  - Monitor current bat gates to inspect for trespass and condition. Evaluate mine entrances for installation of bat gates to those mines which are exceptional bat habitat but not culturally

significant. Evaluate modification of bighorn sheep guzzlers for use by bats and other wildlife.

- Monitor burrowing owl populations and their habitat. Maintain a proactive management program to conserve the species.
- Minimize Mojave fringe-toed lizard mortality and injury from military training. Continue to monitor Mojave fringe-toed lizard populations and the condition of their habitat. Maintain a proactive management program in case of federal listing.
- Jointly monitor the Combat Center's bighorn sheep population and those within the lands proposed for acquisition with California Department of Fish and Game (CDFG) to determine status, distribution, and abundance.
- Monitor the use of natural and artificial water sources by large mammals, including bighorn sheep, through the use of remote cameras. Cooperate with military unmanned aerial vehicle units to integrate biological work into their training missions.
- Consider State-listed species in all Combat Center actions.

Cultural Resources

- Cultural resources would be managed in accordance with the provisions of federal laws and regulations as well as Marine Corps policy. The Programmatic Agreement (PA), *Programmatic Agreement Between the United States Marine Corps and the California State Historic Preservation Officer 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, California,* would be amended to include any lands acquired as a consequence of the proposed action alternative.
- As required by the PA, an Integrated Cultural Resources Management Plan (ICRMP) would be prepared and the historic preservation program prescribed in the ICRMP shall be implemented under the direct supervision of a person or persons, meeting at a minimum, the Secretary of Interior's Professional Qualifications Standards (48 *Federal Register* 44738-44739).
- The ICRMP shall detail the historic preservation program to inventory, manage, and treat any identified historic properties located on lands under the jurisdiction of the Marine Corps. The existing ICRMP for the Combat Center would be modified to include all newly acquired lands and cultural resources. The ICRMP would be modified and developed in consultation with the State Historic Preservation Officer (SHPO) and the Native American Tribes that have an interest in lands under the jurisdiction of the Marine Corps. The SHPO would indicate acceptance of the ICRMP in writing and, upon written agreement by the SHPO, the ICRMP would be implemented under the authority of the amended PA.
- Additional measures would be developed in consultation with the California SHPO and affiliated Tribes.
- The Marine Corps would continue to provide training on the significance of cultural resources and the relevant federal laws that are intended to protect them.

Geological Resources

- A new INRMP for the Combat Center would be developed to include any acquired land areas and would establish policies and procedures for managing geological resources that may be present.

- The same programs and procedures that apply to current training activities to avoid and minimize impacts to soils at the Combat Center (which are outlined in the INRMP) would be extended to the MEB training, including but not limited to:
  - Designing tank traps and other modifications to maintain the natural flow of water during run-off events, to maintain the natural alluvial sediment transport processes.
  - Requiring vehicular traffic to stay on well-defined roads unless training scenarios require otherwise; and
  - Using previously disturbed sites as much as possible during off-road maneuvers to minimize damage to undisturbed sites (Naval Facilities Engineering Command [NAVFAC] Southwest Division 1996).

Water Resources

- The Combat Center would complete and implement the Installation Energy and Sustainability Strategy (IESS) that balances water demands (including those associated with the proposed action) with water supplies by increasing water conservation, using more recycled water, importing water, treating lower quality groundwater, and/or other methods deemed appropriate. The strategy would address sustainable water usage within the Combat Center, as well as regional water management, particularly if the strategy included groundwater extraction from other than the Surprise Springs aquifer.
- The Combat Center would review the Range Environmental Vulnerability Assessment (REVA) findings, including the activities associated with the MEB Exercises addressed by the proposed action, at a frequency of once every five years or sooner based on changes in training exercises that could potentially alter the risk by increasing or decreasing the loading factors, changing locations of where munitions are being used, or other factors that are different from current assumptions and model parameters.

POTENTIAL MITIGATION MEASURES

The CEQ regulations and *Final Guidance for Federal Departments and Agencies on the Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact* provides direction and guidance on mitigating adverse environmental impacts identified in EISs. Therefore, in addition to SCMs identified above, the Marine Corps identified alternatives or resource-specific potential mitigation measures. Table ES-2 lists mitigation measures that have been developed in consultation with regulatory agencies and based on public input through the public involvement process. The ROD produced at the conclusion of the NEPA process will outline mitigation measures that would be implemented by the Marine Corps based on the alternative selected. In addition, required funds would be requested from Congress to execute identified mitigation measures.

Table ES-2. Summary of Potential Mitigation Measures

#	Applicable Alternative(s)	Potential Mitigation Measure
Land Use (LU)		
There are no potential mitigation measures for Land Use.		
Recreation (REC)		
REC-1	4-6	The Marine Corps, in cooperation with the BLM, would establish a RPAA Management Group that would be charged with preparing and implementing a Recreation Management Plan for the RPAA. This Recreation Management Plan would be a component of the INRMP per MCO 5090.2A, Section 11204 (Outdoor Recreation) and would fulfill the requirements of EO 11644. The Recreation Management Plan would include a recreational carrying capacity analysis that addresses recreational use, user profile, demand preferences, conflicts, and conditions consistent with other applicable natural resource and environmental laws.
REC-2	4-6	The RPAA Management Group would meet at least once a year to discuss the suitability of procedures to facilitate recreational use of the RPAA. The RPAA Management Group would seek information from representatives of relevant State agencies, private OHV interest groups, event managers, conservationists, and others as needed and appropriate. Through this process, the Recreation Management Plan would be continuously improved to balance Marine Corps training needs with recreational demand. The RPAA Management Group would also consider the potential use of portions of the Exclusive Military Use area for limited recreational use on a case-by-case basis for organized OHV race events.
Socioeconomics and Environmental Justice (SOC)		
There are no potential mitigation measures for Socioeconomics and Environmental Justice.		
Public Health and Safety (PHS)		
There are no potential mitigation measures for Public Health and Safety.		
Visual Resources (VIS)		
There are no potential mitigation measures for Visual Resources.		
Transportation and Circulation (TRAN)		
TRAN-1	3	Marine Air Ground Task Force Training Command would coordinate with the City of Twentynine Palms, the County of San Bernardino, and other local authorities to provide as much advance notice as possible for the two days per year that North Amboy Road would be closed. Notices of exact dates and approximate times would be provided to city and county transportation officials weeks in advance so as to prepare for altered circulation patterns. Proper signage and warnings would be placed along I-40 and National Trails Highway to the north, and in the City of Twentynine Palms to the south to alert drivers of the road closures.
Airspace Management (AM)		
AM-1	1-6	Potential mitigation measures to minimize the impacts of this alternative airspace configuration would be determined by the FAA and Marine Corps in conjunction with an aeronautical study to be completed by the FAA on the preferred alternative. Continued Marine Corps outreach to airport operators and general aviation pilot groups would seek means of minimizing impacts on this aviation community.
Air Quality (AQ)		
There are no potential mitigation measures for Air Quality.		

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Table ES-2. Summary of Potential Mitigation Measures

#	Applicable Alternative(s)	Potential Mitigation Measure
Noise (NOI)		
There are no potential mitigation measures for Noise.		
Biological Resources (BIO)		
Special conservation measures described for the proposed action (refer to Section 2.8.4) to extend the desert tortoise protections specified in the existing INRMP and existing Combat Center Biological Opinion to the acquired lands would partially offset impacts to desert tortoises for any of the action alternatives. Further offset would occur through the implementation of requirements set forth by USFWS in a Biological Opinion for the proposed project.		
BIO-1	1,2,4,5,6	As feasible, avoid the small populations of crucifixion thorn in the Blacktop, Lavic Lake, and Emerson Lake Training Areas through exercise design and/or installation of protective fencing, before commencement of ground-disturbing training activities.
BIO-2	3	Prepare an updated survey for Nelson's bighorn sheep in the east study area, focusing on usage of the Ship Mountains. The results of this survey would then be utilized by MAGTF Training Command in coordination with NREA to modify the timing of military training exercises in the vicinity of the Ship Mountains or the locations of targets for ordnance delivery, such that disturbance to this population would be minimized to the extent possible without compromising the military mission.
BIO-3	3	Monitoring of Harwood's eriastrum would be included in the updated INRMP, and surveys for presence of this species on the Combat Center and acquired lands would be included as periodic surveys under the INRMP. Targeted surveys to delineate boundaries of the populations north of Cadiz Dry Lake would be performed. Based on the results of these surveys, this population would be avoided through exercise design or protected by fencing, as most effective.
Cultural Resources (CUL)		
The Combat Center ICRMP would be modified to include acquired lands in consultation with SHPO and the Native American Tribes that have an interest in lands under the jurisdiction of the Marine Corps. The current ICRMP expires in 2014, and the new ICRMP would be updated to incorporate any applicable potential mitigation measures as determined during consultation with SHPO.		
Geological Resources (GEO)		
There are no potential mitigation measures for Geological Resources.		
Water Resources (WAT)		
There are no potential mitigation measures for Water Resources.		

Notes: BLM = Bureau of Land Management; EO = Executive Order; FAA = Federal Aviation Administration; I = Interstate; ICRMP = Integrated Cultural Resources Management Plan; INRMP = Integrated Natural Resources Management Plan; MAGTF = Marine Air Ground Task Force; MCO = Marine Corps Order; NREA = Natural Resources and Environmental Affairs; OHV = off-highway vehicle; RPAA = Restricted Public Access Area; SHPO = State Historic Preservation Office.

ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

A summary of environmental impacts for all six action alternatives and the No-Action Alternative is presented below. A summary of environmental impacts is also presented in Table ES-3.

Alternative 1: This alternative would result in significant and unmitigable impacts to: land use, as a result of incompatibility with the Johnson Valley OHV Area Management Plan; recreation, as a result of loss of access to and the use of the majority of the Johnson Valley OHV Area; and airspace management, as a result of the adverse effects of the proposed new and modified SUA on Victor airway and jet route instrument flight rules (IFR) air traffic within or adjacent to the airspace. This alternative would also result in significant and unmitigable impacts to biological resources as a result of the potential adverse effects of training activities on desert tortoises, including total potential take of between 733 and 3,837 federally threatened desert tortoises over the assumed 50-year life of the project (between 590 and 978 in the acquisition study areas). The definition of "take" includes to harass, harm, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. Additionally, significant but mitigable impacts to biological resources would occur in association with this alternative. Beneficial impacts to public health and safety would occur as a result of physical closure of mines that would limit potential unauthorized access by the public.

Alternative 2: This alternative would result in significant and unmitigable impacts to: land use, as a result of incompatibility with the Johnson Valley OHV Area Management Plan; recreation, as a result of loss of access to and the use of approximately 60% of the Johnson Valley OHV Area; and airspace management, as a result of the adverse effects of the proposed new and modified SUA on Victor airway and jet route IFR air traffic within or adjacent to the airspace. This alternative would also result in significant and unmitigable impacts to biological resources as a result of the potential adverse effects of training activities on desert tortoises, including total potential take of between 608 and 3,298 federally threatened desert tortoises over the life of the project (between 466 and 761 in the acquisition study areas). Additionally, significant but mitigable impacts to biological resources would occur in association with this alternative. Beneficial impacts to public health and safety would occur as a result of physical closure of mines that would limit potential unauthorized access by the public.

Alternative 3: This alternative would result in significant and unmitigable impacts to: land use, as a result of inconsistencies with California Desert Conservation Area (CDCA) Plan provisions for mining on public lands and San Bernardino County agricultural designations; transportation, as a result of loss of access to North Amboy Road for up to two days per year; airspace management, as a result of the adverse effects of the proposed new and modified SUA on Victor airway and jet route IFR air traffic within or adjacent to the airspace; air quality, as a result of particulate matter less than 10 microns in diameter (PM_{10}) emissions; water resources, as a result of acquisition of Cadiz Inc. landholdings and eliminating or curtailing their agricultural operation and inhibiting Cadiz Inc. from instituting their Conservation and Storage Project; socioeconomics, as a result of the loss of potential jobs and economic activity that may result from the Cadiz Inc. Groundwater Conservation, Recovery, and Imported Water Storage project. This alternative would also result in significant and unmitigable impacts to biological resources as a result of the potential adverse effects of training activities on desert tortoises, including total potential take of between 215 and 2,960 federally threatened desert tortoises over the life of the project (between 107 and 240 in the acquisition study areas). Additionally, significant but mitigable impacts to biological resources would occur in association with this alternative. Beneficial impacts to public health and safety would occur as a result of physical closure of mines that would limit potential unauthorized access by the public.

Alternative 4: This alternative would result in significant and unmitigable impacts to: land use, as a result of incompatibility with the Johnson Valley OHV Area Management Plan; recreation, as a result of

loss of access to and the use of the Johnson Valley OHV Area for two months per year; and airspace management, as a result of the adverse effects of the proposed new and modified SUA on Victor airway and jet route IFR air traffic within or adjacent to the airspace. This alternative would also result in significant and unmitigable impacts to biological resources as a result of the potential adverse effects of training activities on desert tortoises, including total potential take of between 500 and 3,628 federally threatened desert tortoises over the life of the project (between 346 and 592 in the acquisition study areas). Additionally, significant but mitigable impacts to recreation and biological resources would occur in association with this alternative.

Alternative 5: This alternative would result in significant and unmitigable impacts to: land use, as a result of incompatibility with the Johnson Valley OHV Area Management Plan; and airspace management, as a result of the adverse effects of the proposed new and modified SUA on Victor airway and jet route IFR air traffic within or adjacent to the airspace. This alternative would also result in significant and unmitigable impacts to biological resources as a result of the potential adverse effects of training activities on desert tortoises, including total potential take of between 472 and 3,186 federally threatened desert tortoises over the life of the project (between 324 and 562 in the acquisition study areas). Additionally, significant but mitigable impacts to recreation and biological resources would occur in association with this alternative.

Alternative 6 (Preferred Alternative): This alternative would result in significant, unmitigable impacts to: land use, as a result of incompatibility with the Johnson Valley OHV Area Management Plan; recreation, as a result of loss of access to and the use of 57% of the Johnson Valley OHV Area; and airspace management, as a result of the adverse effects of the proposed new and modified SUA on Victor airway and jet route IFR air traffic within or adjacent to the airspace. This alternative would also result in significant and unmitigable impacts to biological resources as a result of the potential adverse effects of training activities on desert tortoises including total potential take of between 645 and 3,769 federally threatened desert tortoises over the life of the project (between 503 and 834 in the acquisition study areas). Additionally, significant but mitigable impacts to recreation and biological resources would occur in association with this alternative.

No-Action Alternative: The No-Action Alternative would result in less than significant impacts or no impacts for all resource areas.

Table ES-3. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Land Use	SI Plans and Policies • SI and inconsistent with the Johnson Valley OHV Area Management Plan because of loss of access to approximately 91% of the Johnson Valley OHV Area. • SI for not furthering the purpose of EO 11644 to control OHV use to protect resources or minimize conflicts among the various uses of those lands. LSI Plans and Policies • LSI and inconsistent with other plans and policies including CDCA Plan grazing provisions and designated allotments, Upper Johnson Valley Yucca Ring ACEC, and San Bernardino County residential land use designations. Land Status and Ownership • Acquisition of 201,657 acres of federal, non-federal, and state lands. • Minimal (i.e., less than 10) or no relocation of residential and non-residential properties. Mining • No active mines. • Mining claims and abandoned mines are present. • Acquisition of patented and unpatented claims associated with Bessemer and Morris Lode Mines. • Acquisition of other patented and unpatented mining claims if not able to provide reasonable access to the claim. Grazing • Loss of 16.3% of the active Ord Mountain Allotment, but grazing feasible on the remaining portion. • Acquisition and loss of portions of the inactive Johnson Valley Allotment, but no grazing is allowed or planned.	SI Plans and Policies • SI and inconsistent with the Johnson Valley OHV Area Management Plan because of loss of access to approximately 54% of the Johnson Valley OHV Area. • SI for not furthering the purpose of EO 11644 to control OHV use to protect resources or minimize conflicts among the various uses of those lands. LSI Plans and Policies • LSI and inconsistent with other plans and policies including CDCA Plan grazing provisions and designated allotments, and San Bernardino County residential land use designations. Land Status and Ownership • Acquisition of 134,863 acres of federal, non-federal, and state lands. • Minimal (i.e., less than 10) or no relocation of residential and non-residential properties. Mining • Same as Alternative 1. Grazing • Loss of 7.5% of the active Ord Mountain Allotment, but grazing feasible on the remaining portion. • Acquisition and loss of portions of the inactive Johnson Valley Allotment, but no grazing is allowed or planned.	SI Plans and Policies • SI and inconsistent with CDCA Plan multiple use provisions, including access to two active mines, and with San Bernardino County agricultural land use designations on 1,600 acres under cultivation. Mining • SI due to potential for a future case-by-case real estate analysis to find that two active mines would be incompatible with training activities and would require acquisition and closure. LSI Mining • Two active mines, mining claims, and abandoned mines are present. • Acquisition of mines and mining claims if not able to provide reasonable access to the mine or claim. Land Status and Ownership • Acquisition of 198,580 acres of federal, non-federal, and state lands. • Minimal (i.e., less than 10) or no relocation of residential and non-residential properties. Utilities • Southern California Gas Company high pressure pipelines could remain in place and operate.	SI Plans and Policies • SI and inconsistent with the Johnson Valley OHV Area Management Plan because of loss of open access to 91% of the Johnson Valley OHV Area; includes restricted public access of the west study area 10 months per year. LSI Plans and Policies • LSI and inconsistent with other plans and policies including CDCA Plan grazing provisions and designated allotments, Upper Johnson Valley Yucca Ring ACEC, and San Bernardino County residential land use designations. Land Status and Ownership • Acquisition of 201,657 acres of federal, non-federal, and state lands. • Minimal (i.e., less than 10) or no relocation of residential and non-residential properties. Mining • No active mines. • Mining claims and abandoned mines are present. • Acquisition of mines and mining claims if not able to provide reasonable access to the mine or claim. LSI Grazing • Loss of 16.3% of the active Ord Mountain Allotment, but grazing feasible on the remaining portion. • Acquisition and loss of portions of the inactive Johnson Valley Allotment, but no grazing is allowed or planned. Utilities • 43 miles of Southern California Edison transmission lines are located in the acquisition study area and could remain in place and operate.	SI Plans and Policies • Same as Alternative 4. LSI Plans and Policies • Same as Alternative 4. Land Status and Ownership • Acquisition of 180,353 acres of federal, non-federal, and state lands. • Minimal (i.e., less than 10) or no relocation of residential and non-residential properties. Grazing • Same as Alternative 4. Utilities • Same as Alternative 4. Sensitive Land Uses • All of the 65 dB CNEL contour for airfield-related activities, most of the 65 dB $CNEL_{mr}$ contour for airspace-related activities, and most of the 62 dBC CNEL contour for ordnance would be located within the proposed Combat Center boundaries. No sensitive noise receptors located in areas where CNEL contours extend outside of proposed boundaries. LSI Mining • Same as Alternative 4. NA Recreation and OHV Use • Same as Alternative 1.	SI Plans and Policies • Similar to Alternatives 4 and 5 except acreage of the RPAA is reduced; access to roughly 56% of the Johnson Valley OHV Area would be lost. LSI Plans and Policies • Same as Alternative 4. Land Status and Ownership • Acquisition of 167,971 acres of federal, non-federal, and state lands. • Minimal (i.e., less than 10) or no relocation of residential and non-residential properties. Mining • Same as Alternative 1. Grazing • Loss of 7.4% of the active Ord Mountain Allotment, but grazing feasible on the remaining portion. • Acquisition and loss of portions of the inactive Johnson Valley Allotment, but no grazing is allowed or planned. Sensitive Land Uses • All of the 65 dB CNEL contour for airfield-related activities, all of the 65 dB $CNEL_{mr}$ contour for airspace-related activities, and most of the 62 dBC CNEL contour for ordnance activities, would be located within the proposed Combat Center boundaries. No sensitive noise receptors located in areas where CNEL contours extend outside of proposed boundaries. NI Utilities • Avoids Southern California Edison transmission lines. NA Recreation and OHV Use • Same as Alternative 1.	NI • Existing conditions would remain unchanged, and no impacts to land use would occur.

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Table ES-3. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Land Use (continued)	LSI Utilities • 43 miles of Southern California Edison transmission lines could remain in place and operate. Sensitive Land Uses • All of the 65 dB CNEL contour for airfield-related activities, all of the 65 dB $CNEL_{mr}$ contour for airspace-related activities, and most of the 62 dBC CNEL contour for ordnance activities would be located within the proposed Combat Center boundaries. No sensitive noise receptors located in areas where CNEL contours extend outside of proposed boundaries. • Wilderness areas in vicinity of the Combat Center were designed by the CDPA of 1994. The designation was not intended to limit military overflights. The current INRMP would be amended to address new management actions related to land acquisition and airspace utilization. NA Recreation and OHV Use • No additional land use findings are made for recreation other than those related to plans and policies discussed above. See Recreation below.	LSI Utilities 21 miles of Southern California Edison transmission lines are located in the west acquisition study area and could remain in place and operate. Sensitive Land Uses • All of the 65 dB CNEL contour for airfield-related activities, most of the 65 dB $CNEL_{mr}$ contour for airspace-related activities, and most of the 62 dBC CNEL contour for ordnance activities, would be located within the proposed Combat Center boundaries. No sensitive noise receptors located in areas where CNEL contours extend outside of proposed boundaries. NA Recreation and OHV Use • Same as Alternative 1.	LSI Sensitive Land Uses • All of the 65 dB CNEL contour for airfield-related activities, all of the 65 dB $CNEL_{mr}$ contour for airspace-related activities, and most of the 62 dBC CNEL contour for ordnance activities, would be located within the proposed Combat Center boundaries. No sensitive noise receptors located in areas where CNEL contours extend outside of proposed boundaries. Agriculture • LSI and incompatible due to loss of 1,600 acres of cultivated agricultural lands; the 1,000 acres cultivated by Cadiz Inc. represents less than 2% of the agricultural acreage in San Bernardino County. NA Recreation and OHV Use • Same as Alternative 1.	LSI Sensitive Land Uses • All of the 65 dB CNEL contour for airfield-related activities, all of the 65 dB $CNEL_{mr}$ contour for airspace-related activities, and most of the 62 dBC CNEL contour for ordnance activities, would be located within the proposed Combat Center boundaries. No sensitive noise receptors located in areas where CNEL contours extend outside of proposed boundaries. NA Recreation and OHV Use • Same as Alternative 1.			
Recreation	SI • Access to and use of 91% of the Johnson Valley OHV Area would be lost. This resource is unique to the region. • Eliminating OHV use on lands to be acquired under Alternative 1 would not further the purpose of EO 11644 to control OHV use to protect resources or minimize conflicts among the various uses of those lands.	SI • Access to and use of approximately 54% of the Johnson Valley OHV Area would be lost, representing a SI. • Eliminating OHV use on lands to be acquired under Alternative 2 would not further the purpose of EO 11644 to control OHV use to protect resources or minimize conflicts among the various uses of those lands.	LSI • The east study area is not unique to the region, comparable recreation opportunities are available in surrounding areas, and this area does not receive frequent recreational use. • Potential illegal riding impacts would be similar to Alternative 1. SCMs would be the same as Alternative 1.	SI • Access to and use of the Johnson Valley OHV Area would be lost during approximately 2 months each year. This resource is unique to the region. • Significant impacts would be somewhat offset and minimized through the proposed restricted public access of the Johnson Valley OHV Area during approximately 10 months of the year when not used for military training.	SI • Impacts would be the same as under Alternative 4. LSI • Potential illegal riding impacts would be similar to Alternative 1. SCMs would be the same as Alternative 1.	SI • Access to and use of approximately 56% of the Johnson Valley OHV Area would be lost. This resource is unique to the region. • The remaining 44% of the Johnson Valley OHV Area would be available for public recreation 10 months per year (for the portion acquired as RPAA) or all of the year (for the area not acquired).	NI • Existing conditions would remain unchanged, and no impacts to recreation would occur.

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Table ES-3. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Recreation (continued)	SI • Displacement of recreational activities to other recreation areas and OHV routes would indirectly impact the recreational opportunities at those alternative areas through potential overcrowding, reduced capacity to support organized events, diminished user satisfaction and quality of the recreational experience, and more rapid deterioration of trails. LSI • Although implementation of SCMs would reduce the occurrence of illegal OHV use in public and private lands, an increase in illegal riding would likely still occur. Indirect impacts to the County of San Bernardino Law Enforcement Division may also occur if additional resources are required to respond to the increase in illegal activity as a result of this action. Implementation of SCMs 1-3, discussed under Section 4.2.2.1, would reduce these potentially significant impacts to a less than significant level.	SI • Although not all of Johnson Valley OHV Area would be lost, approximately 30% of the acres available for open OHV recreation in the region would be lost. • Displacement of recreational activities to the remaining portion of the Johnson Valley OHV Area and to certain other OHV areas and OHV routes would directly and indirectly impact recreational opportunities through potential overcrowding, reduced capacity to support organized events, diminished user satisfaction and quality of the recreational experience, and more rapid deterioration of trails. LSI • Potential illegal riding impacts would be similar to Alternative 1. SCMs would be the same as Alternative 1.		SI • This alternative meets the purposes of EO 11644 to control OHV use to protect resources, promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands. • Displacement of recreational activities to alternative OHV areas and routes (though substantially reduced relative to other alternatives because of restricted public access permitted approximately 10 months each year) would directly and indirectly impact recreational opportunities through potential overcrowding, reduced capacity to support organized events, diminished user satisfaction and quality of the recreational experience, and more rapid deterioration of trails. • With implementation of mitigation measures REC-1 and REC-2 (in addition to recreation SCMs identified in Chapter 2 and Section 4.2.2.1), impacts to the OHV community and other recreational opportunities would be marginally reduced but would still be significant. LSI • Potential illegal riding impacts would be similar to Alternative 1. SCMs would be the same as Alternative 1.		SI • This alternative meets the purposes of EO 11644 to control OHV use to protect resources, promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands. • Displacement of recreational activities to the remaining portion of the Johnson Valley OHV Area and to certain alternative OHV areas and routes (though substantially reduced relative to Alternative 1) would directly and indirectly impact recreational opportunities through potential overcrowding, reduced capacity to support organized events, diminished user satisfaction and quality of the recreational experience, and more rapid deterioration of trails.. • With implementation of mitigation measures REC-1 and REC-2 (in addition to recreation SCMs identified in Chapter 2 and Section 4.2.2.1), impacts to the OHV community and other recreational opportunities would be marginally reduced but would still be significant. LSI • Potential illegal riding impacts would be similar to Alternative 1. SCMs would be the same as Alternative 1.	
Socioeconomics and Environmental Justice	LSI • Direct impact from acquisition of 141 privately-owned parcels: includes 1 occupied residence, abandoned mines, vacant parcels, and no operating businesses. Land owners would be fairly compensated/provided relocation assistance	LSI • Direct impact from acquisition of private property: same as Alternative 1 but fewer private properties would be acquired (81 parcels). • Direct regional impact from lost sales and tax revenue (<$300,000 or -3.4% compared to baseline) related to reduced recreational and film industry spending.		LSI • Direct regional impact from lost sales and tax revenue ($320,000 or -3.7% compared to baseline) related to reduced recreational and film industry spending. • Direct local impact from lost sales and tax revenue ($1 million or -16.4% compared to baseline) related to reduced recreational and film industry spending.	LSI • Socioeconomic impacts of Alternative 5 would be essentially the same as Alternative 4, with very minor changes in the size of specific dollar amounts.	LSI • Direct impact from acquisition of private property: same as Alternative 1 but fewer private properties would be acquired (105 parcels). • Direct regional impact from lost sales and tax revenue (<$216,000 or -2.5% compared to baseline) related to reduced recreational and film industry spending.	NI • NI with regard to local sources of business revenue and associated income and jobs from recreational visits and film industry use. NI to the economic vitality of small local businesses

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Table ES-3. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Socioeconomics and Environmental Justice (continued)	LSI • Direct regional impact from lost sales and tax revenue ($700,000 or -7.8% compared to baseline) from reduced recreational/film industry spending. • Direct local impact, lost sales and tax revenue ($3.6 million or -60% compared to baseline) from reduced recreational/film industry spending. • Beneficial combined impact (direct and indirect) from net gain in regional sales ($4.5 million), income ($3.1 million), and employment (90 jobs), as influence of Combat Center personnel increase would offset the loss in recreational and film industry spending. Sufficient capacity exists to absorb the added demand for housing and community services. • Direct impact on individual small businesses dependent on limited recreational visitor spending. Smaller firms may fail due to reduced revenue tied to reduced recreational opportunities in Johnson Valley. • Direct impact from reduction ($34,435 or 0.006% of county total) in property tax revenues to local jurisdiction from the acquisition of private land. • Future indirect impact from acquisition of the Morris Lode Mine, which has an approved Conditional Use Permit and Reclamation plan, but where there are currently no mining operations occurring (and possibly other similar mines) in the west study area if acquisition prevents/ delays future development of a local source of iron ore. • Property values are not anticipated to decrease directly/ indirectly from increased noise. • Indirect impact (higher fuel costs) related to civil aviation impacts are expected to occur.	LSI • Direct local impact from lost sales and tax revenue ($1.4 million or -24% compared to baseline) related to reduced recreational and film industry spending. • Beneficial combined impact (direct and indirect) from net gain in regional sales ($5.2 million), income ($3 million), and employment (87 jobs), as influence of Combat Center personnel increase would offset the loss in recreational and film industry spending. Sufficient capacity exists to absorb the added demand for housing and community services. • Direct impact on individual small businesses that are dependent on limited recreational visitor spending. May cause some smaller firms to fail as a result of reduced revenues tied to reduced recreational opportunities in Johnson Valley. • Direct impact from reduction ($25,677 or 0.004% of county total) in property tax revenues to local jurisdiction from the acquisition of private land. • Impacts to mining, property values, and civilian impacts are the same as Alternative 1. • Less than significant economic impact to livestock ranching and farming industries due to the loss of some land for grazing. NI • Same as Alternative 1.	LSI • Direct impact from acquisition of private property (103 private parcels): includes 2 mining operations and 1 agricultural/ water venture potentially purchased and displaced, resulting in a direct loss of an estimated 150 jobs. Land owners would be fairly compensated/provided relocation assistance. • Direct regional impact from lost sales and tax revenue ($24,221 or -0.3% compared to baseline) related to reduced recreational and film industry spending. • Direct local impact from lost sales and tax revenue ($48,458 or -0.8% compared to baseline) related to reduced recreational and film industry spending. • Direct local impact from lost sales and tax revenue ($48,458 or -0.8% compared to baseline) related to reduced recreational and film industry spending. • Combined impact (direct and indirect) from net loss in regional sales ($10 million), income ($4.4 million), and employment (-135 jobs) as a result of displaced businesses (lost jobs only partially offset by new Combat Center jobs) and reduced recreational spending. • Direct impact from reduction ($161,000 or 0.027% of county total) in property tax revenues to local jurisdiction from the acquisition of private land. • Impacts to property values and civilian impacts are the same as Alternative 1. NI • NI associated with cost of providing community services to the project area. • No Environmental Justice impacts.	LSI • Direct impact from acquisition of 141 privately-owned parcels: same as Alternative 1. • Beneficial combined impact (direct and indirect) from net gain in regional sales ($7.1 million), income ($3.9 million), and employment (108 jobs), as influence of Combat Center personnel increase would offset the loss in recreational and film industry spending. Sufficient capacity exists to absorb the added demand for housing and community services. • Direct impact on individual small businesses that are dependent on recreational visitor spending. May cause some smaller firms to fail as a result of reduced revenues tied to reduced recreational opportunities in Johnson Valley. • Impacts to mining, property values, and civilian impacts are the same as Alternative 1. • Less than significant economic impact to livestock ranching and farming industries due to the loss of some land for grazing. NI • Same as Alternative 1.	LSI • Beneficial combined impact (direct and indirect) from net gain in regional sales ($7.5 million), income ($4 million), and employment (110 jobs), as influence of Combat Center personnel increase would offset the loss in recreational and film industry spending. Sufficient capacity exists to absorb the added demand for housing and community services. • Direct impact on individual small businesses that are dependent on limited recreational visitor spending. May cause some smaller firms to fail as a result of reduced revenues tied to reduced recreational opportunities in Johnson Valley. • Small direct reduction ($28,456 or 0.005% of county total) in property tax revenues to local jurisdiction from the acquisition of private land. • Impacts to mining, property values, and civilian impacts are the same as Alternative 1. • Less than significant economic impact to livestock ranching and farming industries due to the loss of some land for grazing. NI • Same as Alternative 1.	LSI • Direct local impact from lost sales and tax revenue ($1.5 million or-24.7% compared to baseline) related to reduced recreational and film industry spending. • Beneficial combined impact (direct and indirect) from net gain in regional sales ($7.5 million), income ($4 million), and employment (110 jobs), as influence of Combat Center personnel increase would offset the loss in recreational and film industry spending. Sufficient capacity exists to absorb the added demand for housing and community services. • Direct impact on individual small businesses that are dependent on limited recreational visitor spending. May cause some smaller firms to fail as a result of reduced revenues tied to reduced recreational opportunities in Johnson Valley. • Small direct reduction ($28,456 or 0.005% of county total) in property tax revenues to local jurisdiction from the acquisition of private land. • Impacts to mining, property values, and civilian impacts are the same as Alternative 1. • Less than significant economic impact to livestock ranching and farming industries due to the loss of some land for grazing. NI • Same as Alternative 1.	that rely on such spending, though such spending is not substantial at a regional economic scale.

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Table ES-3. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Socioeconomics and Environmental Justice (continued)	• Less than significant economic impact to livestock ranching and farming industries due to the loss of some land for grazing. NI • NI associated with cost of providing community services to the project area. • NI on regional or statewide sales of OHVs. • No Environmental Justice impacts						
Public Health and Safety	LSI • Aircraft Activities – Current procedures regarding prevention/response to aircraft-related accidents would continue. Existing plans and procedures related to aircraft-delivered ordnance would be updated to include the new training areas. No off-base receptors would be exposed to noise greater than or equal to 65 dB CNEL. • Ground Training Activities – Range clearance procedures associated with ordnance use would be updated to include the new training areas. Vehicle accidents associated with training operations would be minor. • Emergency Response – Sufficient capacity is present.	LSI • Aircraft Activities, Ground Training Activities, Other Safety Issues, Ground Transportation, Emergency Response, Displaced Recreation, and Hazardous Materials and Hazardous/Solid Waste – Impacts would be similar to those described for Alternative 1. NI • Ground Training (Energy Hazards), Other Safety Issues (Protection of Children) – Impacts would be the same as for Alternative 1. BI • Other Safety Issues (Mines/Contaminated Sites) – Impacts would be the same as for Alternative 1.	LSI • Aircraft Activities, Ground Training Activities, Other Safety Issues, Emergency Response, and Hazardous Materials and Hazardous/Solid Waste – Impacts would be similar to those described for Alternative 1. • Temporary road closures for training would be coordinated with local jurisdictions and authorities and tank crossings would be installed to ensure less than significant impacts. • Mapping and avoiding high-pressure natural gas pipelines would be performed as part of the ground training activities. NI • Ground Training (Energy Hazards), Other Safety Issues (Protection of Children) – Impacts would be the same as for Alternative 1. BI • Other Safety Issues (Contaminated Sites) – Impacts would be the same as for Alternative 1.	LSI • Aircraft Accidents – Current procedures regarding prevention/response to aircraft-related accidents would continue. Existing plans and procedures related to aircraft-delivered ordnance would be updated to include the new training areas • Emergency Response – Sufficient capacity is present. • Displaced Recreation – Indirect impacts associated with the displacement of recreational activities (particularly OHV use) to other recreational areas and designated routes would potentially result in a minimal increase in safety risks associated with OHV use at these other areas. • Other Safety Issues – Physical closure of mines would limit potential unauthorized access by the public. Access by USMC, employees, civilians, invitees and trespassers would be limited by signage and other notice procedures. Contaminated sites would be clearly marked and mapped to minimize public access. No known environmental health or safety risk occur that may disproportionately affect children.	LSI • Aircraft Accidents, Emergency Response, Other Safety Issues, Hazardous Materials and Hazardous/Solid Waste – Impacts would be the same as Alternative 4. • Aircraft and Ground-delivered Ordnance – Impacts would be the same as Alternative 4. • Displaced Recreation – Indirect impacts associated with the displacement of recreational activities (particularly OHV use) to other recreational areas and designated routes would potentially result in a minimal increase in safety risks associated with OHV use at these other areas. NI • Aircraft-delivered Ordnance – Ordnance would be used only within the current Combat Center boundaries, so no impacts to public health and safety would occur. • Ground Training (Energy Hazards) – Impacts would be the same as for Alternative 1. BI • Other Safety Issues (Contaminated Sites) – Impacts would be the same as for Alternative 1.	LSI • Aircraft Accidents, Emergency Response, Other Safety Issues, Hazardous Materials and Hazardous/Solid Waste – Impacts would be the same as Alternative 1 (exclusive military use areas) and Alternative 4 (RPAA). • Aircraft and Ground-delivered Ordnance – Impacts would be the same as Alternative 4. • Displaced Recreation - Indirect impacts associated with the displacement of recreational activities (particularly OHV use) to other recreational areas and designated routes would potentially result in a minimal increase in safety risks associated with OHV use at these other areas. NI • Ground Training (Energy Hazards) – Impacts would be the same as for Alternative 1. BI • Other Safety Issues (Contaminated Sites) – Impacts would be the same as for Alternative 1.	NI • Regular training activities (vehicle use, aircraft use, firing of ammunition, UXO and munitions, generation of hazardous and non-hazardous wastes, and resource use) within the boundaries of the Combat Center would remain the same. • Existing safety risks from pursuit of recreational activities in the acquisition study areas would remain the same.

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Table ES-3. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Public Health and Safety (continued)	LSI • Displaced Recreation – Indirect impacts associated with the displacement of recreational activities (particularly OHV use) would result in increased use of certain other recreational areas and designated routes, potentially resulting in periodic increases in the density of the riding population and an associated marginal increase in the safety risks associated with OHV use. OHV activities are inherently hazardous, participants are typically very cognizant of the risks involved, and responsible riders would be expected to adjust their speed and other factors according to the prevailing riding conditions at any given time, including the density of other riders present. The anticipated increase in safety risk attributable to additional riders displaced from Johnson Valley would be minimal at any particular point in time. • Hazardous Materials and Hazardous/Solid Waste – No change to permits, hazardous waste generator status would occur. Adequate solid waste capacity is present. Access by USMC, employees, civilians, invitees and trespassers would be limited by signage and other notice procedures. Public access to contaminated sites would be restricted due to the exclusive military use resulting in a positive impact. NI • Ground Training (Energy Hazards), Other Safety Issues (Protection of Children) – NI due to energy hazards or protection of children.			• Aircraft/Ground-delivered Ordnance – In the RPAA, the public could potentially come in contact with munitions undetected during UXO and EOD clearance operations. Implementation of SCMs (e.g., range sweeps, public education and permitting) would reduce risk to a less than significant level in the RPAA. NI • Aircraft-delivered Ordnance – Ordnance would be used only within the current Combat Center boundaries, so no impacts to public health and safety would occur. • Ground Training (Energy Hazards) – Impacts would be the same as for Alternative 1. BI • Other Safety Issues (Contaminated Sites) – Impacts would be the same as for Alternative 1.			

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Table ES-3. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Public Health and Safety (continued)	BI • Other Safety Issues (Mines/Contaminated Sites) – Physical closure of mines would further limit potential unauthorized access by the public. Public access to contaminated sites would be reduced or eliminated.						
Visual Resources	LSI • No visual impacts at KVPs. • Impacts would be short-term and specific timeframe. • Proposed acquisition study areas would be used exclusively by the military; any land disturbance would not be visible. • Less than significant loss of scenic/unique vistas in Johnson Valley.	LSI • No or LSI visual impacts at KVPs. • Impacts would be short-term and specific timeframe. • Proposed acquisition study areas would be used exclusively by the military; any land disturbance would not be visible. • Less than significant loss of scenic/unique vistas in Johnson Valley.	LSI • No or LSI visual impacts at KVPs. • Impacts would be short-term and specific timeframe. • Proposed acquisition study areas would be used exclusively by the military; any land disturbance would not be visible.	LSI • No or LSI visual impacts at KVPs. • Impacts would be short-term and specific timeframe. • Less than significant loss of scenic/unique vistas in Johnson Valley.	LSI • LSI visual impacts at KVPs. • Impacts would be short-term and specified timeframe. • Visual impacts to soils in RPAA. • Less than significant loss of scenic/unique vistas in Johnson Valley.	LSI • LSI visual impacts at KVPs. • Impacts would be short-term. • Visual impacts to soils in RPAA, smaller RPAA than Alternative 5. • Less than significant loss of scenic/unique vistas in Johnson Valley.	NI • Existing conditions would remain unchanged, and no impacts to visual resources would occur.
Transportation & Circulation	LSI • No major public roads would be impacted. • Traffic volume(s) could increase by 84 vehicle trips per day during MEB training. • The marginal temporary traffic increase due to MEB mobilization would not create significant impacts.	LSI • Impacts would be the same as under Alternative 1 (though a smaller portion of the west study area would be acquired).	SI • Public access to North Amboy Road would be lost during initial phases of MEB training. • Potential mitigation measure TRAN-1 was identified to lessen the potential effects of closing North Amboy Road to through traffic. However, it is expected that impacts to transportation and circulation would still be significant since there are no other paved roads in the vicinity of North Amboy Road. LSI • Impacts associated with construction of tank crossings on North Amboy Road would be short-term and minimal.	LSI • Impacts would be nearly identical to Alternative 1, but would allow for public access to the west study area 10 months per year.	LSI • Impacts would be identical to Alternative 4 with the exception that the south study area would not be acquired under this alternative.	LSI • Impacts would be nearly identical to Alternative 1, but would allow for public access to the southern portion of the west study area 10 months per year.	NI • Existing conditions would remain unchanged, and no impacts to transportation and circulation would occur.
Airspace Management	SI • Minimal to moderate impacts on Victor airway and moderate to significant impacts on jet route IFR air traffic within or adjacent to new and modified SUA. • Minimal to moderates impacts on routes used by general aviation VFR aircraft.	SI • Impacts for the reduced airspace configuration proposed for this alternative would be generally the same as Alternative 1.	SI • Impacts for the airspace configuration proposed for this alternative would be generally the same as Alternative 1 with the impacts occurring in the eastern areas where MOA/ATCAAs would be converted to restricted airspace.	SI • Impacts would be the same as Alternative 1.	SI • Impacts would be the same as Alternative 1.	SI • Impacts would be the same as Alternative 1.	NI • Current measures would continue to be used to mitigate any impacts on civil aviation.

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Table ES-3. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Airspace Management (continued)	• Minimal to moderate impacts on public airports and instrument approach procedures within close proximity to SUA. • Minimal to moderate impacts on private airfields within, beneath, or bordering SUA.						
Air Quality	LSI • The increase in VOC, CO, NO_x, SO_2, PM_{10}, and PM2.5 emissions from proposed activities would produce LSI. • Air emissions would produce LSI to 1) air quality values, and 2) visibility impairment within the Joshua Tree National Park pristine Class I area.	LSI • Impacts would be the same as Alternative 1.	SI • The increase in operational emissions of PM_{10} would produce SI due to exceeding NAAQS levels. LSI • All other impacts would be the same as Alternative 1.	LSI • Impacts would be the same as Alternative 1.	LSI • Impacts would be the same as Alternative 1.	LSI • Impacts would be the same as Alternative 1.	NI • No new impacts compared to existing conditions.
Noise[1]	• Aircraft Noise – Overflights would increase and occur at lower altitudes than baseline conditions. The 65 dBA CNEL and $CNEL_{mr}$ contours for the airfield and airspace operations, respectively, would be contained within the range boundary and no populations would be exposed to CNEL (or $CNEL_{mr}$) ≥ 65 dBA.	• Aircraft Noise – Overflights would increase and occur at lower altitudes than baseline conditions. The 65 dBA CNEL contours for the airfield operations would be contained within the range boundary and no populations or POIs would be exposed to CNEL ≥ 65 dBA. The 65-70 dB $CNEL_{mr}$ contour band would overlap almost 400 uninhabited acres (162 hectares) outside the range boundary, but with no affected population or POIs.	• Aircraft Noise – Overflights would increase and occur at lower altitudes than baseline conditions. The 65 dBA CNEL contours for the airfield operations would be contained within the range boundary and no populations or POIs would be exposed to CNEL ≥ 65 dBA. The 65 dBA $CNEL_{mr}$ contours for the airspace operations would be contained within the range boundary and no populations would be exposed to $CNEL_{mr}$ ≥ 65 dBA.	• Aircraft Noise – Overflights would increase and occur at lower altitudes than baseline conditions. The 65 dBA CNEL contours for the airfield operations would be contained within the range boundary and no populations or POIs would be exposed to CNEL ≥ 65 dBA. The 65 dBA $CNEL_{mr}$ contours for the airspace operations would be contained within the range boundary and no populations would be exposed to $CNEL_{mr}$ ≥ 65 dBA.	• Aircraft Noise – Overflights would increase and occur at lower altitudes than baseline conditions. The 65 dBA CNEL contours for the airfield operations would be contained within the range boundary and no populations or POIs would be exposed to CNEL ≥ 65 dBA. The 65-70 dB $CNEL_{mr}$ contour band for airspace noise would extend approximately 128 acres (52 hectares) beyond the range boundary but no resident populations or POIs would be exposed to $CNEL_{mr}$ ≥ 65 dBA due to airspace activity.	• Aircraft Noise – Overflights would increase and occur at lower altitudes than baseline conditions. The 65 dBA CNEL and $CNEL_{mr}$ contours for the airfield and airspace operations, respectively, would be contained within the range boundary and no populations or POIs would be exposed to CNEL (or $CNEL_{mr}$) ≥ 65 dBA.	• Aircraft Noise – Conditions would be identical to baseline conditions for aircraft noise. No persons located outside the Combat Center boundaries would be exposed to CNEL or $CNEL_{mr}$ greater than or equal to 65 dBA due to aircraft noise.

Note: [1]The Noise sections of the EIS describe only the potential changes in noise levels under each alternative. The significance of any noise-related impacts is assessed as a function of the environmental resources that may be affected by noise (e.g., biological resources, land use, etc.). Therefore, noise-related impacts are assessed as appropriate in the relevant impact sections for those other resources.

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Table ES-3. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Noise[1] (continued)	• Ordnance Noise – The 62-70 dBC CNEL contour would extend beyond the range boundary to encompass 7,391 acres (2,991 hectares) but would not affect the land use compatibility of any of the 50 applicable points of interest (POIs). The land area subject to a medium potential for noise complaints would increase by 35% compared to baseline and would encompass an estimated 1,098 more people. The area subject to high potential for noise complaint would decrease by 11.7% compared to baseline, but would not include any populations. Seven POIs would be subject to a medium potential for ordnance noise complaints. The probability of damage from ordnance vibrations would be less than 0.0001%.	• Ordnance Noise – The 62dBC CNEL contour would extend beyond the range boundary to encompass 7,003 acres (2,834 hectares), but would not affect the land use compatibility of the applicable POIs. The land area subject to a medium potential for noise complaints would increase by 32.6% compared to baseline and would include an estimated 3,072 people (compared to 2,293 persons for the baseline). The area with high potential for generating noise complaints would increase by 206.4% relative to the baseline condition but would not contain any resident population. Seven POIs would be subject to a medium potential for ordnance noise complaints. The probability of damage from ordnance vibrations would be less than 0.0001%.	• Ordnance Noise – The 62-70 dBC CNEL contour would extend beyond the range boundary on 10,861 acres (4,395 hectares) but would not affect the land use compatibility of any of the 50 applicable POIs. The land area subject to a medium potential for noise complaints would increase by 65.3% compared to baseline and would encompass an estimated 581 more people. The area subject to high potential for noise complaint would increase by 118.7% compared to baseline, but would not include any populations. Nine POIs would be subject to a medium potential for ordnance noise complaints while one POI (Old Woman Mountains (wilderness)) would be subject to a high potential for ordnance noise complaints. The probability of damage from ordnance vibrations would be less than 0.0001%.	• Ordnance Noise – The 62-70 dBC CNEL contour would extend beyond the range boundary on 4,572 acres (1,850 hectares) but would not affect the land use compatibility of any of the 50 applicable POIs. The land area subject to a medium potential for noise complaints would increase by 7.8% compared to baseline and would encompass an estimated 1,434 more people. The area subject to high potential for noise complaint would increase by 30% compared to baseline, but would not include any populations. Five POIs would be subject to a medium potential for ordnance noise complaints. The probability of damage from ordnance vibrations would be less than 0.0001%.	• Ordnance Noise – The 62-70 dBC CNEL contour would extend beyond the range boundary on 5,150 acres (2,084 hectares) but would not affect the land use compatibility of any of the 50 applicable POIs. The land area subject to a medium potential for noise complaints would increase by 5.9% compared to baseline and would encompass an estimated 842 more people. The area subject to high potential for noise complaint would increase by 31.8% compared to baseline, but would not include any populations. Five POIs would be subject to a medium potential for ordnance noise complaints. The probability of damage from ordnance vibrations would be less than 0.0001%.	• Ordnance Noise – The 62-70 dBC CNEL contour would extend beyond the range boundary on 2,106 acres (852 hectares; 408 acres less than the No-Action Alternative) and would not potentially affect the land use compatibility of any of the 51 applicable POIs. The land area subject to a medium potential for noise complaints would increase by 21.2% compared to baseline and would encompass an estimated 1,478 more people. The area subject to high potential for noise complaint would increase by 59% compared to baseline, but would not include any populations. Six POIs would pose a medium potential for ordnance noise complaints. The probability of damage from ordnance vibrations would be less than 0.0001%.	• Ordnance Noise – The area within the CNEL 62 dBC ordnance noise contour that would be outside the boundaries of the Combat Center complex would be 2,514 acres (1,017 hectares), primarily along the northeast boundary. The CNEL 70 dBC noise contour would not extend outside the Combat Center complex. Four POIs would be subject to a medium potential for ordnance noise complaints.

Note: [1]The Noise sections of the EIS describe only the potential changes in noise levels under each alternative. The significance of any noise-related impacts is assessed as a function of the environmental resources that may be affected by noise (e.g., biological resources, land use, etc.). Therefore, noise-related impacts are assessed as appropriate in the relevant impact sections for those other resources.

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Table ES-3. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Biological Resources	SI Protected - Federally Threatened or Endangered Species • SI to and potential take of 733 to 3,837 (590 to 978 in the acquisition study areas) federally threatened adult desert tortoises from military training. Indirect impacts to tortoises and critical habitat in other regional OHV areas and designated routes would be greater than for other alternatives because of a larger amount of displacement under Alternative 1. SI-M Other Status Species • SI-M to small crucifixion thorn populations in Blacktop, Emerson Lake, and southern Lavic Lake Training Areas as a result of crushing or ordnance explosion. Mitigated through implementation of the potential mitigation measure BIO-1 to avoid this population through exercise design, and/or protect it with fencing. LSI Protected - Federally Threatened or Endangered Species • 128,711 acres of non-critical desert tortoise habitat may experience LSI. Species With Other Federal Status • LSI to Mojave fringe-toed lizards from Marine and vehicle movement and ordnance explosion. • LSI to resident special status and migratory birds from loss of vegetation and physical disturbance or displacement. • LSI to special status bat species from ordnance explosion and potential Marine movement in vicinity of current/potentially occupied mines and caves. •	SI Protected - Federally Threatened or Endangered Species • SI to desert tortoises from military training similar to Alternative 1, but slightly reduced due to the smaller west study area. Potential take of 608 to 3,298 adult desert tortoises (466 to 761 in the acquisition study areas). Indirect impacts to tortoises outside the acquisition study areas from displacement and concentration of OHV users. Overall impact greater than for Alternative 1. SI-M Other Status Species • SI-M to small crucifixion thorn populations as described for Alternative 1. Mitigated through implementation of the potential mitigation measure BIO-1. LSI Protected - Federally Threatened or Endangered Species • 117,329 acres of non-critical desert tortoise habitat may experience LSI. Species With Other Federal Status • LSI to Mojave fringe-toed lizards similar to Alternative 1. Less land would be acquired, but the land excluded from acquisition was not found to host any Mojave fringe-toed lizards during surveys. • LSI to resident special status and migratory birds and other federal status species similar to Alternative 1. • LSI to special status bat species, Nelson's bighorn sheep and whitemargin beardtongue similar to Alternative 1.	SI Protected - Federally Threatened or Endangered Species • SI to desert tortoises from military training; lower than other alternatives due to lower desert tortoise density in the east study area, estimated potential take of 215 to 2,960 adult desert tortoises (107 to 240 in the acquisition study areas). No indirect impacts from displacement of OHV users of Johnson Valley OHV Area. No beneficial offset from its closure. Overall impact somewhat lower than for Alternative 1. SI-M Species with Other Federal Status • SI-M to Nelson's bighorn sheep in the Ship Mountains from ordnance explosion during MEB final exercises and MEB Building Block training. • SI-M to populations of Harwood's eriastrum in the east study area in Cadiz Dunes. Other Status Species • SI-M to small crucifixion thorn populations as described for Alternative 1. Mitigated through implementation of the potential mitigation measure BIO-1. • SI-M to populations of Harwood's eriastrum in the east study area in Cadiz Dunes. LSI Protected - Federally Threatened or Endangered Species • 98,571 acres of non-critical desert tortoise habitat may experience LSI. Species With Other Federal Status • LSI to Mojave fringe-toed lizards as routes of travel and ordnance explosion would be remote from known populations.	SI Protected - Federally Threatened or Endangered Species • SI to desert tortoises from military training substantially reduced from Alternative 1 due to the lack of MEB Building Block training in the west study area. Potential take of 500 to 3,628 adult desert tortoises (346 to 592 in the acquisition study areas). Public access to the west study area would eliminate beneficial offset to impacts from military activities, but would mostly eliminate indirect impacts to tortoises within other regional OHV areas. Overall, net impact to tortoises somewhat lower than Alternative 1. SI-M Other Status Species • SI-M to small crucifixion thorn populations as described for Alternative 1. Mitigated through implementation of the potential mitigation measure BIO-1. LSI Protected - Federally Threatened or Endangered Species • LSI to non-critical potential desert tortoise habitat from military exercises reduced from Alternative 1, as a result of differences in the maneuver design. 117,941 acres of non-critical desert tortoise habitat may experience LSI. Species With Other Federal Status • LSI to Mojave fringe-toed lizards similar to Alternative 1. Adverse effects to this species' loose sand habitat would continue from public access and OHV recreation. • Impacts to all other federal status species same as Alternative 1.	SI Protected - Federally Threatened or Endangered Species • SI to desert tortoises from military training substantially reduced from Alternative 1 due to the lack of MEB Building Block training in the west study area and not acquiring the south study area. Potential take of 472 to 3,186 adult desert tortoises (324 to 562 in the acquisition study areas). Public access to the west study area would eliminate the beneficial offset to impacts from military activities, but would mostly eliminate indirect impacts to tortoises within other regional OHV areas. Some indirect impacts to specific OHV alternative areas in the vicinity would be expected to occur during the 2 months per year of exclusive military use of the west study area. Overall, net impact somewhat lower than Alternative 1 and the lowest of all action alternatives. SI-M Other Status Species • SI-M to small crucifixion thorn populations as described for Alternative 1. Mitigated through implementation of the potential mitigation measure BIO-1. LSI Protected - Federally Threatened or Endangered Species • LSI to non-critical potential desert tortoise habitat from military exercises reduced from Alternative 1, from differences in the maneuver design. 104,153 acres of desert tortoise habitat may experience LSI.	SI Protected - Federally Threatened or Endangered Species • SI to desert tortoises similar to Alternative 1. Potential take of 645 to 3,769 adult desert tortoises (503 to 834 in the acquisition study areas). Public access to the RPAA would reduce potential beneficial offset from cessation of OHV recreation. Overall, impact to tortoises greater than Alternative 1 and other action alternatives. Indirect impacts to tortoise populations and critical habitat from displaced OHV activity at other regional OHV areas and designated routes would be similar to Alternative 1, but substantially reduced based on a much lower amount of displaced activity under Alternative 6. SI-M Other Status Species • SI-M to small crucifixion thorn populations as described for Alternative 1. Mitigated through implementation mitigation measure BIO-1. LSI Protected - Federally Threatened or Endangered Species • Impacts to non-critical desert tortoise habitat reduced slightly from Alternative 1 due to differences in the maneuver design. 125,265 acres of desert tortoise habitat may experience LSI. Public access to the RPAA would reduce potential beneficial offset from cessation of OHV recreation.	NI • No impacts to biological resources would occur; however, adverse effects from public access and OHV activity in the west study area would continue.

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Table ES-3. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Biological Resources (continued)	• LSI to Nelson's bighorn sheep on the Combat Center and on the lands underlying the proposed airspace establishment. • LSI to whitemargin beardtongue. LSI Other Status Species • LSI to spectacle fruit populations. • Indirect impact of displaced OHV use on species and occupied habitat in more distant OHV areas located outside the ROI. Vegetation • LSI to vegetation and creosote ring UPAs from physical damage and destruction from training. • LSI to native plant communities from proliferation of non-native plant species due to anthropogenic dispersal and increased risk of fire. Ecosystems • LSI to plant community ecosystems from increased risk of fire, changes in fire frequency regime, and wildlife mortality. • LSI to cryptobiotic soils from Marine and vehicle movement, ordnance explosion, and helicopter landings. • LSI to caves and mines, aquatic habitats, and playas. Wildlife • LSI to non-special status wildlife species, including mammals, amphibians, reptiles, and birds from training activities.	LSI Other Status Species • LSI to spectacle fruit populations would be the same as described for Alternative 1. • Indirect impact of displaced OHV use on species and occupied habitat in more distant OHV areas located outside the ROI. Vegetation • LSI similar to Alternative 1 and would be further reduced due to the smaller acreage. Ecosystems • LSI to cryptobiotic soils similar Alternative 1 and would be further reduced due to the smaller acreage. • LSI to caves and mines, aquatic habitats, and playas similar to Alternative 1. Wildlife • LSI to wildlife similar to Alternative 1.	LSI Species With Other Federal Status • LSI to resident special status and migratory birds similar to Alternative 1. • LSI to other species with other federal status less than Alternative 1, due to lower density of these species. Other Status Species • LSI to spectacle fruit populations would be the same as described for Alternative 1. Vegetation • LSI to plant communities from physical disturbance, but less than Alternative 1, due to less sensitive vegetation in the east study area. This area does not experience high level of OHV activity, change in disturbance from existing conditions greater. Ecosystems • LSI to plant community ecosystems similar to Alternative 1. Lower densities of creosote bush scrub are present; area does not experience high level of OHV activity, disturbance to vegetation greater than in the west study area. • LSI to cryptobiotic soils similar to Alternative 1. Lower levels of soil disturbance compared to the west study area, so impacts to cryptobiotic soils greater than for the other alternatives. • LSI to playas, since vehicles would not likely enter Bristol Dry Lake for risk of stranding. • LSI to caves and mines and aquatic habitats similar to Alternative 1. Wildlife • LSI similar to Alternative 1 and reduced due to the lower habitat diversity.	LSI Other Status Species • LSI to spectacle fruit populations same as Alternative 1. • Indirect impact of displaced OHV use on species and occupied habitat in more distant OHV areas located outside the ROI. Vegetation • LSI to vegetation less than Alternative 1. Potential beneficial effects resulting from cessation of recreational OHV activity would not occur. • LSI to creosote ring UPAs similar to Alternative 1. Adverse effects may continue to occur from public access in the west study area. Ecosystems • LSI to ecosystems similar to Alternative 1. Impacts to sensitive ecosystems (playas, cryptobiotic soils, and caves) would not be offset as much as in Alternatives 1, 2, and 3 because of public use. Wildlife • LSI to wildlife similar to Alternative 1.	LSI Species With Other Federal Status • LSI to Mojave fringe-toed lizards similar to Alternative 1. Adverse effects to this species' loose sand habitat would continue from public access/ OHV recreation. • Impacts to all other federal status species same as Alternative 1. Other Status Species • LSI to spectacle fruit populations same as Alternative 1. • Indirect impact of displaced OHV use on species and occupied habitat in more distant OHV areas located outside the ROI. Vegetation • LSI to vegetation less than Alternative 1. Potential beneficial effects resulting from cessation of recreational OHV activity would not occur. • LSI to creosote ring UPAs similar to Alternative 1. Adverse effects may continue to occur from public access in the west study area. Ecosystems • LSI to ecosystems similar to Alternative 1. Impacts to sensitive ecosystems (playas, cryptobiotic soils, and caves) would not be offset as much as in Alternatives 1, 2, and 3 because of public use. Wildlife • LSI to wildlife similar to Alternative 1.	LSI Species With Other Federal Status • LSI to Mojave fringe-toed lizards, but greater than Alternative 1 because the area currently occupied by Mojave fringe-toed lizards in the west study area would remain open to OHV recreation for much of the year. • Impacts to all other species with other federal status similar to Alternative 1. Other Status Species • LSI to spectacle fruit populations same as Alternative 1. • Indirect impact of displaced OHV use on species and occupied habitat in more distant OHV areas located outside the ROI. Vegetation • Impacts less than Alternative 1. Public access to RPAA would continue, beneficial offsets from cessation of recreational OHV activity less than Alternative 1. • LSI to creosote ring UPAs similar to Alternative 1. Adverse effects would continue from public access and OHV recreation in the RPAA. Ecosystems • LSI to ecosystems similar to Alternative 1. Impacts to sensitive ecosystems (playas, cryptobiotic soils, and caves) would not be offset as much as in Alternatives 1, 2, and 3 because of public use. Wildlife • LSI to wildlife similar to Alternative 1.	

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Table ES-3. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Cultural Resources	LSI • Direct and indirect impacts may result from weapons fire, MEB operations, group and individual traffic, battalion movements, aviation WDZ, and construction. • SCMs and other measures would be implemented to avoid or reduce impacts to resources. NI No impact anticipated from airspace establishment.	LSI/NI • Impacts would be the same as Alternative 1.	LSI/NI • Impacts would be the same as Alternative 1.	LSI/NI • Impacts would be the same as Alternative 1, with the addition of continued impacts from OHV use during the 10 months of allowed public use of Johnson Valley OHV area. OHV damage would be lessened during the other two months of the year.	LSI/NI • Impacts would be the same as Alternative 4.	LSI/NI • Impacts would be the same as Alternative 4.	LSI • Existing conditions would remain unchanged. Impacts from OHV use in the Johnson Valley OHV Area would continue for all 12 months in the year.
Geological Resources	LSI • Soils: Direct impacts from disturbance of soil crusts and soil compaction, dispersion of soil particles as dust due to explosive contact, and shearing/mixing of soil profiles, as a result of military vehicle operations, ordnance delivery, and infantry training. • Soils: Direct impacts (surface disturbance, erosion, and compaction) from continued OHV activity concentrated in smaller area. • Soils: Indirect impacts to water and air quality from military activities on acquired land and OHV use concentrated in smaller area on land not acquired. • Mineral resources: Direct impact and indirect impacts due to loss of ore production if the Morris Lode Mine in the west study area is producing ore and is purchased and closed. • Mineral resources: Indirect impact if alluvial sand and gravel on BLM lands are no longer available for potential sale as a construction aggregate.	LSI • Soils: Direct and indirect impacts from military activities would be the same as for Alternative 1, except they would occur over a smaller portion of the west study area. • Soils: Direct impacts (surface disturbance, erosion, and compaction) from continued OHV activity concentrated in smaller area. • Soils: Indirect impacts to water and air quality from military activities on acquired land and OHV use concentrated in smaller area on land not acquired. • Mineral resources: Direct and indirect impacts would be the same as for Alternative 1. • Paleontological resources: Direct impact would be the same as for Alternative 1. NI • Mineral resources: Direct and indirect impacts would be the same as for Alternative 1. • Seismicity: Impacts would be the same as for Alternative 1.	LSI • Soils: The impacts due to military activities would be the same as for Alternative 1, except that they would occur in the east study area. • Soils: Direct and indirect impacts from continuation of active mining operations and/or mine closure. • Soils: Direct impacts to access of agricultural soils in the east study area, due to overlap of planned direct and indirect fire SDZs with existing agricultural operations. • Indirect impacts to water and air quality associated with military activities would be the same as for Alternative 1, except they would occur in the east study area. • Mineral resources: Direct and indirect impacts if two active and producing calcium chloride mines in the east study area are purchased and closed. • Mineral resources: Indirect impact if alluvial sand and gravel on BLM lands are no longer available for potential sale as construction aggregate.	LSI • Soils: Direct and indirect impacts to soils from military activities would be the same as under Alternative 1, except that the impacts from military activities would occur for approximately only 60 days per year as opposed to up to 160 days per year under Alternative 1. • Soils: Direct impacts associated with OHV use (surface disturbance, compaction, erosion) would occur during 10 months of restricted public access. • Soils: Indirect impacts to water and air quality due to transport of soil material mobilized by water and air, resulting from both military activities and OHV use. • Soils: Direct and indirect impacts from continuation of active mining operationsand/or mine closure. • Mineral resources: if the Morris Lode Mine in the west study area is producing ore and is found to be incompatible with military operations and is purchased and closed, direct and indirect impacts would be the same as for Alternative 1. • Paleontological resources: Direct impact would be the same as for Alternative 1.	LSI • Soils: Direct and indirect impacts to soils from military activities and potential mining activities/closure would be the same as for Alternative 4. • Soils: Direct and indirect impacts associated with OHV use would be the same as for Alternative 4. • Mineral resources: Direct and indirect impacts would be the same as for Alternative 4. • Paleontological resources: Direct impacts would be the same as for Alternative 1. NI • Mineral resources: Impacts to would be the same as for Alternative 4. • Seismicity: Impacts would be the same as for Alternative 1.	LSI • Soils: Direct and indirect impacts from military activities would be the same as for Alternative 1, except they would occur over a smaller portion of the west study area. For up to 160 days, there would be impacts from military activities on (108,530 acres [43,921 hectares]) as opposed to 180,353 acres [72,987 hectares] under Alternative 1. Impacts from military activities would occur for 60 days within the RPAA (38,137 acres [15,434 hectares]). • Soils: Direct impacts from OHV use (surface disturbance, compaction, erosion) would increase within the RPAA area available for use (44% of existing Johnson Valley OHV area open 10 months per year, 24% of existing area open year round). • Soils: Indirect impacts from OHV use (impacts to water and air quality due to transport of soil material mobilized by water and air) would increase within the area available for use (44% of existing Johnson Valley OHV area open 10 months per year, 24% of existing area open year round).	NI • Existing conditions would remain unchanged. Direct impacts to soils from continued OHV activity in the Johnson Valley OHV Area would continue.

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Table ES-3. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Geological Resources (continued)	LSI • Paleontological resources: Direct impact (damage/destruction from ordnance/vehicle traffic, digging infantry positions) to fossils if present in training areas in alluvial soils. NI • Mineral resources: No direct or indirect impacts to mineral resources if there is no ore production from the Morris Lode Mine in the west study area. No direct or indirect impacts from purchase of patented and unpatented mining claims and closure of abandoned mines. No direct or indirect impacts to mineral resources in the Combat Center and the south study area. • Seismicity: There is currently no evidence linking earthquake activity with the use of explosives, therefore proposed training activities would not affect seismic activity in the Mojave Desert.		LSI • Paleontological resources: Direct impact (damage/destruction from ordnance/vehicle traffic, digging infantry positions) to fossils if present in training areas in alluvial soils. NI • Mineral resources: No direct or indirect impacts to mineral resources if active calcium chloride mines in the east study area continue production. No direct or indirect impacts from purchase of patented and unpatented mining claims and/or closure of abandoned mines. No direct or indirect impacts to mineral resources in the Combat Center and the south study area. • Seismicity: Impacts would be the same as for Alternative 1.	NI • Mineral resources: If the Morris Lode Mine is not producing ore, or is found to be compatible with military operations, the impacts to mineral resources would be the same as for Alternative 1. • Mineral resources: Direct and indirect impacts from purchase of patented and unpatented mining claims and closure of abandoned mines in the west study area would be the same as for Alternative 1. • Direct and indirect impacts to mineral resources in the Combat Center and the south study area would be the same as for Alternative 1. • Seismicity: Impacts would be the same as for Alternative 1.		LSI • Mineral resources: Direct and indirect impacts would be the same as for Alternative 1. • Paleontological resources: Direct impacts would be the same as for Alternative 1. NI • Mineral resources: direct and indirect resources would be the same as for Alternative 1. • Seismicity: Impacts would be the same as for Alternative 1.	
Water Resources	LSI • Water demands associated with the proposed action, as well as the long-term needs for potable water supply at the Combat Center, would be addressed by implementation of the IESS, which is an SCM for this project. With implementation of the SCM, Alternative 1 would have NI to groundwater recharge and LSI to groundwater quality and groundwater flow patterns. NI • There would be no impacts to local water wells from ordnance use.	LSI • Impacts and SCMs would be the same as for Alternative 1. NI • Impacts would be the same as for Alternative 1.	LSI • Impacts and SCMs would be the same as for Alternative 1. NI • Impacts would be the same as for Alternative 1.	LSI • Impacts and SCMs would be the same as for Alternative 1. NI • Impacts would be the same as for Alternative 1.	LSI • Impacts and SCMs would be the same as for Alternative 1. NI • Impacts would be the same as for Alternative 1.	LSI • Impacts and SCMs would be the same as for Alternative 1. NI • Impacts would be the same as for Alternative 1.	LSI • With implementation of the IESS, continued water usage at current rates would result in LSI to the long-term water supply.

Legend: ACEC = Area of Critical Environmental Concern; ATCAA = Air Traffic Control Assigned Airspace; BI = Beneficial impact; CDCA = California Desert Conservation Area; CNEL = Community Noise Equivalent Level; $CNEL_{mr}$ = Onset-Rate Adjusted Monthly Community Equivalent Noise Level; CNPS = California Native Plant Society; CO = carbon monoxide; dB = decibel; dBC = C-weighted decibel; EO = Executive Order; EOD = explosive ordnance disposal; IESS = Installation Energy and Sustainability Strategy; IFR = Instrument Flight Rules; KVP = Key viewpoint; LSI = Less than significant impact; MAGTF = Marine Air Ground Task Force; MOA = Military Operations Area; NA = Not Applicable; NAAQS = National Ambient Air Quality Standards; NI = No impact; NO_x = nitrogen oxides; OHV=Off-highway vehicle; PM_{10} = particulate matter less than 10 microns in diameter; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; RPAA= Restricted Public Access Area; SCM = special conservation measure; SI = Significant impact; SI-M = Significant impact mitigable to less than significant; SO_2 = sulfur dioxide; SUA = Special Use Airspace; UPA = Unusual Plant Assemblage; UXO = unexploded ordnance; VFR = Visual Flight Rules; VOC = volatile organic compound; WDZ = Weapons Danger Zone; MEB = Marine Expeditionary Brigade.

CUMULATIVE IMPACTS

A summary of potential cumulative impacts under each action alternative is summarized below.

Table ES-4. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Land Use	SI Recreation and OHV Use • No additional cumulative impacts identified. See Recreation below for additional Recreation-specific impacts. Grazing • Continuing loss of rural agricultural/grazing lands to other local/regional uses. LSI Land Status and Ownership • Minimal impacts would occur under this alternative. Additive effect of relocation is expected to be less than significant for the local area. Mining • No active producing mines in acquisition study areas. Patented mines would be acquired in accordance with applicable regulations. Existing claims and leases in area would be acquired on a case-by-case basis in accordance with applicable regulations. Sensitive Land Uses • Noise modeling takes into consideration ambient noise levels. • Applicable noise contours would remain within the acquisition study areas. Utilities • Existing utilities remain in place. • Past, present, and reasonably foreseeable actions nearby identified no SI. NI Plans and Policies • Inconsistency with Johnson Valley OHV Plan would be a significant and unavoidable impact, however the impact is not cumulative in nature and therefore there is no cumulative impact.	SI Recreation and OHV Use • Same as Alternative 1. Grazing • Same as Alternative 1. LSI Mining • Same as Alternative 1. Land Status and Ownership • Same as Alternative 1. Sensitive Land Uses • Same as Alternative 1. Utilities • Same as Alternative 1. NI Plans and Policies • Same as Alternative 1.	SI Recreation and OHV Use • Same as Alternative 1. Agriculture • Continuing loss of rural agricultural/grazing lands to other local/regional uses. SI and loss of 1,600 acres of cultivated agricultural lands. LSI Mining • Future case-by-case real estate analysis may find that two active chloride mines would be incompatible with training activities and, if so, would require closure. There are other regional sources for the minerals produced by these mines, therefore, if closed would result in less than significant cumulative impact. Land Status and Ownership • Same as Alternative 1. Sensitive Land Uses • Same as Alternative 1. Utilities • Existing utilities could remain in place; however, there would be LSI related to future granting of utilities rights-of-way. NI Plans and Policies • Inconsistency with CDCA Plan would be a significant and unavoidable impact, however the impact is not cumulative in nature and therefore there is no cumulative impact.	SI Recreation and OHV Use • Same as Alternative 1. Grazing • Same as Alternative 1. LSI Mining • Same as Alternative 1 if patented mines are determined to be incompatible with military operations and acquired. Land Status and Ownership • Same as Alternative 1. Sensitive Land Uses • Same as Alternative 1. Utilities • Same as Alternative 1. NI Plans and Policies • Same as Alternative 1. Mining • If patented mines are determined to be compatible with military operations and not acquired.	SI Recreation and OHV Use • Same as Alternative 1. Grazing • Same as Alternative 1. LSI Mining • Same as Alternative 4. Land Status and Ownership • Same as Alternative 1. Sensitive Land Uses • Same as Alternative 1. Utilities • Same as Alternative 1. NI Plans and Policies • Same as Alternative 1. NI Mining • Same as Alternative 4.	SI Recreation and OHV Use • Same as Alternative 1. Grazing • Same as Alternative 1. LSI Mining • Same as Alternative 1. Land Status and Ownership • Same as Alternative 1. Sensitive Land Uses • Same as Alternative 1. Utilities • Avoids Southern California Edison transmission lines. • Past, present, and reasonably foreseeable actions nearby identified no SI. NI Plans and Policies • Same as Alternative 1.

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Table ES-4. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Recreation	SI • OHV use in the region is increasing while land available for OHV use is decreasing. • Several of the past, present, and reasonably foreseeable actions would increase the regional population, increasing users in recreational areas. • There is an expected increase in demand on recreational resources now and into the future. • SB 2921 and CDPA 2010 would minimize and potentially offset some recreation cumulative effects.	SI • Same as Alternative 1. • Land acquisition in the west study area would be slightly less than under Alternative 1, therefore, impacts would be slightly less.	NI • Although there is an expected increased demand on the local recreational resources, the acquisition study areas are not frequently used for recreation and are not unique to the region.	SI • Same as Alternative 1. • Land acquisition in the west study area and the number of displaced users would be significantly less than under Alternative 1, therefore, impacts would be slightly less.	SI • Same as Alternative 4.	SI • Same as Alternative 4.
Socioeconomics and Environmental Justice	LSI • Beneficial combined impact (direct and indirect) to local and regional economic conditions with jobs, revenue, income, and indirect multiplier effects. • Little to no overlap/correlation between past, present, and reasonably foreseeable actions and the proposed action. • SB 2921 would increase number and variety of recreational opportunities in the region attracting visitors, thereby offsetting some localized sales/revenue impacts on local businesses and communities.	LSI • Same as Alternative 1. • However, economic impacts from this alternative would be less than Alternative 1 and the overall net impacts would be more beneficial.	SI • Significant adverse impact to the regional economy if development of the planned Cadiz Inc. Groundwater Conservation, Recovery, and Imported Water Storage project in the east study area was precluded by implementation of Alternative 3. LSI • Same as Alternative 1. • Loss of jobs at displaced businesses in the east study area would cause a small net combined decrease in sales, income, and employment. However, past, present, and reasonably foreseeable actions and SB 2921 would offset the marginal adverse impacts.	LSI • Same as Alternative 1. • However, economic impacts from this alternative would be less than Alternative 1 and the overall net impacts would be more beneficial.	LSI • Same as Alternative 1. • However, economic impacts from this alternative would be less than Alternative 1 and the overall net impacts would be more beneficial.	LSI • Same as Alternative 1 • However, economic impacts from this alternative would be less than Alternative 1 and the overall net impacts would be more beneficial.

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Table ES-4. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Public Health and Safety	LSI Aircraft-related Accidents and Noise • Sufficient management and flight safety measures would be in place for all projects. Aircraft-delivered Ordnance • LSI for the proposed action. • There are no past, present, and reasonably foreseeable actions that would contribute additional impacts of this type. Ground Training Activities • The area would be used exclusively by the military. • Current and additional safety measures would be implemented. • Past, present, and reasonably foreseeable actions nearby identified no SI from energy hazards. • Minor increases in traffic from past, present, and reasonably foreseeable actions would increase the potential for traffic accidents. Other Safety Issues • There are no areas where children would congregate near the acquisition study areas. • Emergency response capacity is present to accommodate the expected increase in activities. • Physical closure and management of mines would have beneficial impacts to the public. Hazardous Materials and Hazardous/Solid Waste • Public access to contaminated sites would be reduced or eliminated. Sufficient capacity and procedures are in place to accommodate solid waste, and manage hazardous materials and waste. Plans would be updated to manage any new hazardous materials or waste streams.	LSI • Aircraft Activities, Accidents, and Noise, Aircraft-delivered Ordnance, Ground Training Activities, Other Safety Issues, Emergency Response, and Hazardous Materials and Hazardous/Solid Waste - Impacts would be the same as for Alternative 1. • Amount of land acquired would be less than Alternative 1. • Mines/Contaminated Sites – Impacts would be the same as for Alternative 1. NI • Ground Training (Energy Hazards), Other Safety Issues (Protection of Children) – Impacts would be the same as for Alternative 1.	LSI • Aircraft Activities, Accidents, and Noise, Aircraft-delivered Ordnance, Ground Training Activities, Other Safety Issues, Emergency Response, and Hazardous Materials and Hazardous/Solid Waste - Impacts would be the same as for Alternative 1. • East study area would be acquired instead of the west study area. • Mines/Contaminated Sites – Impacts would be the same as for Alternative 1. NI • Ground Training (Energy Hazards), Other Safety Issues (Protection of Children) – Impacts would be the same as for Alternative 1.	LSI Aircraft-related Accidents • Current procedures regarding prevention/response to aircraft-related accidents would continue. Ground Training Activities • Aircraft and Ground-delivered Ordnance – presence of munitions constituents during periods of restricted public access results in a LSI to public health and safety with identified SCMs and other specific RPAA management measures. No cumulative projects would contribute to this impact. • Energy hazards would be less than significant because proposed communications towers would be far enough away from ordnance use and ground training activities. • Minor increases in traffic from past, present, and reasonably foreseeable actions would increase the potential for traffic accidents. Other Safety Issues • There are no areas where children would congregate near the acquisition study areas. • Emergency response capacity is present to accommodate the expected increase in activities. • Mines/Contaminated Sites – Impacts would be the same as for Alternative 1. Hazardous Materials and Hazardous/Solid Waste • Impacts would be the same as for Alternative 1.	LSI • Aircraft Accidents, Ground Training Activities, Emergency Response, Other Safety Issues, Hazardous Materials and Hazardous/Solid Waste – Impacts would be the same as Alternative 4. • Aircraft and Ground-delivered Ordnance – Impacts would be the same as Alternative 4 for aircraft and ground-delivered ordnance. • Mines/Contaminated Sites – Impacts would be the same as for Alternative 1.	LSI • Aircraft Accidents, Ground Training Activities, Emergency Response, Other Safety Issues, Hazardous Materials and Hazardous/Solid Waste – Impacts would be the same as Alternative 4). • Aircraft and Ground-delivered Ordnance – Impacts would be less than Alternative 4, but still less than significant. • Mines/Contaminated Sites – Impacts would be the same as for Alternative 1.

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Table ES-4. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Visual Resources	NI • LSI visual impacts from proposed action; land disturbance would be short-term. • Very few, if any, visual receptors would be impacted doubly by past, present, and reasonably foreseeable actions due to the spatial distance between the proposed action and past, present, and reasonably foreseeable actions. • All new development would be in accordance with city/county general plans.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	LSI • Same as Alternative 1.
Transportation & Circulation	NI • NI from the proposed action. • On-base past, present, and reasonably foreseeable actions would overlap but impacts would be negligible. Grow the Force project would mitigate any potential impacts. • Any off-base increases in traffic are part of standard planning and community development.	NI • Same as Alternative 1.	NI • Same as Alternative 1. • Due to short span and location of Amboy Road closures there would be no cumulative impact.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	NI • Same as Alternative 1.
Airspace Management	NI • No pending or proposed cumulative airspace or airport action were identified. • All future airspace proposals in the region would require consultation with the FAA.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	NI • Same as Alternative 1.

Continued on next page

Table ES-4. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Air Quality	LSI • Proposed VOC, CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$ emissions would not contribute to an exceedance of an air quality standard due to cumulative impacts. • Proposed emissions would produce very low impacts to ambient pollutant levels within nearby Class I area. • GHG emissions would result in minimal additions to the U.S. inventory, resulting in less than significant cumulative impacts to global climate change.	LSI • Same as Alternative 1.	SI • Same as Alternative 1, except that proposed emissions of PM_{10} would contribute to significant cumulative impacts due to exceeding NAAQS levels. LSI Cumulative impacts of VOC, CO, NO_x, SO_2, and $PM_{2.5}$ emissions would be slightly higher than Alternative 1.	LSI • Same as Alternative 1.	LSI • Same as Alternative 1.	LSI • Same as Alternative 1.
Noise[1]	• The incremental contribution of each of these actions, when taken in combination with Alternative 1, are not anticipated to expose any additional off-range civilians to CNEL/CNELmr greater than or equal to 65 dB . • Cumulative noise impacts to land use, public health and safety, and wildlife are discussed in Section 5.4.1, *Land Use*, Section 5.4.4, *Public Health and Safety*, and Section 5.4.10, *Biological Resources*, respectively.	• Same as Alternative 1.	• Same as Alternative 1.	• Same as Alternative 1.	• Same as Alternative 1.	• Same as Alternative 1.

Note: [1]The Noise sections of the EIS describe only the potential changes in noise levels under each alternative. The significance of any noise-related impacts is assessed as a function of the environmental resources that may be affected by noise (e.g., biological resources, land use, etc.). Therefore, noise-related impacts are assessed as appropriate in the relevant impact sections for those other resources.

Table ES-4. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Biological Resources	SI • Project impacts, when considered with solar and wind energy projects, would cumulatively impact desert tortoises and non-critical desert tortoise habitat contributing to regional decline of the population. • The same projects would result in a cumulative impact on native plant ecosystems through grading, mowing, etc. combined with adverse effects to native plant ecosystems due to loss of plant cover and likely proliferation of non-native species from the proposed action. • Closure of most of Johnson Valley OHV Area would cumulatively impact desert tortoises, wildlife, and vegetation in the region.	SI • Cumulative impacts to desert tortoise from concentration of military training into a smaller portion of the west study area would increase the intensity of disturbance in that area as compared to Alternative 1. Similarly, recreational OHV activity would be concentrated into a smaller Johnson Valley OHV Area, resulting in increased intensity of use there. When combined with solar and wind energy projects in the region, would cumulatively impact desert tortoises and their habitat to a greater extent than Alternative 1. SI Cumulative impacts to wildlife, vegetation, and native plant ecosystems (e.g., creosote bush scrub) due to loss of plant cover and likely proliferation of non-native species. For the reasons described for desert tortoise, these cumulative impacts would be greater than for Alternative 1.	SI • Cumulative impacts to desert tortoise from continued OHV recreation in the Johnson Valley OHV Area would further contribute to cumulative impacts to desert tortoises, as would solar and wind energy development in the region. Because the east study area is host to low tortoise densities and subjectively poorer habitat, cumulative impacts to tortoises from this alternative would be less than under Alternative 1. • No closure of Johnson Valley OHV Area, so reduced cumulative impacts to desert tortoises, wildlife, and vegetation in those areas as compared to other alternatives. SI Cumulative impacts to wildlife, vegetation, and native plant ecosystems (e.g., creosote bush scrub) due to loss of plant cover and likely proliferation of non-native species.	SI • Cumulative impacts to desert tortoises from continued OHV recreation in west study area; impacts somewhat lower than for Alternative 1. • Closure of Johnson Valley OHV Area for two months a year would cumulatively impact desert tortoises, wildlife, and vegetation in other regional OHV areas, but much less than under Alternative 1. • Cumulative impacts to wildlife, vegetation, and native plant ecosystems from loss of plant cover and proliferation of non-native species; impacts lower than for Alternative 1 since OHV activity would be reduced and intensity of military activities in the west study area would be lower. SI • Cumulative impacts to desert tortoises from continued OHV recreation in the west study area. Overall contribution to cumulative impacts somewhat lower than for Alternative 1. • Closure of Johnson Valley OHV Area for two months of the year would cumulatively impact desert tortoises, wildlife, and vegetation in other regional OHV areas, but much less than under Alternative 1. • Cumulative impacts to wildlife, vegetation, and native plant ecosystems (e.g., creosote bush scrub) due to loss of plant cover and likely proliferation of non-native species. Overall contribution to cumulative impacts somewhat lower than for Alternative 1 because displacement of OHV activity would be reduced and intensity of military activities in the west study area would be lower.	SI • Cumulative impacts to desert tortoises from continued OHV recreation in the west study area. Overall contribution to cumulative impacts lower than for Alternative 1 and the lowest of project alternatives because displacement of OHV activity would be reduced, the south study area would not be acquired, and intensity of military activities in the west study area would be lower. • Closure of Johnson Valley OHV Area for two months of the year would cumulatively impact desert tortoises, wildlife, and vegetation in other regional OHV areas, but much less than under Alternative 1. SI Cumulative impacts to wildlife, vegetation, and native plant ecosystems (e.g., creosote bush scrub) due to loss of plant cover and likely proliferation of non-native species. Overall contribution to cumulative impacts lower than for Alternative 1 for the same reasons noted for desert tortoise above.	SI • Concentration of military training into a smaller portion of west study area would increase intensity of disturbance as compared to Alternative 1. Recreational OHV activity would be concentrated into a smaller Johnson Valley OHV Area, resulting in increased intensity of use there. When combined with energy projects in the region, would cumulatively impact desert tortoises to a greater extent than Alternative 1. • Closure of 40% of Johnson Valley OHV Area would impact desert tortoises, wildlife, and vegetation in other regional OHV areas. However, these would be less than under Alternative 1. SI • Cumulative impacts to wildlife, vegetation, and native plant ecosystems due to loss of plant cover and likely proliferation of non-native species. For the reasons described for desert tortoise, these cumulative impacts would be greater than for Alternative 1.

Continued on next page

Table ES-4. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Cultural Resources	SI • Proponents of the proposed action and any past, present, and reasonably foreseeable actions have to comply with federal laws relating to protection of cultural resources. • However, cumulatively, there would be a potential net loss of some types of cultural resources.	SI • Same as Alternative 1.	SI • Same as Alternative 1.	SI • Same as Alternative 1.	SI • Same as Alternative 1.	SI • Same as Alternative 1.
Geological Resources	LSI • Past, present, and reasonably foreseeable actions would involve ground disturbance, with potential to disrupt soil surface, cause compaction and erosion of soil, and damage paleontological resources. • Alternative 1 would marginally increase the potential for impacts to these resources, but such impacts are expected to be less than significant. • Alternative 1 and one reasonably foreseeable action may reduce access to potential future sources of iron ore and construction aggregate in the area. Cumulative impacts to the availability of both are expected to be less than significant.	LSI • Same as Alternative 1.	LSI • Alternative 3 and one reasonably foreseeable action may reduce access to potential future sources of chloride minerals and construction aggregate in the area. Cumulative impacts to the availability of both are expected to be less than significant. • Cumulative impacts to soils and paleontological resources would be the same as for Alternative 1.	LSI • Same as Alternative 1.	LSI Same as Alternative 1.	LSI • Same as Alternative 1.
Water Resources	LSI • Alternative 1 could combine with other past, present, and reasonably foreseeable future actions to cumulatively impact groundwater resources and cause a decline in potable water in the absence of a long-term plan for managing the potable water supply in the region.	LSI • Same as Alternative 1.	SI • The proposed action would inhibit Cadiz Inc. from instituting their Cadiz Valley Water Project. It would also reduce their agricultural operations and limit access to the existing agricultural water supply.	LSI • Same as Alternative 1.	LSI • Same as Alternative 1.	LSI • Same as Alternative 1.

Legend: CDCA = California Desert Conservation Area; CDPA = California Desert Protection Act; CO = carbon monoxide; FAA = Federal Aviation Administration; GHG = greenhouse gas; LSI = Less than significant impact; NI = No impact; OHV=Off-highway vehicle; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; RPAA= Restricted Public Access Area; SB = Senate Bill; SCM = special conservation measure; SI = Significant impact; SO_2 = sulfur dioxide.

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CHAPTER 1.
PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION

The National Environmental Policy Act (NEPA) requires federal agencies to examine the potential effects of their proposed actions on the human environment, which includes the natural and physical environment and the relationship of people with that environment (40 Code of Federal Regulations [CFR] § 1508.14). An Environmental Impact Statement (EIS) is a detailed public document that complies with the requirements of NEPA by assessing the potential effects that a major federal action may have on the human environment. To that end, this EIS identifies the proposed action, along with a preferred alternative, and evaluates the potential environmental effects associated with a range of reasonable alternatives. Each of the action alternatives, as well as the No-Action, is described in Chapter 2 of this EIS.

The Department of the Navy (DoN), acting as the project proponent and on behalf of the Marine Corps, proposes to establish a large-scale training range facility at the Marine Corps Air Ground Combat Center at Twentynine Palms, California (hereafter referred to as the "Combat Center") that would accommodate sustained, combined-arms, live-fire, and maneuver training for all elements of a Marine Expeditionary Brigade (MEB) (the proposed action). MEB training would include large-scale MEB Exercises involving three battalion task forces and associated MEB Building Block training[3] for participating units up to a single battalion task force. To implement the proposed action, the Marine Corps would acquire additional land adjacent to the existing Combat Center, establish and modify military Special Use Airspace (SUA) above the proposed MEB-sized training range, and conduct the specified MEB training.

This EIS is being prepared by the DoN (as action proponent). The Bureau of Land Management (BLM) and the Federal Aviation Administration (FAA) are cooperating agencies in the preparation of this EIS (See Appendix A, *Agency Correspondence*).

1.2 OVERVIEW OF MARINE CORPS MISSION, ORGANIZATION, AND TRAINING PHILOSOPHY

The Marine Corps' mission is unique among the military services in that, by law, it operates as a combined arms force in land, sea and air operations: "The Marine Corps shall be organized, trained, and equipped to provide fleet marine forces of combined arms, together with supporting air components…" (10 United States Code [USC] § 5063 [a]). Additionally, 10 USC § 5063 directs the Marine Corps to "perform such other duties as the President may direct." In maintaining a high state of training and readiness for such missions, the Marine Corps has established itself as the premier expeditionary force, ready to respond immediately to crises anywhere in the world in defense of the nation and its allies and interests.

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[3] Marine Corps Order (MCO) 3502.6, *Marine Corps Force Generation Process*, signed 29 April 2010, requires that pre-deployment training be executed in accordance with a standardized system of four "Building Blocks": Block 1 supports individual training and unit instructor development; Block 2 supports collective training in core capabilities and theater-specific training at the Company level and below; Block 3 supports advanced collective training at the Battalion level; and Block 4 is a graduation predeployment training exercise and assessment. The MEB Exercise represents Block 4 in this system and the MEB Building Block training represents Blocks 1, 2 and 3.

The Marine Corps is also required by law to "be so organized as to include not less than three combat divisions and three air wings, and such other land combat, aviation, and other services as may be organic therein" (10 USC § 5063). The Marine Corps organizes its divisions and air wings into Marine Air Ground Task Forces (MAGTFs). Marine Air Ground Task Forces are scalable in size and can be tailored for specific missions (e.g., humanitarian assistance, emergency response, peacekeeping, specific regional threat, major war abroad). This ability gives the Marine Corps the flexibility to address the full spectrum of military operations by sizing and tailoring MAGTFs to fit the situation and optimize forces as needed for forward presence, engagement, crisis response, antiterrorism, and warfighting. Regardless of their size, all MAGTFs are composed of common organizational elements that include command, ground combat, air combat, and logistics.

The three primary types of MAGTFs (based on scale and mission type) are as follows:

- Marine Expeditionary Unit (MEU) – Consists of 1,500 to 3,000 personnel and is built around a Battalion Landing Team, a reinforced squadron, and a Combat Logistics Battalion. A MEU is capable of conducting amphibious operations, specific subsets within the Range of Military Operations, supporting operations, and special operations.
- Marine Expeditionary Brigade – Can consist of up to 20,000 personnel and is built around a Regimental Combat Team, a Marine Aircraft Group, and a Combat Logistics Regiment. A MEB provides a transitional capability between the smaller MEU and the larger Marine Expeditionary Force (MEF). It contains scalable, warfighting capability across the spectrum of military operations and can act as a Joint Task Force Headquarters.
- Marine Expeditionary Force – Consists of 20,000 to 90,000 personnel and is built around a division, an aircraft wing, and a Marine Logistics Group. A MEF is capable of sustained operations ashore as well as acting as a Joint Task Force Headquarters.

Special Purpose MAGTFs of varying sizes can also be organized to accomplish specific missions, including humanitarian assistance and disaster relief.

With readiness central to the organizational mission, the Marine Corps follows a "come as you are" and "train as you fight" philosophy placing high value on the training of its forces in environments that closely replicate real-world battle conditions. Maximum realism is imparted to training events to best prepare Marines for actual combat conditions. Essential to achieving this realism is the use of live-fire weaponry and the integration of air and ground forces in a combined arms maneuver environment. Live, realistic training serves to teach core competencies, test unit capabilities, and allow individuals and units to learn collectively from the experiences of battlefield events, high tempo of operations, limited resources, long distances, complex communications, and challenging decision situations. These experiences cannot be adequately replicated via simulation and/or virtual/constructive training methods, although these training methods are useful in the early building block proficiency phases leading up to live training events (MAGTF Training Command 2008).

Different types of MAGTFs are trained differently. Marine Expeditionary Units, the smallest of the MAGTFs, conduct live-fire maneuver training as part of tactical "field training exercises" on training ranges owned by the Marine Corps or other services. This means that the entire unit trains in the field with the actual equipment with which they will deploy, conducting activities very similar to what they will execute in real world operations. Marine Expeditionary Brigades and MEFs, the large-scale MAGTFs, traditionally conduct training using "command post exercises." A command post exercise is an exercise in which the forces are simulated, involving the commander, the staff, and communications

within and between headquarters. The focus of a command post exercise is on the command element of the MAGTF, facilitated by simulated and/or virtual/constructive forces. In response to evolving national security strategy and the lessons learned in Afghanistan and Iraq, as well as to better meet the challenges of emerging threats in an uncertain environment, the Marine Corps has identified a need for greater reliance on MEBs. The Marine Corps has also determined that a command post exercise is no longer sufficient to train a MEB for the capabilities it requires in the current and future threat environment (MAGTF Training Command 2008).

The MEB is a task-organized MAGTF that can conduct missions across the full range of military operations. The MEB includes major combat and supporting vehicles, aircraft, weapons systems, and personnel organized around four primary elements (Figure 1-1). The Command Element contains the MEB headquarters and other units that provide intelligence, communications, and administrative support. It provides the command and control, communications, computers, and joint interoperability necessary for effective planning and execution of force operations. The Ground Combat Element for a MEB is a Regimental Combat Team. It is task organized to conduct offensive and defensive ground operations to support the MEB's mission. The Regimental Combat Team is built around three battalion task forces. Each battalion task force can contain infantry, tanks, amphibious assault vehicles, combat engineers, reconnaissance, mortar, and artillery units. The Aviation Combat Element is built around a Marine Aircraft Group, which includes fixed-wing and rotary-wing aircraft of various types and is task organized to perform offensive and defensive air operations required to support the MEB's mission. The Logistics Combat Element is organized around a Combat Logistics Regiment. It provides the full range of combat logistics functions and capabilities necessary to maintain the continued readiness and sustainability of the MEB.

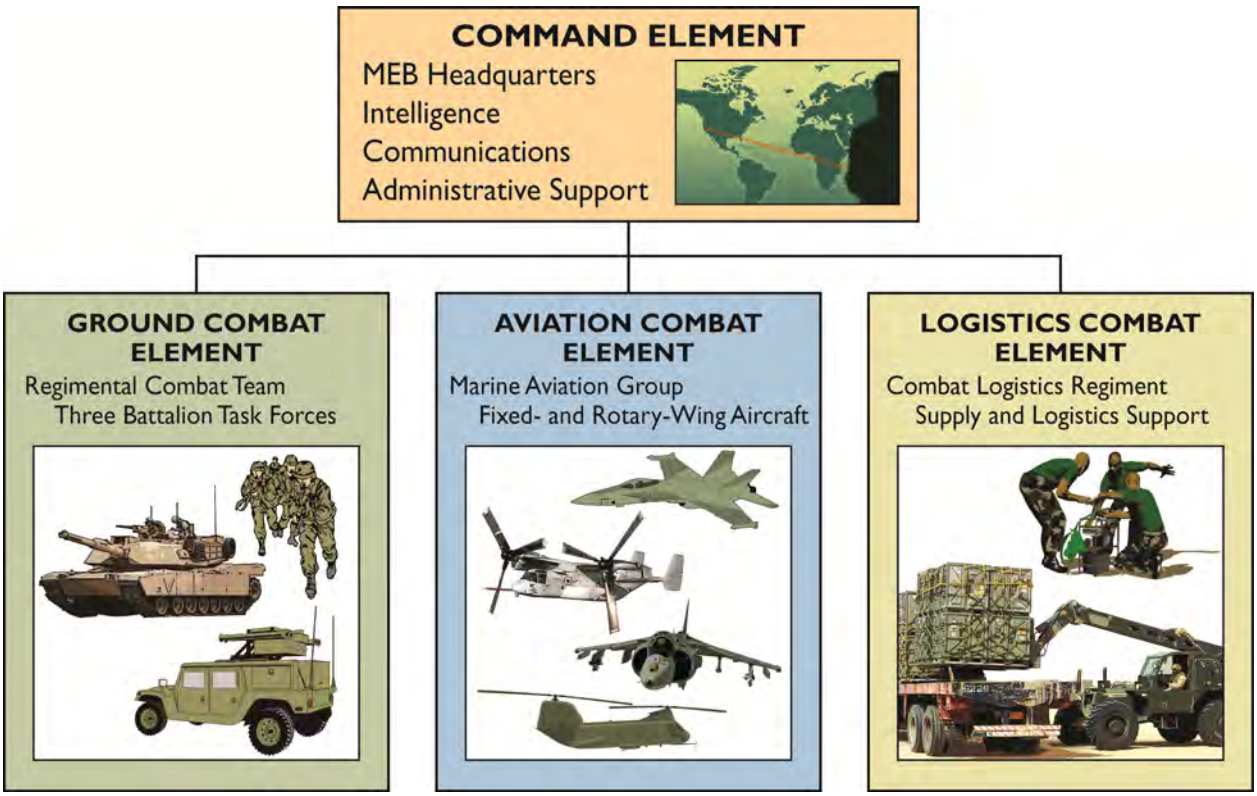


Figure 1-1 Organization of a MEB

1.3 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.3.1 Purpose of and Need for the Proposed Action

The purpose of the proposed action is to fulfill the Marine Corps' requirement to provide sustained, combined-arms, live-fire, and maneuver field training for MEB-sized MAGTFs, each consisting of three battalion task forces and associated command, aviation, and combat logistics support elements. This training requirement, drawn from a November 2006 Marine Requirements Oversight Council decision that validated the need to establish a large-scale MAGTF training area, stems from the *Marine Corps Strategy 21* commitment (DoN 2000) to increasingly employ MEBs as the primary contingency response force. Marine Expeditionary Brigades must be capable of performing a variety of missions throughout the spectrum of conflict because they will encounter complex situations containing asymmetric threats, nonlinear battlefields, and unclear delineation between combatants and non-combatants. To overcome these challenges and operate effectively, MEBs must be able to conduct maneuver-intensive operations over extended distances, supported by closely coordinated precision fires, aviation-delivered ordnance, and sustained, focused logistical support. Large-scale MAGTF training currently relies on classroom instruction, command post exercises, and simulation to accomplish staff training requirements. These methods offer limited practical experience and cannot provide realistic training opportunities that enhance the capability to rapidly and effectively integrate all elements of the large-scale MAGTF into a single cohesive force. The task of successfully integrating all elements of a MEB to produce an effective, joint interoperable war-fighting organization can most effectively be accomplished through realistic training that replicates operating conditions these units are likely to encounter. Furthermore, the experiences in every major armed conflict in which the U.S. has been involved since World War II clearly illustrate why realistic training is critical for keeping pace with weapons and combat evolution and in finding success in all phases of warfare. Realistic training is critical to the planning, design, and engineering of weapons systems and tactics for combat. The extent to which deficiencies in equipment or tactics can be discovered and skills developed in realistic training rather than battle pays great dividends in terms of lives saved and combat effectiveness. Consistent with this objective, Marine Corps Order (MCO) 3502.6, *Marine Corps Force Generation Process* (DoN 2010), mandates a Building Block Training paradigm involving a progressive approach from individual Marine to unit collective training events that focus on core capabilities, unit cohesion, and theater-specific training.

The Marine Corps needs the proposed action because existing facilities, ranges, and live-fire ground and air maneuver areas are inadequate to support the requirement for MEB-sized training exercises (Office of the Secretary of Defense 2004). An effective MEB-sized Block 4 assessment exercise requires live-fire and maneuver training space (and associated airspace) for three battalion task forces, while the Marine Corps' largest training site (the Combat Center) can only accommodate live-fire and maneuver training for up to two battalion task forces. In addition, because most of the training areas aboard the Combat Center are fully committed during traditional combined arms training (which occurs over 250 days per year), Block 1-3 training for home station and external units are sometimes diminished in scope, forcing units to add remediation events to combat predeployment training to satisfy prerequisites for combat certification. The proposed action is needed to resolve training range deficiencies so that MEB training can be accommodated in accordance with the 2006 Marine Requirements Oversight Council decision and the pre-deployment readiness directives of MCO 3502.6, and so that Marines are able to train as they will fight.

1.3.2 Background

The genesis of the proposed action did not arise out of any singular event or policy but from a lengthy evolution of national, military, and service-level strategies, policies, and doctrines. The evolution can arguably date as far back as World War II, but the events of the past 20 years, particularly the end of the Cold War and the terrorist attacks of September 11, 2001, have catalyzed the need for dramatic changes in the U.S. military.

The National Security Strategy of 1995 announced a major shift in the national security environment from specific Cold War-related threats to threats from a wide range of potential adversary capabilities arising from a large variety of potential sources (The White House 1995). National Military Strategy and joint services doctrine responded by embracing the concept of full-spectrum capabilities, a concept that served to broaden the definition of the range of military-operations requirements. This broadened definition in turn required a respective increase in military capabilities. The range, number, and types of capabilities required from U.S. armed forces today are much broader than they were under the Cold War security environment. To set the conceptual framework to provide for these capabilities, service-level strategic guidance was revised. The Marine Corps published its revised strategic guidance in *Marine Corps Strategy 21* in 2000 (DoN 2000). This strategy identifies the MEB as the "premier response force for smaller-scale contingencies…" The new, defined role of the MEBs represented a doctrinal shift from their traditional role during the Cold War era. The role of MEBs was changed and elevated to such a degree that a full review of what MEBs should train for and how they should train was undertaken (MAGTF Training Command 2008).

With the National Security Strategy, National Military Strategy, and joint doctrine calling for capabilities across the full spectrum of operations, the recent employment of MEBs in an ad hoc manner at the outset of the Afghanistan and Iraq wars, and with the determination that MEBs would be the primary contingency response force (DoN 2000), it became apparent that the MEB-sized MAGTF must be capable of a wider range of operations and must be more expeditionary and ready than in the past. This meant that a command-post exercise would no longer be sufficient to train a MEB. Along with Building Block training events designed to prepare individuals and subordinate units for deployment, a comprehensive field training exercise would be necessary to integrate all the units, build cohesiveness, exercise a wider range of capabilities, and provide the increased readiness that is now required of a MEB (Center for Naval Analyses 2004a). Since a MEB is significantly larger than a MEU (requiring more resources) and since training ranges within the Department of Defense (DoD) were already strained, the Marine Corps' Training and Education Command authorized the Center for Naval Analyses to conduct a detailed review of MEB training requirements and the environment necessary to conduct effective MEB training (Center for Naval Analyses 2004a).

The Center for Naval Analyses study included three main tasks:

1. *Identify MEB training requirements.* Proposed MEB operational missions were evaluated to identify specific and implied training tasks for the MEB commander, MEB staff, and component Marine Corps units. The findings of this effort were published in a January 2004 report entitled *MEB Training Exercise Study: Identifying MEB Training Requirements* (Center for Naval Analyses 2004b).
2. *Determine the training environment required to support MEB training requirements.* Marine Expeditionary Brigade training requirements were evaluated to determine the training environment required to support the mission tasks. The findings were presented in a February

2004 report entitled *Expanded MEB Training Requirements and the Associated Training Environment* (Center for Naval Analyses 2004c).

3. *Assess specific alternative ranges that support the training environment.* Alternative ranges were evaluated to determine their capability to support the MEB training environment for recurring large-scale training events, including extended battlefield operations. An August 2004 report entitled *Analysis of Marine Expeditionary Brigade Training Areas* summarized the findings of the analysis. This report analyzed the MEB responsibilities and unit training areas to identify specific places and training methods required to support MEB training exercises (Center for Naval Analyses 2004d).

The final report in the project series, entitled *MEB Training Exercise Study: Final Report*, was released in December 2004. It summarized the entire project, presented findings of the analyses, and concluded with recommendations (Center for Naval Analyses 2004a).

The February 2004 report by the Center for Naval Analyses explained that the target training audience of a MEU is the entire MAGTF focused at the tactical level, while the target audience of a MEF is the Command Element focused at the operational level (Center for Naval Analyses 2004c). In a MEB, the training audience is both the MAGTF and Command Element to a unique extent in that it must train to operate as both a tactical maneuver element and as an operational level command. This dual nature means that MEB-sized training shares elements of both MEU- and MEF-sized training in such a way that it requires its own set of training requirements. The report identified those requirements, indicating in particular the need for field training exercises in which a MEB could employ its Ground Combat Element in three different ways: 1) a single battalion with a single objective, 2) single battalions with multiple objectives, and 3) multiple battalions with a single objective. It further stated: "Training for a multi-battalion, single objective mission requires a maneuver area large enough to accommodate all the battalions." It concluded that "the analysis validates the need for a MEB field exercise" and "to fully train a MEB to function as a MAGTF capable of planning and executing combined-arms, the MEB requires a field training exercise. A field training exercise creates the conditions necessary to train the entire command and control infrastructure from initial planning, to execution, to providing feedback into the on-going or current planning." (Center for Naval Analyses 2004a).

In light of the Center for Naval Analyses study, the Marine Corps' Training and Education Command determined that, at a minimum, a MEB-sized MAGTF needed a comprehensive training opportunity that would exercise all elements of the MAGTF in an environment that replicates real conditions as nearly as possible. In support of this determination, the Training and Education Command formally introduced MEB-sized MAGTF training into the training continuum in August of 2005 (Marine Corps Training and Education Command 2005).

A report to Congress in February 2004 (Office of the Secretary of Defense 2004) noted that "Marine Corps Strategy 21 and Expeditionary Maneuver Warfare describe and define the Marine Corps' mission to provide combatant commanders with scalable, interoperable, combined arms MAGTFs that can quickly deploy and operate in an expeditionary environment across the spectrum of conflict" and that "the MEB is the Marine Corps' primary contingency response force and is the smallest MAGTF capable of forcible entry operations." More significantly, it noted that "the Marine Corps does not have a range capable of supporting MEB-sized fire and maneuver combined-arms exercises." The following excerpt from the report summarizes the need for MEB-sized MAGTF training and the current resource constraints affecting such training:

> MAGTFs supporting Operation Enduring Freedom conducted sustained combat operations in an extended Joint Operations Area spanning over 650,000 square miles (mi^2) (1,683,492 square kilometers [km^2]) nearly 400 miles (644 kilometers [km]) from their sea-based logistics bases. In the current national security environment, the employment of MEBs in support of joint operations under similar conditions is more likely than ever. However, the Marine Corps lacks a training facility capable of supporting all MEB (or MEF) elements realistically. The Marine Corps' largest training facility, the Combat Center at Twentynine Palms, accommodates only MEU-sized MAGTF and MAGTF element Battalion Landing Team training. Thus, MEB commanders, staffs, and subordinate commanders must rely on unrealistic classroom training, command post exercises and simulation. Therefore, the Marine Corps is initiating planning for a MEB training facility that will provide sufficient space and infrastructure to train large MAGTFs, to optimize MEB effectiveness and utility in the Joint environment.

The report continued by describing the training environment required to train a MEB:

> Successful integration of MEB elements can only be achieved through training that replicates operating conditions the MEB may encounter. To ensure MEBs are fully trained and capable, the Marine Corps requires a MEB training facility with sufficient contiguous training area to conduct full-scale MEB [training]. Required capabilities of a MEB Training Facility include:

- Day and night live-fire air and ground maneuvers on a MEB scale for extended exercise periods.
- Ample space for aviation and strike and fire assets to support deep-battle shaping operations.
- Marine Expeditionary Brigade live-fire/maneuver areas for current and future fire capabilities for a 5-day exercise.
- Ample maneuver area for sustained, long-range logistics operations in a rear battle environment.
- Easy access to Marine concentrations to facilitate deployments and minimize transportation costs.
- Virtual scenario simulation with digital linkage to other (Joint) training centers.
- Modernized targets, position-location and feedback systems, and live-fire ranges.

The Report to Congress indicated that the Marine Corps' existing training bases, facilities, ranges, and live-fire ground and air maneuver areas were inadequate to support MEB-sized training requirements.

The largest training site in the Marine Corps inventory, the Combat Center at Twentynine Palms, can effectively accommodate sustained combined-arms, live-fire, and maneuver training for only two battalions. To complicate this deficiency, new weapons systems have expanded the joint battle space by: 1) increasing target engagement distances, 2) improving speed and mobility of forces, and 3) enhancing the Marine Corps' overall ability to shape the battle space. These improved systems must be incorporated into MEB-sized MAGTF training exercises and in a manner that maximizes their capabilities (MAGTF Training Command 2008).

Based on professional experience and analysis, the Marine Corps recognized that more training area would be required to accomplish this training. However, no document existed that objectively defined the dimensions of that training space. Concurrently, the Marine Corps recognized that Marine Corps-wide investment for range infrastructure required a document that described required range capabilities for specific sized units and organizations. This led to the development of the *Required Capabilities Document* (Marine Corps Training and Education Command 2006a) that quantitatively defines the required range capabilities that will enable Marine Corps ranges to support mission essential training.

This document has been published as Marine Corps Reference Publication 3-0C. It defines the required capabilities for ranges sized for individual-level training to ranges sized for MEB-sized MAGTF training. "Threshold" range requirements were defined as the minimum capabilities to allow training to an acceptable readiness level. "Objective" range requirements were defined as the minimum capabilities to support training to a preferred readiness level. For MEB-sized MAGTF training, the *Required Capabilities Document* called for the following:

1. Live-fire and maneuver land space with a Threshold amount of 892 mi^2 (2,310 km^2) and an Objective amount of 1,189 mi^2 (3,079 km^2), including a beachfront, and allowing for live-fire of both air and ground, direct- and indirect-fire weapon systems.
2. An airspace of 50 x 80 nautical miles (NM), and from surface to 50,000 feet above ground level (AGL) with some portions permitting supersonic operations, some portions over significant topography, and extending 10 NM beyond the horizontal limits of the land training space.
3. A cumulative total of 36,000 mi^2 (93,240 km^2) littoral sea space, including an area at least 15 NM wide, and contiguous to the beachfront capable of supporting amphibious vehicle and landing craft training, and extending seaward to the simulated Amphibious Ready Group/Expeditionary Strike Group element location.

These ideal range requirements exceed the size and setting of the operational areas available at any current military training range in the U.S. Only by linking separate national training ranges, airspace, and sea space in such a way as to create a distributed regional training environment could all MEB training objectives be sufficiently supported (Center for Naval Analyses 2004a). To determine which regional area could best support MEB-sized MAGTF training, the Center for Naval Analyses study analyzed three regions within the Continental U.S.:

- Southwest U.S. (San Diego, Camp Pendleton, Twentynine Palms, Yuma)
- Middle Atlantic Coast (Morehead City, Cherry Point, Camp Lejeune, Fort Bragg, Fort AP Hill)
- Gulf of Mexico (Pensacola, Eglin Air Force Base, Fort Polk, Avon Park)

The Center for Naval Analyses developed a report (Center for Naval Analysis 2004a) that concluded that the southwest U.S. ranges would provide the best support for MEB training requirements; while Mid-Atlantic and Gulf of Mexico ranges would require significant use of non-Marine Corps ranges, representational forces, and simulation support. It also found that, while southwest U.S. ranges were the best match, distributed operations, representational units, and simulation would still be required. While there are several large Marine Corps bases in the southwestern U.S., the Combat Center is the only option as a result of the analysis provided in the Center for Naval Analyses (2004a) report. However, the Combat Center would still need to expand to support realistic full-unit ground and fires training for the required three battalion MEB force, even though the Combat Center does not provide littoral sea space (Center for Naval Analyses 2004c). Section 2.7 discusses why other installations were discounted from further analysis.

A *Land Use Requirements Study* completed in July of 2005 investigated the adequacy of available training lands at the Combat Center to support a MEB live-fire, combined-arms exercise program and the requirement for any additional training land and airspace to support such a training program (MAGTF Training Command 2005a). The study was validated by the *Required Capabilities Document* (Marine Corps Training and Education Command 2006a), the MAGTF Training Command's *Training and Exercises 2015*, (MAGTF Training Command 2005b) and the Training and Education Command's *MEB Training Transformation Campaign Plan* (Marine Corps Training and Education Command 2005). The *Land Use Requirements Study* reported that of the 936 mi^2 (2,424 km^2) within the Combat Center

borders, only 40% of those lands was available for live-fire and maneuver training (approximately 379 mi^2 [982 km^2). The remaining 60%, although useable for other training and installation support purposes, cannot offer live-fire and maneuver training opportunities due to topography, infrastructure, resource conservation, or other reasons. The *Required Capabilities Document* called for a minimum threshold amount of 892 mi^2 (2,310 km^2), leaving a shortfall of approximately 513 mi^2 (1,329 km^2). The *Land Use Requirements Study* further reported that airspace above the installation was not only insufficient to support future training requirements, but was insufficient to support current training requirements. The study concluded: "In order to develop the capability of the Combat Center to support mission-essential live-fire and maneuver training of MEB-sized units in the joint context…contiguous expansion of training land is necessary." The study went on to identify contiguous land that could likely support large-scale live-fire training as well as some of the significant constraints associated with them (MAGTF Training Command 2005a).

As threats to national security were expected to remain uncertain in the future, the requirement to comprehensively train flexible MEB-sized MAGTFs was seen by the Marine Corps as an enduring requirement (MAGTF Training Command 2008). Because MEB training was an enduring requirement, and because existing land and airspace resources were insufficient to provide a MEB training range, land acquisition and airspace establishment appeared necessary to provide a MEB training range. As such, Training and Education Command drafted a *Universal Needs Statement* for obtaining a large-scale MAGTF training capability, which was approved by the Marine Requirements Oversight Council in November of 2006 (Marine Corps Training and Education Command 2006b). The Marine Requirements Oversight Council's review of the analysis of the alternatives, as derived from the Center for Naval Analyses study, determined that there were no suitable geographic or technical alternatives to expansion at the Combat Center and approved initiation of an expansion study for that installation.

Further deliberation by the Marine Corps general officer leadership determined that any land acquisition and airspace establishment effort must provide a minimum of the following:

1) Three maneuver corridors oriented and sized to support three reinforced infantry battalion task forces abreast, with at least two battalion task forces converging toward a single MEB objective.
2) 48-72 hours of continuous operational, integrated live-fire and maneuver time.
3) The associated airspace needed to exercise the air element as part of large-scale MAGTF training exercises.

1.4 DESCRIPTION OF THE COMBAT CENTER

1.4.1 Location

The Combat Center is located in the Mojave Desert in San Bernardino County, California, approximately 150 miles (241 km) east of Los Angeles and 50 miles (80 km) northeast of Palm Springs (Figure 1-2). The southern boundary of the installation is adjacent to the City of Twentynine Palms, approximately 6 miles (10 km) north of State Route (SR) 62. The northern boundary of the installation is located south of Interstate (I-) 40. The western boundary of the installation is adjacent to the Johnson Valley Off-Highway Vehicle (OHV) Area, which is administered by the BLM. The eastern boundary of the installation is located west of Amboy Road.

Kilometers 0 40

Miles 0 30

Figure 1-2
Regional Location of the Combat Center

1.4.2 History of the Combat Center

The development of the Combat Center at Twentynine Palms has been driven primarily by the evolution of doctrine, tactics, weapons systems, and missions associated with MAGTF operations and training requirements. These have steadily expanded the operational pace and required maneuver space of modern warfare. From the time the range was established by the Marine Corps in the early 1950s to the present, the size of the range has remained constant, while the nature and scope of training missions have undergone significant transformation to meet the requirements of the Marine Corps and national defense. The following is a brief history of the Combat Center and its expanding mission:

<u>World War II to 1974 – Focus on Artillery Training</u>

- *World War II:* The U.S. Army and Navy initially used the desert area north of Twentynine Palms for aviation training. Later, it was used for bombing and gunnery ranges. Military use ceased at the end of the war.
- *1952-1974:* In 1952, the Marine Corps assumed control of the area, establishing an artillery training range. The first artillery units arrived in 1953 and continued to be the primary users of the installation for the next two decades. In 1957, after an extensive building program, the installation was officially commissioned as Marine Corps Base, Twentynine Palms.

<u>1974-2003 – Development of the Premiere MAGTF Training Base</u>

- *1974:* General Wilson directed the establishment of the Marine Corps Air-Ground Combat Training Center at Twentynine Palms and tasked it with the mission "to conduct air-ground combat training in order to exercise and evaluate the combined arms capabilities and readiness of all elements of participating MAGTF units."
- *1975:* Marine Corps combined arms training was initiated with Palm Tree Exercises, initially artillery-centric exercises in employment of supporting arms.
- *1976-1977:* Additional units of the Fleet Marine Force, including an infantry battalion, tank battalion, and combat service support element were permanently assigned to the installation. The Expeditionary Airfield (EAF) was constructed (completed in 1978).
- *1978:* Marine Air Ground Task Force training exercises were formally designated as the Combined Arms Exercise (CAX) Program.
- *1978-2003:* The Combat Center provides the maneuver space and ranges for 10 CAXs per year (on average) for both active and reserve components, usually employing a battalion-sized maneuver element as the Ground Combat Element. The CAX program undergoes continuous, incremental refinement to enhance the effectiveness of MAGTF training.
- *1979:* The installation was re-designated as the Marine Corps Air Ground Combat Center. An Assault Amphibious Vehicle company was established to support mechanized combined arms training. The first CAX employing a largely mechanized MAGTF was conducted.
- *1980:* Expansion of the mission continued with establishment of the headquarters of the 7th MEB at the Combat Center.
- *1983:* The first Light Armored Vehicle Company in the Marine Corps is activated at the Combat Center.
- *1986:* 3rd Light Armored Reconnaissance Battalion is activated at the Combat Center.
- *1987:* Two Remotely Piloted Vehicle companies are activated; re-designated in 1996 as Marine Unmanned Aerial Vehicle Squadron 1.
- *1988:* A Marine Wing Support Squadron is transferred from Hawaii to the Combat Center to operate the EAF in support of aviation operations.

- *1989-90:* The 7th Marine Regiment, including the headquarters company and three infantry battalions, relocate from Marine Corps Base Camp Pendleton to the Combat Center.
- *2000:* The MAGTF Training Command is activated, formally aligning the range with the Marine Corps Training and Education Command.
- *2000-present:* The MAGTF Training Command and the Training and Education Command lead planning efforts for development of a large-scale facility to support training in Military Operations on Urban Terrain (MOUT). Simultaneously, planning efforts begin for the Marine Corps' MEB Training Initiative.

2003-Present – Planning for the Future

- *2003:* The Combat Center is designated for training events executed as part of the Joint National Training Capability and supports the May 2003 exercise.
- *2003:* Marine Air Ground Task Force Training Command substantially revises the CAX format to meet the asymmetric operational environment of the Global War on Terrorism, focusing on theater-specific pre-deployment training requirements. The revised exercise ultimately was formalized as "Mojave Viper."
- *2003-2006:* Four, unique MOUT facilities are planned and constructed at the Combat Center, including two, live-fire ranges for training in urban combined arms at the small-unit level and two, non-live-fire ranges for training in Stability and Security Operations and certain counterinsurgency operations.
- *2006:* By Marine Corps directive, all deploying ground combat units are directed to participate in Mojave Viper exercises. Training throughput of the Combat Center doubles from pre-war CAX levels. The Combat Center continues to provide home station training ranges for tenant forces when not deployed.
- *2007:* Construction is initiated for a 1,500 building, large-scale MOUT facility, to be completed in 2009.
- *2007:* The Advisor Training Group is activated to direct training of Transition Teams for deployment, and a formal multi-week Transition Team training program is initiated.
- *2008:* The Marine Corps Tactics and Operations Group is activated, with the mission of executing an advanced "train-the-trainer" program for key members of Ground Combat Element battalion and regimental staffs.
- *2008:* Five infantry battalions pre-deploy to the Combat Center for conducting Mojave Viper training.
- *2009:* An additional Unmanned Aerial Vehicle Squadron is established at the Combat Center.

1.4.3 Current Training Areas and Assets

The Combat Center is the Marine Corps' largest combined-arms, live-fire training range complex, encompassing approximately 600,000 acres (242,812 hectares). The Combat Center is divided into 23 distinct training areas (Figure 1-3). Training areas are functional administrative units that enable different types of training to be conducted simultaneously without jeopardizing safety. The boundaries of training areas, though not marked in the field, are defined by training requirements, topography, and constraints. The training areas also vary in size, terrain, and use restrictions. For example, a portion of the Sand Hill and Acorn Training Areas is subject to use restrictions that protect the installation's potable water well field and the area's biological and cultural resources. Training areas, or portions thereof, are subject to range regulations/Standard Operating Procedures (SOPs) to provide for range safety. Range safety policy is provided in Marine Corps range safety documents, with local policy established by the Commanding General of the Combat Center. Appendix B provides a more detailed description of all 23 training areas and any current restrictions or focused uses that may apply.

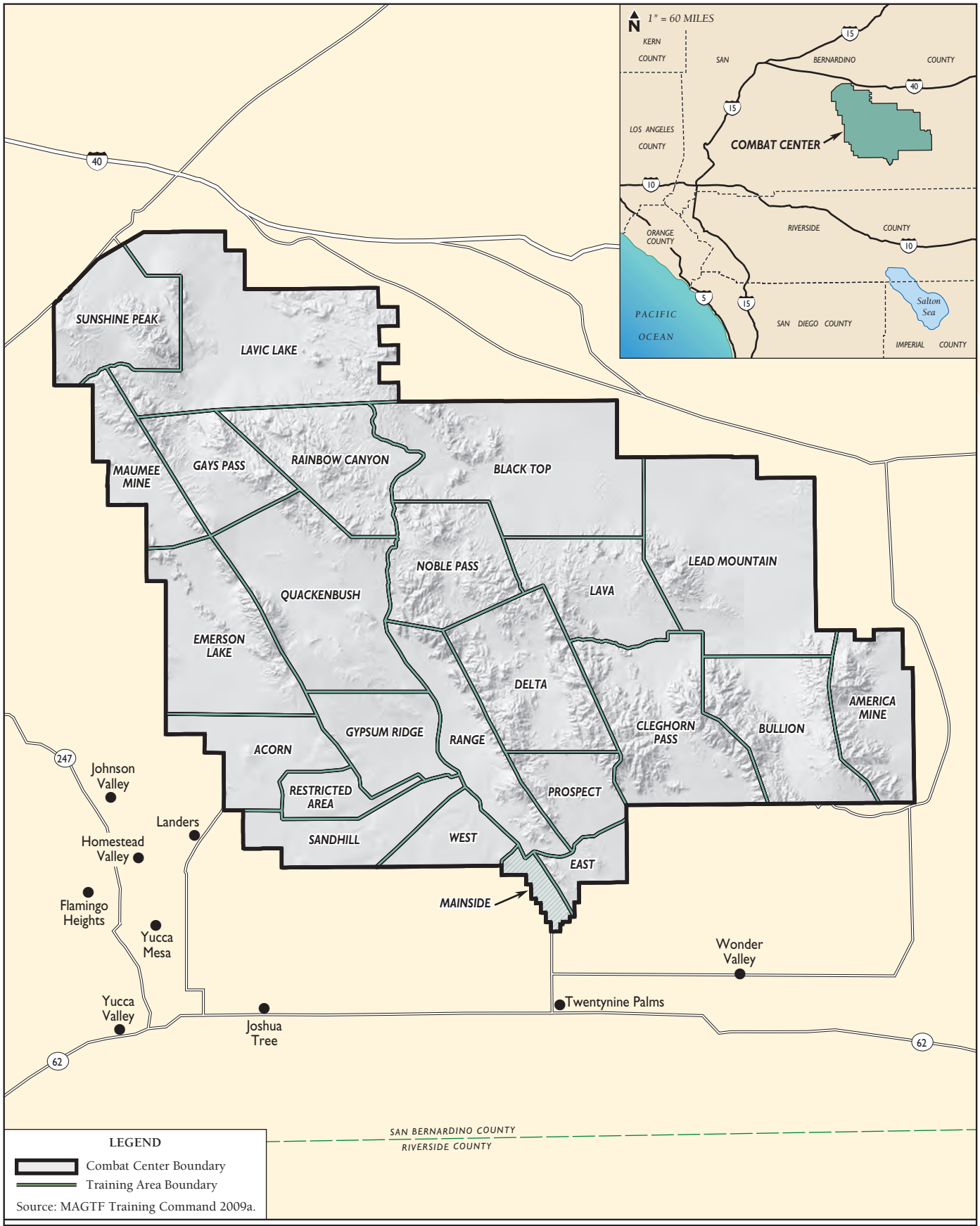
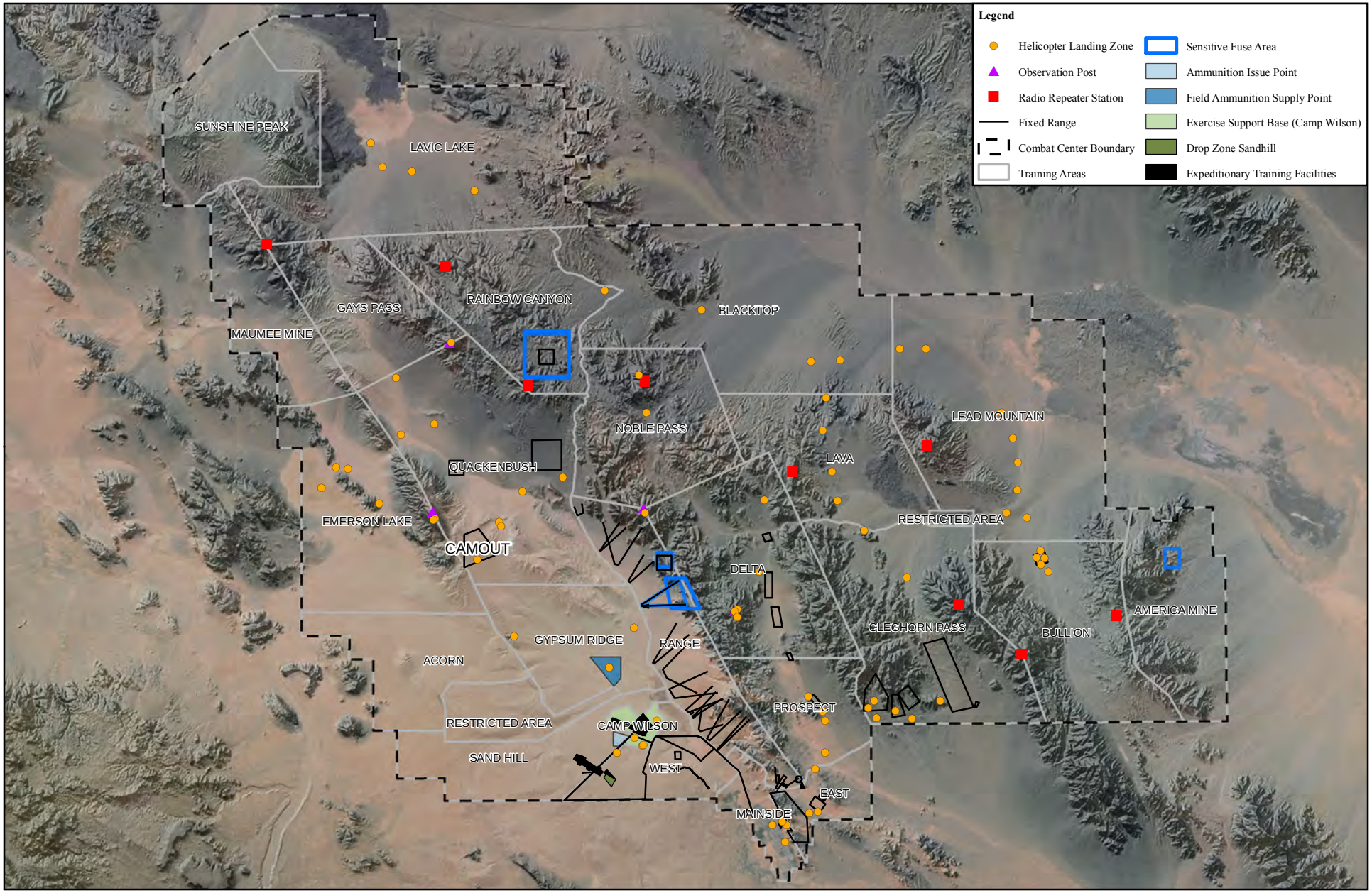


Figure 1-3
Combat Center Training Areas



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 1-4
Fixed Ranges and Training Support Assets

N

The majority of the Combat Center is undeveloped. Mainside, in the southernmost part of the installation, is the primary developed area, with an array of maintenance, storage, administration, and housing facilities. Most of the other training sites and range support facilities at the Combat Center are expeditionary in nature (Figure 1-4). Expeditionary training facilities are austere by design to replicate battlefield situations. These facilities include the EAF complex, most of the Exercise Support Base known as Camp Wilson, aircraft landing zones, a parachute drop zone, observation posts, radio repeater towers, and pre-designated range training support sites.

A partial view of Mainside, looking southwest.

- The EAF complex is an austere support base for aviation units engaged in CAXs. The complex has an 8,000-foot aluminum-matting runway, aircraft parking area, tactical airfield fuel dispensing system, expeditionary control tower, weather facilities, and emergency facilities.
- The Exercise Support Base (Camp Wilson) supports deployed units during CAXs. It lies northeast of the EAF, partially within the Sand Hill and West Training Areas. Permanent and temporary structures are located at the site.

A view of Camp Wilson and the Expeditionary Airfield.

- Assault Landing Zone (ALZ) Sandhill is an unimproved airfield with a 5,000-foot unpaved runway used by fixed-wing aircraft and helicopters. Sixteen other smaller landing zones used for helicopters and other aircraft are distributed throughout the Combat Center.
- Drop Zone (DZ) Sandhill, located about 0.6 mile (1 km) southeast of ALZ Sandhill, is used for parachute drops of personnel and cargo. Parachute drops are permitted in other areas but are not recommended due to the presence of large obstructions in these areas that could injure parachutists.
- Observation posts and radio repeater towers are located throughout the Combat Center on strategic high points. The observation posts are used to evaluate training exercises, and radio towers support communication within the Combat Center.
- Pre-designated Range Training Support Sites are austere combat support sites that have already been established in fixed locations to support units during training exercises. Examples include forward arming refueling sites, field ammunition supply points, forward logistics bases, field

mess areas, and shower units. Establishment of these types of facilities would otherwise require excavation and other ground disturbance to create fuel containment berms, slit trenches, bivouac areas, and vehicle parking. Consequently, units are encouraged to utilize the existing support sites as a means to reduce the environmental burdens associated with establishing new sites, to ensure environmental compliance, and to extend the use of valuable training lands. The environmental effects of the use of predesignated sites was evaluated in 1997 (Templeton 1997).

Certain types of focused training activities at the Combat Center are concentrated within a series of 45 fixed ranges (Figure 1-4). The training on fixed ranges is controlled in terms of impact areas, types of weapons, weapons platforms, and munitions used, and allowable maneuvers. Each fixed range is subject to SOPs that specify allowable uses and relevant restrictions on use of the range. For example, certain fixed ranges do not allow live-fire while others do not permit vehicular travel. See Appendix B for a description of each fixed range at the Combat Center.

A variety of targets and target systems are used at the Combat Center. A total of 16 training areas contain laser target areas, which are used for laser ground-to-ground and air-to-ground firing. Regulations and guidelines designed to protect human health and safety and the environment are strictly enforced to prevent exposure to hazardous levels of laser radiation. Two types of permanent automated target systems are used in the Combat Center training areas: the Infantry Remote Engagement Target System (pop-up stationary infantry targets and pop-up moving infantry targets on aluminum rails) and the CAX Target System (stationary pop-up armor targets). Other permanent but non-automated targets are used for live-fire munitions from artillery, tanks, and aircraft. These targets consist of plywood sheets representing armor or other military vehicles, large and small surplus military vehicles, stacks of tires, and silhouettes of personnel. Mobile targets are occasionally moved to vary training scenarios. Figure 1-5 shows a representative sample of target systems used in Combat Center training operations.

Vehicular circulation throughout the Combat Center occurs on 354 miles (570 km) of unpaved main supply routes and 665 miles (1,070 km) of secondary roads. Main supply routes (MSRs) have an average width of 32 feet (10 meters) and a maximum speed limit of 30 miles (48 km) per hour. Secondary roads average 16 feet (5 meters) in width and are also limited to 30 miles (48 km) per hour. However, such speeds are not possible on substantial portions of these roads.

Despite the Combat Center's large overall size, the combination of steep topography, environmental conservation areas, and other physical and operational constraints to mobility limit the mechanized live-fire and maneuver training utility of almost 60% of the installation. The terrain is characterized by four steep ridgelines of the northwest-southeast trending Bullion Mountains, which rise to over 4,000 feet (1,219 meters) in elevation. The Bullion Mountains generally divide the installation into four primary corridors that facilitate mechanized maneuver and live-fire training. From northeast to southwest these four corridors are the Blacktop, Noble Pass, Quackenbush, and Emerson Lake corridors (Figure 1-6). The mountain ridges that separate these corridors are generally too steep for mechanized vehicles and, as shown in Figure 1-6, these areas are classified as "No-Go" and "Caution" areas in terms of vehicle mobility for training. Other constraints to vehicle mobility and operational flexibility include dry lake beds that become impassable when wet, volcanic rock outcrop areas, areas that contain sensitive biological and cultural resources, and areas designated for controlled access and no live fires due to operational restrictions and safety requirements.

Rear View of Pop-up Tank Silhouette Target

Tank Shell Stationary Target

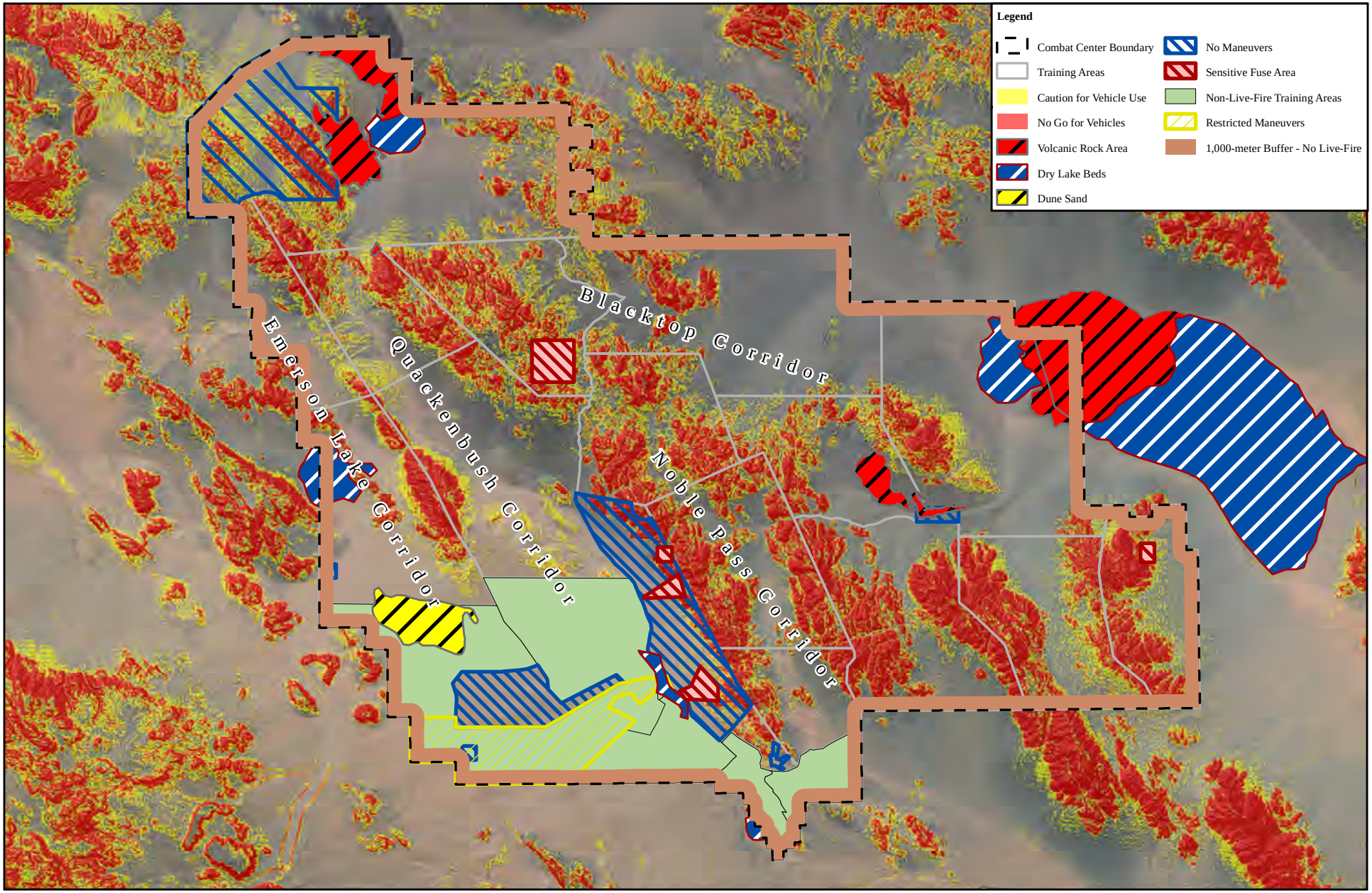
Moving Infantry Remote Engagement
Target on a Rail

Pop-up Stationary Infantry Target
with Convoy Silhouettes in Background

Surplus A-7 Aircraft Shells Used as Targets

Typical Tire Stack Target

Figure 1-5
Representative Target Systems Used in Combat Center Training Operations



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 1-6
Constraints on Use of the Combat Center for Live-Fire and Maneuver Training

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1.4.4 Airspace

Airspace for military operations is a critical component of the range capability necessary to train Marine forces. A three-dimensional training environment is necessary for combined-arms, live-fire, and maneuver training of mechanized ground forces (e.g., high-angle weapons systems such as artillery and mortars) and for all aviation training activities. According to Federal Aviation Regulations, 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" (14 CFR Part 73 § 73.3). The FAA designates SUA to identify areas where military activity or unusual flight conditions may occur. These airspace designations alert non-participating aircraft (civilian or military) to the possible presence of hazardous activities and exclude them from those activities. The types of airspace designated in the vicinity of the Combat Center include a Restricted Area, Military Operations Areas (MOAs), and Air Traffic Control Assigned Airspace (ATCAA). Military aircraft also utilize Military Training Routes (MTRs) as airspace corridors between units of SUA and for low-altitude navigation and tactical training. Figure 1-7 describes the characteristics and altitude ranges of each type of airspace.

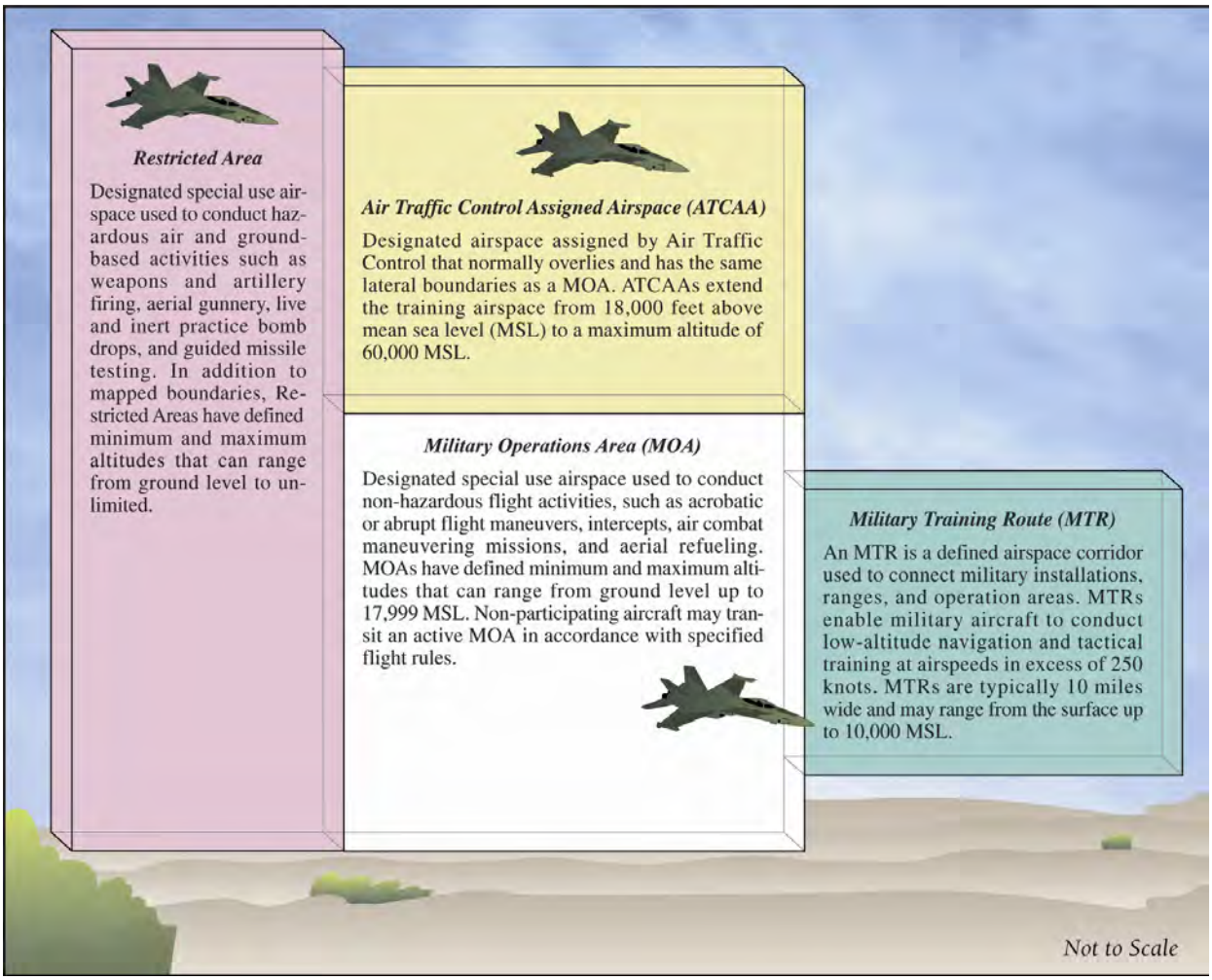


Figure 1-7 Types of Airspace Designated for Use by Military Aircraft

The following blocks of airspace are currently used to support Combat Center training: Restricted Area R-2501, the Bristol MOA/ATCAA, the Sundance MOA, and the Turtle MOA/ATCAA (Figure 1-8). Additional airspace known as the "CAX Corridor," which fills in the space between the Bristol MOA and the Turtle MOA (see Figure 1-8), has been established via Letter of Agreement (LOA) with the FAA to facilitate transit of exercise aircraft between blocks of airspace to accommodate refueling and other tactical operations.

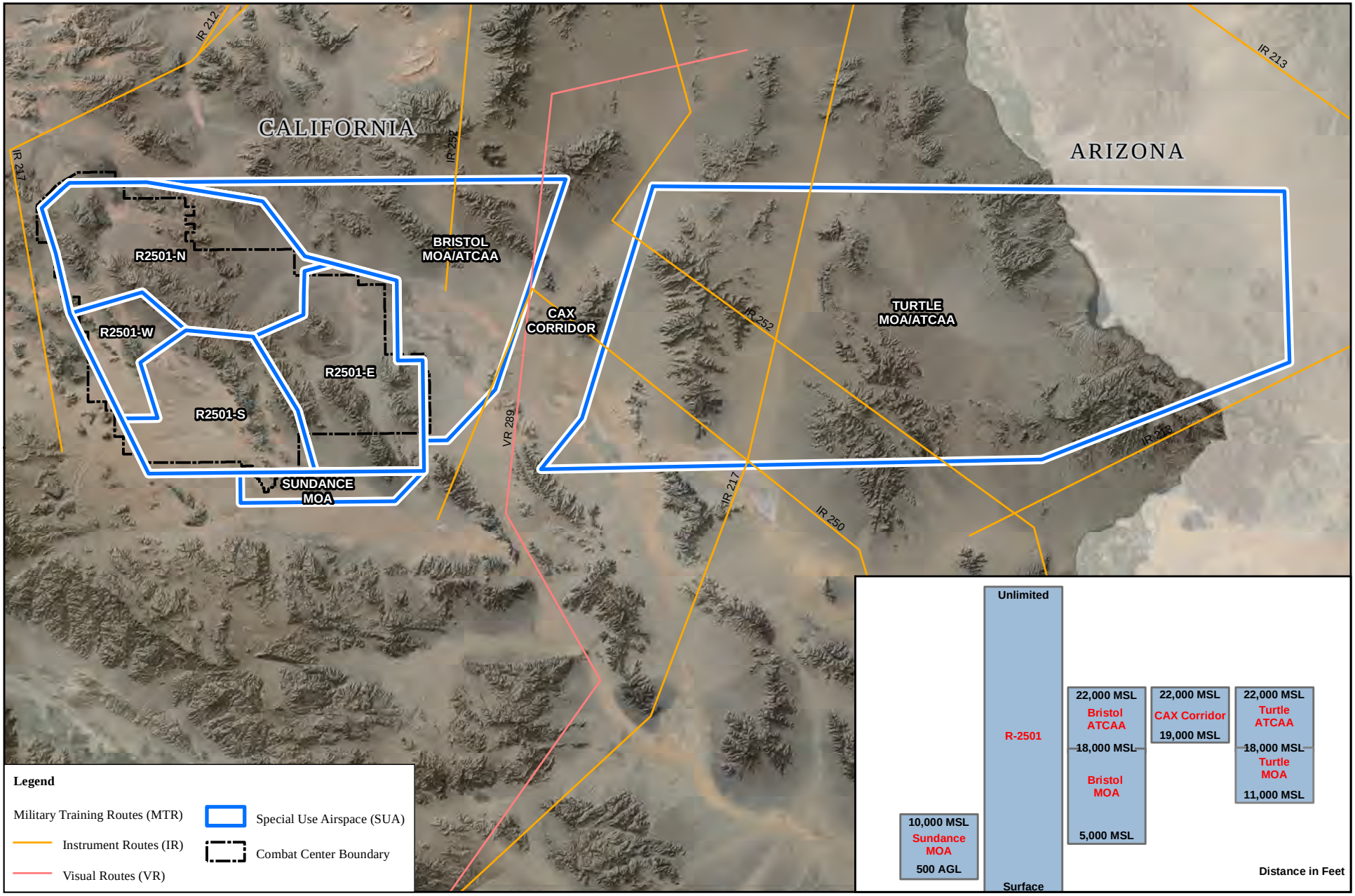
- R-2501 is divided into four subparts (north, south, east, and west). This SUA roughly overlies (but is not coincident with) the Combat Center's boundaries. The altitudes published for R-2501 are unlimited, meaning from ground level to the upper altitude that is required for the activity. Published 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 to the Los Angeles Air Route Traffic Control Center (LA ARTCC) for its use.
- The Bristol MOA abuts the R-2501 eastern boundary from 5,000 feet above mean sea level (MSL) up to, but not including, 18,000 feet MSL. The Bristol ATCAA overlies the Bristol MOA from the top of the MOA to 22,000 feet MSL. The Bristol MOA/ATCAA is available for training Monday-Friday 7:00 a.m. to 3:00 p.m. local time, and other times by Notice to Airmen (NOTAM).
- The Sundance MOA abuts the southern boundary of R-2501 from 500 feet AGL to 10,000 feet MSL and is available when scheduled via NOTAM.
- The Turtle MOA is located east of (but not adjacent to) the Bristol MOA. Turtle MOA extends from an altitude of 11,000 feet MSL up to, but not including, 18,000 feet MSL, while the overlying ATCAA continues from the MOA ceiling up to 22,000 feet MSL. The Turtle MOA is available 6:00 a.m. to 4:00 p.m. local time, Monday-Friday, and other times by NOTAM.
- The CAX Corridor is used by Marine Corps and joint forces aircraft as needed during training exercises. The CAX Corridor, which is currently used rarely because it can only be scheduled with the FAA when an Air Traffic Control (ATC) detachment is present at a training exercise, has a limited altitude range between 19,000 and 22,000 feet MSL.

Several MTRs have also been established in close proximity to the Combat Center. Military Training Routes are designated as either instrument routes (IRs) or visual routes (VRs), depending on the flight rules under which pilots are required to fly the route. Figure 1-8 illustrates the six military training routes that have been established near the Combat Center: IR-212, IR-213, IR-217, IR-250, IR-252, and VR-289. The IRs are scheduled by the 3rd Marine Aircraft Wing at Marine Corps Air Station Miramar, California, and the VRs are scheduled by the 452nd Air Mobility Wing at March Air Reserve Base, California.

1.4.5 Training Exercises and Activities

1.4.5.1 Overview

The Combat Center operates under the command authority of the MAGTF Training Command. The MAGTF Training Command specializes in preparing Marines for combat operations by conducting combined-arms, live-fire, and maneuver exercises at the Combat Center. The Combat Center also supports individual and unit proficiency training (both tenant and transient units) that prepares each unit for larger, more complex exercises.



Kilometers
0 5 10 20
0 5 10 20
Miles

Source: MAGTF Training Command 2009a

Figure 1-8
Existing Military SUA and Other Airspace in the Vicinity of the Combat Center

N

Specialized training opportunities include learning to avoid vehicle roll-overs and evade Improvised Explosive Devices, learning to drive in formation in urban environments and detect enemy insurgent attacks, close combat in urban environments, military checkpoint procedures and defense, and an increasing range of skills and abilities needed on the front lines of current and future conflicts.

The Combat Center represents a unique training venue compared to other locations in the continental U.S., particularly with respect to the ability to conduct live-fire and maneuver similar to what Marines would execute in combat operations. This capability makes the Combat Center the best place to train to achieve full readiness levels. It is also what makes the Combat Center so busy day in and day out. Each year, the MAGTF Training Command trains over one-third of the total Marine Corps forces in combined-arms, live-fire, and maneuver exercises. Operating procedures at the Combat Center allow Marines to maneuver both on foot and in vehicles through live ordnance impact areas. These procedures also permit the use in a combined arms setting of most air and ground weapons commonly used by the Marine Corps. Most importantly, combined arms, live-fire, and maneuver training enables commanders to practice command and control and fire support coordination over challenging terrain.

Table 1-1 lists the training exercises that regularly take place at the Combat Center. Coordination of the training schedule is necessarily complex as a variety of users from the Marine Corps (both resident and transient), Army, Navy, and Air Force conduct wide-ranging activities and exercises, and many different activities can occur simultaneously in different parts of the installation. This can be especially complicated in managing airspace and aircraft involved in simultaneous but different training exercises. Some type of training occurs each day of the year, with major exercises conducted on approximately 250 days per year (70%). The remaining 30% of the year is devoted to smaller types of activities and exercises.

Table 1-1. Major Combat Center Training Exercise Schedule

Event	Average Frequency (per year)	Event Duration	Total Days of Training
Enhanced Mojave Viper	8	33 days	264
Steel Knight	1	14 days	14
Desert Scimitar	1	14 days	14
Summer Heat	1	14 days	14
Desert Fire Exercise	2	14 days	28
Infantry Officer Course Field Exercise	4	15 days	60
Fire Support Coordination Application Course	1	14 days	14
Tactical Air Control Party	7	4 days	28
Total			**436**

Table 1-1 indicates that the equivalent of 436 days of training occur during the 70% of the year that major exercises are held. The training usage by home station units during the remaining 30% of the year is the equivalent of about 131 additional days of training, meaning that the equivalent of 567 days of training days occur each year at the Combat Center. The Enhanced Mojave Viper (EMV), Steel Knight, Desert Scimitar, Summer Heat, and Desert Fire Exercise are Combat Center-wide exercises that impact the majority of the available Range Training Areas (334 annual training days). This illustrates the currently high level of training throughput at the Combat Center.

In addition to these training exercises, unit-level training activities also occur on a regular basis. Transient commands (those not stationed at the installation) that schedule individual fixed ranges for unit

training include numerous Marine Corps, Air Force, Army, and Navy units. Tenant organizations (further described in Section 1.4.7) conduct unit-level training augmented with tanks, artillery, and aviation on a routine basis.

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

1.4.5.2 Evolution of the Combined Arms Exercise (CAX) Program

"Traditional" CAX

From its beginnings in 1978 until 2004, the CAX program has been continuously and incrementally refined, while maintaining essential components:

- Combined Arms Staff Training, which trained maneuver element staffs in combined arms, using simulators.
- Air Support Coordination Exercise, a live-fire event designed to train company and battalion staffs of the Ground Combat Element and the Aviation Combat Element in coordinated delivery of aviation fires.
- Fire Support Coordination Exercise, a live-fire event designed to train company and battalion staffs of the Ground Combat Element in coordinated delivery of artillery and mortar fires.
- Unit-level range training, which consisted of squad, platoon, and company-level training of the Ground Combat Element in live-fire and maneuver events.
- Final Exercise, a multi-day, live-fire MAGTF exercise, with live-fire and maneuver by multiple maneuver elements in multiple corridors at several elements of the command.
- Combined arms integration from single maneuver elements of a company size, such as a mechanized infantry, helicopter assault company, light armored reconnaissance company, or tank company, through reinforced multiple maneuver element/multiple corridor rehearsals.

The "traditional" CAX centered on integration of capabilities and MAGTF elements for close battle in a maneuver intensive, symmetric warfare environment, and the Ground Combat Element (which for the typical CAX has been a reinforced infantry battalion) received the most training benefit. Until 2003, the training plan called for conducting 10 CAXs per year. Marine Corps successes in the first Gulf War in 1991, in leading the introduction of U.S. forces into Afghanistan in 2001, and again in Operation Iraqi Freedom in 2003, have validated the Marine Corps' doctrinal training philosophy of live-fire combined arms MAGTF integration through CAX.

Mojave Viper

Beginning in 2004, the CAX format was substantially revised to meet the asymmetric training requirements of the Global War on Terror. The revised event, designated Mojave Viper, represented a comprehensive mission rehearsal exercise. Each Mojave Viper exercise was a dynamic training event that integrated all weapons systems from small arms to attack aircraft and prepared deploying units for urban operations, stability and security operations, and counter insurgency operations. Approximately 35,000-40,000 Marines participated annually in about 250 separate training events, including multi-day exercises, as part of Mojave Viper.

Based upon combat lessons learned, the training syllabus for deploying units participating in Mojave Viper continued to be revised. At the same time, the Marine Corps modified its approach to force generation. All deploying ground combat units were required to execute Mojave Viper at the Combat Center, and the Combat Center was for the first time designated as the location of required service-level pre-deployment training.

The successful development and execution of Mojave Viper further validated the CAX program as the cornerstone of Marine Corps training doctrine. Mojave Viper applied combined arms tactics to a new kind of war, while supplementing that training with emerging warfighting tactics, techniques, and procedures in near-real time. Therefore, Mojave Viper provided not only a mission rehearsal exercise for immediately deploying forces, but also a model for the future application of core warfighting methods refined over several decades through the CAX program.

Enhanced Mojave Viper

As Mojave Viper matured and became focused on counter-insurgency operations, specific Marine Corps core competencies began to atrophy. Elements of the MAGTF began to diverge and flow to other training venues to focus on autonomous mission essential tasks. Feedback from either of the respective combat theaters and after action documents revealed a rapidly deteriorating ability to execute detailed planning across each echelon of the MAGTF. In response to this alarming trend, MAGTF Training Command directed a re-integration of each element to the combat pre-deployment training and Mission Rehearsal Exercise. To that end, the EMV exercise was designed with a focus on providing a venue capable of fully accommodating the training requirements of the Aviation Combat Element and the Logistics Combat Element of a MAGTF. Enhanced Mojave Viper formally replaced the Mojave Viper exercise in June 2009 and is currently the primary CAX conducted at the Combat Center. In 2010, the exercise is conducted 8 times per year and requires 33 days for each evolution (5 days of preparation and 28 days of training)[4]. This throughput, when combined with other exercises listed in Table 1-1 and the tenant units that are required to conduct building block events, makes for an extremely high usage rate of available ranges and range training areas. The average EMV facilitates the training of 3-5 battalions, 1-3 squadrons and a Regimental headquarters. This annual throughput represents over one third of the Marine Corps operational structure.

To assess the capabilities of each element of the MAGTF, an additional infantry battalion was introduced and concurrent training was executed to provide the dynamic maneuver required to meet the requirements of the respective elements' mission essential tasks. The Aviation Combat Element began deploying a composite aircraft group, capable of fully integrating with each element of the MAGTF, during every training evolution throughout the entire EMV exercise. The Logistics Combat Element was also task organized to support and also integrate with each training event.

Enhanced Mojave Viper also provides an opportunity to juxtapose a Regimental Command Element over the MAGTF to provide a Mission Rehearsal Exercise for the Command Element. The Regimental

[4] It is assumed in this EIS that by the time the proposed action were implemented (approximately 2015), requirements for EMV iterations would likely be reduced to align with pre-war CAX levels of about 4-5 EMV-equivalent exercises annually. This expected reduction would be offset by the increase in MEB Building Block training (see Section 2.1), such that the overall training throughput of tenant and transient units up to a single battalion in size would approximate 2010 levels.

Command Element is challenged to establish its communications architecture, determine combat and logistics priorities, and administer assets based on a commander's intent. Establishing the Regimental Command Element serves as a precursor to the proposed large-scale MEB Exercises and a complete return to the Marine Corps fundamentals of combined arms, live-fire, and maneuver warfare.

Future CAX

Combined arms, live-fire training will evolve and remain the centerpiece of Marine Corps training. The Marine Corps is aggressively developing service-level combined arms training exercises of the future. Warfare in the 21st century demands flexible organizations that apply a mix of combat and non-lethal actions, interagency capabilities and joint warfare, innovative use of airpower, and synchronization of intelligence activities. For rapid integration of these capabilities, no other military formation is more prepared to execute the full range of warfighting tasks than the MAGTF. The "Future CAX" is expected to build on previous CAXs (including former Mojave Viper and the current EMV) to fully exercise all future capabilities of the MAGTF, including advanced weapons systems, new tactics, and emerging expeditionary strike capabilities across the spectrum of conflict. As with the current EMV exercise, any potential "Future CAX" training program that might someday replace EMV would be developed and implemented independently of the proposed MEB Exercise program at the Combat Center.

1.4.6 Representative Combat Center Training by Category

All training activities at the Combat Center can be grouped into four major categories: vehicle maneuvers, infantry maneuvers, aircraft operations, and ordnance delivery. Each is an integral part of the training mission and contributes to the overall combat readiness and success of the Marine Corps. The major training exercises described above typically involve some or all of these categories of activities simultaneously and at varying scope and scale. The following detailed descriptions of training operations, equipment, and ordnance use are based on information provided by the MAGTF Training Command (MAGTF Training Command 2009a).

1.4.6.1 Vehicle Maneuvers

Vehicles use the Combat Center's training areas, fixed ranges, and road network daily and are a crucial element in operational activities. Normally, the MSRs and secondary roads are used to transport Marines and supplies to fixed ranges and other training sites. However, off-road use of vehicles is an integral part of the real-life battle scenarios that take place during major exercises, when large numbers of vehicles travel off-road for varying periods of time. Vehicles involved in training operations are categorized as follows:

- Tracked Vehicles – vehicles with non-rubber wheels or tracks (e.g., tanks, Amphibious Assault Vehicles);
- Heavy Wheeled Vehicles – vehicles with multiple axles and/or more than four rubber tires (e.g., Light Armored Vehicles, five- and seven-ton trucks, personnel carriers); and
- Light Wheeled Vehicles – vehicles with four rubber tires (e.g., utility vehicles, high-mobility multi-purpose wheeled vehicles [also known as "Humvees"], and smaller trucks).

Tracked vehicles function as weapons systems, armored personnel carriers, engineering devices, and recovery systems. The Abrams M1A1 Main Battle Tank and the Amphibious Assault Vehicle are the main components of mechanized operations. In a combat environment, the capabilities of tracked vehicles are influenced by terrain-related factors such as surface, subsurface, and slope. Tracked vehicles utilize terrain to the maximum advantage and have the capability of traveling over virtually any flat or

gently sloping land (a 22% grade is normally used as a planning factor to evaluate tracked vehicle movement). When moving into position, vehicles use terrain for cover and concealment; vehicles also spread out over washes, hills, rocky outcrops, and sloping terrain to cover and mask their movements. Depending upon the tactical training requirements and terrain, tracked vehicles may or may not utilize roads. During the 250 days per year on which major training exercises are conducted, tracked vehicles travel an estimated aggregate average of 220 miles (354 km) per day or approximately 55,000 miles (88,514 km) per year (see Table 1-2). Figure 1-9 displays photographs of representative tracked vehicles used at the Combat Center.

Wheeled vehicles (both heavy and light) primarily function as weapons systems, reconnaissance vehicles, Marine transports, and combat service support vehicles. Many of the same tactics and limitations that apply to tracked vehicles also apply to wheeled vehicles. Excessive slopes and rough terrain can severely impair mobility or stop travel altogether, and the vehicles typically spread out during travel to present smaller targets. During major exercises, all heavy-wheeled vehicles collectively travel an estimated average of 3,280 miles (5,279 km) per day or 820,000 miles (1,319,662 km) per year (see Table 1-2). Light-wheeled vehicle use under the same conditions involves an estimated aggregate average of 4,500 miles (7,242 km) per day or 1,125,000 miles (1,810,512 km) per year. Figure 1-9 displays photographs of representative wheeled vehicles used at the Combat Center.

Table 1-2. Representative Annual Vehicle Use During Peak Periods

Category	Average Daily Number of Vehicles at Peak Use[1]	Aggregate Miles Per Day at Peak Use[1]	Average Annual Days Per Year of Peak Use[1]	Average Annual Miles Per Year at Peak Use[1]
Tracked	63	220	250	55,000
Heavy-Wheeled	185	3,280	250	820,000
Light-Wheeled	200	4,500	250	1,125,000

Notes: [1]Peak use includes major exercises (e.g., EMV, Steel Knight, Desert Fire Exercise, Desert Scimitar) only. Data regarding the levels of vehicle use during the 115 days per year of off-peak use are not available.
Source: DoN 2003; MAGTF Training Command 2009a.

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

1.4.6.2 Infantry Maneuvers

Infantry or “dismounted” operations are essential elements of training at the Combat Center. Dismounted attacks are necessary and must be practiced to ensure that Marine units are capable of achieving mission objectives. These operations occur in all training areas, including those that are geographically restrictive to vehicles. Annually, infantry maneuvers at the Combat Center involve approximately 1,500 Marines per day. Such maneuvers are often extensive in the distance and area covered on foot, with an average of 3 miles (5 km) traveled per Marine per day (DoN 2003; MAGTF Training Command 2009a).

Abrams M1A1 Main Battle Tank

Medium Tactical Vehicle Replacement

High Mobility Artillery Rocket System

Light Armored Vehicle

Amphibious Assault Vehicle

High Mobility Multipurpose
Wheeled Vehicle

Figure 1-9
Representative Vehicles Used in Combat Center Training Operations

Ground training exercises and activities can last for extended periods of time and require bivouacking in which Marines camp on the range and conduct various operations. Staged operations can include excavation of soils for trenches and fighting positions (to provide individuals with protection against enemy fire or for sanitation reasons). Digging activities associated with staged operations create ground disturbances below the normal soil horizon of 12 inches (30 centimeters). On average, an estimated 12% of the ground element forces will dig a fighting hole on any given day. Finally, infantry maneuvers also require the use of restrictive materials (e.g., razor wire) with associated berms and trenches to facilitate realistic battle scenarios.

1.4.6.3 Aircraft Operations

A variety of manned and unmanned aircraft are used at the Combat Center on a regular basis for air-to-ground ordnance delivery (discussed below), Marine transport, and other combined arms training activities. Many training-related aircraft operations originate and/or terminate at the EAF located on the border between the Sand Hill and West Training Areas; but it is also normal for aircraft engaged in training exercises to fly to the Combat Center from some other airfield and return without ever landing at the EAF. Specific aircraft operations and activities associated with major exercises may include the following: low-level bombing, strafing, close air support, limited ground controlled intercepts, air combat maneuvers, dissimilar air combat training, parachute operations, close-in fire support, target marking, forward air control, electronic warfare, visual reconnaissance, aerobatic flights, Marine inserts, Tactical Air Control Party, medical evacuation support, Marine lifts, resupply, low-altitude training, night vision goggle training, spotter of artillery and/or air strikes, and photo and photoflash runs. Air operations independent of major exercises include: numerous individual aircrew training flights by Marine, Navy, Army, and Air Force aircraft; low-altitude air defense firing exercises; air command and control indoctrination training; and a small number of contracted aviation flights. Total aircraft sorties in Combat Center airspace in any given year can range between 25,000 and 28,000 sorties, including non training-related flights. Sortie refers to an operational mission conducted by a single aircraft. Table 1-3 displays the total training-related aircraft sorties by aircraft type in 2001. Data for 2001 is being used as a representative year because total sorties since 2002 have been reduced considerably by operational deployments (e.g., Operation Enduring Freedom and Operation Iraqi Freedom). Figure 1-10 displays a sample of representative aircraft types that are used in Combat Center operations.

Table 1-3. Representative Annual Aircraft Sorties

Aircraft	Sorties
FA-18 C/D	4,938
F-5E	158
KC-130	1,169
AV-8B	4,043
AH-1	5,181
UH-1 or UH-60	1,623
CH-53E	2,507
CH-46E	4,858
Unmanned Aerial Vehicle	1,294
Total	**26,221**

Note: Data for 2001 is being used as a representative year because total sorties since 2002 have been reduced considerably by operational deployments (e.g., Operation Enduring Freedom and Operation Iraqi Freedom). .

Source: Wyle 2003; MAGTF Training Command 2009a.

F/A-18 Hornet

AV-8B Harrier

RQ-7 Shadow Unmanned Aerial Vehicle

CH-46 Sea Knight

AH-1 Cobra

UH-1 Huey

Figure 1-10
Representative Aircraft Used in Combat Center Training Operations

1.4.6.4 Ordnance Delivery

Aircraft-Delivered

The delivery of air-to-ground ordnance is one of the characteristic training activities conducted at the Combat Center. The majority of air-to-ground ordnance delivery occurs on approximately 80,000 acres (32,375 hectares) (13.4% of total area) encompassing many different training areas. These include almost all of Quackenbush, the southern half of Gays Pass, Lavic Lake, the northern portions of Rainbow Canyon and Noble Pass, most of Lead Mountain, the central portion of Black Top, and the Delta Training Area corridor. Fixed Range 601 and Fixed Range 605 are used exclusively for aircraft-delivered ordnance.

The manner and type of ordnance delivered are highly variable due to differences in aircraft, weapon platforms and systems, munitions, and missions. An estimated 35,000 units of aircraft ordnance are delivered annually at the Combat Center, including rockets, machine gun munitions, and conventional bombs.

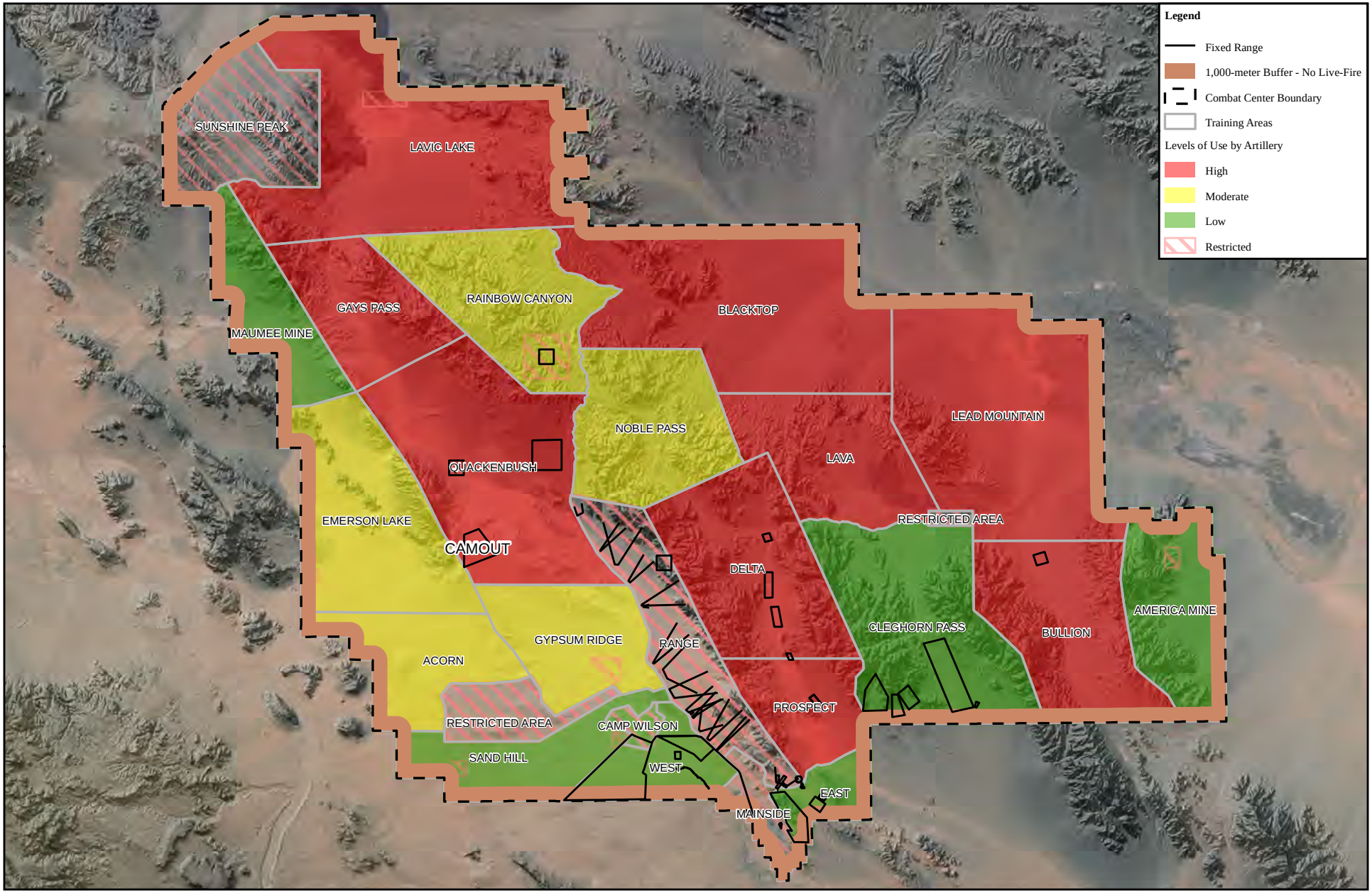
Artillery

Artillery use occurs on approximately 110,000 acres (44,515 hectares) (18%) of the installation, but is concentrated on approximately 45,000 acres (18,211 hectares) (7.5%). Most artillery firing is directed at fixed targets and areas that are already heavily disturbed. Most of the explosive ordnance fired leaves craters about 2 feet (0.6 meter) wide and 6 inches (15 centimeters) deep. Very little artillery use occurs in the mountainous areas of the Combat Center (Figure 1-11). Currently, an estimated 58,000 units of artillery ordnance are fired annually within the Combat Center, including mortar shells, missiles, and heavy artillery munitions.

Tank and Other Armor Ordnance

Tank operations are conducted over approximately 200,000 acres (80,937 hectares) (33%) of the Combat Center, but most of the ordnance delivered from tanks and associated maneuvers are concentrated in 132,000 acres (53,419 hectares) (22%). The majority of tank operations take place in areas that are already moderately to highly disturbed (Figure 1-12). Tank firing occurs in all or parts of the following training areas: Black Top, Lavic Lake, Emerson Lake, Quackenbush, Gays Pass, Delta Corridor, Bullion, Lead Mountain, Maumee Mine, and Cleghorn Pass. Unit-level tank, Amphibious Assault Vehicle, and Light Armored Vehicle training and annual gunnery qualifications occur at Range 500 in the Cleghorn Pass Training Area.

An estimated 52,000 units of ordnance are fired annually by tanks (120 millimeter [mm]), Amphibious Assault Vehicles (30 mm), and Light Armored Vehicles (25 mm), including both explosive and inert munitions.

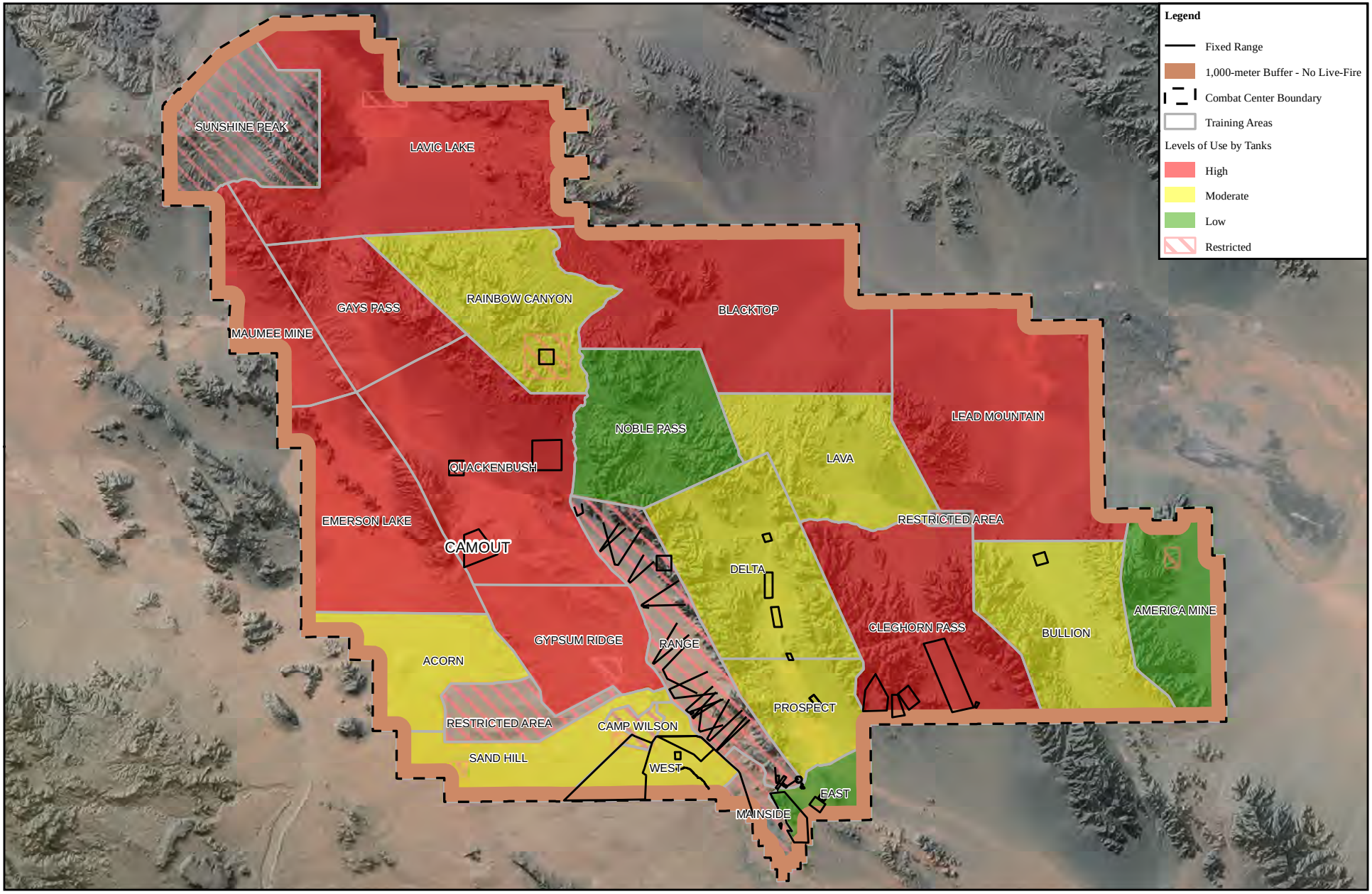


Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 1-11
Current Training Footprint and Levels of Use by Artillery

N



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles
Source: MAGTF Training Command 2009a

Figure 1-12
Current Training Footprint and Levels of Use by Tanks

Other Ordnance

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

These operations occur at certain fixed ranges, such as the 400 Series Ranges (see Appendix B), and throughout various training areas during major exercises. In addition to the small arms component of major exercises, qualification and annual requalification with the service rifle and service pistol occurs at the Marksmanship Training Unit ranges located at the north end of Mainside. These ranges include: known-distance and unknown-distance rifle ranges; a Battle Sight Zero range for calibrating rifle sights; known-distance, moving target, and close combat pistol ranges; a multipurpose shotgun range; and an indoor simulated marksmanship trainer.

Grenades, Demolitions, and Signal Illumination

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

1.4.7 Tenant Units and Manpower

As of July 2010, the following tenant units are permanently stationed at the Combat Center. They include infantry, tank, and other combat battalions; two unmanned aerial vehicle squadrons; training schools, a Naval Hospital, and other organizations:

- Marine Corps Communication Electronics School
- 7th Marine Regiment
- 1st Battalion, 7th Marines
- 2nd Battalion, 7th Marines
- 3rd Battalion, 7th Marines
- 3rd Battalion, 4th Marines
- 3rd Battalion, 11th Marines
- 3rd Light Armored Reconnaissance Battalion
- 1st Tank Battalion
- 4th Tank Battalion
- D Company, 3rd Amphibious Assault Vehicle Battalion
- Marine Wing Support Squadron 374
- Unmanned Aerial Vehicle Squadron 1
- Unmanned Aerial Vehicle Squadron 3
- Combat Logistics Battalion 7
- Robert E. Bush Naval Hospital

Several of these tenants conduct unit-level training at the Combat Center on a routine basis, augmented with tanks, artillery, and aviation assets. Combined with military and civilian personnel employed by the host command, the total manpower associated with the Combat Center included more than 12,000 people in 2006, more than 10,000 of whom were active duty military personnel. The current manpower level as of July 2010 is estimated to be more than 13,000 persons total. An estimated annual average of 30,000 additional Marine personnel visit the Combat Center for training periods that average four weeks in duration (MAGTF Training Command 2009a).

1.4.8 Regional Influence

Since being established in 1952, the Combat Center has enjoyed a mutually beneficial relationship with its neighbors. The installation provides a major stimulant to the local and regional economy as the largest

employer in the area. Many local businesses attribute a significant portion of their business to the Combat Center's workforce of military and civilian personnel. Military contracting also stimulates the local and regional economies in direct and indirect ways, despite the fact that a large proportion of contracting dollars go to larger firms outside the local area. Many of these non-local firms hire local labor to execute the work, and also bring their employees to the region. In 2007, salaries and wages paid to the almost 15,000 Combat Center military and civilian personnel totaled more than $698 million (MAGTF Training Command 2007). Other direct and indirect influences on the local and regional economies are related to installation-related payments for retiree pensions; health care, education, and utilities; mutual aid services for rescue, fire, emergency, and law enforcement; and the participation of MAGTF Training Command and tenant personnel in a wide variety of local volunteer organizations.

1.4.9 Environmental Protection

MAGTF Training Command has continuously demonstrated its commitment to protecting the environment while conducting its training mission. This commitment is reflected in the high quality environmental compliance and natural/cultural resources programs operative at the Combat Center. Marine Air Ground Task Force Training Command maintains and implements an Integrated Natural Resources Management Plan (INRMP) and an Integrated Cultural Resources Management Plan (ICRMP) to guide natural and cultural resources management. Active programs are also in place for pollution prevention, water and air quality assurance, recycling (including range residue), green energy, hazardous waste management, and the compliance enforcement. The purpose of these programs and policies is to ensure that the mission and support activities are compliant with environmental regulatory requirements. Marine Air Ground Task Force Training Command is devoted to maintaining a balance between fulfilling mission objectives and fulfilling its role as a steward of the environment. This pursuit of balance between resource use and preservation has earned the Combat Center national, state, and local recognition for excellence in accomplishing its mission while simultaneously ensuring compliance with federal, state, and local environmental laws and regulations.

1.5 ENVIRONMENTAL REVIEW PROCESS

1.5.1 Notice of Intent

On October 30, 2008, the DoN published a Notice of Intent (NOI) to prepare an EIS. This notice set forth the DoN's intent to prepare an EIS to evaluate the potential effects of the proposed land acquisition/airspace establishment in support of MEB-sized live-fire and maneuver training at Twentynine Palms, California. The NOI announced the proposed action, scoping alternatives, and the purpose and need for the proposed action. The NOI also provided the public scoping meeting times and locations, the hotline number for comments, the project website location, contact information for questions about the proposal, and the closing day of the public scoping period. A correction notice was published in the *Federal Register* on November 21, 2008 to correct an error in the original October 30, 2008 NOI regarding the scheduled dates for the public scoping meetings. The NOI and *Federal Register* publications are included in Appendix C.

1.5.2 Public Scoping Process

The 90-day public scoping period for the proposed action officially began on October 30, 2008 with publication of the NOI, and ended on January 31, 2009. The intent of the scoping process was to provide the opportunity for local communities, government agencies, special interest groups, and the general public to learn about the DoN's proposal and to offer several ways for those interested to express their

thoughts regarding the proposal (i.e., through letters, emails, written comment sheets, and speaker cards). To provide the public the opportunity to review and learn about the proposal and to express their thoughts regarding the project and alternatives, three open-house public scoping meetings were held from December 3-5, 2008. The Scoping Summary Report, which describes the scoping process and summarizes the comments received, is available on the project website (http://www.marines.mil/unit/29palms/las/pages/default.aspx). The public scoping process and results are briefly described below.

1.5.2.1 Scoping Meeting Format

The public scoping meetings were presented as an "open house," a format that was specifically designed to create a comfortable and informative atmosphere. Using this format, participants could speak individually with Marine Corps personnel and other members of the project team. The goals of these meetings were to introduce the communities to the EIS process, provide available project information, answer questions from community members, and solicit public input on important issues and concerns. Nearly 700 community members attended the three meetings, presenting important and challenging questions to the project team.

The meeting format consisted of a sign-in table at the facility entrance and several information stations, each staffed by knowledgeable Marine Corps personnel and/or other members of the project team to provide technical expertise in their subject-matter area. Information station topics included importance of training at the Combat Center, purpose and need, proposed action and scoping alternatives, NEPA process, and environmental stewardship. Materials presented and available at the public scoping meetings are available at the project website (http://www.marines.mil/unit/29palms/las/pages/default.aspx).

1.5.2.2 Scoping Meeting Attendance

Table 1-4 summarizes the public scoping meeting times, locations, and the number of attendees. The meetings were held in communities that were centrally located and would serve those areas anticipated to be most affected by the proposed action.

Table 1-4. Schedule of Scoping Meetings and Attendance

Date	Location	Attendance[1]
December 3, 2008	Twentynine Palms, California	124
December 4, 2008	Victorville, California	189
December 5, 2008	Ontario, California	347

Note: [1]Actual attendance was higher; numbers shown are based only on sign-in attendance sheets.

1.5.2.3 Additional Opportunities to Comment

In addition to the scoping meetings, the Marine Corps provided various methods for the public to comment during the scoping period, including email, mail, phone, and fax. The Marine Corps identified these methods in the NOI, the scoping letter, project website, press releases to the local media, display advertisements in local newspapers, and on the scoping meeting comment sheets and display boards.

1.5.2.4 Results of Scoping

Scoping comments were received from various groups, including regional and local governments, environmental groups, OHV users, lawyers, and private citizens. The majority of comments were received from OHV users (approximately 71%) and environmental groups (approximately 21%). The main issues of concern raised in comments included impacts to Land Use (prevention of other development opportunities, impacts to other current land uses), Recreation (decrease in area available for OHV and other recreational activities); Socioeconomics (decrease in revenue/employment, loss of

mining, devaluation of surrounding private property, increased costs for law enforcement, decrease in OHV-related sales); Visual Resources (loss of natural vistas, major visual resources, and open desert habitat; potential visual impacts resulting from equipment and support structures used during training exercises); Noise (increase from additional training exercises and military activities); Air Quality (increased air emissions, greenhouse gas [GHG] emissions, carbon footprint, dust, and regional haze); Airspace (potential impacts to the SUA for private and commercial pilots); Biological Resources (impacts to listed, rare, and sensitive species; habitat loss; loss of wildlife corridors/linkages, violation of existing plans and policies for biological resources management); Cultural Resources (impacts to artifacts, historic cabins, and historic mining/freighting sites; possible destruction or elimination of historic structures and/or districts; potential violation of tribal concerns and rights); and Water Resources (potential to overdraft the groundwater aquifer, changes to groundwater flow patterns, and impacts to groundwater recharge potential; concerns regarding surface water impacts, including erosion and sedimentation, contamination from fuel spills and leaks, contamination from ordnance, and reduction in riparian systems and ephemeral streams; potential increased water withdrawal and acquisition of adjudicated water rights associated with private lands acquired).

Alternatives Suggested During the Public Scoping Period: During the scoping period (October 30, 2008 through January 31, 2009), the public also suggested various alternative actions for the Marine Corps to consider, and some suggested modifications to the alternatives proposed. The Final Scoping Report (published June 11, 2009 and available on-line at http://www.marines.mil/unit/29palms/las/pages/default.aspx) further elaborates on these suggestions. In addition to the purpose/need for the proposed action, the Marine Corps considered fiscal, training, and environmental constraints associated with all of the suggestions from the public.

Elements of many public comments (e.g., restricted public access when MEB Exercises are not occurring) have been incorporated into some alternatives carried forward for EIS analysis. Public comments influenced the development of the new Alternative 6. Similar to the Marine Corps' intent with Alternatives 4 and 5 (formulated before scoping), the development of Alternative 6 is consistent with the public's suggestion to:

- Allow for controlled periodic access for occasional public access and activities.

A number of public suggestions for alternatives did not meet the proposed action's screening criteria for reasonable alternatives (see Section 2.3.1). These suggested alternatives included:

- De-designate existing congressionally-designated wilderness areas.
- Identify alternative locations outside the Mojave Desert.
- Train outside of the continental U.S.
- Construct an MOUT training facility at the Marine Corps Air Station, Miramar.
- Use an alternative site for MOUT and Multi-Range Training (e.g., Naval Air Weapons Station, China Lake).

As discussed in Section 2.7, these alternatives were rejected because they did not meet the purpose of and need for the proposed action or were inconsistent with the screening criteria for identifying suitable lands for acquisition.

1.5.3 Cooperating Agencies

The DoN is the proponent for the proposed action and is the lead agency for the preparation of this EIS. As defined in 40 CFR § 1508.5, a cooperating agency "means any federal agency other than a lead agency which has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major federal action significantly affecting the quality of the human environment." A cooperating agency's responsibilities include participation in the NEPA process as early as possible, participation in the scoping process, and on the lead agency's request, development of information to be included in the EIS, and staff support during EIS preparation (40 CFR § 1501.6). Under 40 CFR § 1501.6, federal agencies with jurisdiction by law shall be cooperating agencies if requested by the lead agency.

The land being considered for potential acquisition under the proposed action is predominantly administered by the BLM, while the airspace being considered for establishment or modification is controlled by the FAA. Therefore, at the beginning of the EIS process, the DoN requested that these entities become cooperating agencies. Each agency signed a letter or agreement indicating their willingness to be a cooperating agency (see Appendix A, *Agency Correspondence*). The DoN has coordinated with the cooperating agencies regularly throughout the EIS process.

1.5.3.1 Bureau of Land Management

The BLM's involvement as a cooperating agency in the development of this EIS has been triggered by:

- its current jurisdiction by law and special expertise over the majority of lands segregated for consideration of expansion of the Combat Center at Twentynine Palms;
- its receipt of a subsequent public lands withdrawal application; and
- its procedural responsibilities under Section 204 of the Federal Land Policy and Management Act (FLPMA) to identify and submit proposed public land withdrawals larger than 5,000 acres (2,023 hectares) through the Secretary of the Interior to Congress, including providing the information identified in Section 204 (c)(2) of that Act.

The BLM has unique knowledge of the public lands under its control and has the expertise essential to help the DoN evaluate appropriate parcels of land to meet MEB training requirements. As outlined in FLPMA and implementing regulations in 43 CFR Part 2300, the BLM is responsible for processing public land withdrawal applications from other federal agencies and is responsible for submitting preliminary findings and recommendations on such applications to the Secretary of the Interior. However, a land withdrawal for the purposes of national defense may only be made by an act of Congress. This process is described in more detail below.

In accordance with 43 CFR Subpart 2310, the DoN submitted a land withdrawal application to the Barstow Field Office of the BLM on August 14, 2008. A land withdrawal refers to public lands that a federal agency requests from another federal agency (in this case the BLM) for a specific use. While the land title remains with the federal government, the acreage associated with the withdrawal would no longer be available for public use. The application was submitted as part of the formal process for the proposed land acquisition at the Combat Center. The initial application was to withdraw 365,906 acres (148,077 hectares) of public lands, and approximately 507 acres (205 hectares) of actively mined or explored federal subsurface mineral estate from all forms of appropriation under the public land laws, including surface entry, mining, and mineral leasing under the Mineral Act of 1947. While the majority of the lands under study for acquisition are part of the public domain, some privately-held interests are present in the acquisition study areas and may need to be acquired.

Subsequently, in accordance with 43 CFR § 2310.2(a) and § 2310.3-1(b), the BLM published a Notice of Proposed Legislative Withdrawal and Opportunity for Public Meeting; California on September 15, 2008. The Notice provided a 90-day comment period, from September 15, 2008 through December 15, 2008, for stakeholders to express their views on the impacts of the proposed land withdrawal. In addition, the BLM held three meetings to inform the public of the BLM's responsibility related to the withdrawal request. These meetings were announced in the *Federal Register* and local newspapers. One open house format meeting was held in Twentynine Palms, California on October 23, 2008; and two open house format meetings were held in Victorville, California on October 24, 2008. Marine Corps representatives were present at the meetings to provide information and answer questions at various information stations, with maps, posters, and displays. Comments received during the BLM public meetings were considered in the Marine Corps' scoping process.

On June 11, 2009, the Marine Corps submitted an updated set of legal descriptions to BLM which reduced the segregation area that was identified in the Marine Corps' land withdrawal application of August 14, 2008. The Marine Corps relinquished interest in approximately 33,000 acres (13,355 hectares) of public land and approximately 60,000 acres (24,281 hectares) of federal, state, and private lands. The relinquishment was based on additional analysis of the Marine Corps' training needs and public comments during the EIS scoping period. The relinquishment is to align the alternatives for study in the EIS more closely with terrain features, eliminate lands that offer minimal training value, and reduce the number of occupied affected private parcels.

Upon completion of the Final EIS, in the event that the DoN decides to pursue a project alternative involving acquisition of public lands, the BLM would prepare a draft legislative proposal to implement the land withdrawal request. Together with any proposed findings and recommendations, this draft legislative proposal would be sent to the Director of the BLM for review. After review, and using the Final EIS as NEPA documentation for the decision, the Director's decision would be made a part of the case file and submitted to the Secretary of the Interior. The Secretary of the Interior would review the case file and transmit to Congress the proposed legislation for the withdrawal request along with recommendations, which may or may not support the proposed legislation in whole or in part (43 CFR § 2310.3-4[f]). The proposed legislation would then follow a course determined by Congress. For the land withdrawal to occur, the legislation must be passed by Congress and the President must sign it into law.

1.5.3.2 Federal Aviation Administration

Congress has charged the FAA with administering all navigable airspace in the public interest as necessary to ensure the safety of aircraft and the efficient use of such airspace. As the agency with jurisdiction by law and special expertise with respect to those portions of the proposal regarding establishment of new or modified SUA, the FAA has participated in the preparation of this EIS.

No airspace decision has been or would be made before complete environmental review and consultation with the FAA, other stakeholders, and the public. The necessary coordination with the FAA would be iterative. Airspace dimensions, altitudes and times required may change as the cooperative effort is conducted. This EIS incorporates the best available current information on airspace dimensions in the proposed action based on preliminary information from the FAA describing existing airspace uses and in light of ongoing discussions with the FAA. Use of the best available information provides the public, agencies, and decision-makers the opportunity to evaluate the consequences of the proposed action in accordance with Council on Environmental Quality (CEQ) regulations (specifically 40 CFR 1500.1[b]). As the development of SUA proposals evolves, the Marine Corps would evaluate results in relation to

new information and afford the public the opportunity to comment through the FAA airspace proposal process.

1.5.4 Consultation and Coordination

In addition to consideration under NEPA, the proposed action is subject to federal and state regulatory requirements and, therefore, the DoN is consulting and/or coordinating with the U.S. Fish and Wildlife Service (USFWS), California State Historic Preservation Office (SHPO), California State Lands Commission, California Department of Fish and Game (CDFG), Mojave Desert Air Quality Management District (MDAQMD), and others on the proposed action. In addition, government-to-government consultation is being conducted with potentially affected Native American Indian Tribes and Nations. These include the Chemehuevi Indian Tribe, Colorado River Indian Tribes, Twentynine Palms Band of Mission Indians, Morongo Band of Mission Indians, Fort Mojave Indian Tribe, San Manuel Band of Mission Indians, and Agua Caliente Band of Cahuilla Indians.

1.5.5 Draft EIS

A Draft EIS was prepared in compliance with NEPA of 1969 (42 USC §§ 4321-4370h); and the CEQ *Regulations for Implementing the Procedural Provisions of NEPA* (40 CFR Parts 1500-1508). The Draft EIS evaluated alternatives for establishing and operating a MEB-sized training facility at the Combat Center to fulfill MEB-sized MAGTF training requirements. Project alternatives (including the No-Action Alternative) are described in Chapter 2.

The public comment period on the Draft EIS began on 25 February 2011 and closed on 26 May 2011. The Draft EIS was sent to regulatory agencies, Native American Tribes, municipalities, elected officials, and to individuals who requested copies during scoping. Concurrently, a Notice of Availability of the Draft EIS was announced in the *Federal Register* on 25 February 2011 (Volume 76, Number 38, Pages 10583-10584), local newspapers, and on the project website (see Appendix C, *Public Involvement*). The notice indicated locations (e.g., public libraries) where the Draft EIS was available to be reviewed, the duration of the public review and comment period, the address for submitting comments, and the time and location of the public meetings. The public meetings provided an opportunity for interested parties to comment on the content of the Draft EIS, which formed the basis for making subsequent changes in the Final EIS.

The DoN held three informational open house style public meetings to inform the public about the proposed action and the alternatives under consideration, and to provide an opportunity for the public to comment on the proposed action, alternatives, and the adequacy and accuracy of the Draft EIS. Informational posters were displayed and subject matter experts were available during the open house to answer questions on the Draft EIS. Comment forms and a stenographer were available to receive written or oral comments from the public. The public meetings took place from 12-14 April 2011. Date, scheduled time, and location of the public meetings held were:

- Tuesday, 12 April 2011 at Copper Mountain College in Joshua Tree, CA from 5:00 p.m. to 9:00 p.m.
- Wednesday , 13 April 2011 at the Ontario High School Gym in Ontario, CA from 5:00 p.m. to 9:00 p.m.
- Thursday , 14 April 2011 at the Hilton Garden Inn in Victorville, CA from 5:00 p.m. to 9:00 p.m.

Additional details on the public comment period for the Draft EIS are provided in Chapter 12.

1.5.6 Final EIS

Following the close of the comment period, written and oral comments on the Draft EIS were reviewed and responses to comments developed (see Appendix N, *Response to Public Comments on the Draft EIS*). This Final EIS was prepared by incorporating responses to comments and additional analyses as applicable. The Final EIS was circulated in the same manner as the Draft EIS.

Public and agency comments on the Draft EIS revealed the need to clarify or enhance certain information in the Final EIS. These clarifications and enhancements improved the accuracy and thoroughness of the analyses presented in the Draft EIS. In one case (socioeconomic impacts of Alternative 3) the new information altered the conclusions regarding the nature and magnitude of impacts of the proposed action. Minor editorial and typographical corrections also occurred. The following comprises the major changes and clarifications presented in the Final EIS:

- Information about the Draft EIS public comment meetings and the public comment period has been added to Section 1.5.6 and Chapter 12.
- Additional details have been added to Sections 2.2.3 and 2.2.4 to clarify ground operations occurring at night, which provided the basis for additional analysis added to the visual resources section (Section 4.5) regarding visual impacts from night operations.
- Clarification of the disposition of specific mines in Section 2.6, and through the impact analyses as appropriate.
- Two additional alternatives that were considered but eliminated from further analysis have been added to Section 2.7. These include the potential non-withdrawal of a portion of the public land managed by BLM that would allow for restricted public access under Alternatives 4, 5, and 6; and the potential for BLM to continue to have management responsibility for those same areas after withdrawal and transfer to the DoN.
- Based on USFWS Section 7 Consultation, Section 2.8.4 describes four additional special conservation measures for Biological Resources, including the creation of new Special Use Areas, implementation of a tortoise translocation program, expanded monitoring, and population augmentation.
- Additional discussion of the Rock Pile has been added to Recreation, Sections 3.2 and 4.2.
- Socioeconomics Section 3.3 has been updated with 2010 census data, which were not available at the time the Draft EIS was prepared.
- Additional data on and discussion of impacts to “homestead communities” such as Amboy, Flamingo Heights, Homestead Valley, Wonder Valley, etc.; OHV manufacturing and retail industries; loss of future mining potential; impacts related to the loss of land for grazing; and impacts to the local cement industry have been added to Sections 3.3 and 4.3.
- Discussion of additional community services/agencies (e.g., San Bernardino County Service Area 70 Improvement Zone M, San Bernardino County Service Area 29, Mojave Desert Resource Conservation District, Mojave Water Agency, etc.) has been added to various sections as appropriate, including Land Use (Sections 3.1 and 4.1), Public Health and Safety (Sections 3.4 and 4.4), and Water Resources (Sections 3.13 and 4.13).
- Airspace Sections 3.7 and 4.7 have been revised and updated per coordination with the FAA, including the adjustment of airspace boundaries for Alternatives 1, 4, 5, and 6, and analysis of more refined airspace utilization data from FAA.
- Additional discussion regarding air quality impacts to sensitive receptors has been added to Sections 3.8 and 4.8.

- Additional analyses of single-event noise and noise-generated vibrations have been conducted. Results have been added to Appendix H and discussion of impacts has been added to Sections 4.1 (*Land Use*) and 4.9 (*Noise*).
- Biological Resources sections (Sections 3.10, 4.10, and 5.4.10) were updated with additional information or discussion regarding impacts of solar facilities in the region on sand transport corridors and related impacts on Mojave fringe-toed lizards; the occurrence of the American badger (*Taxidea taxus*), desert kit fox (*Vulpes macrotis*), and two kangaroo rat species (*Dipodomys merriami* and *D. deserti*) in the project area; migratory birds in the Pacific Flyway; and potential impacts to tortoises and other animals due to reduced plant productivity associated with dust deposition on leaf surfaces.
- Discussion of applicability of the Small Tract Act of 1938 under the National Historic Preservation Act (NHPA) has been added to Section 3.11.
- Additional discussion of potential mineral deposits in the acquisition study areas, as well as the region, and newly available details on the Bessemer and Morris Lode mines have been added to Section 3.12 and discussed throughout the impact analyses as appropriate.
- Newly available details on the Cadiz Valley Water Project have been added to Sections 3.13, 4.13, and 4.3 as appropriate.
- Additional public scoping issues identified during scoping are listed for each resource area.
- An additional mitigation measure for Recreation (REC-1: establishment of an RPAA Management Group) has been identified and discussed in the impact analysis in Section 4.2.
- Revisions to the proposed southern battalion route resulted in updates to figures in Section 4.10 and revisions to the impacts to tortoises, tortoise habitat, and vegetation for all alternatives except Alternative 3.
- Discussion of impacts to railroads has been added to Section 4.6 (*Transportation*).
- Discussion of impacts to seismicity from ordnance delivery has been added to Geological Resources, Section 4.12.
- Discussion of impacts from ordnance on water wells has been added to Water Resources, Section 4.13.
- The Water Resources cumulative impacts analysis, Section 5.4.13, and the Socioeconomics impact analysis for Alternative 3 in Section 4.3, have been revised based on new information about the Cadiz Valley Water Project.
- Agency correspondences with the California SHPO, California Native American Heritage Commission, USFWS, and MDAQMD have been incorporated into Appendix A.
- Based on USFWS Section 7 Consultation and public comments, Appendix I was updated with revised methodology and discussion.
- In response to consultation with USFWS, a Displaced OHV Recreation Study was conducted to identify impacts to desert tortoise associated with potential increases in legal and illegal OHV activity displaced from Johnson Valley. The study has been included as Appendix M and results of the study have been incorporated in Sections 4.2 and 4.10 as appropriate.
- Public comments and the Marine Corps' responses to comments have been added as Appendix N.

1.5.7 Biological Opinion

The Marine Corps prepared a Biological Assessment (BA) that was submitted to the USFWS Ventura Field Office on July 12, 2011. On October 18, 2011, the USFWS agreed to initiate formal Section 7 consultation under the Endangered Species Act (ESA), and considered consultation initiated as of

September 21, 2011. Subsequently, the Marine Corps and the Combat Center developed with USFWS four conservation measures synergistic with those proposed in the BA that would improve monitoring and protection of Agassiz's desert tortoises, *Gopherus agassizii*. These measures include:

- designation of 8,901 acres (3,602 hectares) of new Category 1 Special Use Areas for protection of desert tortoises in existing Combat Center training areas;
- monitoring of the desert tortoise populations in more than 70,000 acres (28,328 hectares) of wilderness area in the vicinity of the Combat Center, with assessments occurring every 5 years for 30 years;
- provision of at least two Conservation Law Enforcement Officers for law enforcement and patrols in and around the wilderness areas and Critical Habitat adjacent to the acquired areas and Combat Center; and
- monitoring, fencing, barrier installation, and sign installation at areas in or near the project area that experience high human use, including potentially displaced OHV use.

As part of their drafting a Biological Opinion, the USFWS analyzed how *G. agassizii* would be affected by the proposed action, accounting for the conservation measures proposed by the Marine Corps. The USFWS released the Draft Biological Opinion on June 25, 2012 and issued a Final Biological Opinion on July 17, 2012 (see Appendix O).

1.5.8 Record of Decision

The Record of Decision (ROD) reflects the DoN's final decision on the proposed action, the rationale behind that decision, and any commitments to monitoring and mitigation. A ROD will be issued by the DoN following the issuance of the Final EIS and a 30-day waiting period. The BLM will also issue a ROD that reflects its independent evaluation of the proposed action and alternatives. Each ROD will be published in the *Federal Register*, distributed to agencies and interested parties, and posted on the project website. Its availability will also be announced in local newspapers.

If the ROD selects an alternative that includes the acquisition of public lands, the DoN would proceed with the public land withdrawal process in coordination with the BLM (see Section 1.5.3.1 above) and would follow all required procedures. Congress and the President would have to approve any withdrawal before any selected alternative involving public land withdrawal could be implemented. If the ROD selects an alternative that includes the acquisition of private lands, the DoN would request funding to purchase the lands at fair market value and to take other required actions to prepare the property for military use. If the ROD determines that additional SUA should be established, the Marine Corps would submit formal SUA proposals to the FAA. The FAA would then undertake SUA proposal processing (including rulemaking as appropriate) per FAA Order 7400.2 to consider establishment of associated SUA.

1.6 SCOPE AND ORGANIZATION OF THE EIS

This EIS has been organized into two distinct volumes: Volume 1 contains Chapters 1 through 12 of the EIS and Volume 2 includes publications pertinent to the public involvement process, all technical appendices, and responses to public comments on the Draft EIS. Following Chapter 1, Volume 1 of this EIS 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; Chapter 5 describes the cumulative impacts of the action alternatives in conjunction with other projects in the area; Chapter 6 provides a summary of impacts identified in the EIS; and Chapter 7 addresses various other considerations required by NEPA. This is followed by references (Chapter 8), acronyms and abbreviations (Chapter 9), persons and agencies contacted (Chapter 10), and a list of preparers and their qualifications (Chapter 11). Chapter 12 includes a discussion of comments on the Draft EIS.

CHAPTER 2.
PROPOSED ACTION AND ALTERNATIVES

2.1 OVERVIEW OF THE PROPOSED ACTION

The proposed action evaluated in this Environmental Impact Statement (EIS) is to establish a large-scale training facility at the Marine Corps Air Ground Combat Center in Twentynine Palms (the "Combat Center") that would accommodate a proposed new program of sustained, combined-arms, live-fire, and maneuver training for all elements of a Marine Expeditionary Brigade (MEB)-sized Marine Air Ground Task Force (MAGTF), including full-scale MEB Exercises and MEB Building Block[5] training (up to a single battalion). Section 1.3 described the MEB training requirements and the purpose of and need for a large-scale range facility that would accommodate such training. The proposed action would expand the existing air and ground operating areas at the Combat Center to establish the required MEB-sized training facility and support sustained, combined-arms, live-fire, and maneuver training for all elements of MEB-sized MAGTFs.

The proposed action includes three fundamental and interrelated components:

- ***Acquisition of Land*** contiguous to existing Combat Center operating areas to provide a sufficient area for realistic MEB-sized sustained, combined-arms, live-fire, and maneuver training that meets at least a minimum threshold level of MEB training requirements within appropriate margins of safety.
- ***Modification and Establishment of Special Use Airspace (SUA)*** to enable full integration of MEB-sized Aviation Combat Element operations and both air- and ground-delivered live-fire ordnance use within appropriate margins of safety.
- ***Expanded Training,*** implemented as a full-scale MEB Exercise conducted twice per year for 24 continuous days each. Current levels of proficiency training (Building Block training) that may be conducted by individual home station and external units (up to a single battalion in size) when MEB Exercises are not being conducted are also analyzed in this EIS.

It is assumed in this EIS that the proposed action would be implemented sometime in the 2014/2015 timeframe, by which time the 2010 levels of Enhanced Mojave Viper (EMV) exercise iterations are expected to have been reduced to pre-war Combined Arms Exercise (CAX) levels of about 4-5 EMV-equivalent exercises annually. This anticipated reduction in EMV exercises is expected to offset any MEB Building Block training associated with the proposed MEB Exercises, such that the overall training throughput of home station and external units up to a single battalion in size would be approximately equivalent to 2010 levels by the time the proposed action were implemented (i.e., the two proposed MEB Exercises per year would represent the only increase in training throughput compared to 2010 levels).

[5] Marine Corps Order (MCO) 3502.6, *Marine Corps Force Generation Process*, signed 29 April 2010, requires that pre-deployment training be executed in accordance with a standardized system of four "Building Blocks": Block 1 supports individual training and unit instructor development; Block 2 supports collective training in core capabilities and theater-specific training at the Company level and below; Block 3 supports advanced collective training at the Battalion level; and Block 4 is a graduation predeployment training exercise and assessment. The MEB Exercise represents Block 4 in this system and the MEB Building Block training represents Blocks 1, 2 and 3.

While no net change in the current number, frequency, or operational profiles of unit training activities are expected to result from the proposed action, much of the MEB Building Block training would occur in the acquired land and airspace areas (in all but two of the action alternatives), whereas the current EMV training activities only occur within existing Combat Center boundaries.

As described in detail later in this chapter, a total of six action alternatives that would meet the Marine Corps' purpose and need for MEB training capabilities have been developed and are carried forward for detailed analysis in this EIS. Each of the six action alternatives includes land acquisition, airspace modification/establishment, and operational components. Some of these components would be the same across the different alternatives. Three of the action alternatives would provide restricted public access to and use of some or all of the acquired training land for permitted recreational purposes when the proposed MEB Exercises are not being conducted. Land acquisition under each action alternative would involve up to two "acquisition study areas" (also referred to as "study areas") out of three such areas identified for potential acquisition. One alternative (Alternative 5) would involve land acquisition in only one of the three acquisition study areas. None of the action alternatives would involve land acquisition in all three acquisition study areas.

In the interest of providing as realistic a training environment as possible, proposed construction of facilities or infrastructure would be minimal under any of the action alternatives. The communications infrastructure that supports current Combat Center range operations would be extended into any acquired land via the proposed installation of two or three communications towers (the proposed number and locations of such towers would vary by action alternative; see the details for each alternative in Section 2.4). Under one alternative, a series of four concrete tank crossings would be constructed across an existing paved road (North Amboy Road). No other permanent fixtures (e.g., paved roads, utility lines, fixed firing ranges, or other permanent infrastructure) would be constructed, demolished, or modified under any of the six action alternatives, either within the existing installation or on land that would be acquired under the action. Placement and redistribution of temporary target arrays, as well as temporary ground excavation associated with normal vehicle and infantry maneuver operations (e.g., for trenches, fighting positions, etc., as described in Section 1.4.6), would occur periodically under any of the action alternatives, and would occur both on existing installation land and on land that would be acquired under each alternative. In addition, some re-grading or other improvement/maintenance of existing unpaved access roads, and the development of new unpaved access roads, would occur as part of any of the project alternatives. In any newly acquired land areas, a main unpaved access road to the area and up to five unpaved branch paths for access into target arrays would be developed under any of the six project alternatives (no more than approximately 25 to 35 miles (40 to 56 kilometers [km]) of new unpaved roads, depending on the alternative).

Additional manpower would be required to manage the land/airspace areas and expanded training capability under each action alternative. The estimated increase in military and civilian jobs/personnel at the Combat Center would vary by alternative, but would range from a low of 59 to a high of 77 additional personnel. In addition, during each proposed MEB Exercise, an estimated 10,000 to 15,000 Marines would reside at the existing Exercise Support Base within the Combat Center. On average, approximately two-thirds of the participants in any MEB Exercise (6,000-10,000 Marines) would travel to the Combat Center from other locations. The Marines would be transported to and from the Combat Center over a 10-day time period at the beginning and end, respectively, of each of the two MEB Exercises per year. Depending upon the origin point of any particular group of participating Marines, the mobilization for proposed MEB training would potentially involve any combination of four main methods: 1) by air to a regional airport; 2) by bus from either home station or the regional airport; 3) by tactical vehicle

convoyed from home station; 4) by military aircraft directly into the Strategic Expeditionary Landing Field (SELF). A small number of participating Marines (200-400) would accompany vehicles and equipment transported to the Combat Center to support the MEB training. Since the Combat Center maintains a very large Equipment Allowance Pool, about 25% of the tactical vehicles used in a typical MEB Exercise would continue to travel to the Combat Center, either by road convoy or by truck.

The following sections in this chapter describe the proposed action in more detail, including the six action alternatives and the No-Action Alternative. Section 2.2 describes the training requirements and composition of an operational template for the proposed MEB Exercise, which is integral to the alternatives screening criteria and the identification of alternatives, and for the proposed MEB Building Block training. Section 2.3 focuses on the screening criteria and evaluation process that led to the selection of alternatives. Section 2.4 describes each of the resulting six action alternatives and the No-Action Alternative. In compliance with the National Environmental Policy Act (NEPA), the No-Action Alternative is carried forward for analysis even though it would not satisfy the purpose of and need for the action. Following the detailed discussion of each alternative, the Marine Corps' Preferred Alternative is identified (Section 2.4.8). Section 2.5 describes the proposed management of the Restricted Public Access Areas (RPAAs) under three of the action alternatives. Section 2.6 describes the disposition of mining claims and properties under the proposed action. Section 2.7 discusses alternatives considered but eliminated from further analysis and Section 2.8 lists identified special conservation measures (SCMs) by resource area that would be implemented as part of the proposed action. The SCMs, also known as Best Management Practices (BMPs) or Standing Operating Procedures (SOPs), are presented in the analysis of each resource. In addition to the SCMs, there are proposed mitigation measures, defined in the Council on Environmental Quality (CEQ) regulations at 40 Code of Federal Regulations (CFR) 1508.20 and include actions to avoid, minimize, rectify, reduce, or compensate for environmental impacts, which are summarized in Chapter 6.

2.2 MEB TRAINING REQUIREMENTS AND REPRESENTATIVE MEB EXERCISE TEMPLATE

The fundamental issue in determining a reasonable range of project alternatives to satisfy the requirements of NEPA was to determine how much of an expansion in air and ground operating areas would be necessary to meet MEB training requirements. The first step in answering this question was to systematically construct a representative MEB Exercise training template based on fundamental MEB training requirements, mission essential tasks, and training doctrine. The template lays out the generalized content and structure of each day of training. Within the parameters of this general template, individual MEB commanders would, as part of their role in the MEB Exercise, develop a detailed and customized design strategy for implementation of each day's training plan. As described more thoroughly in Section 2.2, this generic MEB Exercise template enabled project planners to identify and evaluate varying schemes of combined-arms, live-fire, and maneuver training scenarios that served to effectively translate or transfer the training requirements to the actual training landscape. This in turn allowed for exploration of alternative land acquisition and airspace establishment scenarios that would meet MEB training requirements as defined below.

2.2.1 Marine Expeditionary Brigade Training Requirements

As summarized in Section 1.3.2, the evolution of the Marine Corp's requirements for MEB training capabilities began several years before the start of the NEPA process with a comprehensive review of national, military, and service-level defense strategies, policies, and training doctrine. Informed along the way by lessons learned during wartime experience in Iraq and Afghanistan, this process eventually

culminated in the identification of the following "Objective" (preferred) and "Threshold" (minimum) requirements for the MEB training.

Objective MEB Training Requirements

- Independent, offensive maneuver of three battalion task forces abreast and associated air combat element operations, with *the three* battalion task forces converging on a single MEB objective;
- 48-72 hours of continuous offensive operations by the three battalion task forces as they converge on a single MEB objective; and
- Integrated air and ground maneuver live-fire with optimized freedom of action to the greatest extent practicable considering operational range capabilities and munitions safety requirements.

Threshold MEB Training Requirements

- Independent, offensive maneuver of three battalion task forces abreast and associated air combat element operations, with *at least two* battalion task forces converging on a single MEB objective;
- 48-72 hours of continuous offensive operations by all three battalion task forces; and
- Integrated air and ground maneuver live-fire with optimized freedom of action to the greatest extent practicable considering operational range capabilities and munitions safety requirements.

2.2.2 Training Objectives and Mission Essential Tasks

The process of translating the MEB training requirements into a functional training template required the identification of representative training objectives for each of the four component MEB combat elements and a set of mission essential tasks that would support these objectives.

Representative Command Element training objectives for the MEB Exercise, as derived from Marine Corps Order (MCO) 3500.11E, are as follows:

- Accept an assigned mission from higher headquarters, develop a comprehensive plan (to include sustaining the force), and exercise effective command and control ensuring tactical success on the battlefield.
- Gather and analyze information, make decisions, organize resources, plan, communicate instructions, coordinate and supervise execution, and monitor the results of MEB operations.
- Utilize, detect, deliver, and assess methodology. Conduct targeting, intelligence, and electronic warfare operations in support of the tactical scheme of maneuver in an assigned area of responsibility.
- Develop essential fire support tasks in support of the scheme of maneuver. Coordinate the execution of these tasks while minimizing risk through doctrinal integration and coordination techniques.

Representative Ground Combat Element training objectives for the MEB Exercise are as follows:

- Plan, rehearse, and execute schemes of maneuver consistent with assigned tactical missions by integrating and employing all components of live-fire operations (direct, indirect, aviation, and non-lethal).

- Provide timely, accurate, and continuous fires in support of the MEB and Ground Combat Element schemes of maneuver.
- Ensure comprehensive logistics planning and sustainment of the Ground Combat Element during the execution of tactical operations.

Representative Aviation Combat Element training objectives for the MEB Exercise are as follows:

- Plan, develop, and manage an Air Tasking Order and Aviation Combat Element Operations Order based on the Command Element tasks and Ground Combat Element and Logistics Combat Element requirements in support of the MEB concept of operations.
- Employ an Aviation Combat Element battle staff and Marine Aviation Command and Control System to ensure the effective use, coordination, and employment of aviation assets as required by the Command Element for current and future combat operations, including integration of ground-based air defense.
- Ensure comprehensive logistics planning and sustainment of the Aviation Combat Element during the execution of tactical operations.

Representative Logistics Combat Element training objectives for the MEB Exercise are as follows:

- Plan, rehearse, and execute logistical schemes of maneuver consistent with the assigned tactical missions by operating forward in the field to ensure the sustainment of the MEB under mid-to-high intensity tactical circumstances.
- Support the MEB with transportation, maintenance, supply, health services, engineering/utilities, and services.
- Ensure comprehensive logistics planning and sustainment of the Logistics Combat Element during the execution of tactical operations.

Table 2-1 provides a representative sample of mission essential tasks that would need to be accomplished during a MEB Exercise to support the MEB-sized training objectives.

2.2.3 MEB Exercise Training Template

Training exercises like the proposed MEB Exercise are constructed on a framework of progressively larger and more challenging training events, which build on successive evolutions designed to reinforce learning through assessment of established levels of performance. The training events would be driven by the mission essential tasks. The operational commander would select mission essential tasks from the Joint Task List. Once validated by the Marine Expeditionary Force (MEF) operational commander, these tasks would be transmitted to MAGTF Training Command, which would then develop a training exercise designed to accomplish the tasks. Over the course of the contingency preparation cycle, elements of the ground range and SUA would be activated to conduct the specific task; with each specific training iteration growing in scope and complexity. The end state is a fully integrated MEB "Final Exercise" phase, which assesses each echelon at its full operational capability.

Table 2-1. Sample MEB-Sized MAGTF Mission Essential Task List

MCT #	Essential Task
MCT 1.3.1	Conduct Maneuver
MCT 1.3.4	Conduct Assault Support Operations
MCT 1.4.1.5	Conduct Clearance Operations
MCT 1.6.1	Conduct Offensive Operations
MCT 1.6.4	Conduct Defensive Operations
MCT 1.6.6.9	Conduct Stability Operations
MCT 1.6.8	Conduct Counter-Insurgency Operations
MCT 2	Develop Intelligence
MCT 2.2.5.2	Conduct Air Reconnaissance
MCT 3	Employ Firepower
MCT 3.2	Attack Targets
MCT 4.1.2	Provide Supply Support
MCT 4.2	Conduct Maintenance Operations
MCT 4.3	Conduct Transportation Operations
MCT 4.3.4	Conduct Air Delivery
MCT 4.4	Conduct General Engineering Operations
MCT 4.5	Provide Health Services
MCT 5	Exercise Command and Control
MCT 5.3.5	Control of Aircraft and Missiles
MCT 5.5.1	Integrate and Operate with Joint/Combined Forces
MCT 6.1.1.2	Develop Rear Area Security Plan

Note: MCT = Marine Combat Task
Source: Department of the Navy (DoN) 2001.

Immediately following the typical 4-day period for reception, staging, onward movement, and integration, the training template developed for the proposed MEB Exercise is 24 days in length. The majority of the exercise period would involve progressively more challenging training evolutions to work up to the final culminating exercise (this pre-Final Exercise phase of the training template is referred to throughout this EIS as the "MEB Work-up" phase of the exercise). To satisfy the MEB training requirement for 48-72 hours of continuous offensive operations, the MEB Exercise training template culminates in a 3-day Final Exercise. The following describes the key components of the MEB Exercise training template (DoN 2001).

Day of Training 1 through 3: During these first 3 days of the MEB Work-up phase, each of the three battalion task forces involved in the MEB Exercise would take turns conducting a single day of Fire Support Team and Ground Air Integration Training activities. The evolution is designed as a Tactical Exercise Without Troops, meaning that infantry units and other Marines who are not the focus of the training objectives of this evolution would not participate (only about 200 Marines out of the full battalion force of about 2,000 Marines would participate in each of these days of training). The remaining Marines from the participating battalion on each day, as well as those waiting their turn for the Fire Support Team and Ground Air Integration Training evolution, would conduct selective proficiency training activities at existing Combat Center fixed ranges or training areas (Appendix B contains a summary of the most likely operations by range). Participating units would be charged with developing a detailed plan for overall coordination of air, artillery, and mortars. Communication links designed to transfer fire support coordination measures would be established and exercised. Emphasis would be placed on orchestrating combined arms assets and establishing procedures for centralized or de-centralized request and control. The staff would be driven to put together sophisticated packages of fires to exercise and evaluate the unit's ability to orchestrate all.

Training Evolution Objectives:

- Assess unit's ability to maintain overall situational awareness, assign priority of fires in accordance with unit SOPs and established doctrinal publications. Additionally, force the unit to designate priority targets for engagement and update those priorities and targeting as the tactical situation develops.
- Assess fire support coordinators' ability to maintain a detailed plot of all friendly positions, civilian population centers, and places protected by the law of war. Additionally, command operations center awareness of adjacent friendly operations, intelligence, airspace coordination measures and overlays.
- Assess the command's ability to coordinate with adjacent or higher Fire Support Coordination Centers if fires or their effects impact in another unit's zone or come with the constraints imposed by the higher Fire Support Coordination Center.
- Based on the tactical play of the maneuver, provide recommendations for changing or shifting fire support coordination measures and those designated maneuver control measures.
- Assess the command's ability to coordinate the attack of targets in the priority established by the operations order or according to the commander's changes based on the tactical play of the maneuver. Additionally, the unit would be able to demonstrate an ability to adjust fires based on the advance of maneuver units, changes to priority, and any changes to the scheme of maneuver.
- Assess the command's ability to respond quickly to targeting data and immediate fire support requests to expeditiously coordinate the destruction of high payoff targets.
- Assess the command's ability to echelon ground-based fires support assets.
- Assess the command's ability to maintain the status of remaining air sorties, aircraft on call, and all preplanned air missions throughout each Air Tasking Order cycle. Utilize the Tactical Air Control Party to aid in the quick response of aviation assets to changes in the tactical play of the problem.
- Demonstrate the ability to displace the Fire Support Coordination Center by echelon, with no loss of control or degradation of support.

Day of Training 4 through 9: During this phase of the MEB Work-up training, each of the three battalion task forces would take turns conducting a 2-day evolution (consecutive), which would include the full complement of battalion personnel and equipment. For each battalion task force, the first day would be focused on offensive operations while the second day would be focused on defensive operations. Those non-participating battalions awaiting their turn for this evolution would conduct selective proficiency training activities at existing Combat Center fixed ranges or training areas (Appendix B). The first-day offensive training scenario would be built with a significant amount of operational free play designed to achieve offensive objectives: destroy a constructive enemy force or equipment, deceive or divert a notional enemy force, fix a notional force in place, and/or disrupt a notional force. A premium would be placed on requiring the commander to weight the main effort with superior combat power. The exercise would require the unit to concentrate assets while preserving forces to exploit success, thereby accepting risk elsewhere. Success would be dependent on maneuver, deception, speed, violence, surprise, and economy of force.

Training Evolution Objectives – Offensive Operations:

- Movement to contact would be conducted to develop the situation and to establish or regain contact with the enemy. The notional force would require the commander to make initial contact with minimal forces and to expedite the employment and concentration of the force. The commander would be forced to anticipate and foresee the actions on contact. To maintain freedom of action upon contact, the commander would deploy an advance force capable of locating and fixing the constructive enemy force. The main body is positioned so as to remain uncommitted, capable of maneuvering without interference at the time of the commander's choosing. The advance force must contain sufficient combat power to overcome security and delaying forces and provide time for the commander to maintain pressure and shift assets.
- The exercise force would transition to an attack to defeat, destroy, or neutralize the notional enemy force. The design would emphasize maximum application of combat power, bold maneuver, and prompt exploitation of success. Emphasis would be placed on preventing enemy maneuver or counteraction, maneuver to gain advantage, delivery of an overwhelming assault to fix, destroy and exploit any gained advantage. Commanders must be given the opportunity to make adjustment during the attack and maintain the offensive momentum. Free play would provide opportunities for hasty attacks, deliberate attacks, spoiling attacks, counterattacks, feints, and raids.
- After the attack, the notional force would have elements capable of forming cohesive attacks, so the exercise force would have to exploit the attack and extend the destruction by maintaining constant offensive pressure. The objective of the exploitation is the disintegration of enemy forces to the point where there is no alternative but surrender or flight. The commander would be tested on his preparation to exploit every attack without delay. To that end, the maneuver commander would need the resources and facilities to employ his principal exploitation tool, the reserve force. The exploitation force must be given as much freedom of action as possible, and efforts would be bold, violent, aggressive, and fast.
- At some point in the evolution, the enemy would appear to be completely broken down, and the commander would be given the opportunity to pursue the notional enemy force. Like the exploitation phase, pursuit requires broad decentralized control and rapid maneuver. During the pursuit, the commander would task organize his force into a direct pressure force and an encircling force. Each force must be properly resourced and the encircling force must have continuous fire support and significant facilities to maneuver (the Aviation Combat Element is particularly effective in this regard and would require airspace to outmaneuver the notional force). The pursuit would likely push the utmost limits of Marine endurance, equipment, weapon kinematics, and especially supplies. Any relief from the combat pressure would afford the notional force an opportunity to pull together scattered units, emplace obstacles, or break contact.

On the second day of this evolution, exercise design would drive the participating battalion force to transition from offensive operations to defensive operations. The purpose of this evolution is to test the commander's ability to create a favorable situation for resumption of offensive operations. Defensive operations strive to force the notional enemy force to reach a Culminating Threshold without achieving its objectives, to gain or regain the initiative. The commander would be given extensive operational freedom to use the terrain and available firepower. Subordinate commanders would be required to take the necessary steps to maintain their positions and cover gaps in their dispositions by the use of obstacles, fires, or reserves.

Training Evolution Objectives – Defensive Operations:

- Maneuver would be constantly assessed as part of all defensive operations. Within the echelons of defense, maneuver is essential to security operations, operations within the main battle area, and rear areas. Units at each echelon would be required to maneuver in depth, taking advantage of terrain and tactical developments, to concentrate, disperse, and occupy positions from which they can bring more effective fires to bear on the enemy.
- The defender would be required to prepare and organize the defense on terrain of his choosing. The notional force would be able to choose the specific time and point of attack. The commander would be assessed on the ability to direct the energy of the enemy's attack into terrain which is least advantageous; making the most of preparations that time allows. Preparations would be continuous throughout the evolution and continuously tested by the notional force. The use of security forces would be required to inhibit the notional force's intelligence effort and deceive the enemy as to the exact location of main defenses.
- The commander would be placed in a scenario where it would not be possible to defend everywhere in strength. The commander would be forced to develop a plan to concentrate forces and fires at the decisive place, while exercising economy of force in less critical areas. Some portion of his front would be unoccupied or effectively held by fires and obstacles. The defensive scheme of maneuver would require the commander to take advantage of terrain and positioning of reserves so they can intervene quickly to support the main effort. Full freedom of operational maneuver would be required to enable the commander to rapidly concentrate fires and shift forces.
- The commander would seek every opportunity to take offensive action. The unit would be taking every opportunity to: launch spoiling attacks on the notional force as they are preparing or assembling for an attack; attack the notional force with security forces to harass, interdict, deceive and damage their forces before they reach the main battle area; or counterattack the notional force to destroy or repulse enemy penetrations.
- Each unit would be assessed in their ability to provide mutual support as it strengthens any defense. Each position must be emplaced to make maximum use of the terrain, but also emplaced in such a manner that the notional enemy could not attack one position without coming under fire from at least one other. The unit would be assessed in its ability to estimate its supportability based on the terrain, range of its weapons and visibility. The notional enemy force would be dissipated based on the operational force's ability to disperse fire away from the main attack, based on the soundness of the Mutual Support Plan.
- The soundness of the unit's Mutual Support Plan would manifest itself in the ability to provide effective defense-in-depth. The siting of defensive positions throughout the main battle area would serve to absorb and progressively weaken the notional enemy attacker. If effective, it would provide maneuver space within the defensive sector for the maneuver of subordinate units against the notional enemy's main effort. Enough space must be afforded to: disrupt the momentum of the notional attack and prevent a breakthrough of friendly lines; force or channel the notional force into engagement areas; stall for time to allow the commander to determine the notional enemy's main effort and counter it with fires or reserves; and disperse the effects of enemy fire.
- The commander would be assessed on the ability to: engage the enemy at the earliest opportunity with security forces; employ weapons systems at their maximum effective range; use blocking

positions, obstacles, and supplementary positions throughout the main battle area; and position and move reserves and fire support units.

Day of Training 10 through 14: During this phase of the MEB Work-up, key staff from all three MEB battalions would participate in a 2-day planning session followed by 3 days of Combined Arms Simulation Training, which involves a series of sand table exercises (battle simulations on a physical replica of the Combat Center) designed to prepare the staff for the Final Exercise. During this phase of the exercise, non-participating personnel from all three battalions would conduct standard proficiency training at various existing Combat Center fixed ranges and training areas (Appendix B).

Day of Training 15 through 17: During this 3-day evolution, all three battalion task forces would have 1 day for positioning in the field followed by a 2-day Training Exercise Without Troops rehearsal for the first 2 days of the MEB Final Exercise. All infantry and other non-participating personnel from all three battalions would conduct standard proficiency training at various existing Combat Center fixed ranges and training areas (Appendix B).

Day of Training 18 and 19: These days are reserved for orders revision and movement to the field of the entire complement of all three battalion task forces in preparation for the MEB Final Exercise.

Day of Training 20 through 24: This phase includes the culminating 3-day Final Exercise, which would include all personnel from all three battalion task forces (approximately 10,000 to 15,000 personnel). The Final Exercise would be followed by 1 day for retrograde and cleanup and 1 day for range turnover.

During the Final Exercise scenario, the enemy situation encountered would represent a force manned, equipped, and arrayed for a conventional mid- to high-intensity conventional battle. The enemy portrayal would be designed to provide the MEB a degree of realism and an opportunity to apply Marine Corps doctrinal tactics, techniques, and procedures. Describing enemy functions would be the responsibility of the Tactical Exercise Controllers ("Coyotes"). The Coyotes would be positioned throughout the four elements of the MEB throughout the duration of the exercise. They would "paint" enemy actions to drive the MEB towards accomplishing the specified training objectives. Target arrays and objectives would generally be placed on the desert floor or near the base of high ground. Most live-fire engagements would occur along the natural length of each corridor.

The Marine Corps Systems Approach to Training would be used to prepare the detailed design of the Final Exercise. This process utilizes a crawl, walk, run methodology. Each day, the threat situation would change to increase the level of complexity required of the MEB to effectively and safely conduct air and surface live-fire integration in support of ground and aviation maneuver. Generally, each day of the Final Exercise would require the MEB to conduct operations in four phases. *Phase 1* would include employing reconnaissance and surveillance assets to identify threats. *Phase 2* would consist of employing indirect and aviation-delivered fires to engage and weaken the threat forces. *Phase 3* would consist of the main attack involving the integration of air and surface-delivered fires in support of ground and aviation maneuver. *Phase 4* would include establishing defensive positions and conducting resupply operations in preparation for the next day's offensive operations.

The MEB commander would be given as much freedom of operational maneuver as possible to provide the medium to realistically employ the full spectrum of combined arms in support of live-fire and maneuver. Overly burdensome restrictions to any particular element of training would likely impede the ability to train effectively to each anticipated Mission Essential Task.

2.2.4 MEB Building Block Training

In addition to the proposed 24-day MEB Exercises, individual units up to a single battalion in size would conduct MEB Building Block training. Because of an expected reduction in EMV exercises and other tenant and transient unit training associated with the anticipated drawdown of forces in Afghanistan and Iraq, it is assumed that the proposed MEB Building Block training would represent no net change in the overall number, frequency, or operational profiles of similar unit training activities relative to current high levels (in 2010). Because most of the training areas aboard the Combat Center are fully committed during the conduct of traditional combined arms training and more recently during EMV exercises, initial stages of proficiency training are sometimes diminished in scope. Consequently, units are forced to add training events to their combat pre-deployment training to fully complete the prerequisites to be certified ready for combat. During advanced Block 4 training events, such as the proposed MEB Exercise, this manifests itself in degraded performance in some areas, requiring remediation before deployments and loss of training opportunities (especially advanced tactics and MAGTF integration). The proposed use of the expanded operating areas is intended to avoid similar deficiencies in the conduct of MEB Building Block training.

The typical training rhythm for MEB Building Block training would consist of a 4-day per week training evolution. In keeping with a standard garrison duty cycle, units (up to a single battalion in size) would form up on Monday morning, prepare their personnel and equipment, and road march to their reserved training areas. It is expected that units would have completed their preparations and be ready to engage in training in a live-fire status around 12:00 p.m. local time. The next 4 days would provide a medium for progressively more challenging combined arms, live-fire, and maneuver evolutions, ranging from squad operations to full battalion offensive maneuver. During the 4-day exercise, different elements would be conducting Block 1 and 2 training, including the use of airspace as depicted in Table 2-8. There would be a consistent level of air and ground training intensity throughout all four days.

Squad Operations. Training day 1 would begin with a rotational maneuver course designed to teach, coach, and mentor the missions assigned to the Marine rifle squad. The squad course would be designed to introduce techniques of fire, combat formations, offensive combat, defensive combat, and patrolling.

Company Operations. Training day 2 would shift focus to the Marine infantry company. After each of the squads within the battalion have completed the respective courses, the squads would form up and begin executing company-level competencies. The company course would be designed to introduce or reinforce command and control, company plans and orders, offensive operations, defensive operations, and patrolling.

Battalion Operations. Training days 3 and 4 would be designed to bring the respective units and attachments together to form a cohesive battalion, capable of executing live fire, sophisticated combined arms, and maneuver. Training day 3 would feature offensive operations with a live-fire movement to contact, target engagement (based upon a higher headquarters-established priority), weapons effect assessment, and maneuver onto a set of objectives. Training day 4 would feature a consolidation and hasty transition to defensive operations as the battalion would be forced to delay and defend against a notional force which has amassed firepower and begun to maneuver on the battalion. The battalion course would be designed to introduce/reinforce offensive and defensive operations.

This 4-day training evolution would be repeated weekly throughout the year whenever MEB Exercises are not being conducted (an average of approximately 40 weeks or 160 days each year). The operational footprint for these MEB Building Block training activities would be smaller than the full MEB Exercise.

2.2.5 Night Operations

2.2.5.1 MEB Training Work-Up (days 1-19)

During days 1-19 of the MEB Training template, ground-based operations would generally conform to the aviation times listed in Section 2.4 for each alternative. Day 19 would generally consist of vehicle movement to staging areas for commencement of the exercise. It is projected that there would be on average 3 hours of night operations (25%) occurring before midnight each day; however, vehicle movement would occur throughout the hours of darkness to some degree. Camps and safety areas would have some flood lights in place to allow for maintenance or security. For the purposes of analysis, each day of the MEB Training Work-Up would involve approximately 1,500 Marines and 100 vehicles in the newly acquired areas. Weaponry would include use of artillery, mortars, and aviation-delivered ordnance, which would contribute to light sources. In extreme cases, individual rotary-wing aircraft may need to activate the aircraft spotlight, but this would not be in support of a training task.

2.2.5.2 MEB Training Final Exercise (days 20-24)

For the purposes of analysis, the MEB Training Final Exercise would require approximately 15,000 Marines and 1,786 vehicles (as outlined in Table 2-5). Day 20 would generally consist of vehicle movement to staging areas for commencement of the exercise. Aircraft would initiate the exercise with shaping fires, insertion of required intelligence, surveillance, and reconnaissance assets, and other associated movements. Once initiated, the MEB Exercise would maintain a logical flow with the entire force generally moving toward the MEB objective. Live fire would take place generally before midnight, but events may take longer or be rescheduled depending on the execution.

2.2.5.3 MEB Building Block

The training timeframe and template within each MEB Building Block training 4-day event is expected to vary since the training audience would be a different unit each time. However, it is expected that night operations would be conducted for approximately 6 hours during two nights of each 4-day exercise, concluding before midnight (approximately 25% of exercise occurring at night). For the purposes of analysis, the MEB Building Block training 4-day exercise would be a Company-sized live fire event with approximately 250 Marines and 30-40 vehicles. Vehicle movement at night would be minimized and would consist of either administrative traffic back to the Combat Center or combat vehicles directly executing training events. Weaponry would include use of artillery and mortars, which would contribute to light sources.

2.3 ALTERNATIVES ANALYSIS

2.3.1 Screening Criteria

The screening criteria and alternatives to be studied in the EIS were ratified by the project's Executive Steering Committee, composed of Marine Corps leadership. The objective and threshold training requirements and generic MEB Exercise training template described in the previous section directly influenced the development and application of the following screening criteria, which were used to identify and evaluate potential alternatives for the proposed action. To be considered a viable and reasonable alternative, any land acquisition and airspace modification/establishment scenario must satisfy all of the following conditions (at least to a threshold level where appropriate):

1. ***Allow for independent, offensive live-fire and maneuver of three battalion task forces.*** The objective standard is for the three battalion task forces to converge on a single MEB objective.

The threshold standard is for two of the three battalion task forces converging on a single MEB objective. This criterion necessarily depends on the application of exercise planning criteria associated with the concept of the required training and acknowledgment of geographical characteristics of the area (e.g., terrain constraints on mobility and direction of maneuver, notional distances for effective and safe live-fire surface danger zones [SDZs] and aviation weapons danger zones [WDZs], realistic travel distance to assembly areas, available support for tactical communications and logistics).

2. ***Allow for 48-72 hours of continuous offensive operations by the three battalion task forces.*** This criterion requires the application of exercise design criteria and acknowledgment of geographical characteristics of the area.
3. ***Allow for integrated air and ground maneuver live fires with optimized freedom of action (within reasonable constraints)***. Freedom of action refers to the flexibility that should be afforded MEB commanders to customize their training plan and live-fire tactics for any given training evolution to achieve the most optimal training value from the exercise.
4. ***Be contiguous with current Combat Center property and associated military airspace.***
5. ***Avoid congressionally-designated wilderness areas, parks, wildlife refuges, designated critical habitat for threatened or endangered species, cities/towns, and interstate highways.***
6. ***Allow for sustained tactical logistics and tactical communications over extended distances.***
7. ***Provide opportunities for exercise design flexibility to avoid training evolution repetition.***
8. ***Provide for at least 3,280 feet (1,000 meters) of buffer area between live-fire areas (including SDZs and WDZs) and any proposed or existing installation boundary in accordance with the established Combat Center safety policy (Combat Center Order 3500.4H).***

These screening criteria were used to systematically identify the range of reasonable alternatives carried forward for analysis in this EIS. Some of these criteria are exclusionary in nature, representing conditions that must be true for an alternative to be considered reasonable. Other criteria were evaluated relative to the threshold and objective MEB training requirements. With the exception of the No-Action Alternative (as described in Section 2.4.7 below), only alternatives that would satisfy these criteria were considered reasonable and carried forward for detailed evaluation in this EIS. Alternatives that were identified but eliminated from further consideration in the EIS based on these criteria are described in Section 2.7.

Considering these criteria and Marine Corps MEB training requirements, any reasonable alternative requires a substantial amount of training area. The required operating area would be a combination of existing training land and airspace within the current Combat Center and SUA boundaries, and any contiguous lands or airspace to be acquired or established. Exercise planning considerations associated with specific types of operations also provided general guidance in determining the necessary size of the MEB training space. For example, WDZs (for aircraft-delivered weapons) and SDZs (for surface-to-surface weapons) were used to define the geographic parameters for safe use of weapon systems and training munitions (two samples are shown in Figure 2-1). These danger zones were distributed to correspond to the MEB Exercise training template to help define the extent of the required land area. The safe use of surface-to-surface weapons systems also requires a substantial amount of airspace in addition to the lateral safety footprint represented by the SDZs. High Mobility Artillery Rocket Systems, for example, require airspace up to 40,000 feet above ground level (AGL) for airspace de-confliction. The M777 155 millimeter (mm) Howitzer requires airspace up to 30,000 feet AGL. Direct fire weapons

systems (e.g., rifles, machine guns, tank main guns up to 120mm) require anywhere from 5,000 to 13,000 feet AGL.

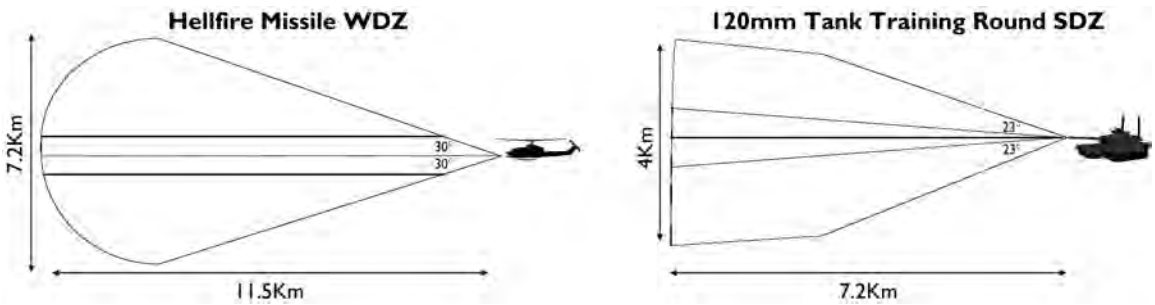


Figure 2-1 Sample Danger Zones for Common Weapon Systems

Similarly, as shown in Figure 2-2, Marine Corps training doctrine establishes notional planning guidelines for safe and tactically-desirable separation distances that should occur between progressively larger force structures (e.g., platoons, companies, battalions, etc.) during maneuver. The figure illustrates the notional maneuver frontage width and tactical separation for mechanized units of various sizes. For example, the frontage of a single platoon of four mechanized vehicles abreast, with each 13-foot (4-meter) wide vehicle separated by 328 feet (100 meters), equals 1,037 feet (316 meters). A company consisting of three of these platoons, each again separated by 328 feet (100 meters), results in a frontage width of 0.7 mile (1.1 km). At the largest scale, a full Regimental Combat Team of three battalion task forces abreast presents a notional frontage of 27.3 miles (44 km). These types of exercise planning considerations (e.g., SDZ parameters, maneuver capability supported by the local landscape, notional maneuver frontage guidelines) were used by operations and training experts on the project team to identify a range of reasonable project alternatives of appropriate size and scope to satisfy the screening criteria.

2.3.2 Methodology for Selection of Action Alternatives

The following process was used to apply the screening criteria, MEB training template, and exercise planning considerations introduced above to identify a range of reasonable alternatives for the proposed action:

Step 1: Exclude non-adjacent lands in the vicinity of the Combat Center that would be infeasible to acquire by identifying on a map towns and congressionally-designated wilderness areas, parks, interstate highways, and wildlife refuges (Criteria 4 and 5). This constraints analysis narrowed the feasible landscape for potential land acquisition and led to the identification of the preliminary acquisition study areas shown in Figure 2-3. As shown in the figure, the potential for acquisition of land to the north and to the south is considerably more constrained than to the west and east.

Step 2: Identify feasible maneuver corridors, assembly areas, and MEB training objectives. Starting with the four major maneuver corridors within the current Combat Center, the planning team explored various options for extending these corridors into the feasible acquisition study areas shown in Figure 2-3. Based on expertise with operational planning and exercise design, the project planners also considered opportunities for establishing MEB Exercise assembly areas and locations for MEB Final Exercise objectives that would potentially serve as starting and ending points for exercise maneuvers.

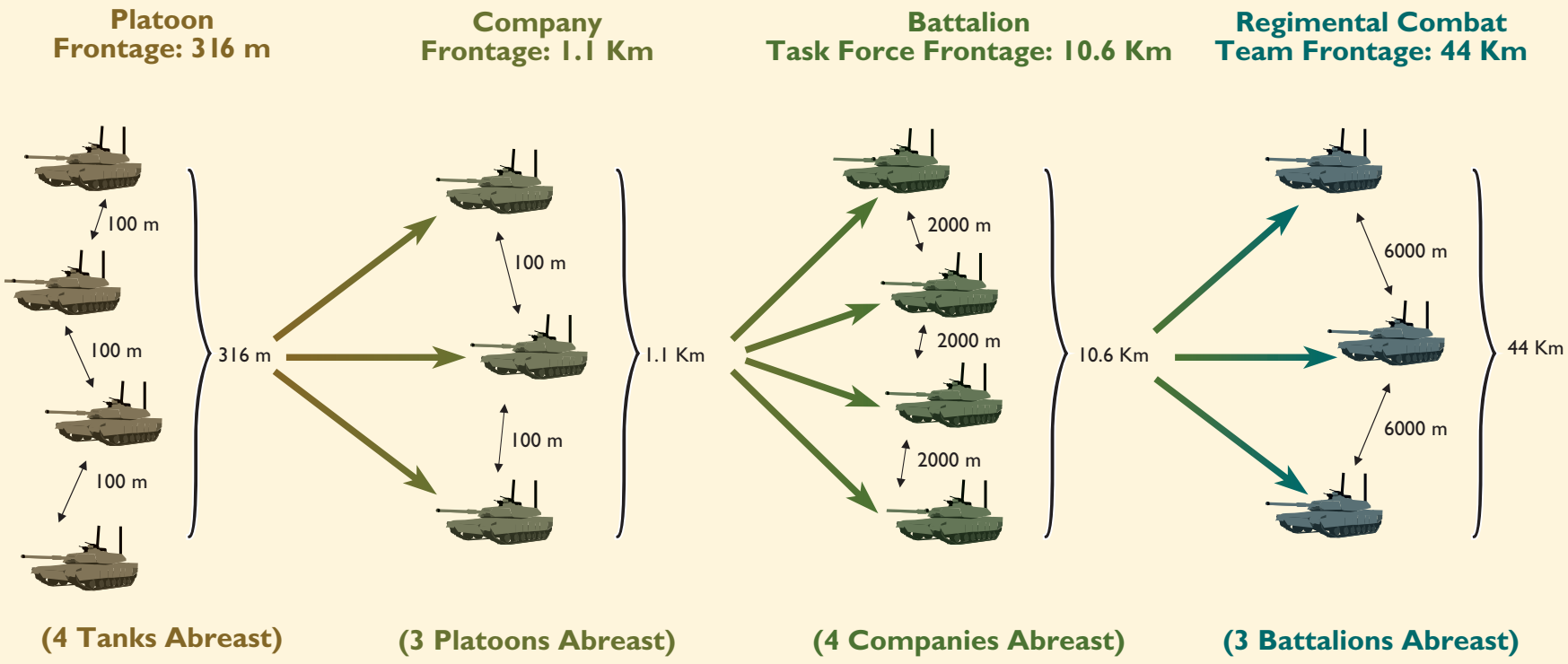


Figure 2-2
Notional Frontage and Tactical Separation Distances for Components of a MEB Ground Combat Element

The relatively large open areas in the west study area (Figure 2-3) were found to offer multiple opportunities for maneuver corridors, assembly areas, and MEB objectives (depending on direction of maneuver). The small acquisition study area on the south side of the Combat Center was retained as a potential assembly area that would also serve to extend the existing Noble Pass maneuver corridor (see Figure 1-6). The east study area also features large areas of open space for either an assembly area from which to begin a maneuver corridor or a MEB objective toward which the battalion task forces would converge, although this area also has known constraints to maneuver such as dry lake beds and volcanic rock outcroppings (see Figure 1-6).

At this stage of the process, potential acquisition of land to the north/northeast of the Combat Center (in the Northeast Study Area shown in Figure 2-3) was eliminated from further consideration because the land area to the north would offer no MEB training value. Mountainous terrain north of the Combat Center would not achieve the minimum threshold for Criterion 1 (independent, offensive live-fire and maneuver of at least two battalions converging on a single MEB objective) or Criterion 2 (at least 48-72 hours of continuous offensive operations by three battalion task forces even if not all are able to converge on a single MEB objective). In addition, the combination of two active mines, Interstate (I-) 40, the Town of Ludlow, a partially underground gas line, and a surface laid oil pipeline north of the Combat Center would severely restrict freedom of action and the employment of live-fire weapons (Criterion 3).

The southeast study area was also withdrawn as a potential candidate for acquisition at this stage because of access constraints, reduced freedom of action, and limited exercise design flexibility by more than one battalion task force (Criteria 1, 3, and 7, respectively), all related to the presence of the Cadiz Dunes and Sheephole Valley Wilderness Areas (see Figure 2-3).

Step 3: Translate the notional MEB Exercise training template and operational screening criteria (Criteria 1, 2, 3, 6, 7, and 8) into corresponding geographic constructs for overlay on the current and potential training landscape, and explore options for land acquisition that would accommodate MEB Exercise training requirements and design parameters. This planning process yielded generic schemes of maneuver for the MEB Final Exercise that would accomplish required training objectives while factoring in geographic realities of terrain restrictions, distance or access to potential task force assembly areas, direction of maneuver, SDZ footprint requirements for live-fire munitions, and other planning factors and training constraints that currently apply at the installation and would apply in the identified acquisition study areas. The process also addressed concerns about avoidance or restricted public access of the Johnson Valley Off-Highway Vehicle (OHV) Area. As a result of this comprehensive planning exercise, the project planners identified five schemes of maneuver representing a variety of land acquisition combinations and scenarios, maneuvers in both an east-to-west and west-to-east direction, and convergence on a MEB objective by two or three battalion task forces, while also satisfying at least the minimum threshold training requirements. In response to early input from local stakeholders concerned about loss of access to the Johnson Valley OHV Area in the west study area, one of the alternatives (Alternative 2) attempted to minimize acquisition of land in Johnson Valley and two other alternatives (Alternatives 4 and 5) incorporated designated RPAAs, which are areas where public recreation access would be permitted when MEB Exercises were not being conducted. Additional information regarding the RPAAs and associated management and safety procedures are discussed in detail in Section 2.5.

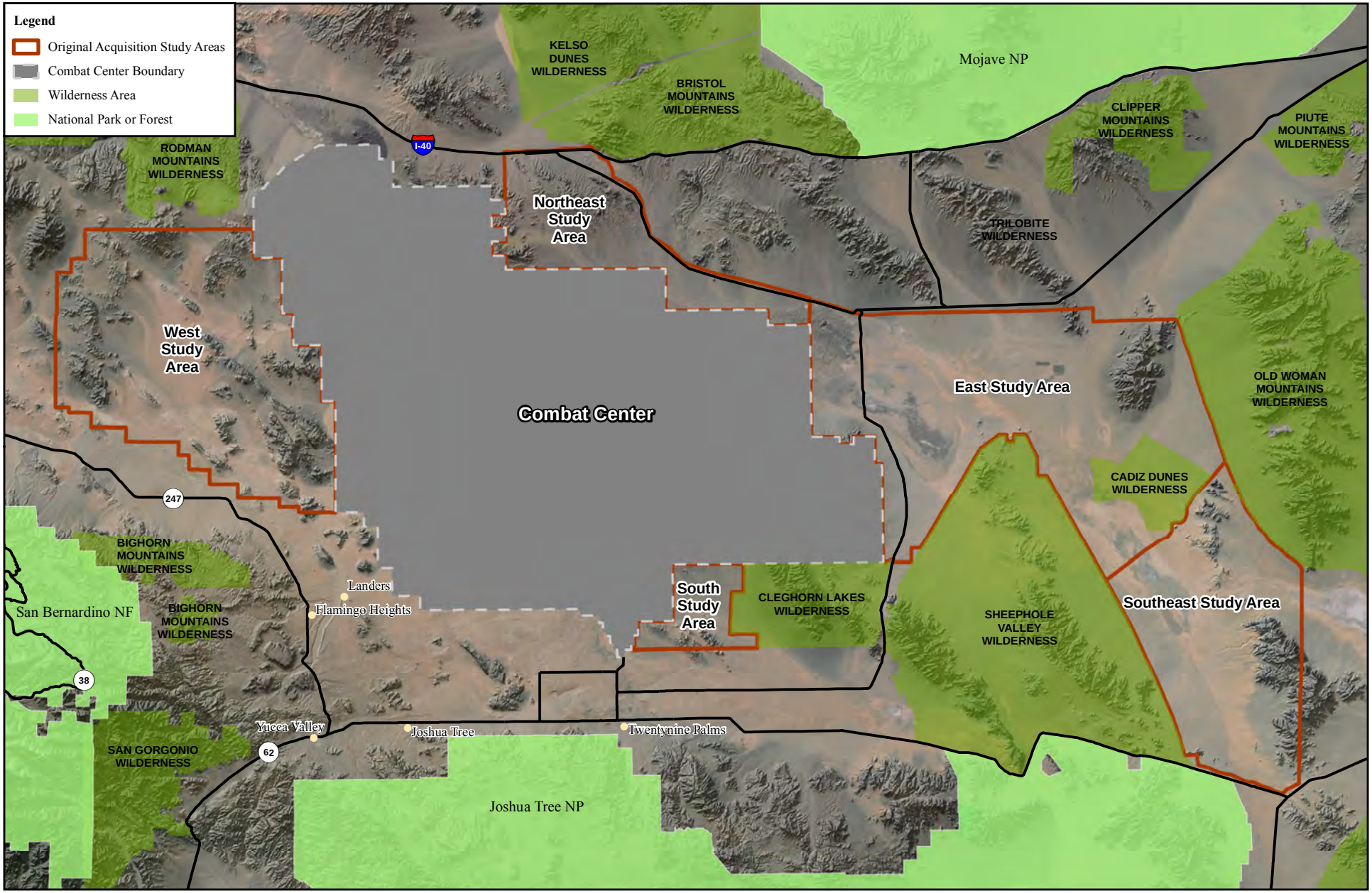


Figure 2-3
Application of Exclusionary Criteria to Narrow Potential Alternatives

Step 4: Incorporate Aviation Combat Element training and MEB air support and live-fire requirements to create composite alternatives that include required land acquisition, airspace modification and establishment, and MEB Exercise operations. The ground training scheme of maneuver and live fire was used to anchor the airspace requirement. Airspace would be required above, and in conjunction with the MEB ground forces to exercise the full capability of the combined air and ground forces. Appendix D provides a detailed summary of the specific MEB Aviation Combat Element training and airspace requirements that informed this analysis. Expanded airspace would be needed for initial establishment of air superiority, maintenance of that air superiority, air-to-ground suppression of threats, and continuous support of the three battalions engaged in the MEB Final Exercise. The expanded airspace would be required over the MEB objectives, in areas where ground-to-ground or air-to-ground engagements would occur, in recovery areas, and in connecting areas to permit a comprehensive and realistic Aviation Combat Element support of the MEB Exercise. The airspace would be required during the MEB Final Exercise, MEB Exercise Work-up operations, and MEB Building Block training according to the training templates and each exercise-specific or evolution-specific training plan.

The end result of this comprehensive planning exercise was the identification of five alternatives combining various scenarios of land acquisition, airspace modification/establishment, and MEB Exercise training operations. Along with a No-Action Alternative involving no land acquisition or airspace establishment, these five alternatives were presented to the public and stakeholders as part of the EIS scoping process.

2.3.3 Revision of Scoping Alternatives to Yield Alternatives Carried Forward

The five alternatives that emerged from the above process included feasible schemes of maneuver representing a variety of land/air combinations and scenarios, maneuver in both an east-to-west and west-to-east direction, convergence on the MEB objective by two or three battalion task forces, and full integration of air and ground MEB training. All action alternatives met or exceeded the threshold training requirements. Three of the alternatives (2, 4, and 5) attempted to either minimize acquisition of land in Johnson Valley or explore a restricted public access scenario. Maps of each alternative as they were presented at the public scoping meetings are included in Appendix C, *Public Involvement* in Volume II of this EIS.

Following the 3-month scoping period (October 30, 2008 – January 31, 2009), and largely in response to the scoping comments received, the boundaries of each of the alternatives were revised to align more closely with terrain features, eliminate perimeter land parcels with minimal training value, and reduce the number of occupied privately-owned parcels. The southern boundary of the western study area was aligned more closely with terrain features, and various private and state lands that were not essential to the project were omitted. The proposed land acquisition in the west study area for these alternatives was reduced from approximately 188,000 acres (76,081 hectares) to 180,353 acres (72,987 hectares). In the south study area, the acquisition area boundary was revised to eliminate virtually all interest in private property, resulting in a reduction in proposed acquisition from approximately 22,000 acres (8,903 hectares) to 21,304 acres (8,621 hectares). Finally, in the east study area, the boundaries were revised to exclude lands segmented by the Burlington Northern Santa Fe Railroad; Amboy Crater and lava field; desert tortoise critical habitat; and dry lake/sand dunes between Sheephole Valley and Cadiz Dunes Wilderness Areas. The proposed land acquisition for the east study area was reduced from approximately 212,000 acres (85,793 hectares) to 177,276 acres (71,741 hectares). The sum total of the land relinquishment associated with these boundary refinements reduced the total acreage of the combined acquisition study areas from about 422,000 to 378,933 acres (177,700 to 153,349 hectares). A map

showing the refinements in acquisition study area boundaries is included in Appendix C, *Public Involvement* in Volume II. By letter dated June 11, 2009, the DoN informed the Bureau of Land Management (BLM) of these boundary refinements. The BLM's publication of a *Federal Register* Notice for *Partial Cancellation of Proposed Withdrawal* was published in the *Federal Register* on January 25, 2010 (Vol. 75, No. 15).

Stakeholder comments received during the public scoping period also led to the development of a sixth action alternative. From the beginning of the project planning process, the Marine Corps engaged with local and regional stakeholders in an effort to understand and address public concerns about the proposed action. Prominent among these had been a widespread interest in the potential closure of all or part of the Johnson Valley OHV Area located in the west study area. Marine Corps planners had already made a concerted effort to address these issues by exploring ways to limit any land acquisition in the west study area or to incorporate restricted public access scenarios in some of the action alternatives. These earlier efforts had been evidenced in some of the alternatives presented during public scoping. In response to the comments received during the scoping period, Marine Corps planners further examined ways to address this issue while still satisfying project training requirements. The result is that a sixth action alternative was added for analysis. The following section describes each of the six action alternatives that are carried forward for analysis in this EIS. The No-Action Alternative is also carried forward for analysis and is described in Section 2.4.7.

2.4 ALTERNATIVES CARRIED FORWARD FOR ANALYSIS

The six action alternatives evaluated in this EIS all have the same three fundamental components: acquisition of additional training land, establishment and modification of training airspace, and a new field exercise program of sustained, combined-arms, live-fire, and maneuver training that meets at least the minimum threshold requirements for a MEB-sized Block 4 exercise and associated MEB Building Block training in accordance with MCO 3502.6. In addition, three of the action alternatives (Alternatives 4, 5, and 6) would allow for restricted public access for recreational use on at least a portion of the acquired land in the west study area (Johnson Valley). The specific management objectives, processes, and procedures that would be implemented to enable public recreational use within the RPAAs for Alternatives 4, 5, and 6 are described in Section 2.5.

Land Acquisition: Five of the alternatives would involve acquisition of land in the west study area. One of these (Alternative 1) would involve exclusive year-around military use of the entire west study area; two alternatives (2 and 6) would involve exclusive year-around military use of a portion of the west study area; and three of the alternatives (4, 5, and 6) would permit some level of restricted public use in all or part of the west study area for approximately 10 months of each year. Five of the six alternatives (all but Alternative 5) would also involve acquisition of the south study area (all involving exclusive military use). One alternative (Alternative 3) would involve acquisition of the east study area for exclusive year-around military use (except for public use of Amboy Road).

Airspace Establishment and Modification: All six alternatives involve the establishment of new SUA and the modification of existing airspace. Only the Sundance Military Operations Area (MOA) would be subject to modification of existing lateral dimensions, which is proposed under all six alternatives. All other proposed modifications to existing SUA under any of the alternatives would involve changes in vertical dimensions and times of use only. One alternative (Alternative 3) would also involve reclassifying two existing MOA/Air Traffic Control Assigned Airspace (ATCAAs) as Restricted Areas (with the same lateral dimensions). No changes are proposed for the R-2501 Restricted Area under any of the alternatives. Under all alternatives, acquired airspace would be returned to Federal Aviation

Administration (FAA) control to be made available for commercial and general aviation when not being used by the Marine Corps.

Training: Two MEB Exercises involving sustained combined-arms, live-fire, and maneuver training of a MEB-sized MAGTF would be conducted each year under all six of the action alternatives. The scheduling of MEB Exercises has not been determined, but one MEB Exercise involving approximately 10,000 to 15,000 Marines would likely occur approximately every 6 months. The general template for the MEB Exercise was described in detail in Section 2.2.3. In addition, for alternatives that involve year-around exclusive military control of all or part of the west or east study areas (Alternatives 1, 2, 3, and 6), MEB Building Block training (including smaller-scale live fire and maneuver operations by units up to a single battalion in size) would occur in these acquired exclusive military use areas during times of the year that MEB Exercises are not being conducted. MEB Building Block training in the south study area would involve maneuver/marshalling operations only (no live fire) in that area.

The Marine Corps would employ a variety of ammunition and explosives during the course of the proposed MEB Exercises and any MEB Building Block training. Such munitions would be delivered from both ground- and aircraft-based weapons systems. Some types of ammunition and explosives are known as "dud producing," because they have the potential to produce "dud" rounds that failed to explode or otherwise function as intended, and that may continue to pose a risk of detonation at a later time. Other types of munitions are "non-dud producing," meaning that a misfire or other failure to function as designed does not yield a "dud" that might detonate unexpectedly. Examples of non-dud producing ordnance include: small-millimeter non-explosive bullets (ball and tracer cartridges), propelling charges, Bangalore torpedoes, demo charges, blasting caps, detonation cord, fuses, and primers. To reduce potential hazards to the public in areas proposed for restricted public access when MEB Exercises are not being conducted (as in Alternatives 4, 5, and 6), only non-dud producing ordnance would be fired into or entirely within any acquired land areas designated for restricted public access. Units participating in training would still carry dud producing ordnance while operating in RPAAs, and may fire dud producing ordnance from within such areas into adjacent training areas designated for exclusive military use, but any ammunition or explosives intended to land within the RPAAs would be exclusively non-dud producing. Use of various types of ammunition and explosives during training, as well as other self-imposed restrictions on Marine Corps training for purposes of minimizing potential hazards to the public, are described in more detail in Section 2.5 and in sections below that focus on each action alternative.

Additional manpower would be required to manage the land and airspace areas and expanded training capability under each action alternative. Table 2-2 identifies the number of proposed additional full-time military or civilian jobs that would be created to support various functions at the Combat Center under each project alternative.

Table 2-2. Proposed Personnel Increases under each Action Alternative

Program	Number of Personnel					
	Alt. 1	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Alt. 5**	**Alt. 6**
Conservation	7	5	7	9	9	9
Range Residue Processing	7	5	0	7	7	7
Recycling Program	0	0	0	2	2	2
Hazardous Waste Processing	3	2	3	3	3	3
Pollution Prevention	1	1	1	1	1	1
Range Maintenance	5	5	3	5	5	5
Range Safety	2	2	2	2	2	2
Public Affairs Office/ Communications/Community Plans	6	6	6	6	6	6
Explosive Ordnance Disposal	8	8	8	8	8	8
Provost Marshal Office Patrols	24	24	24	24	24	24
Long-Term Management	7	7	5	10	10	10
TOTAL =	**70**	**65**	**59**	**77**	**77**	**77**

Source: MAGTF Training Command 2010.

Two or three communications towers (similar to existing towers located within the Combat Center) would be installed depending on the action alternative. Installation of the communications towers would enable adequate range communications in the expanded operating areas. Figure 2-4 shows the type of communications tower proposed, which would be 65-feet (20-meters) tall and have four concrete footings set 14 feet (4 meters) apart. The Marine Corps has identified three potential communication tower locations in the west study area (for Alternatives 1, 2, 4, 5, and 6) and two potential communication tower locations in the east study area (Alternative 3). Specific locations for communication tower construction varies depending on the alternative. Locations of the proposed communications towers for each action alternative are shown on Figures 2-5a (Alternative 1), 2-6a (Alternative 2), 2-7a (Alternative 3), 2-8a (Alternative 4), 2-9a (Alternative 5), and 2-10a (Alternative 6). Under Alternatives 2 and 6, the northernmost tower would be located outside the area proposed for acquisition by the DoN/Marine Corps. The communication tower would be co-located at the site of an existing powerline or telecommunication tower. The Marine Corps would coordinate with the appropriate authorities to acquire an easement, lease, permit, or make other necessary arrangements to construct the communication tower.

Figure 2-4 Photograph of a Representative Communications Tower

The construction contractor would use a heavy-lift helicopter to transport precast foundations and steel assemblies and infrastructure to each mountaintop location. A temporary 10 by 40-foot shelter would also be installed via helicopter for the safety of contractor employees in the event of storm events. The heavy-lift helicopter would be used to erect the steel beams and platforms. Due to the remoteness of these proposed tower sites, construction contractors would also be flown to and from the tower locations each day via helicopter.

Tower installation would require approximately 24 days per tower to complete. Equipment staging locations for tower installation would occur within an approximately 400x300 foot area near each tower location. The staging locations would be determined during the design stage of the project, and biological and cultural surveys would occur before construction.

Table 2-3 summarizes the primary characteristics of each of the six alternatives. The remainder of this section describes each of the six alternatives in more detail, including graphical depictions of proposed land acquisition study areas, proposed airspace configurations, and generic training plans for MEB Exercises and MEB Building Block training (as applicable within proposed acquisition study areas).

Table 2-3. Summary of Action Alternatives

Proposed Land Acquisition (Acres)[1] by Acquisition Study Area	Proposed Airspace Establishment and Modification[2]	Proposed Expansion of Training
Alternative 1		
West (180,353) South (21,304) Total (201,657)	Establish New Airspace: • Restricted Area R-XXXX • Johnson Valley MOA/ATCAA • Sundance ATCAA • CAX MOA/ATCAA Modify Existing Airspace: • Sundance MOA: expand laterally and vertically • Bristol ATCAA: expand vertically • Turtle MOA/ATCAA: expand vertically	• MEB Exercises: 2 per year for 24 days each. • MEB Work-up: focused on western half of Combat Center and west study area. • MEB Final Exercise: - East-to-west direction of maneuver; - Two task forces assemble east side of Combat Center; one in south study area; all three converge on single MEB objective in west area. • MEB Building Block training: 4-day evolutions in west study area up to 40 weeks/year and only unit marshalling/maneuver in south study area. • Installation of three communications towers (Figure 2-5a). • Increase of 70 personnel.
Alternative 2		
Partial West[1] (113,558) South (21,304) Total (134,863)	Establish New Airspace: • Restricted Area R-XXXX (reduced) • Johnson Valley MOA/ATCAA (reduced) • Sundance ATCAA • CAX MOA/ATCAA Modify Existing Airspace: • Sundance MOA: expand laterally and vertically • Bristol ATCAA: expand vertically • Turtle MOA/ATCAA: expand vertically	• MEB Exercises: 2 per year for 24 days each. • MEB Work-up: focused on western half of Combat Center and reduced west study area. • MEB Final Exercise: - East-to-west direction of maneuver; - Two task forces assemble east side of Combat Center; one in south study area; all three converge on single MEB objective in reduced west study area. • MEB Building Block training: 4-day evolutions in reduced west study area up to 40 weeks/year and only unit marshalling and maneuver in south study area. • Installation of three communications towers (Figure 2-6a). • Increase of 65 personnel.
Alternative 3		
East (177,276) South (21,304) Total (198,580)	Establish New Airspace: • Sundance ATCAA • CAX Restricted Area Modify Existing Airspace: • Sundance MOA: expand laterally and vertically • Bristol MOA/ATCAA: reclassify as Restricted Area to 40,000 feet MSL • Turtle MOA/ATCAA: expand vertically	• MEB Exercises: 2 per year for 24 days each. • MEB Work-up: eastern half of Combat Center. • MEB Final Exercise: - East-to-west direction of maneuver; - Two task forces assemble in east study area; one in south study area; all three converge on single MEB objective in northwest corner of Combat Center. • MEB Building Block training: 4-day evolutions in east study area up to 40 weeks/year and only unit marshalling and maneuver in south study area. • Installation of two communications towers; construction of four tank crossings on Amboy Road (Figure 2-7a). • Increase of 59 personnel.

Continued on next page

Table 2-3. Summary of Action Alternatives

Proposed Land Acquisition (Acres)[1] by Acquisition Study Area	Proposed Airspace Establishment and Modification[2]	Proposed Expansion of Training
Alternative 4		
West (180,353) South (21,304) Total (201,657)	Airspace configuration identical to Alternative 1	• MEB Exercises: 2 per year for 24 days each. Only non-dud producing ordnance in west study area. Restricted public access to Johnson Valley (except for two 984 x 984-foot [300 x 300-meter] Company Objective areas) permitted approximately 10 months/year. • MEB Work-up: Focused on western half of Combat Center. • MEB Final Exercise: - West-to-east direction of maneuver; - Three task forces assemble in west study area; two converge on single MEB objective on east side of Combat Center; one terminates the exercise in the south study area. • MEB Building Block training would occur only within existing Combat Center boundaries (except maneuver/marshaling only in south study area.) • Installation of three communications towers (Figure 2-8a). • Increase of 77 personnel.
Alternative 5		
West only (180,353)	Airspace configuration identical to Alternative 1	• MEB Exercises: 2 per year for 24 days each. Only non-dud producing ordnance in west study area. Restricted public access to Johnson Valley (except for two 984 x 984-foot [300 x 300-meter] Company Objective areas) permitted approximately 10 months/year. • MEB Work-up: western half of Combat Center. • MEB Final Exercise: - West-to-east direction of maneuver; - Three task forces assemble in west study area; two converge on single MEB objective on east side of Combat Center; one terminates the exercise with training at the existing CAMOUT facility. • MEB Building Block training would occur only within existing Combat Center boundaries.. • Installation of three communications towers (Figure 2-9a). • Increase of 77 personnel.
Alternative 6 (Preferred Alternative)		
West (146,667): - RPAA (38,137) - Exclusive Marine Corps Use (108,530) South (21,304) Total (167,971)	Airspace configuration identical to Alternative 1	• MEB Exercises: 2 per year for 24 days each. Only non-dud producing ordnance in southern portion of west study area. Restricted public access to southern portion of west study area (except for two 984 x 984-foot [300 x 300-meter] Company Objective areas) permitted approximately 10 months/year. • MEB Work-up: western half of Combat Center and part of west study area (exclusive military use area). • MEB Final Exercise: - East-to-west direction of maneuver; - Two task forces assemble east side of Combat Center; one in south study area; all three converge on single MEB objective in west study area (exclusive use parcel). • The RPAA would be used during MEB Exercises only and only non-dud producing ordnance would be used in that area. • MEB Building Block training: 4-day evolutions in the west study area (exclusive military use area only) up to 40 weeks/year and only unit marshalling/maneuver in south study area. • Installation of three communications towers (Figure 2-10a). • Increase of 77 personnel.

Notes: [1]Acreage is approximate.
[2]Proposed times of use for each airspace configuration is described in the following subsections for each action alternative.
ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; MAGTF = Marine Air Ground Task Force; MEB = Marine Expeditionary Brigade; MOA = Military Operations Area; MSL = Above mean sea level; RPAA = Restricted Public Access Area.

2.4.1 Alternative 1

2.4.1.1 Proposed Land Acquisition

Figure 2-5a illustrates the acquisition study areas for proposed land acquisition under Alternative 1. Two separate land areas would be acquired: the west study area comprising approximately 180,353 acres (72,987 hectares) on the west side of the Combat Center; and the south study area comprising approximately 21,304 acres (8,621 hectares) on the south side. Approximately 90% of the acreage in the west and about 97% of the acreage in the south is administered by the BLM. The remaining land area is non-federal lands.

2.4.1.2 Proposed Airspace Configuration

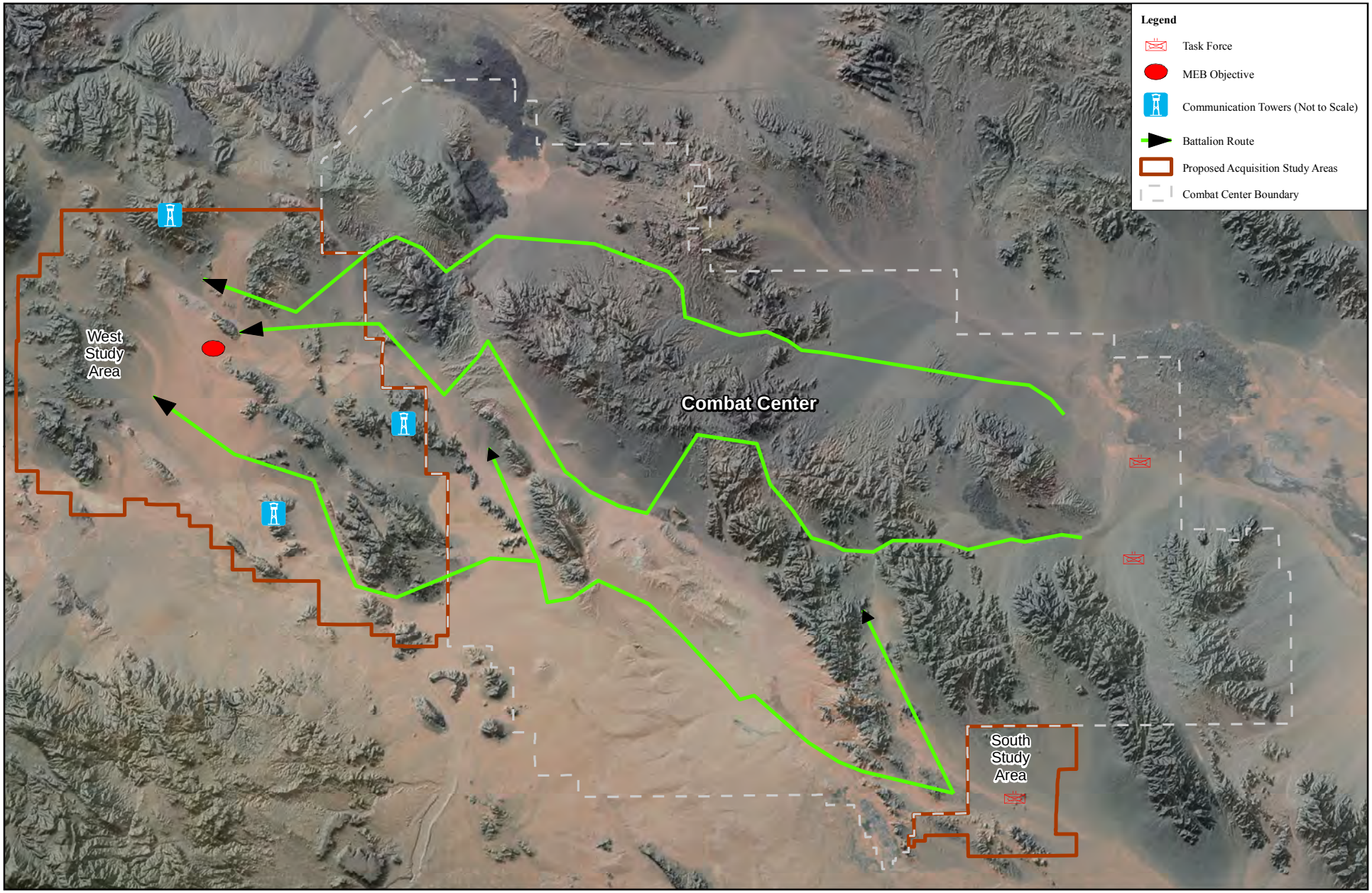
The proposed airspace configuration associated with Alternative 1 is depicted graphically in Figure 2-5b and described in the following subsections. Under this alternative, no changes to Restricted Area R-2501 would occur.

Table 2-4 provides a summary of the lateral airspace footprint for Alternative 1 as compared to the area affected by existing designated airspace.

Table 2-4. Airspace Footprint for Alternative 1

Airspace Area	Baseline Airspace (mi^2)	Alternative 1 (mi^2)
Existing Airspace Units		
R-2501	1,076	1,076
Sundance MOA/ATCAA	67	559
Bristol MOA/ATCAA	534	534
CAX Corridor (proposed MOA/ATCAA)	N/A	372
Turtle MOA/ATCAA	2,275	2,275
New Airspace Units		
R-XXXX	---	356
Johnson Valley MOA/ATCAA	---	183
Total	**3,952**	**5,355**

Notes: N/A = Not applicable. CAX corridor is not currently designated SUA.
ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; mi^2 = square mile; MOA = Military Operations Area.

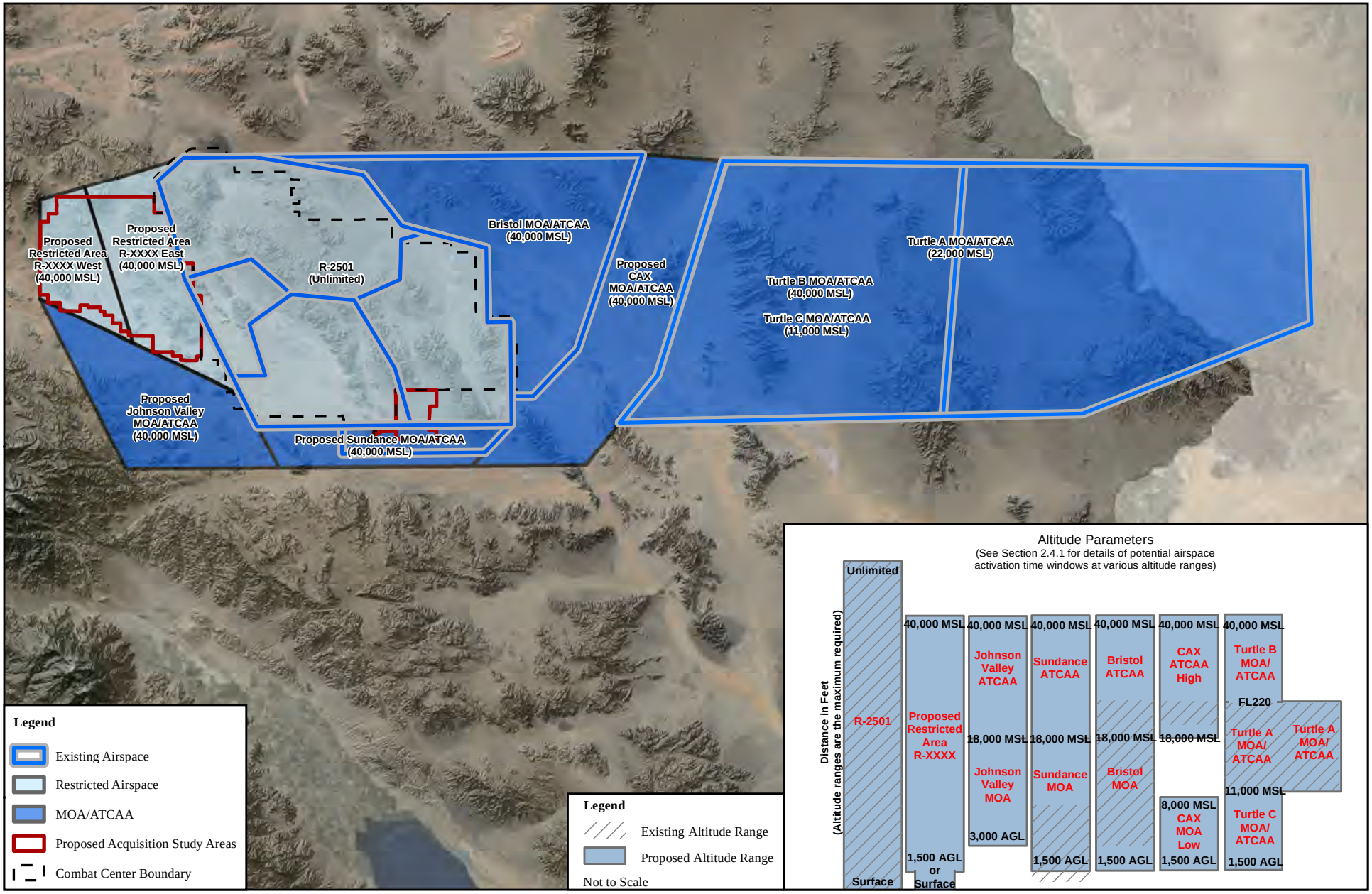


Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 2-5a
Alternative 1: Land Acquisition Study Areas

N



Source: MAGTF Training Command 2009a

Figure 2-5b
Alternative 1: Airspace Establishment and Modification

Establishment of New Airspace: Restricted Area R-XXXX East/West and Johnson Valley MOA/ATCAA

Under Alternative 1, a new Restricted Area (identified as R-XXXX in this EIS pending assignment of a number designation by FAA) would be established adjacent to the western side of the existing R-2501 and subdivided into east and west sectors as shown in Figure 2-5b to provide an overall connected airspace for MEB training, including MEB Exercise evolutions and MEB Building Block training within and above the west study area. This new airspace would meet the selection criteria for operational requirements by providing a Restricted Area from the surface to various altitudes up to 40,000 feet above mean sea level (MSL). In compliance with FAA guidelines stipulating that the floor of a Restricted Area may be established to the surface only when the using agency owns, leases, or (by agreement) controls the underlying surface, the proposed R-XXXX East/West would include the airspace from the surface to 40,000 feet MSL (Flight Level [FL] 400) only above the lateral boundaries of any land acquired in the west study area. The remaining portions of the proposed R-XXXX (Figure 2-5b) would have a floor of 1,500 feet AGL to facilitate access to private airfields and property outside the proposed land acquisition area. The proposed R-XXXX East/West sectors would be scheduled and activated, as needed, to support employment of direct and indirect fire weapons and aviation activities (including live fire). This proposed new R-XXXX is also a component of Alternatives 2 (reduced size with no subdivision), 4, 5, and 6. The controlling agency for this proposed SUA would be the FAA Los Angeles Air Route Traffic Control Center (LA ARTCC).

The proposed R-XXXX Restricted Area would support the following aviation training activities within the altitudes indicated:

- Surface to, but not including, 8,000 feet MSL over land controlled by MAGTF Training Command and from 1,500 feet AGL to, but not including, 8,000 feet MSL over portions of R-XXXX outside the proposed land acquisition area, to accommodate unmanned aircraft systems, rotary-wing operations, low-altitude refueling operations, and small caliber-direct fire weapons systems;
- 14,000 feet MSL to, but not including, 27,000 feet MSL (FL270) to accommodate most of the manned fixed-wing aircraft, airborne refueling operations, indirect fire weapons, and higher-tiered unmanned aircraft systems; and
- 27,000 feet MSL (FL270) to 40,000 feet MSL (FL400) to accommodate some fixed-wing tactical operations, high-mobility artillery rocket system use, and other high-altitude indirect fire systems.
- 8,000 feet MSL to, but not including, 14,000 feet MSL to accommodate medium-tiered unmanned aircraft systems, reduced charge indirect fire systems, and some surveillance and targeting platforms.

Activation of the proposed R-XXXX East sector or the combined East/West sectors would be intermittent by Notice to Airmen (NOTAM), as required, to support live fire training, ranging from small unit to MEB-sized exercises. The R-XXXX East and East/West sectors would be activated when training includes employment of direct fire weapons (such as rifles and machine guns), lasers, mortars, artillery, demolitions, unmanned aerial systems, and/or close air support training conducted by rotary-wing aircraft, fixed-wing aircraft, and unmanned aerial vehicles. Altitude requirements would vary from surface to 40,000 feet MSL (FL400), as described above, depending upon which systems, activities, and events have been scheduled. A minimum of 15% use of the planned live fire ranges would occur during the hours of darkness. Activation of the R-XXXX East/West sectors would be planned as follows:

- R-XXXX East would be activated from surface (or 1,500 feet AGL for portions of this Restricted Area outside the proposed land acquisition areas) to FL180 for up to 8 hours per day for 160 days per year; and up to 12 hours per day for an additional 28 days per year.
- R-XXXX West would be activated from surface (or 1,500 feet AGL over portions of this Restricted Area outside the proposed land acquisition area) to 10,000 feet MSL for up to 8 hours per day for 160 days per year; and up to 12 hours per day for an additional 28 days per year.
- R-XXXX East/West would be activated from the surface (or 1,500 feet AGL for portions of this Restricted Area outside the proposed land acquisition areas) to FL270 for up to 24 hours per day for 6 days per year.
- R-XXXX East/West would be activated from the surface (or 1,500 feet AGL for portions of this Restricted Area outside the proposed land acquisition areas) to FL400 for up to 12 hours per day for 6 days per year (not to exceed 40 hours per year).

The *Johnson Valley MOA/ATCAA* would directly support MEB training through aircraft maneuvering to the south of the new R-XXXX East/West sectors through to R-2501 and through the proposed Sundance MOA/ATCAA Extension. Under Alternative 1, the Johnson Valley MOA would be established over land not controlled by the Marine Corps and would be activated from 3,000 feet AGL up to, but not including, FL180. The Johnson Valley ATCAA would overlay the Johnson Valley MOA from FL180 to FL400. The Johnson Valley MOA/ATCAA would be activated by NOTAM either by itself or in conjunction with existing and/or planned restricted airspace and MOAs/ATCAAs, and would allow for aircraft tactical maneuvering during the non-hazardous portions of scheduled training events. Fixed-wing training would be conducted in the proposed airspace as a component of both MEB Exercises and MEB Building Block training events.

The proposed Johnson Valley MOA/ATCAA would support the following aviation training activities within the altitudes indicated:

- 3,000 feet AGL up to, but not including, 8,000 feet MSL to accommodate rotary-wing aircraft and other operations;
- 8,000 feet MSL up to, but not including, 14,000 feet MSL to accommodate some surveillance and targeting platforms;
- 14,000 feet MSL up to, but not including, 27,000 feet MSL (FL270) to accommodate most of the manned fixed-wing aircraft, airborne refueling operations, and higher-tiered unmanned aircraft systems; and
- 27,000 feet MSL (FL270) to 40,000 feet MSL (FL400) to accommodate fixed-wing tactical operations.

Activation of the proposed Johnson Valley MOA/ATCAA would be planned as follows:

- From 3,000 feet AGL to FL180 for up to 8 hours per day for 160 days per year; and up to 12 hours per day for an additional 28 days per year.
- From 3,000 feet AGL to FL270 for up to 24 hours per day for 6 days per year.
- From 3,000 feet AGL to FL400 for up to 12 hours per day for 6 days per year (not to exceed 40 hours per year).

The Johnson Valley MOA would permit general aviation Visual Flight Rules (VFR) traffic within the MOA using see-and-avoid. The establishment of this new MOA/ATCAA is also a component of

Alternatives 2 (in a reduced size), 4, 5, and 6. The controlling agency for this proposed airspace would be the FAA LA ARTCC.

Expansion and Modification of Sundance MOA and Establishment of Sundance ATCAA

The *Sundance MOA* extension and the establishment of an overlying *Sundance ATCAA* are components of all six action alternatives. The existing Sundance MOA would be expanded both laterally and vertically to provide airspace for military aircraft to transition and recover during MEB training. The MOA floor (currently at 500 feet AGL) would be raised to 1,500 feet AGL to accommodate civilian access to some of the underlying property and private airfields per federal aviation regulations. The MOA would be modified to go up to, but not including, 18,000 feet MSL (the current ceiling is at 10,000 feet MSL). A new overlying ATCAA would also be established from 18,000 feet MSL (FL180) to 40,000 feet MSL (FL400). The controlling agency for this proposed airspace would be the FAA LA ARTCC.

The MOA/ATCAA would be activated by NOTAM either by itself or in conjunction with existing and/or planned restricted airspace and MOAs/ATCAAs, and would allow for aircraft tactical maneuvering during the non-hazardous portions of scheduled training events. Fixed-wing training would be conducted in the proposed airspace as a component of both MEB Exercises and MEB Building Block training events. The Sundance MOA/ATCAA extension would provide connected airspace to existing and proposed MOAs and Restricted Areas and would provide airspace of the size and volume needed to support MEB Exercises and proficiency training involving attack through recovery maneuvering.

The proposed Sundance MOA/ATCAA would support the following aviation training activities:

- Sundance Low from 1,500 feet AGL to, but not including, 14,000 feet MSL to accommodate rotary-wing transit and some tactical fixed-wing routing and holding operations; and
- Sundance High from 14,000 feet MSL to 40,000 feet MSL (FL400) to accommodate most manned fixed-wing tactical aircraft and prospective airborne refueling operations.

Activation of the extended Sundance MOA/ATCAA for both day and night operations would be planned as follows:

- 1,500 feet AGL to 10,000 feet MSL intermittently by NOTAM;
- 1,500 feet AGL to FL180 up to 12 hours per day for up to 28 days per year;
- 1,500 feet AGL to FL270 up to 24 hours per day for up to 6 days per year; and
- 1,500 feet AGL to FL400 for up to 12 hours per day for 6 days per year (not to exceed 40 hours per year).

Expansion and Modification of Bristol MOA/ATCAA

The Bristol MOA would be modified by designating the floor altitude at 1,500 feet AGL. The Bristol ATCAA would be expanded vertically to FL400 to provide altitude consistency with the adjacent R-2501 and provide continuity for MEB Building Block training as well as for the MEB Exercises. The Bristol MOA/ATCAA expansion would provide the capability to tactically concentrate aviation firepower and safely transition aviation elements from disparate mission profiles. The Bristol MOA/ATCAA expansion would avoid the administrative requirement to compress ingress and egress routes and would have altitude segments to meet the requirement to seamlessly flow manned systems to marshal points, maneuver areas, airborne refueling tracks, and entry and exit points. The VFR traffic could fly see-and-avoid. The MOA/ATCAA would be activated by NOTAM either by itself or in conjunction with existing and/or planned restricted airspace and MOAs/ATCAAs, and would allow for aircraft tactical

maneuvering during the non-hazardous portions of scheduled training events. Fixed-wing training would be conducted in the proposed airspace as a component of both MEB Exercises and MEB Building Block training events. Both day and night operations would occur in this airspace. The proposed Bristol MOA/ATCAA expansion and modification would be implemented as part of all action alternatives except Alternative 3. The controlling agency for this proposed airspace would be the FAA LA ARTCC.

The proposed Bristol MOA/ATCAA would support the following training activities for the altitudes indicated:

- 1,500 feet AGL up to, but not including, 14,000 feet MSL to accommodate rotary-wing aircraft and various surveillance and targeting platforms;
- 14,000 feet MSL up to, but not including, 27,000 feet MSL (FL270) to accommodate most of the manned fixed-wing aircraft, advanced surveillance platforms, and airborne refueling operations; and
- 27,000 feet MSL (FL270) to 40,000 feet MSL (FL400) to accommodate tactical fixed-wing operations.

The proposed Bristol MOA/ATCAA expansion and modification would be implemented as part of all action alternatives except Alternative 3.

Activation of the Bristol MOA/ATCAA would be planned as follows:

- 5,000 feet AGL to FL220 from 7:00 a.m. to 3:00 p.m. Monday-Friday, other times by NOTAM;
- By NOTAM from 1,500 feet AGL to FL270 for up to 24 hours per day for 6 days per year; and
- By NOTAM from 1,500 feet AGL to FL400 for up to 12 hours per day for 6 days per year (not to exceed 40 hours per year).

<u>Establishment of a High/Low Corridor MOA/ATCAA in place of the CAX Corridor</u>

The proposed CAX High/Low Corridor MOA/ATCAA would be established from 1,500 feet AGL up to 8,000 feet MSL (CAX Low Corridor MOA) with an overlying ATCAA from FL180 to FL400 (CAX High Corridor ATCAA). The High/Low corridors would provide connecting airspace from the Turtle MOA through to the expanded Bristol MOA/ATCAA, the existing R-2501, and the proposed new R-XXXX East/West and Johnson Valley MOA/ATCAA. Use would include day and night operations and VFR traffic could either transit this airspace between the High/Low corridors (above 8,000 feet MSL) or use see-and-avoid while transiting within the Low MOA corridor altitudes (8,000 feet MSL and below). Each of the proposed High/Low MOA/ATCAA corridors would be activated by NOTAM, as needed, either separately or in conjunction with the existing and/or proposed SUA to provide aircraft tactical maneuvering during the non-hazardous portions of scheduled training events. Fixed-wing training would be conducted in the proposed airspace as a component of MEB Final Exercises only.

The proposed CAX High/Low MOA/ATCAA would support the following aviation training activities within the altitudes indicated:

- 1,500 feet AGL up to 8,000 feet MSL to accommodate medium-tiered unmanned aircraft systems, rotary-wing aircraft, and various surveillance and targeting platforms;
- 18,000 feet MSL (FL180) up to, but not including, 27,000 feet MSL (FL270) to accommodate most of the manned fixed-wing aircraft, advanced unmanned aircraft systems, and airborne refueling operations; and

- 27,000 feet MSL (FL270) to 40,000 feet MSL (FL400) to accommodate tactical fixed-wing operations.

Activation of the proposed CAX High/Low Corridor MOA/ATCAA would be planned as follows:

- High Corridor ATCAA by NOTAM from FL180 up to FL270 for up to 24 hours per day for 6 days per year;
- High Corridor ATCAA by NOTAM from FL180 to FL400 for up to 12 hours per day for 6 days per year (not to exceed 40 hours per year);
- Low Corridor MOA by NOTAM from 1,500 feet MSL up to 8,000 feet MSL for up to 24 hours per day for 6 days per year; and
- Low Corridor MOA by NOTAM from 1,500 feet AGL up to 8,000 feet MSL for up to 12 hours per day for 6 days per year.

The proposed CAX High/Low Corridor MOA/ATCAA would be implemented as part of all action alternatives except Alternative 3. The controlling agency for this proposed airspace would be the FAA LA ARTCC.

Modification of Turtle MOA and ATCAA

Under action alternatives 1, 2, 4, 5, and 6, the Turtle MOA/ATCAA would be subdivided both laterally and vertically, as shown in Figure 2-5b, to provide altitude continuity with the proposed CAX High/Low Corridor MOA/ATCAA and the modified Bristol MOA/ATCAA to the west. It is proposed that the Turtle MOA/ATCAA be subdivided into A, B, and C sectors with Turtle A MOA/ATCAA encompassing the existing full lateral boundaries from 11,000 feet MSL to FL220; Turtle B ATCAA encompassing the western portion of the existing boundaries from FL220 to FL400; and the Turtle C MOA encompassing the western portion from 1,500 feet AGL to 11,000 feet MSL. The Turtle A/B/C sector(s) would be activated by NOTAM either individually or in conjunction with existing and/or planned SUA, and would allow for aircraft tactical maneuvering during the non-hazardous portions of scheduled training events. Fixed-wing training would be conducted in the proposed airspace as a component of MEB Final Exercises and MEB Building Block training. Both day and night operations would occur in this airspace.

The proposed Turtle A/B/C MOA/ATCAA sectors would support the following aviation training activities, as their individually proposed altitudes would permit:

- 1,500 feet AGL up to, but not including, 18,000 feet MSL (FL180) to accommodate most manned fixed-wing and rotary-wing aircraft and airborne refueling operations; and
- 18,000 feet MSL (FL180) to 40,000 feet MSL (FL400) to accommodate tactical fixed-wing operations.

Activation of the Turtle A/B/C MOA/ATCAA sectors would be planned as follows:

- Turtle A MOA/ATCAA from 11,000 feet MSL to FL220 from 6:00 a.m. to 4:00 p.m. Monday-Friday; other times by NOTAM;
- Turtle B and C MOA/ATCAA sectors by NOTAM from 1,500 feet AGL to FL270 for up to 24 hours per day for 6 days per year. Turtle A MOA/ATCAA would also be active, as needed, during those times; and
- Turtle B and C MOA/ATCAA sectors by NOTAM from 1,500 feet AGL to FL400 for up to 12 hours per day for 6 days per year (not to exceed 40 hours per year). Turtle A MOA/ATCAA would also be active, as needed, during those times.

2.4.1.3 Alternative 1 Training

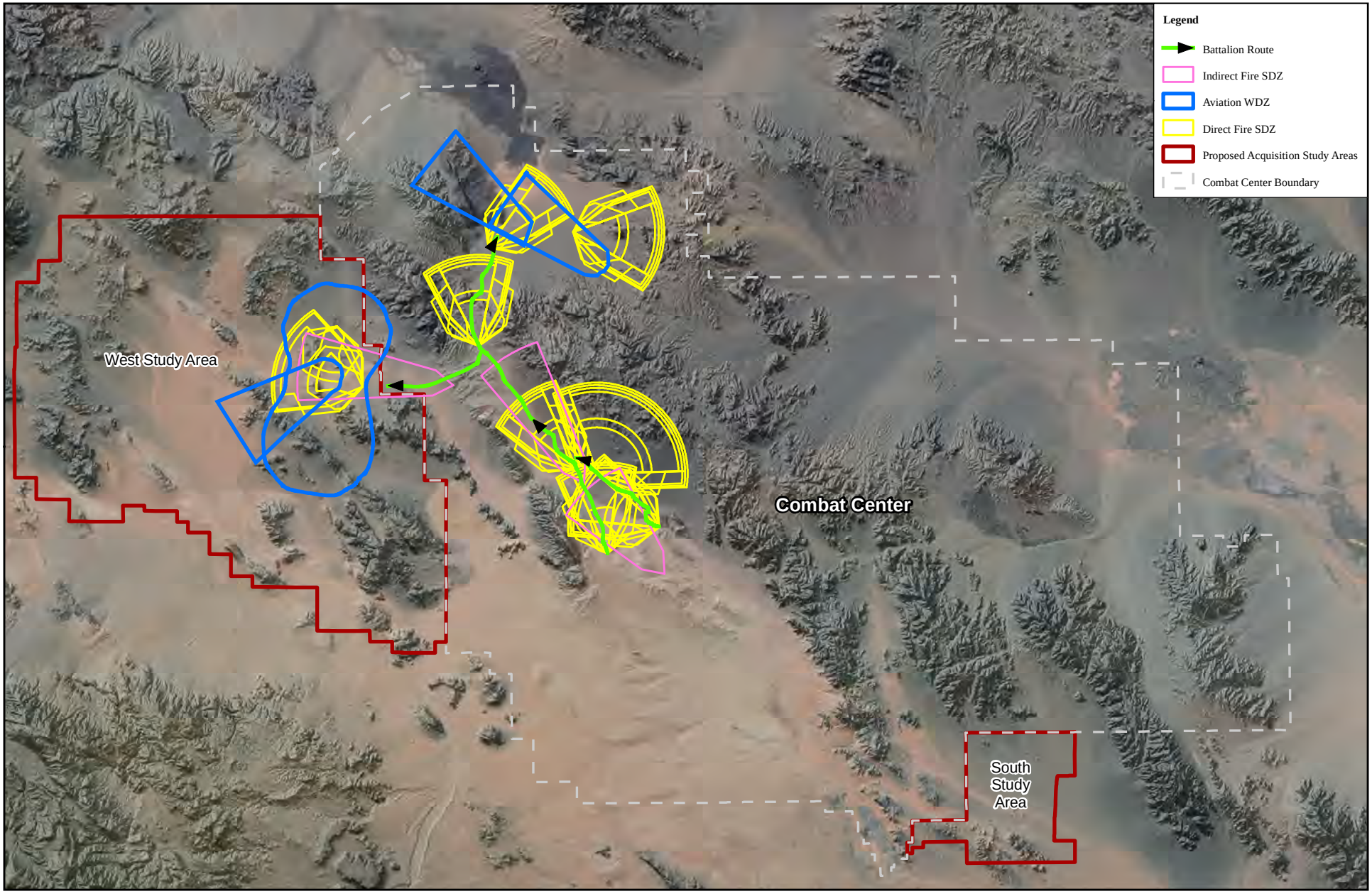
MEB Exercise Training Program: Ground Operations

Alternative 1 was designed to support an east-to-west direction of maneuver for the MEB Exercise, with two battalion task forces assembling near the eastern edge of the existing Combat Center boundary, and the third battalion assembling in land within the south study area. All three task forces would maneuver westward through commonly used corridors on the installation and converge at the MEB objective within the proposed west study area.

The proposed action includes two MEB training exercises per year, each consisting of 24 consecutive days of training. The template for the MEB Exercise was described in detail in Section 2.2.3. During the first 9 days of MEB Work-up training, individual battalion task forces would take turns conducting recurring evolutions of fire support and ground/air integration training (1 day per battalion) and a 2-day offensive/defensive evolution. A generic but representative scheme of maneuver for these early training evolutions under Alternative 1 is illustrated in Figure 2-5c. The generic scheme of maneuver for the MEB Final Exercise rehearsal on training days 16 and 17 and the Final Exercise itself on training days 20 through 22 are illustrated in Figure 2-5d. Both of these figures illustrate a representative pattern of SDZs associated with the types of live-fire weapons that would be used during the MEB Exercise. The actual pattern would vary from exercise to exercise and from day to day within each MEB Exercise to sustain optimal freedom of action for the commanders that devise the specific training plan each day.

Marine Expeditionary Brigade Exercise training under Alternative 1 would require that battalion task forces establish themselves and conduct exercises both within existing Combat Center boundaries and newly acquired lands. Under Alternative 1, task force Marines and force vehicles involved in MEB Exercise training would utilize on-installation main supply routes (MSRs) and secondary roads for ingress to and egress from training areas, but would not use the Mainside roadway network or public roads. Marine Expeditionary Brigade Exercise training would require a maximum of 40 instructor vehicles (commercial-style government vehicles and Hummers) to utilize public roads for access to and from training areas. This would occur at a maximum of 15 days per MEB Exercise (two per year), for a total of 30 days per year. Also, maintenance personnel would use public roads to access certain training areas (as applicable to the alternative) for target resets and route maintenance for the duration of MEB Exercise training. This would require, on average, two maintenance vehicles and occasionally a trailer, at a maximum of 10 days per MEB Exercise (two per year), for a total of 20 days per year. Instructor and maintenance vehicles utilizing public roads would use established convoy routes through Twentynine Palms (see Section 3.6) and other roadways as discussed in Section 3.6.3.

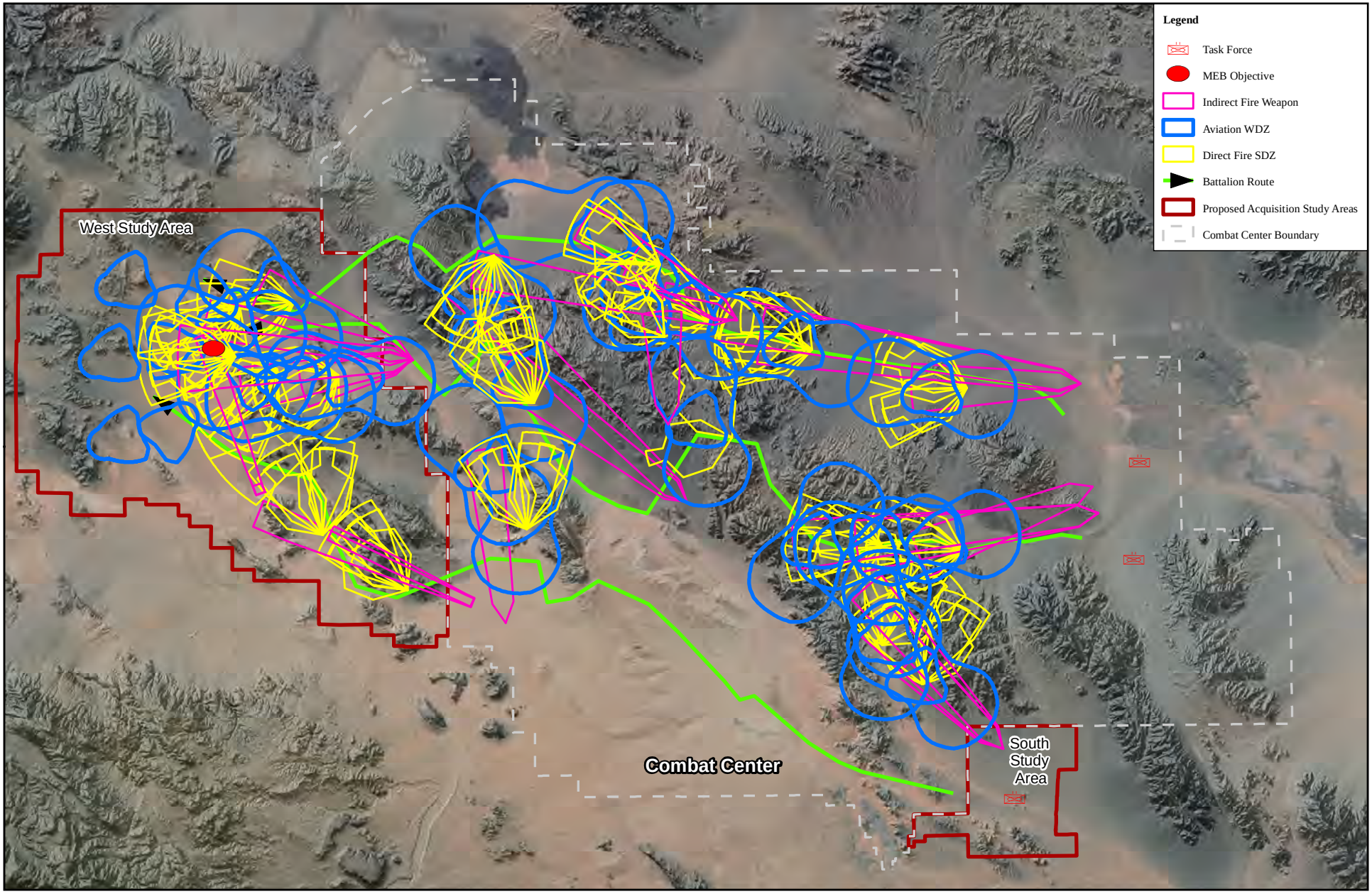
Table 2-5 lists the types of vehicles that would typically participate in the average MEB Exercise and provides an estimated distance traveled by each type. Vehicles with no distances noted are expected to be towed by other vehicles to the places where they would be used. Table 2-6 lists the types and numbers of surface-to-surface weapons that would typically be used during each MEB Exercise, and Table 2-7 lists the types and estimated quantities of munitions that would be used by ground forces during each MEB Exercise. Appendix E contains photographs and specifications for major vehicles, equipment, weapons, and aircraft that would be used in MEB Exercises.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 2-5c
Alternative 1: Representative MEB Exercise Work-up Training Scenario



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 2-5d
Alternative 1: Representative MEB Final Exercise Scenario

N

Table 2-5. Alternative 1: Estimated Vehicle Distances Traveled During MEB Exercises[1,2]

Item #	Type of Vehicle	Number of Vehicles	Distance Traveled per MEB Exercise (miles)[3]	Annual Total Distance Traveled (miles)[3]
B0057	Joint Assault Bridge	5	-	-
B0060	Medium Crawler Tractor	5	-	-
B0160	Assault Breacher Vehicle	5	-	-
B0589	Excavator, Combat	12	-	-
B1082	Grader	2	-	-
B2460	Armored Tractor	3	-	-
B2462	D7 Bulldozer	5	-	-
B2483	Armored Backhoe	12	-	-
B2561	Extended Boom Forklift	4	-	-
B2566	Light Capacity Rough Terrain Truck Forklift	2	-	-
B2567	Tractor, Rubber Tired, Articulated Steering, Multi-purpose Vehicles	10	-	-
D0003	Medium Tactical Vehicle Replacement	348	114,407	228,814
D0030	High-Mobility Multipurpose Wheeled Vehicle	785	196,693	393,386
D0209	Logistics Vehicle System	198	37,547	75,094
D1161	Internally Transportable Vehicle	50	9,078	18,156
E0150	M60A1 Bridge Vehicle	4	1,290	2,580
E0846	Amphibious Assault Vehicle	187	43,775	87,550
E0942, E0946, E0947, E0949	Light Armored Vehicle (Variants)	87	17,347	34,694
E1378	M88A2 HERCULES Recovery Vehicle	12	645	1,290
E1500	High-Mobility Artillery Rocket System	6	35	70
E1888	Abrams M1A1 Main Battle Tank	44	8,177	16,354
Total		**1,786**	**428,994**	**857,988**

Notes: [1]Estimated distances would also apply to Alternatives 2, 4, 5, and 6.
[2]The vehicle mileage assumed during Building Block training is encompassed in the Air Quality baseline modeling (see Appendix G).
[3]Some vehicles would be towed and, therefore, do not have a value for distance traveled.
MEB = Marine Expeditionary Brigade
Source: MAGTF Training Command 2009a.

Table 2-6. Representative Surface-to-Surface Weapons Used During MEB Exercises

Item #	Type of Weapon	Estimated # of Weapons Used per Exercise	Estimated # of Weapons Used Annually[1]
E0207	JAVELIN	24	48
EO671	155mm Howitzer	18	32
E0915	Rocket Launcher	84	168
E0935	TOW Launcher	50	100
E0980	0.50 cal Machine Gun	458	916
E0989	M240B Machine Gun	518	1,036
E0994	MK-19 Grenade Launcher	338	676
E1065	60mm Mortar	27	54
E1070	120mm Mortar	6	12
E1095	81mm Mortar	24	48
Total		**1,529**	**3,058**

Notes: cal = caliber; mm = millimeter; TOW = Tube-launched, Optically tracked, Wire-guided missile
[1]Weapons used by Building Block training account for one-third of these amounts.
Source: MAGTF Training Command 2009a.

Table 2-7. Representative Munitions Used by Ground Forces During MEB Exercises[1]

Munitions Type	Item #[1]	Estimated # Used per Exercise[2]	Estimated # Used Annually[2]
Cartridges Smaller than 30mm	**A059**, **A063**, **A064**, **A131**, **A576**, **A976**	468,135	936,270
Cartridges 30-75mm	B519, B535, B576, B630, B643, B647	12,121	24,242
Cartridges 75mm and Larger	C784, C785, C868, C870, C871, C995	5,734	11,468
Projectiles, Canisters, and Charges	D505, D528, D532, **D533**, **D541**, D544, D579	19,166	38,332
Grenades	G878, G930, G940, G945	333	666
Rockets, Rocket Motors, and Igniters	HX05, HX07, J143	72	144
Mines and Smoke Pots	K143	72	144
Signals and Simulators	L312, L314, L324	180	360
Blasting Caps, Demolition Charges, and Detonators	**M028**, **M032**, **M039**, **M130**, **M131**, **M421**, **M456**, **M670**, **M757**, **M766**, ML25, MN79	8,829	17,658
Fuses and Primers	N289, N340, **N523**	12,321	24,642
Guided Missiles	PB99, WF10	72	144

Notes: **Bold** type indicates non-dud producing ordnance
[1]Estimates of munitions used per exercise represent a net increase based on the MEB Exercise and are compared to the baseline amount of ordnance fired (see Appendix H).
[2]See Table 2-15 for quantification on non-dud producing ordnance by munition type.
mm = millimeter
Source: MAGTF Training Command 2009a.

MEB Exercise Training Program: Air Operations

Flight activities would generally occur over the 24-day period for each MEB Exercise, but would increase during the final 3 days of each exercise over a daily 24-hour flight window to assess fully-operational MEB capabilities. Overall, MEB Exercises would account for approximately one-third of all annual Combat Center flight operations and airspace usage. During each daily mission, participating aircraft would traverse the existing and proposed Restricted Areas and MOAs/ATCAAs at the varying altitudes, flight profiles, and time durations required to support realistic air and ground-based combat training scenarios.

Table 2-8 provides an estimate of the average daily flight activity and the average flight window (hours of use for a typical MEB Exercise) associated with the proposed airspace configuration for Alternative 1 (see Figure 2-5b). This table also includes, for comparison, the average daily flight activity and flight windows for MEB Building Block training that would utilize the existing and proposed airspace configuration other days of the year when MEB Exercises are not scheduled. Appendix D contains a more detailed summary of proposed aircraft operations within the proposed SUA for Alternative 1. Table 2-9 lists the types and estimated quantities of air-delivered munitions that would be expended during each MEB Exercise.

Table 2-8. Average Daily Airspace Use for MEB Exercises and Other Flight Activities

Airspace Use	Airspace Unit						
	Existing R-2501	Proposed R-XXXX	Proposed Johnson Valley MOA/ ATCAA	Proposed Sundance MOA/ ATCAA	Proposed Bristol MOA/ ATCAA	Proposed CAX MOA/ ATCAA	Proposed Turtle MOA/ ATCAA
MEB Exercise Scenario (48 days/year)							
Average Daily Sorties							
MEB Work-up[1]	74	74	74	0	74	0	0
Final Exercise[2]	133	133	133	133	133	133	133
Average Daily Flight Window (hours day/night)[3]							
MEB Work-up	9/3	9/3	9/3	0	4/0	0	0
Final Exercise	12/12	12/12	12/12	12/12	12/12	12/12	12/12
MEB Building Block Training (160 days/year)							
Average Daily Sorties							
All Days	14/7	14/7	14/7	0	14/7	0	0
Average Daily Flight Window (hours day/night)[3]							
All Days	10/1	10/1	10/1	0	10/1	0	0
Other Military Flight Activities (270 days/year)[4]							
Average Daily Sorties							
All Days	49	49	49	7	25	7	7
Average Daily Flight Window (hours day/night)[3]							
All Days	8/3	8/3	8/3	2/1	4/2	1/1	1/1

Notes: [1]The Work-up phase of the MEB Exercise includes training days 1-19; however, flight activity would not occur during training days 10 and 18. The average daily sorties calculation did not include those two training days.
[2]The Final Exercise phase of the MEB Exercise includes training days 20-22; flight activity would occur during all three of these training days.
[3]The daily flight window is the continuous span of time (hours) each day during which flight operations would typically occur from start to finish. This is the duration of time the airspace would be scheduled to accommodate these operations. Where indicated, this flight window may be divided between day (0700-2200 hours) and night (2200-0700 hours) operations to fulfill nighttime training requirements.
[4]Other military flight activities may include other major training exercises and basic proficiency training and would be conducted within the designated airspace during those periods when the twice annual MEB Exercises would not be scheduled (approximately 270 days each year).
ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; MEB = Marine Expeditionary Brigade; MOA = Military Operations Area.

Source: MAGTF Training Command 2009a.

Table 2-9. Representative Air-Delivered Munitions Used During MEB Exercises[1]

Munitions Type	Identification Code	Estimated # Used per Exercise	Estimated # Used Annually
Air-to-Ground Missiles			
Laser Maverick Missile	AGM-65E	To Be Determined	To Be Determined
Unguided Munitions			
General Purpose Bomb			
- 25 pounds (Inert)	MK-76	975	1,950
- 500 pounds	MK-82	510	1,020
- 1,000 pounds (Inert)	MK-83 (Inert)	78	156
- 1,000 pounds	MK-83	66	132
- 2,000 pounds	MK-84	18	36
Inert Practice Bomb	BDU-45	180	360
2.75-inch Rocket	HE/WP/RP Rocket	4,200	8,400
5-inch Zuni Rocket	HE/WP/ILLUM Rocket	396	792
Guided Munitions			
Hellfire missile	MK-114	36	72
Laser Guided Bomb			
- 500 pounds	GBU-12	216	432
- 1,000 pounds	GBU-16	27	54
- 2,000 pounds	GBU-10	2	4
Joint Direct Attack Munitions			
- 250 pounds	GBU-38 version 4	126	252
- 500 pounds	GBU-38, GBU-54	288	576
- 1,000 pounds	GBU-32	12	24
- 2,000 pounds	GBU-31	32	64
Hard Target Penetrator	GBU-24	2	4
Small Diameter Missile	GBU-39	12	24
TOW Missile	BGM-71	42	84
Laser Guided Training Round	-	216	432
Penetrator (500 pounds)	BLU-111	192	384
Aircraft Gun Systems Munitions			
20mm	-	99,000	198,000
25mm	-	90,500	181,000
7.62mm[2]	-	168,000	336,000
.50 cal[2]	-	395,000	790,000
Chaff and Flares			
Chaff	-	3,200	6,400
Flares	-	10,431	20,862

Notes: [1] Estimates of munitions used per exercise represent a net increase based on the MEB Exercise and are compared to the baseline amount of ordnance fired (see Appendix H).
[2]Non-dud producing ordnance.
AGM = air-to-ground missile; BDU = Bomb Dummy Unit; BGM = ballistic guided missile; BLU = bomb live unit; cal = caliber; GBU = guided bomb unit; HE = high explosive; ILLUM = illuminating; mm = millimeter; RP = red phosphorus; TOW = Tube-launched, Optically tracked, Wire-guided missile; WP = white phosphorus;
Source: MAGTF Training Command 2009a.

MEB Building Block Training in the West Acquisition Area

In addition to proposed new MEB Exercises that would occur under Alternative 1 in the proposed west acquisition area, smaller-scale MEB Building Block training by individuals and units (up to a single battalion) would also be conducted in the expanded operating area. The typical training rhythm for MEB Building Block training would consist of a 4-day per week training evolution conducted within the proposed west study area. In keeping with a standard garrison duty cycle, battalions would form up on Monday morning, prepare their personnel and equipment, and road march to their reserved training areas. It is expected that units would have completed their preparations and be ready to engage in training in a live-fire status around 12:00 p.m. local time. The next 4 days would provide a medium for progressively more challenging combined arms, live-fire, and maneuver evolutions, ranging from squad operations to full battalion offensive maneuver (as described in Section 2.2.4). The associated SDZs for the 4-day MEB Building Block training evolution in the reduced west acquisition area is shown in Figure 2-5e.

When not being used for MEB Exercises, the south study area would be used to enhance transition access from Mainside to the eastern and central training areas and provide tactical enhancement to units maneuvering throughout the central and eastern portions of the Combat Center. Marine Air Ground Task Force Training Command proposes to grade and maintain several miles of trail access to facilitate installation thoroughfare and marshalling areas for exercise forces. Marshalling forces would likely take up static positions awaiting the beginning of the exercise and then rapidly begin movement to contact. Some command posts and rear area logistics operations may remain in place, briefly, awaiting opportunity to move forward to keep pace with the maneuver force. Under this alternative, no live-fire ranges or indirect firing positions would be established within the proposed south study area and no combined-arms, live-fire operations by tenant or transient units would occur in this area when MEB Exercises are not occurring.

2.4.2 Alternative 2

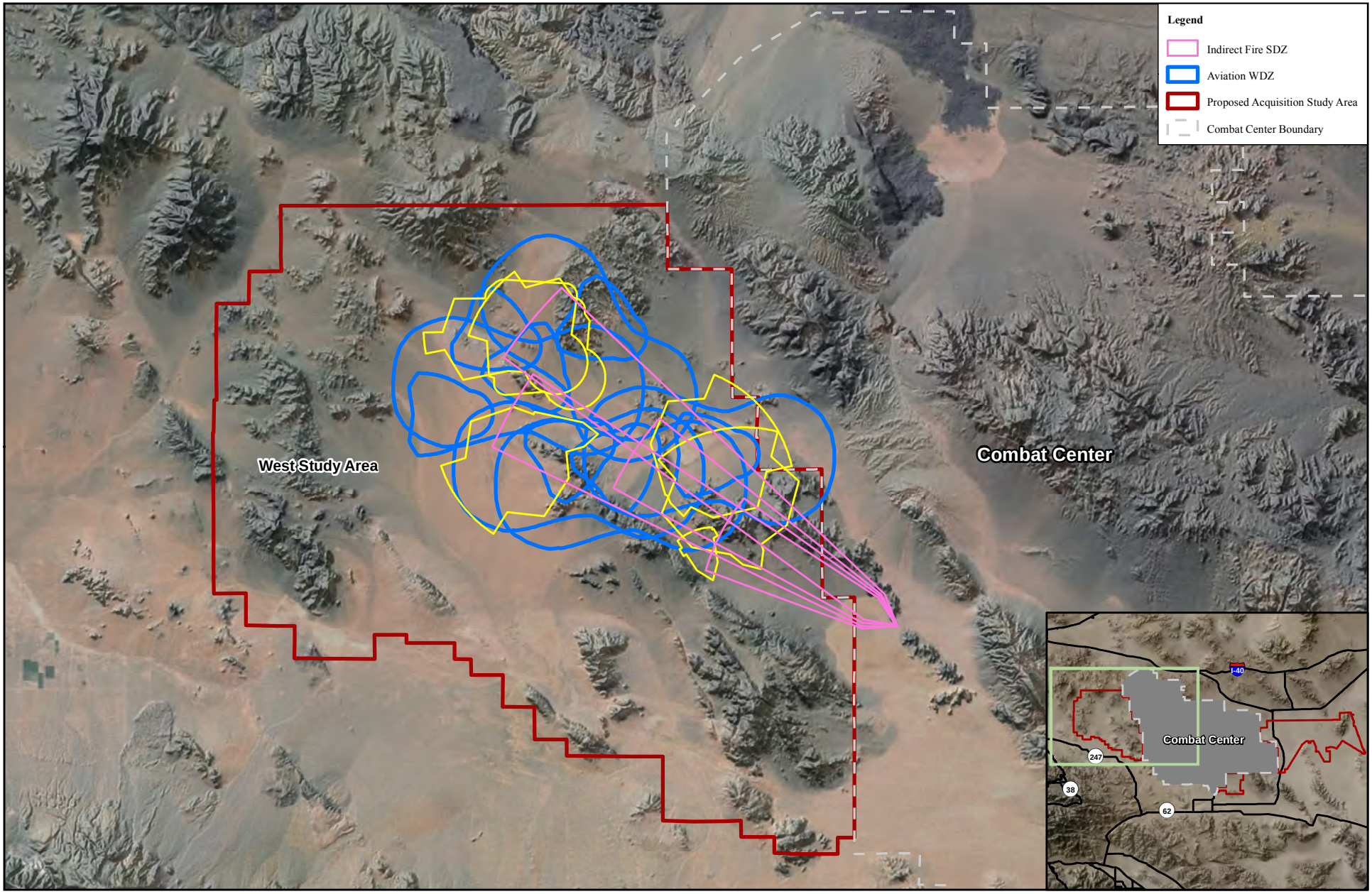
2.4.2.1 Proposed Land Acquisition

Figure 2-6a illustrates the acquisition study areas for proposed land acquisition under Alternative 2. Two separate land areas would be acquired: a substantially reduced (compared to Alternative 1) west study area of approximately 113,558 acres (45,955 hectares) and the 21,304-acre (8,621-hectare) south study area on the south side of the Combat Center.

2.4.2.2 Proposed Airspace Configuration

The proposed airspace configuration associated with Alternative 2 is depicted graphically in Figure 2-6b and described in the following subsections. Under this alternative, no changes to R-2501 would occur. A detailed summary of proposed aircraft operations under Alternative 2 is provided in Appendix D.

Table 2-10 provides a summary of the lateral airspace footprint for Alternative 2 as compared to the area affected by existing designated airspace.



Kilometers
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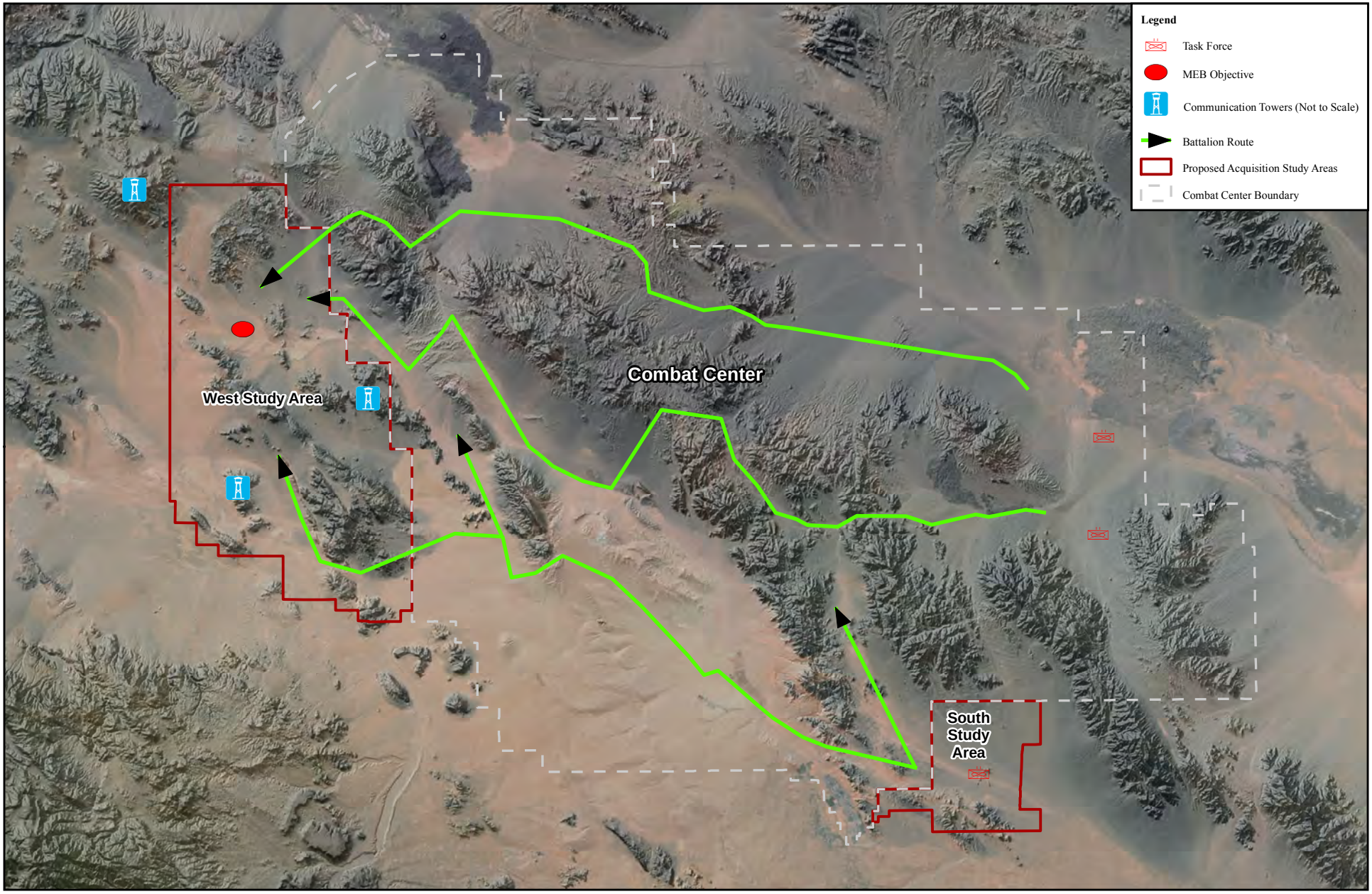
0 1.5 3 6
Miles
Source: MAGTF Training Command 2009a

Figure 2-5e
Representative MEB Building Block Training Footprint Associated With Alternative 1

N

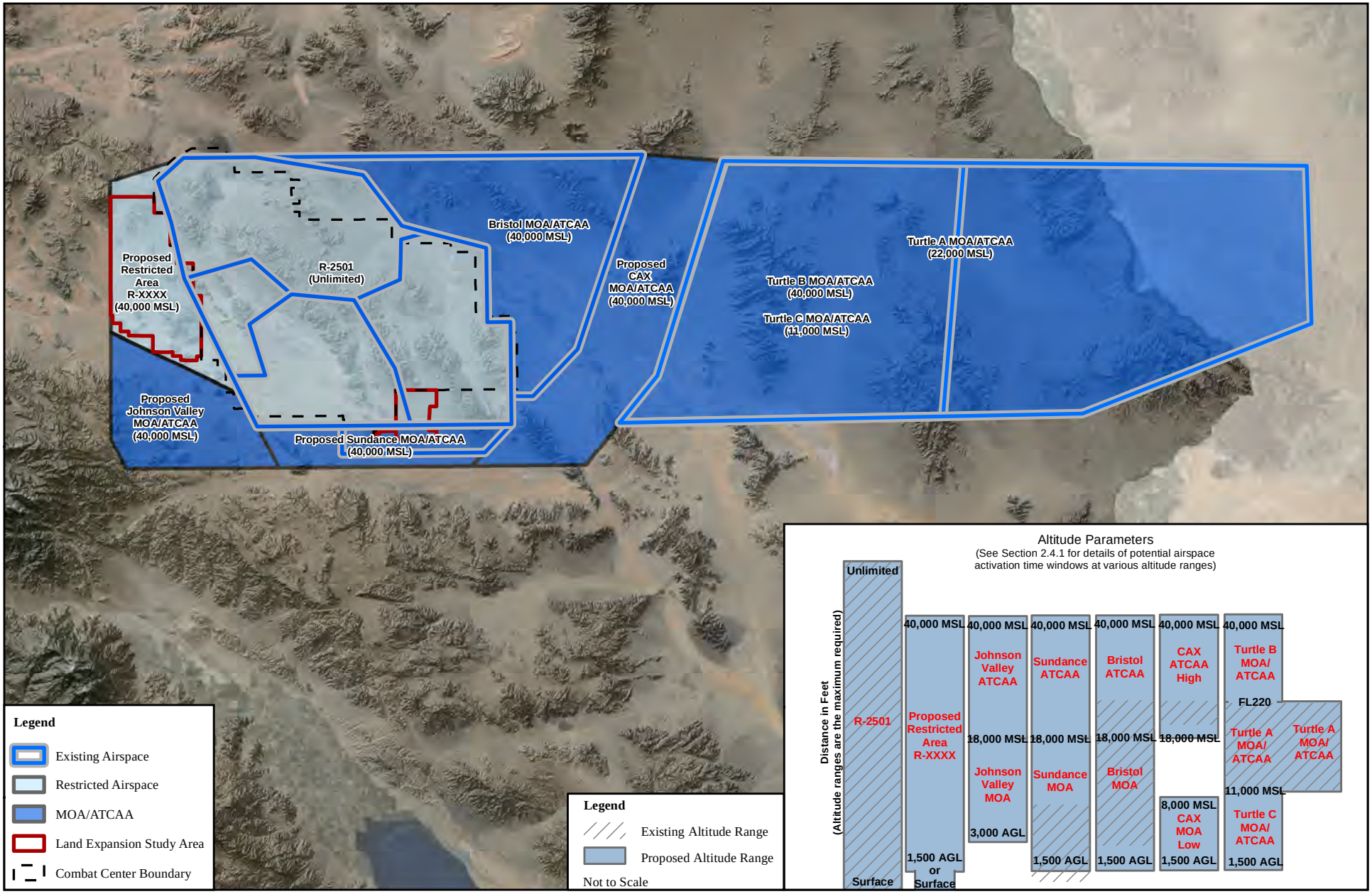


Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 2-6a
Alternative 2: Land Acquisition Study Areas

N



Source: MAGTF Training Command 2009a

Figure 2-6b
Alternative 2: Airspace Establishment and Modification

Table 2-10. Airspace Footprint for Alternative 2

Airspace Area	Baseline Airspace (mi^2)	Alternative 2 (mi^2)
Existing Airspace Units		
R-2501	1,076	1,076
Sundance MOA/ATCAA	67	559
Bristol MOA/ATCAA	534	534
CAX Corridor (proposed MOA/ATCAA)	N/A	372
Turtle MOA/ATCAA	2,275	2,275
New Airspace Units		
R-XXXX	---	209
Johnson Valley MOA/ATCAA	---	131
Total	**3,952**	**5,156**

Notes: N/A = Not applicable. CAX corridor is not currently designated SUA.
ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; mi^2 = square mile; MOA = Military Operations Area.

Establishment of New Airspace: Partial R-XXXX and Partial Johnson Valley MOA/ATCAA

Under Alternative 2, a new partial *Restricted Area* (R-XXXX) would be established to provide for aircraft support directly over the reduced west study area of Alternative 2. This new Restricted Area would be established from the surface to 40,000 feet MSL over land acquired and controlled by the Marine Corps and from 1,500 feet AGL to 40,000 feet MSL outside the acquired land area.

The proposed partial R-XXXX would support the following aviation training activities:

- Surface to, but not including, 8,000 feet MSL over the areas controlled by MAGTF Training Command, and 1,500 feet AGL to, but not including, 8,000 feet MSL over areas not controlled, to accommodate unmanned aircraft systems, rotary-wing operations, low-altitude refueling operations, and small caliber-direct fire weapons systems;
- 8,000 feet MSL to, but not including, 14,000 feet MSL to accommodate medium-tiered unmanned aircraft systems, reduced charge indirect fire systems, and some surveillance and targeting platforms;
- 14,000 feet MSL to, but not including, 27,000 feet MSL to accommodate most of the manned fixed-wing aircraft, airborne refueling operations, indirect fire weapons, and higher-tiered unmanned aircraft systems; and
- 27,000 feet MSL to 40,000 feet MSL to accommodate some fixed-wing tactical operations, high-mobility artillery rocket system use, and other high-altitude indirect fire systems.

The partial R-XXXX, when activated, would only permit participating aircraft over the eastern portion of Johnson Valley. The western portion of Johnson Valley would continue to safely support Instrument Flight Rules (IFR) and VFR traffic. Planned activation of R-XXXX under Alternative 2 would be the same as described in Section 2.4.1 for Alternative 1.

The partial *Johnson Valley MOA/ATCAA* would also be established as new SUA under Alternative 2. It would be contiguous to the western boundary of R-2501 and to the proposed R-XXXX to the north. The partial Johnson Valley MOA would be established over land not controlled by the Marine Corps and would extend from 3,000 feet AGL up to, but not including, 18,000 feet MSL. The partial Johnson Valley ATCAA would overlay the MOA from 18,000 feet MSL to 40,000 feet MSL.

The proposed partial Johnson Valley MOA/ATCAA would support the following aviation training activities:

- 3,000 feet AGL to, but not including, 8,000 feet MSL over the area not controlled by the Marine Corps to accommodate rotary-wing aircraft;
- 8,000 feet MSL to, but not including, 14,000 feet MSL to accommodate surveillance and targeting platforms;
- 14,000 feet MSL to, but not including, 27,000 feet MSL to accommodate most of the manned fixed-wing aircraft and airborne refueling operations; and
- 27,000 feet MSL to 40,000 feet MSL to accommodate some fixed-wing tactical operations.

The partial Johnson Valley MOA/ATCAA, in conjunction with the partial R-XXXX, would provide airspace support to MEB Building Block training as well as the MEB Exercises. The MOA/ATCAA would permit general aviation VFR traffic flying see-and-avoid. The activated MOA would have high-speed aircraft maneuvering over much of the eastern portion of Johnson Valley. Planned activation of the MOA/ATCAA under Alternative 2 would be the same as described for Alternative 1.

Expansion and Modification of Sundance MOA and Establishment of Sundance ATCAA

Under Alternative 2, the existing Sundance MOA would be expanded both laterally and vertically as described in Section 2.4.1 for Alternative 1. The MOA would be extended laterally as shown in Figure 2-6b, and vertically from 1,500 feet AGL up to, but not including, 18,000 feet MSL. A new overlying ATCAA would also be established from 18,000 feet MSL to 40,000 feet MSL. Planned activation of this MOA/ATCAA under Alternative 2 would be the same as described for Alternative 1.

Expansion and Modification of Bristol MOA/ATCAA

The Bristol MOA/ATCAA would be vertically expanded to provide altitude consistency to connect to R-2501 and support MEB training. The proposed modifications to the Bristol MOA/ATCAA are illustrated in Figure 2-6b and would be the same as the modifications described in Section 2.4.1 for Alternative 1. Planned activation of this MOA/ATCAA under Alternative 2 would be the same as described for Alternative 1.

Establishment of the CAX High/Low Corridor MOA/ATCAAs

Under Alternative 2, the proposed CAX High/Low MOA/ATCAA would be structured as shown in Figure 2-6b and planned activation would be the same as described in Section 2.4.1 for Alternative 1.

Modification/Subdivision of Turtle MOA/ATCAA

Under Alternative 2, the Turtle MOA would be modified and subdivided laterally and vertically into the Turtle A, B, and C MOA/ATCAAs as proposed for Alternative 1 and described in Section 2.4.1. Planned activation would also be the same as under Alternative 1.

2.4.2.3 Alternative 2 Training

MEB Exercise Training Program

Alternative 2 was designed to support an east-to-west direction of maneuver, with two battalion task forces assembling near the eastern edge of the existing Combat Center boundary, and the third battalion assembling in the proposed south study area. All three task forces would maneuver westward through commonly used corridors on the installation and converge at the MEB objective located in about the middle of any land acquired within the reduced west study area (to allow for SDZ and other safety

buffers). With reduced maneuver distances compared to Alternative 1, Alternative 2 would minimally satisfy MEB training requirements associated with the time dedicated to sustained, combined-arms, live-fire, and maneuver training.

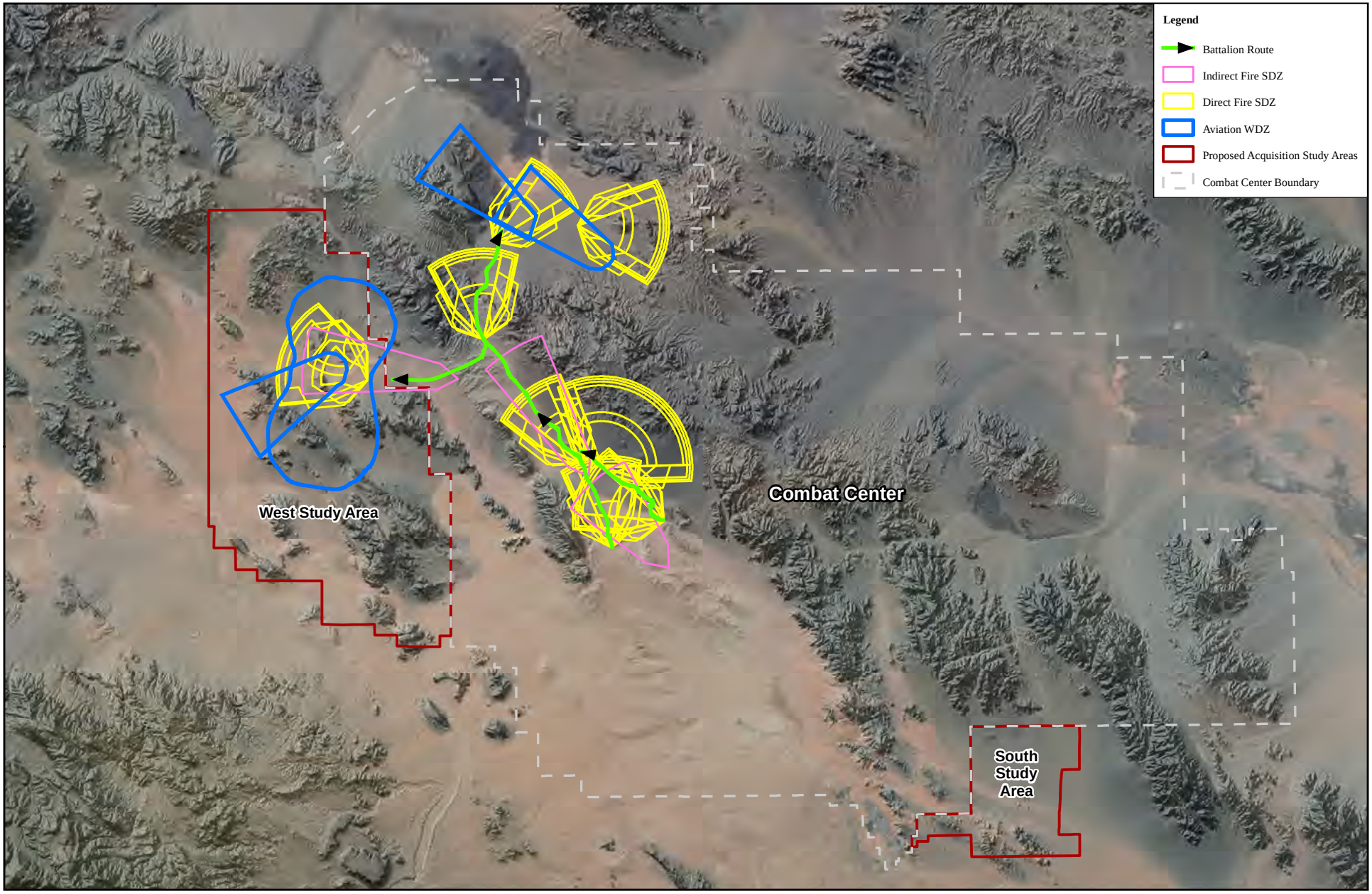
The proposed action includes two MEB training exercises per year, each consisting of 24 consecutive days of training. The template for the MEB Exercise was described in detail in Section 2.2.3. A generic but representative scheme of maneuver for the first 9 days of MEB Work-up evolutions under Alternative 2 is illustrated in Figure 2-6c. The generic scheme of maneuver for the Final Exercise rehearsal and the Final Exercise itself under Alternative 2 is illustrated in Figure 2-6d. Both of these figures illustrate a representative pattern of SDZs associated with the types of live-fire weapons that would be used during those phases of the MEB Exercise. The actual pattern would vary from exercise to exercise and from day to day within each MEB Exercise to sustain optimal freedom of action for the commanders that devise the specific training plan each day.

MEB Exercise training under Alternative 2 would feature the same vehicles, weapons, munitions, and aircraft as described in Section 2.4.1 for Alternative 1.

The average amount of daily flight activity under Alternative 2 would be identical to that described for Alternative 1 (Table 2-8). However, daily flight activities would be distributed somewhat differently while traversing the existing and proposed airspace configuration for Alternative 2. The reduced airspace areas that would be proposed for the partial R-XXXX and Johnson Valley MOA/ATCAA would require that aircraft maneuvers be shifted more into R-2501 and the other proposed Sundance, Bristol, CAX, and Turtle MOAs/ATCAAs, as appropriate, for both MEB Exercise phases. Appendix D contains a more detailed summary of proposed aircraft operations within the proposed SUA for Alternative 2.

MEB Building Block Training in the Acquisition Study Areas

Under Alternative 2, the MEB Building Block training that would occur in the reduced west acquisition area when MEB Exercises are not being conducted would be the same as described in Section 2.4.1 for Alternative 1. The associated SDZs for the 4-day MEB Building Block training evolution in the reduced west acquisition area is shown in Figure 2-6e. The south study area would be used for maneuver and marshalling of units as described previously for Alternative 1.

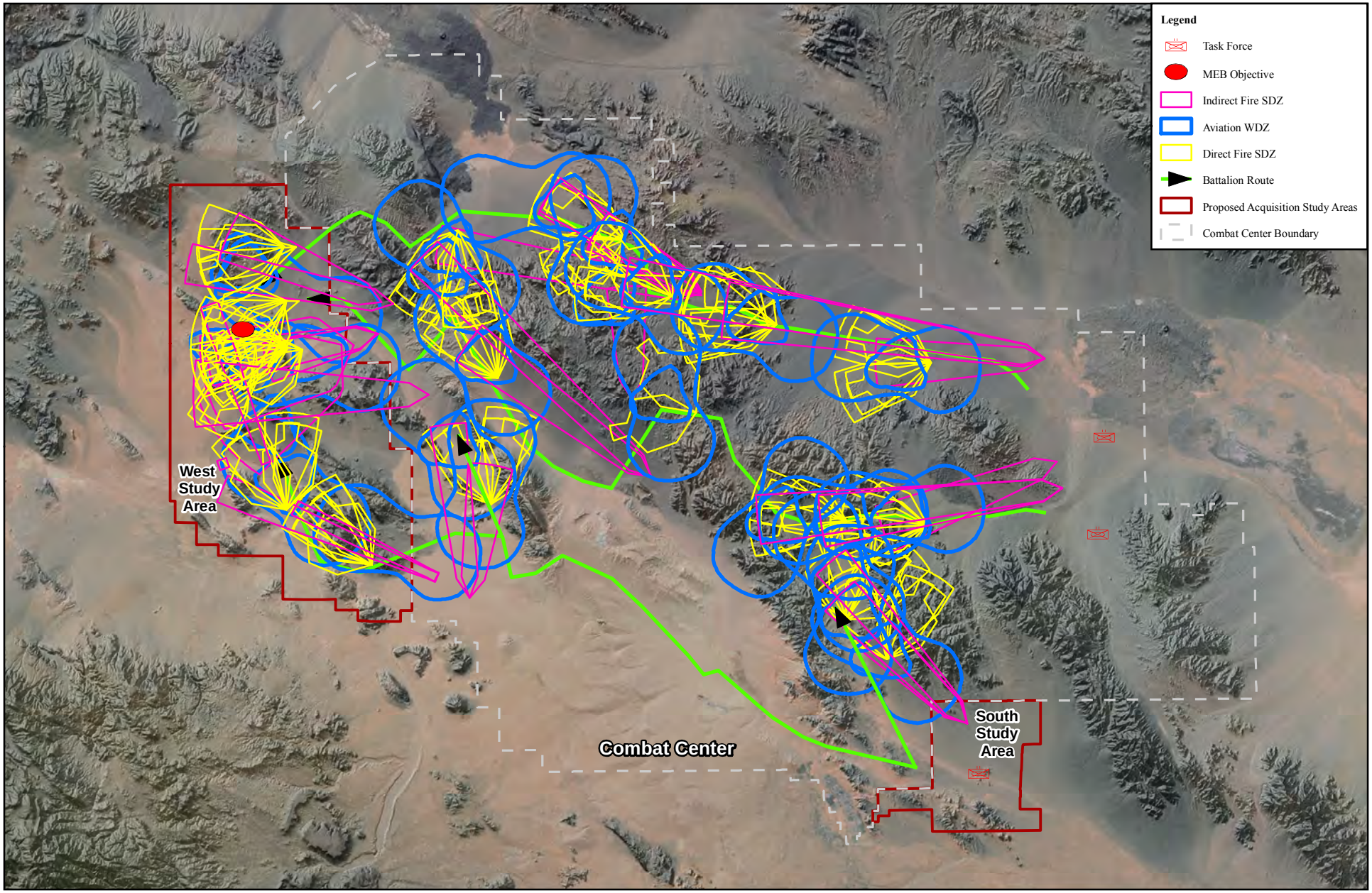


Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 2-6c
Alternative 2: Representative MEB Exercise Work-up Training Scenario

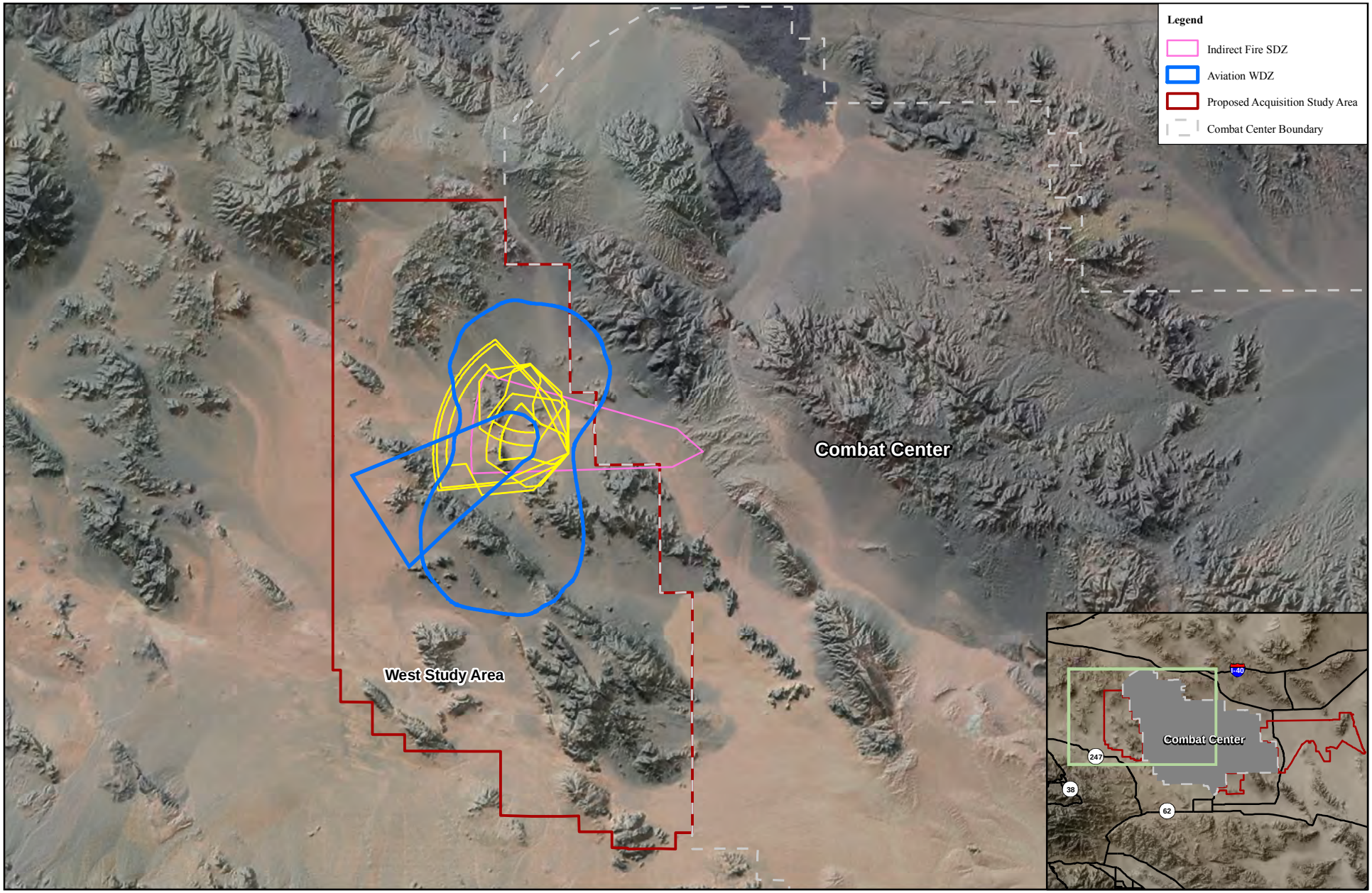
N



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 2-6d
Alternative 2: Representative MEB Final Exercise Scenario



Kilometers
0 1.5 3 6
0 1.5 3 6
Miles
Source: MAGTF Training Command 2009a

Figure 2-6e
Representative MEB Building Block Training Footprint Associated With Alternative 2

N

2.4.3 Alternative 3

2.4.3.1 Proposed Land Acquisition

Figure 2-7a illustrates the acquisition study areas for proposed land acquisition under Alternative 3. Two separate land areas would be acquired: the east study area comprising 177,276 acres (71,741 hectares) on the eastern side of the Combat Center and the 21,304-acre (8,621-hectare) south study area.

2.4.3.2 Proposed Airspace Configuration

The proposed airspace configuration associated with Alternative 3 would extend to the east rather than over Johnson Valley. Ground operations that would begin in any acquired lands to the east of the Combat Center under this alternative would require a Restricted Area over the extended range area. Under this alternative, no changes to R-2501 would occur. The proposed airspace configuration is depicted graphically in Figure 2-7b and described in the following subsections. A detailed summary of proposed aircraft operations under Alternative 3 is provided in Appendix D. Table 2-11 provides a summary of the lateral airspace footprint for Alternative 3 as compared to the area affected by existing designated airspace.

Table 2-11. Airspace Footprint for Alternative 3

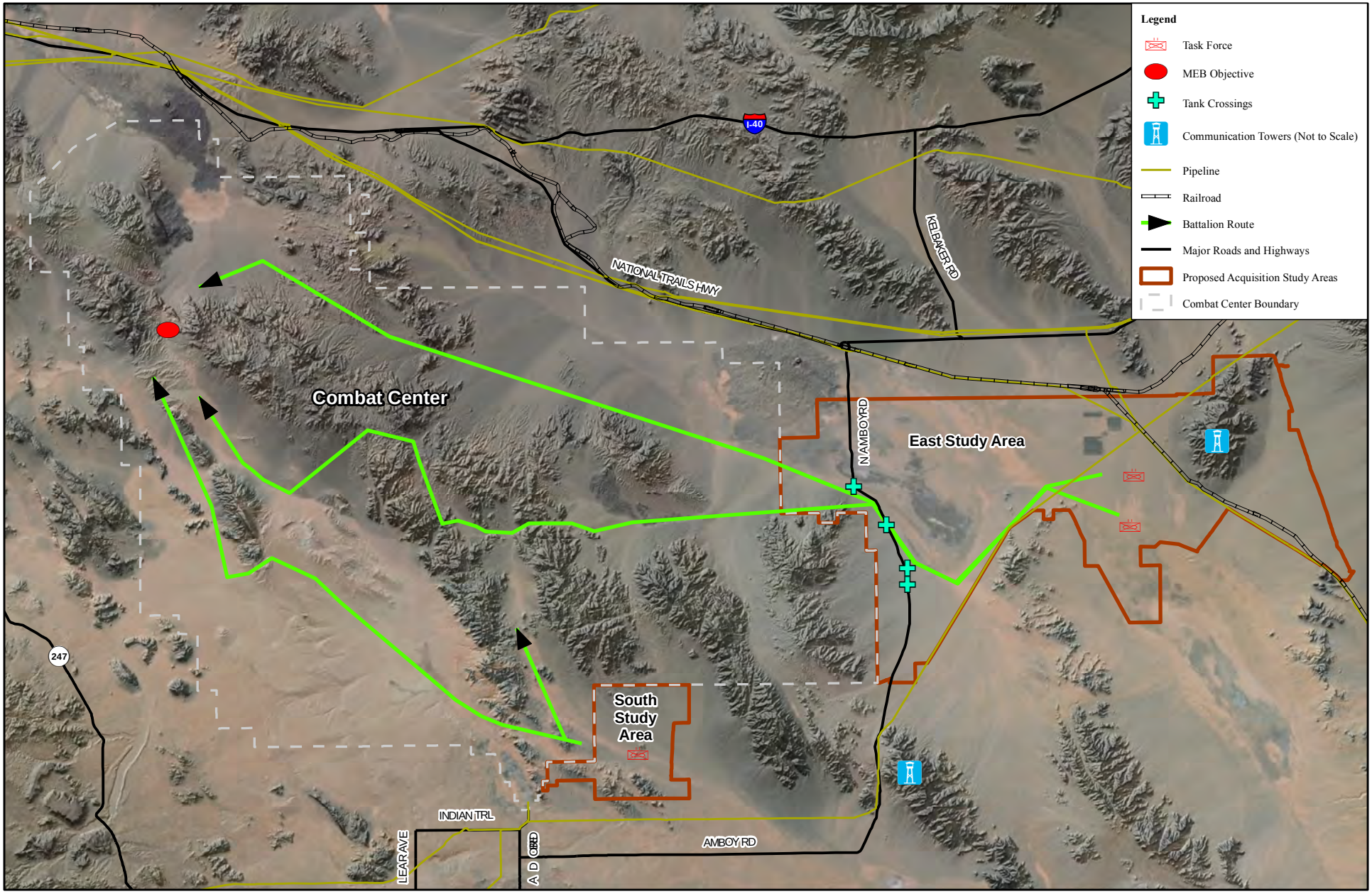
Airspace Area	Baseline Airspace (mi^2)	Alternative 3 (mi^2)
Existing Airspace Units		
R-2501	1,076	1,076
Sundance MOA/ATCAA	67	405
Bristol MOA/ATCAA	534	534
CAX Corridor (proposed as a Restricted Area)	N/A	372
Turtle MOA/ATCAA	2,275	2,275
Total	**3,952**	**4,662**

Notes: N/A = Not applicable. CAX corridor is not currently designated SUA.
ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; mi^2 = square mile; MOA = Military Operations Area.

Expansion and Reclassification of Bristol MOA/ATCAA as Bristol Restricted Area

Under Alternative 3, the existing Bristol MOA/ATCAA would be reclassified as a Restricted Area and designated from the surface to 40,000 feet MSL within the lateral boundaries of any land acquired in the east study area. The remaining portions of the airspace outside the acquired land area (Figure 2-7b) would have a floor of 1,500 feet AGL and extend to 40,000 feet MSL. The proposed Restricted Area would provide altitude consistency to connect R-2501 and support MEB training. The controlling agency for this proposed SUA would be FAA LA ARTCC.

The Bristol Restricted Area would provide the capability to tactically concentrate aviation firepower and safely transition aviation elements from disparate mission profiles. The Restricted Area would avoid the administrative requirement to compress ingress and egress routes and would meet the requirement to seamlessly flow manned and unmanned systems to marshal points, live-fire, and maneuver areas, airborne refueling tracks, and entry and exit points. The Bristol Restricted Area airspace would be amended to provide a more congruent boundary along the east edge of R-2501.



Kilometers
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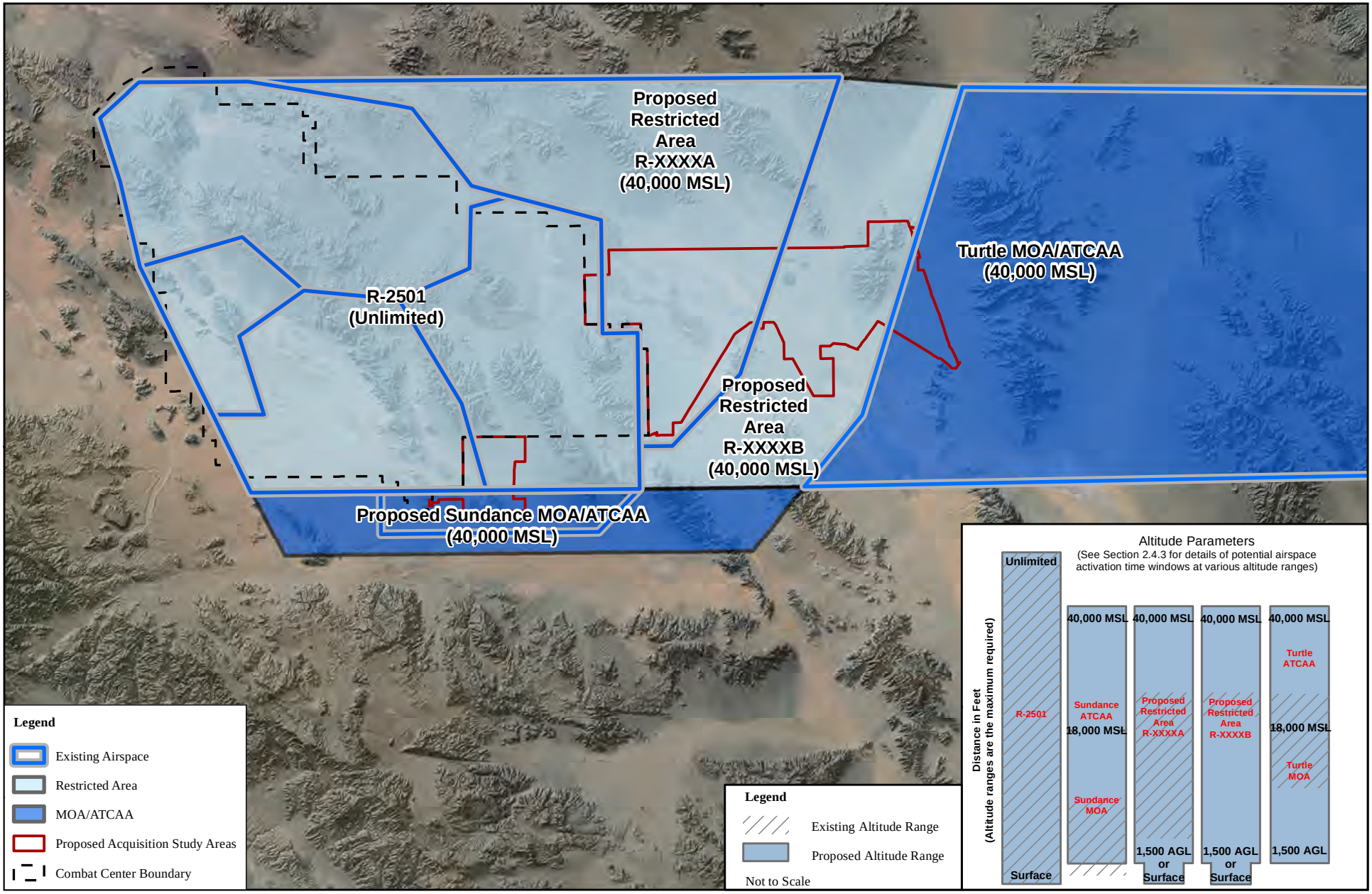
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 2-7a
Alternative 3: Land Acquisition Study Areas



Kilometers
0 5 10 20
0 5 10 20
Miles

Source: MAGTF Training Command 2009a

Figure 2-7b
Alternative 3: Airspace Establishment and Modification

N

The proposed Bristol Restricted Area would support the following aviation training activities:

- Surface (over areas that may be acquired) and beginning at 1,500 feet AGL (over areas not acquired – see Figure 2-8b) up to, but not including, 14,000 feet MSL to accommodate medium-tiered unmanned aircraft systems, rotary-wing aircraft, various surveillance and targeting platforms, and small-caliber direct-fire weapons systems;
- 14,000 feet MSL up to, but not including, 27,000 feet MSL to accommodate most of the manned fixed-wing aircraft, advanced unmanned aircraft, airborne refueling, and indirect fire weapons; and
- 27,000 feet MSL to 40,000 feet MSL to accommodate tactical fixed-wing operations and high-altitude indirect fire systems.

Activation of the proposed Bristol Restricted Area would be intermittent by NOTAM in support of live fire training, ranging from small unit to MEB-sized exercises. The SUA would be activated when training includes employment of direct fire weapons (such as rifles and machine guns), lasers, mortars, artillery, demolitions, unmanned aerial systems, and/or close air support training conducted by rotary-wing aircraft, fixed-wing aircraft, and unmanned aerial vehicles. Altitude requirements would vary from surface to 40,000 feet MSL depending upon which systems, activities, and events have been scheduled. A minimum of 15% use of the planned live fire ranges would occur during the hours of darkness. Activation of this SUA would be planned as follows:

- From surface (or 1,500 feet AGL over portions of the Bristol Restricted Area outside the proposed land acquisition areas) to 27,000 feet MSL for up to 24 hours per day for 6 days per year and from surface (or 1,500 feet AGL) to 40,000 feet MSL for up to 12 hours per day for 6 days per year (not to exceed 40 hours per year);
- From surface (or 1,500 feet AGL over portions outside the proposed land acquisition area) to 18,000 feet MSL for up to 12 hours per day for 28 days per year; and
- From surface (or 1,500 feet AGL over portions outside the proposed land acquisition area) to 18,000 feet MSL for up to 8 hours per day for 160 days per year.

<u>Establishment of the CAX Corridor as a Restricted Area</u>

Under Alternative 3, the existing CAX Corridor would be established as a Restricted Area and designated continuous from the surface to 40,000 feet MSL within the lateral boundaries of any land acquired in the east study area. The remaining portions of the airspace outside the acquired land area (Figure 2-7b) would have a floor of 1,500 feet AGL and extend to 40,000 feet MSL. The proposed CAX Restricted Area would provide connecting airspace from the Turtle MOA through to the proposed Bristol Restricted Area and the existing R-2501, which would help to create training distances for MEB Exercises and other aircrew training consistent with current and anticipated weapon systems and with the challenges faced by Marine Corps pilots in combat.

The proposed CAX Restricted Area would support the following aviation training activities:

- Surface (over areas that may be acquired) and beginning at 1,500 feet AGL (over areas not acquired – see Figure 2-7b) up to, but not including, 14,000 feet MSL to accommodate rotary-wing aircraft and various surveillance and targeting platforms;
- 14,000 feet MSL to, but not including, 27,000 feet MSL to accommodate most of the manned fixed-wing aircraft, advanced unmanned aircraft systems, and airborne refueling operations; and

- 27,000 feet MSL to 40,000 feet MSL to accommodate tactical fixed-wing operations.

The CAX Corridor is the primary corridor for civil aviation to transit from the San Diego area to the Las Vegas area. The proposed CAX Restricted Area, when activated, would prevent non-participating aircraft from transiting the airspace. Planned activation of this SUA would be similar to that of the proposed Bristol Restricted Area above.

Limited Extension and Modification of Sundance MOA and Establishment of ATCAA

Alternative 3 does not include new airspace over Johnson Valley. The Sundance MOA/ATCAA Limited Extension would help connect the proposed new CAX Restricted Area with existing R-2501 (Figure 2-7b). In addition to being extended laterally, the Sundance MOA would be modified to go from 1,500 feet AGL up to, but not including, 18,000 feet MSL. A new overlying ATCAA would also be established from 18,000 feet MSL to 40,000 feet MSL.

The Sundance MOA/ATCAA Limited Extension would support the following aviation training activities:

- 1,500 feet AGL to, but not including, 14,000 feet MSL to accommodate rotary-wing transit and some tactical fixed-wing routing and holding operations; and
- 14,000 feet MSL to, but not including, 40,000 feet MSL to accommodate most of the manned fixed-wing tactical aircraft and prospective airborne refueling operations.

This Sundance MOA/ATCAA Limited Extension would provide support for MEB training for return flight and would have minimal size and volume to support training exercises. The MOA would permit general aviation VFR traffic flying see-and-avoid within the airspace. Activation of this airspace would be the same as for Alternative 1.

Modification of Turtle MOA/ATCAA

Under Alternative 3, the Turtle MOA/ATCAA would be expanded vertically and segmented as shown in Figure 2-7b whereas this modification would lower the Turtle MOA floor from 11,000 feet MSL to 1,500 feet AGL and raise the Turtle ATCAA ceiling from 22,000 feet MSL to 40,000 MSL. Activation of the modified MOA/ATCAA would be as follows:

- From 1,500 feet AGL up to 27,000 feet MSL for up to 12 hours per day for 6 days per year and from 1,500 feet AGL to 40,000 feet MSL for up to 12 hours per day for 6 days per year (not to exceed 40 hours per year); and
- From 11,000 feet MSL to 22,000 feet MSL between the hours of 6:00 a.m. to 4:00 p.m. Monday through Friday; other times by NOTAM.

2.4.3.3 Alternative 3 Training

Marine Expeditionary Brigade Exercise Training Program

Alternative 3 was designed to support an east-to-west direction of maneuver similar to the first two alternatives, but beginning from acquired land to the east of the Combat Center and terminating near the existing western boundary of the installation. Under this alternative, two battalion task forces would assemble at the same basic location on any acquired land in the east study area (see Figure 2-7a) and would have to follow in trace of each other along a single corridor between the dry lake area and the Sheephole Valley Wilderness before splitting into two distinct corridors within the current Combat Center. While this maneuver provides valued training, the two battalions would not be able to conduct integrated air and ground live fires with optimized freedom of action until they crossed the current

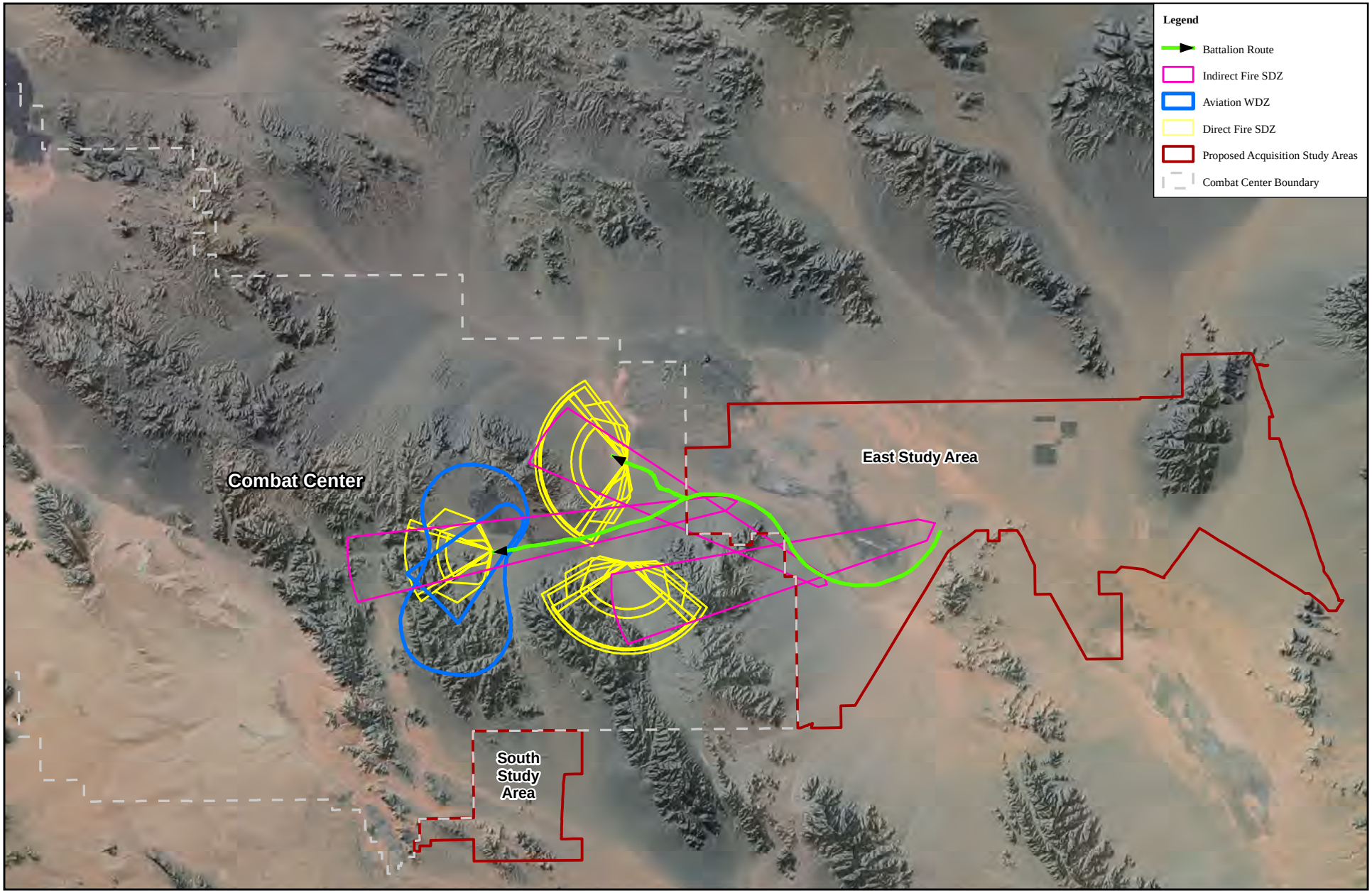
installation boundary. The third battalion would assemble on acquired lands in the south study area. All three task forces would maneuver westward through commonly used corridors on the installation and converge at the MEB objective located in the northwest corner of the installation.

The proposed action includes two MEB training exercises per year, each consisting of 24 consecutive days of training. The template for the MEB Exercise was described in detail in Section 2.2.3. A generic but representative scheme of maneuver for the first 9 days of MEB Work-up evolutions under Alternative 3 is illustrated in Figure 2-7c. The generic scheme of maneuver for the Final Exercise rehearsal and the Final Exercise itself under Alternative 3 is illustrated in Figure 2-7d. Both of these figures illustrate a representative pattern of SDZs associated with the types of live-fire weapons that would be used during those phases of the MEB Exercise. The actual pattern would vary from exercise to exercise and from day to day within each MEB Exercise to sustain optimal freedom of action for the commanders that devise the specific training plan each day.

Marine Expeditionary Brigade Exercise training under Alternative 3 would feature the same vehicles, weapons, munitions, and aircraft use as described in Section 2.4.1 for Alternative 1, except that vehicle travel distances would be increased over other alternatives because of the greater distance of the assembly areas for the first two battalions. Estimated vehicle travel under this alternative is provided in Table 2-12.

Transit from the east study area to the MEB objective located in the northwest corner of the Combat Center would require vehicles, equipment, and personnel to cross Amboy Road. During battalion work-ups and vehicle crossings, Amboy Road would be temporarily closed. It is anticipated that the temporary closure of Amboy Road would occur intermittently over a 5-day period during a MEB training. No closure would exceed a 4-hour period. Local authorities would assist in ensuring alternate routes are available and clearly marked. Two checkpoints (located at the north and south ends of the restricted area along Amboy Road) would be set up when training forces are positioned east of Amboy Road. Military Police along with local authorities would be positioned at these two checkpoints to alert the public regarding road closure and/or training exercises. Four concrete tank crossings would be constructed across Amboy Road, each one approximately 20 feet (6 meters) long by 40 feet (12 meters) wide (see Figure 2-7a).

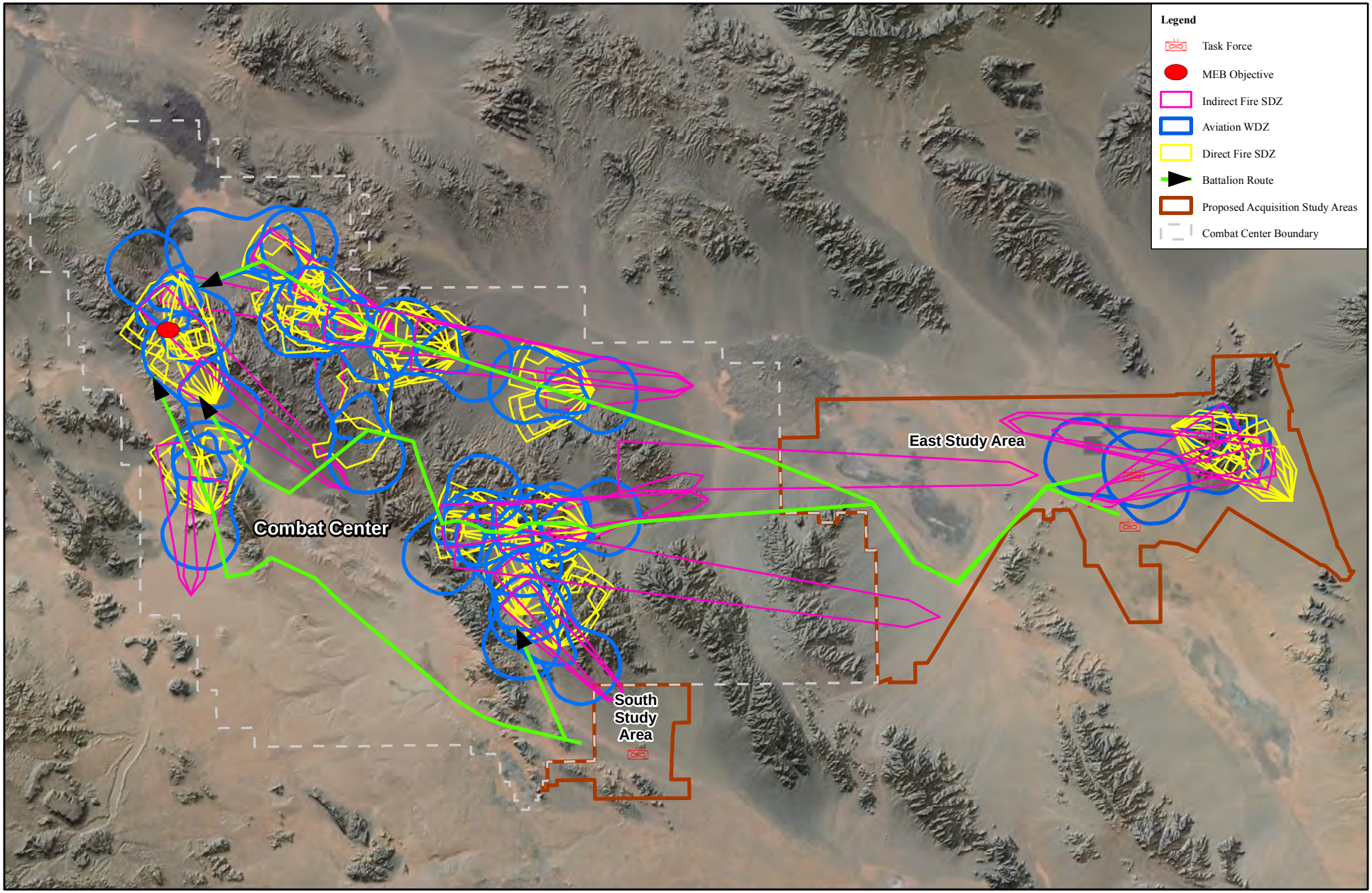
Flight activities conducted for the MEB Exercise under this alternative would be the same as described for Alternative 1 with regard to the average daily flight activity and flight windows. However, without any designated SUA to the west and south of R-2501, this alternative would shift flight activities to airspace blocks further to the east. Table 2-13 provides an estimate of the average daily aircraft activity that would be associated with the Alternative 3 proposed airspace configuration. As noted in the table, the Sundance, Bristol, CAX, and Turtle SUA would experience greater use than they would under the other alternatives. For comparison, this table also includes the daily average flight activities for MEB Building Block training that would utilize the same existing and proposed airspace configuration throughout the year when MEB Exercises are not scheduled. Appendix D contains a more detailed summary of proposed aircraft operations within the proposed SUA for Alternative 3.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 2-7c
Alternative 3: Representative MEB Exercise Work-up Training Scenario



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 2-7d
Alternative 3: Representative MEB Final Exercise Scenario

Table 2-12. Alternative 3: Representative Vehicle Distances Traveled During MEB Exercises

Item #	Type of Vehicle	Number of Vehicles	Distance Traveled per MEB Exercise (miles)[1]	Annual Total Distance Traveled (miles)[1]
B0057	Joint Assault Bridge	5	-	-
B0060	Medium Crawler Tractor	5	-	-
B0160	Assault Breacher Vehicle	5	-	-
B0589	Excavator, Combat	12	-	-
B1082	Grader	2	-	-
B2460	Armored Tractor	3	-	-
B2462	D7 Bulldozer	5	-	-
B2483	Armored Backhoe	12	-	-
B2561	Extended Boom Forklift	4	-	-
B2566	Light Capacity Rough Terrain Truck Forklift	2	-	-
B2567	Tractor, Rubber Tired, Articulated Steering, Multipurpose Vehicles	10	-	-
D0003	Medium Tactical Vehicle Replacement	348	132,235	264,470
D0030	High-Mobility Multipurpose Wheeled Vehicle	785	234,096	468,192
D0209	Logistics Vehicle System	198	46,159	92,318
D1161	Internally Transportable Vehicle	50	11,253	22,506
E0150	M60A1 Bridge Vehicle	4	1,464	2,928
E0846	Amphibious Assault Vehicle	187	52,546	105,092
E0942, E0946, E0947, E0949	Light Armored Vehicle (Variants)	87	21,202	42,404
E1378	M88A2 HERCULES Recovery Vehicle	12	732	1,464
E1500	High-Mobility Artillery Rocket System	6	35	70
E1888	Abrams M1A1 Main Battle Tank	44	10,162	20,324
	Total	**1,786**	**509,884**	**1,019,768**

Notes: [1]Some vehicles would be towed and, therefore, do not have a value for distance traveled.
MEB = Marine Expeditionary Brigade
Source: MAGTF Training Command 2009a.

Table 2-13. Average Daily Airspace Use for MEB Exercises and Other Military Flight Activities

Airspace Use	Airspace Unit				
	Existing R-2501	Proposed Sundance MOA/ATCAA	Proposed Bristol Restricted Area	Proposed CAX Restricted Area	Proposed Turtle MOA/ATCAA
MEB Exercise Scenario (48 days/year)					
Average Daily Sorties					
MEB Work-up[1]	74	74	74	74	74
Final Exercise[2]	133	133	133	133	133
Average Daily Flight Window (hours day/night)[3]					
MEB Work-up	9/3	9/3	9/3	9/3	9/3
Final Exercise	12/12	12/12	12/12	12/12	12/12
MEB Building Block Training (160 days/year)					
Average Daily Sorties					
All Days	14/7	14/7	14/7	14/7	14/7
Average Daily Flight Window (hours day/night)[3]					
All Days	10/1	10/1	10/1	10/1	10/1
Other Military Flight Activities (270 days/year)[4]					
Average Daily Sorties					
All Days	49	49	49	49	49
Average Daily Flight Window (hours day/night)[3]					
All Days	8/3	5/2	7/2	6/2	5/2

Notes: [1]The Work-up phase of the MEB Exercise includes training days 1-19; however, flight activity would not occur during training days 10 and 18. The average daily sorties calculation did not include those two training days.
[2]The Final Exercise phase of the MEB Exercise includes training days 20-22; flight activity would occur during all three of these training days.
[3]The daily flight window is the continuous span of time (hours) each day during which flight operations would typically occur from start to finish. This is the duration of time the airspace would be scheduled to accommodate these operations. Where indicated, this flight window may be divided between day (7:00 a.m.-10:00 p.m. local time) and night (10:00 p.m.-7:00 a.m. local time) operations to fulfill nighttime training requirements.
[4]Other military flight activities may include major training exercises and basic proficiency training and would be conducted within the designated airspace during those periods when the twice annual MEB Exercises would not be scheduled (approximately 270 days each year).
ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; MEB = Marine Expeditionary Brigade; MOA = Military Operations Area.
Source: MAGTF Training Command 2009a.

MEB Building Block Training in the Acquisition Study Areas

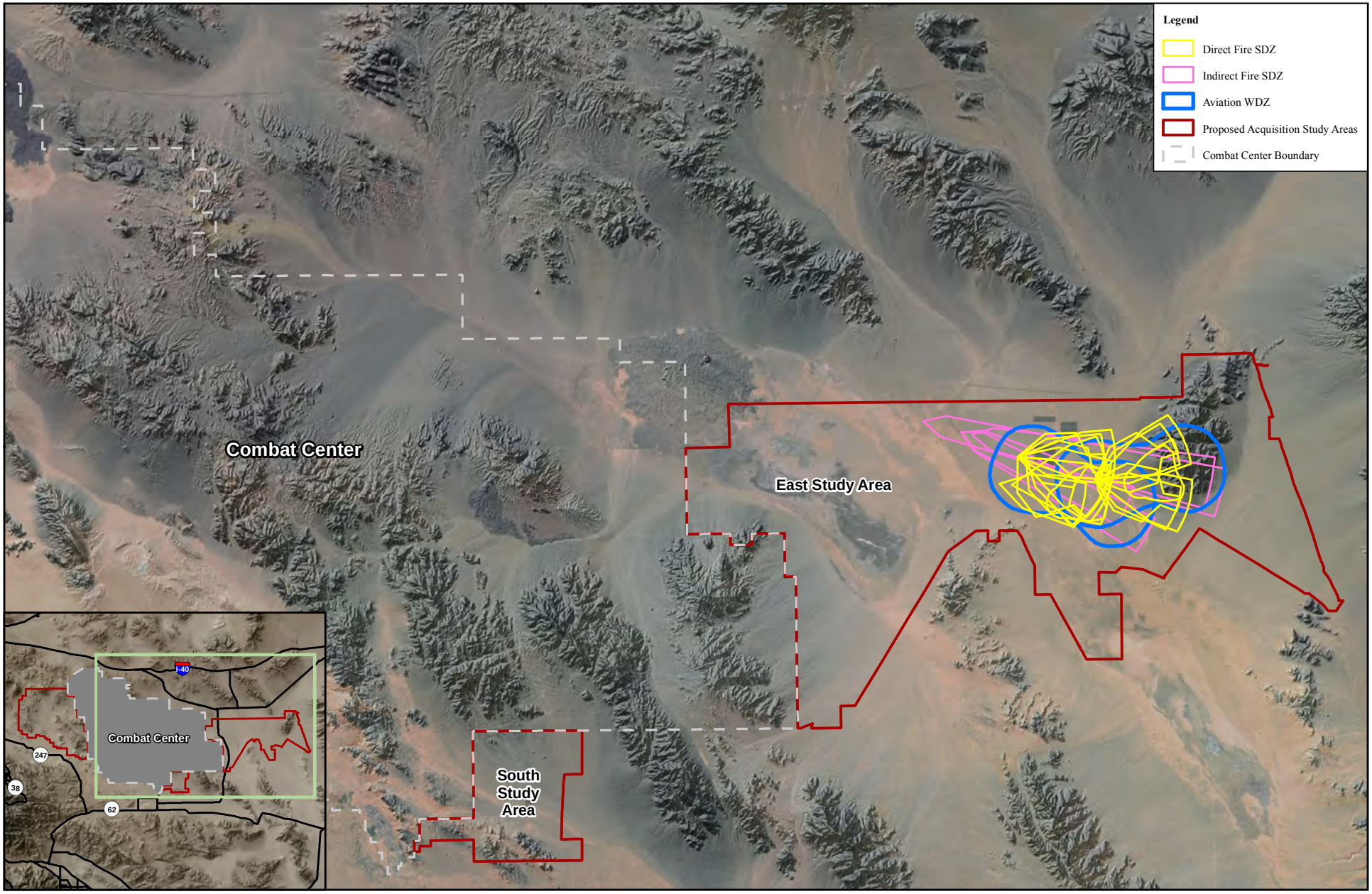
In addition to proposed MEB Exercises that would occur in the east acquisition area under Alternative 3, smaller-scale MEB Building Block training would also be conducted in the expanded operating area. The same 4-day training evolution described for Alternative 1 (involving progressively larger units and more intensive live-fire and maneuver training activity each day) would be conducted instead in the east study area on a weekly basis whenever MEB Exercises were not being conducted (an average of 40 weeks or 160 days each year). Figure 2-7e illustrates the SDZ footprint and a generic scheme of maneuver for MEB Building Block training that would occur in the east study area.

The south study area would be used for maneuver and marshalling of units as described previously for Alternative 1.

2.4.4 Alternative 4

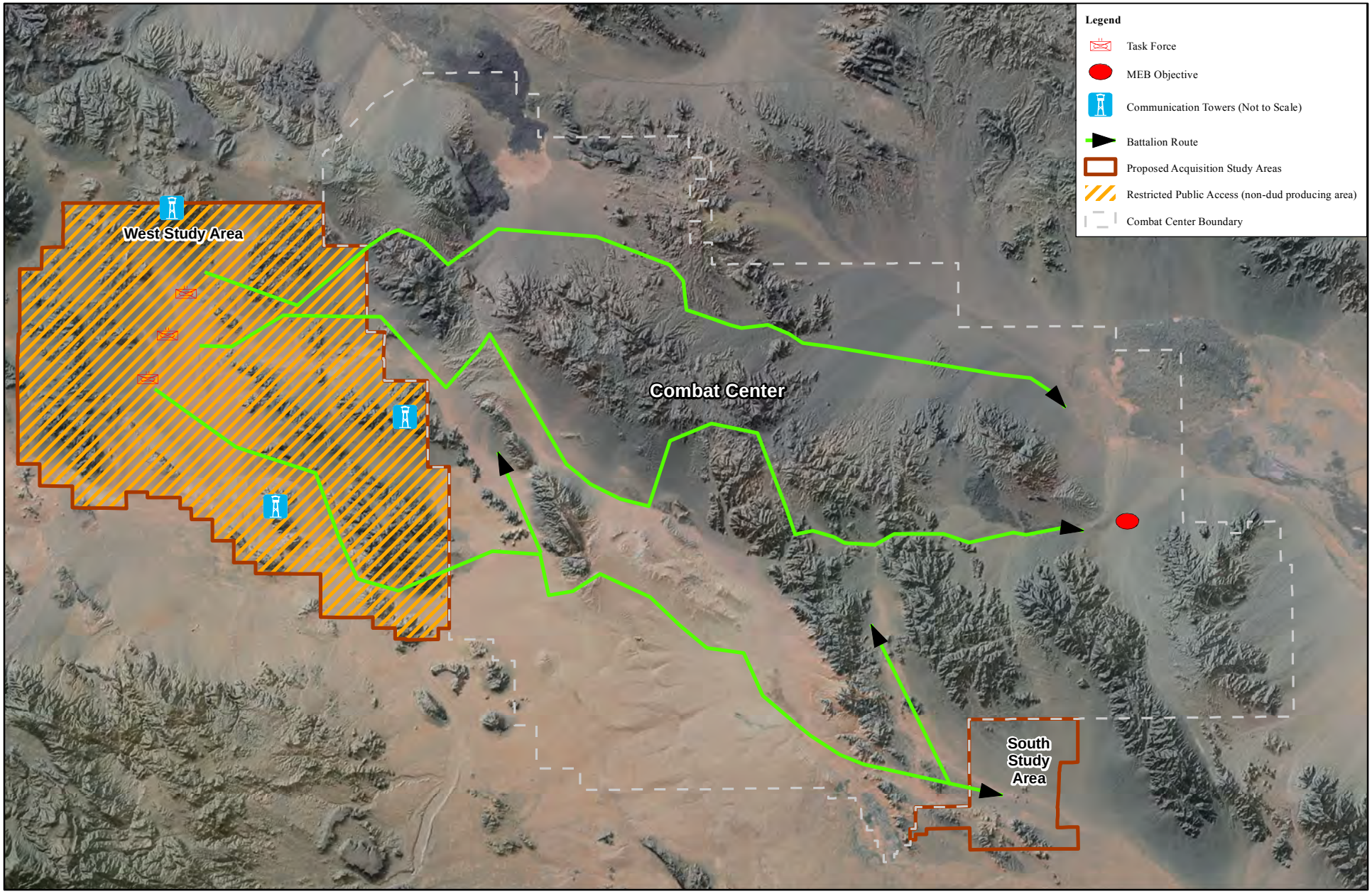
2.4.4.1 Proposed Land Acquisition

Figure 2-8a illustrates the acquisition study area for proposed land acquisition under Alternative 4. This alternative would require the acquisition of the same land areas as for Alternative 1: approximately 180,353 acres (72,987 hectares) in the west study area and approximately 21,304 acres (8,621 hectares) in the south study area.



Kilometers
0 2.5 5 10
0 2 4 8
Miles
Source: MAGTF Training Command 2009a

Figure 2-7e
Representative MEB Building Block Training Footprint Associated With Alternative 3



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 2-8a
Alternative 4: Land Acquisition Study Areas

2.4.4.2 Proposed Airspace Configuration

The proposed airspace configuration associated with Alternative 4 is depicted graphically in Figure 2-8b and described below. It would be identical in lateral and vertical dimensions, stratification, and utility as was described in Section 2.4.1 for Alternative 1, except that the proposed airspace to the west of R-2501 under Alternative 4 would only be activated in support of each MEB Exercise (MEB Work-up phase and Final Exercise) and not for MEB Building Block training during the periods between each MEB Exercise. As described in more detail in the next subsection, Alternative 4 is intended to support restricted public access to the majority of acquired lands in Johnson Valley when MEB Exercises are not being conducted, and therefore would not be used for MEB Building Block training in the west study area; such training would occur in existing range areas on the Combat Center subject to availability constraints and requirements for other training activities.

Table 2-14 provides a summary of the lateral airspace footprint for Alternative 4 as compared to the area affected by existing designated airspace. No changes to R-2501 would occur under Alternative 4, and this SUA would continue to be activated and used as needed to support all required training exercises and activities.

Table 2-14. Airspace Footprint for Alternative 4

Airspace Area	Baseline Airspace (mi^2)	Alternative 4 (mi^2)
Existing Airspace Units		
R-2501	1,076	1,076
Sundance MOA/ATCAA	67	559
Bristol MOA/ATCAA	534	534
CAX Corridor (proposed MOA/ATCAA)	N/A	372
Turtle MOA/ATCAA	2,275	2,275
New Airspace Units		
R-XXXX	---	356
Johnson Valley MOA/ATCAA	---	183
Total	**3,952**	**5,355**

Notes: N/A = Not applicable. CAX corridor is not currently designated SUA.
ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; mi^2 = square mile; MOA = Military Operations Area.

<u>Establishment of New Airspace: Restricted Area R-XXXX East/West and Johnson Valley MOA/ATCAA</u>

Under Alternative 4, a proposed new *Restricted Area* (R-XXXX pending assignment of a number designation by FAA) would be established adjacent to the western side of the existing R-2501 and subdivided into East and West sectors to provide an overall connected airspace for MEB Exercise evolutions within and above the west study area. This new airspace would meet the selection criteria for operational requirements by providing a Restricted Area from the surface to various altitudes up to 40,000 feet MSL. In compliance with FAA guidelines, the proposed R-XXXX would include the airspace from the surface to 40,000 feet MSL only above the lateral boundaries of any land acquired in the west study area. The remaining portions of the proposed R-XXXX (Figure 2-8b) would have a floor of 1,500 feet AGL to facilitate access to private airfields and property outside the proposed land acquisition area. The proposed R-XXXX East/West subdivisions would support employment of direct and indirect fire weapons and aviation activities (including live fire). The controlling agency for this proposed SUA would be FAA LA ARTCC.

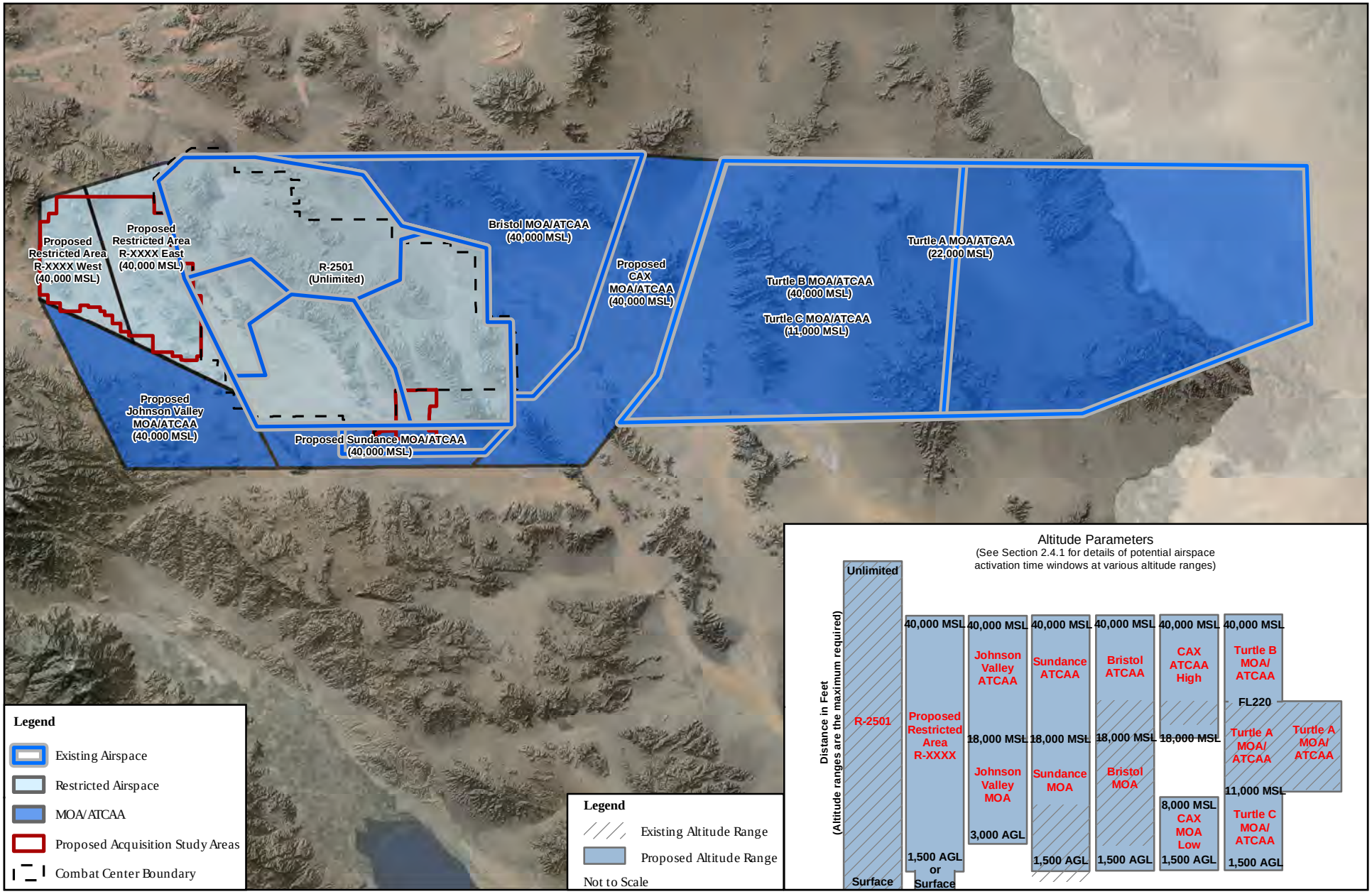


Figure 2-8b
Alternative 4: Airspace Establishment and Modification

Activation of the proposed R-XXXX Restricted Area East sector or the combined East/West sectors would be intermittent by NOTAM, as required, to support live fire training required during MEB Exercises only. The SUA would be activated when training includes employment of direct fire weapons (such as rifles and machine guns), lasers, mortars, artillery, demolitions, unmanned aerial systems, and/or close air support training conducted by rotary-wing aircraft, fixed-wing aircraft, and unmanned aerial vehicles. Altitude requirements would vary from surface to 40,000 feet MSL depending upon which systems, activities, and events have been scheduled. A minimum of 15% use of the planned live fire ranges would occur during the hours of darkness. Activation of the R-XXXX East/West sectors would be planned as follows:

- MEB Final Exercises: R-XXXX would be activated from surface (or 1,500 feet AGL over portions outside the proposed land acquisition area) to 27,000 feet MSL for up to 24 hours per day for 6 days per year and from surface (or 1,500 feet AGL) to 40,000 feet MSL for up to 12 hours per day for 6 days per year (not to exceed 40 hours per year).
- MEB Exercise Work-ups: R-XXXX would be activated from surface (or 1,500 feet AGL over portions outside the proposed land acquisition area) to 18,000 feet MSL for up to 12 hours per day for 28 days per year.

The *Johnson Valley MOA/ATCAA* would directly support MEB Exercises through aircraft maneuvering to the south of the new R-XXXX through to R-2501 and through the proposed Sundance MOA/ATCAA Extension. The Johnson Valley MOA would be established over land not controlled by the Marine Corps and would be activated from 3,000 feet AGL up to, but not including, 18,000 feet MSL. The Johnson Valley ATCAA would overlay the Johnson Valley MOA from 18,000 feet MSL to 40,000 feet MSL. The Johnson Valley MOA/ATCAA would be activated by NOTAM either by itself or in conjunction with existing and/or planned restricted airspace and MOAs/ATCAAs, and would allow for aircraft tactical maneuvering during the non-hazardous portions of scheduled training events. Flight training would be conducted in the proposed airspace as a component of MEB Exercises only.

Activation of the proposed Johnson Valley MOA/ATCAA would be planned as follows:

- MEB Final Exercises: from 3,000 feet AGL to 27,000 feet MSL for up to 24 hours per day for 6 days per year and from 3,000 feet AGL to 40,000 feet MSL for up to 12 hours per day for 6 days per year (not to exceed 40 hours per year).
- MEB Exercise Work-ups: from 3,000 feet AGL to 18,000 feet MSL for up to 12 hours per day for 28 days per year.

The Johnson Valley MOA would permit general aviation VFR traffic within the MOA using see-and-avoid. The controlling agency for this proposed airspace would be FAA LA ARTCC.

<u>Expansion and Modification of Sundance MOA and Establishment of Sundance ATCAA</u>

Under Alternative 4, the existing Sundance MOA would be expanded both laterally and vertically to provide airspace for military aircraft to transition and recover during MEB training. The MOA floor (currently at 500 feet AGL) would be raised to 1,500 feet AGL to allow additional civilian access to some of the underlying property and private airfields per federal aviation regulations. The MOA would be modified to go up to, but not including, 18,000 feet MSL (the current ceiling is at 10,000 feet MSL). A new overlying ATCAA would also be established from 18,000 feet MSL to 40,000 feet MSL. The controlling agency for this proposed airspace would be FAA LA ARTCC.

The MOA/ATCAA would be activated by NOTAM either by itself or in conjunction with existing and/or planned restricted airspace and MOAs/ATCAAs, and would allow for aircraft tactical maneuvering during the non-hazardous portions of scheduled training events. The Sundance MOA/ATCAA extension would provide connected airspace to existing and proposed MOAs and Restricted Areas and would provide airspace of the size and volume needed to support flight training events involving attack through recovery maneuvering.

Activation of the extended Sundance MOA/ATCAA would occur from 1,500 feet AGL to 40,000 feet MSL for up to 12 hours per day for two periods of 20 days each per year, for a total of 40 days per year. Use would include both day and night operations.

Expansion and Modification of Bristol MOA/ATCAA

The Bristol MOA would be modified by designating the floor altitude at 1,500 feet AGL. The Bristol ATCAA would be expanded vertically to provide altitude consistency to connect to R-2501 and provide continuity for MEB Building Block training as well as for the MEB Exercises. The Bristol MOA/ATCAA expansion would provide the capability to tactically concentrate aviation firepower and safely transition aviation elements from disparate mission profiles. The Bristol MOA/ATCAA expansion would avoid the administrative requirement to compress ingress and egress routes and would have altitude segments to meet the requirement to seamlessly flow manned systems to marshal points, maneuver areas, airborne refueling tracks, and entry and exit points. The VFR traffic could fly see-and-avoid. The MOA/ATCAA would be activated by NOTAM either by itself or in conjunction with existing and/or planned restricted airspace and MOAs/ATCAAs, and would allow for aircraft tactical maneuvering during the non-hazardous portions of scheduled training events. Both day and night operations would occur in this airspace. The controlling agency for this proposed airspace would be FAA LA ARTCC.

Activation of the Bristol MOA/ATCAA would be planned as follows:

- MEB Final Exercises: from 1,500 feet AGL to 27,000 feet MSL for up to 12 hours per day for 6 days per year and from 1,500 feet AGL to 40,000 feet MSL for up to 12 hours per day for 6 days per year (not to exceed 40 hours per year).
- MEB Work-ups and Building Block training: from 5,000 feet MSL to 22,000 feet MSL between the hours of 7:00 a.m. to 3:00 p.m. Monday through Friday; and other times by NOTAM.

Establishment of a High/Low Corridor MOA/ATCAA in Place of the CAX Corridor

The proposed CAX High/Low MOA/ATCAA would be the same as described in Section 2.4.1 for Alternative 1. The High/Low corridors would provide connecting airspace from the Turtle MOA through to the expanded Bristol MOA/ATCAA, the existing R-2501, and the proposed new R-XXXX and Johnson Valley MOA/ATCAA. Use would include day and night operations and VFR traffic could transit the airspace using see-and-avoid. The proposed High and/or Low Corridor MOA/ATCAAs would be activated by NOTAM in conjunction with existing and/or planned restricted airspace and MOAs/ATCAAs, and would allow for aircraft tactical maneuvering during the non-hazardous portions of scheduled training events. Fixed-wing training would be conducted in the proposed airspace as a component of MEB Final Exercises only.

Activation of the proposed CAX High/Low Corridor MOA/ATCAA would also be planned as described in Section 2.4.1 for Alternative 1. The controlling agency for this proposed airspace would be FAA LA ARTCC.

Modification of Turtle MOA and ATCAA

Under Alternative 4, the Turtle MOA/ATCAA would be expanded and subdivided both laterally and vertically into Turtle A, B, and C sectors as described in Section 2.4.1 for Alternative 1 to provide altitude continuity with the proposed CAX High/Low Corridor MOA/ATCAAs and the modified Bristol MOA/ATCAA to the west. The Turtle A, B, and C MOA/ATCAA sectors would be activated separately or combined by NOTAM, as needed, in conjunction with existing and/or planned restricted airspace and MOAs/ATCAAs, and would allow for aircraft tactical maneuvering during the non-hazardous portions of scheduled training events. Fixed-wing training would be conducted in the proposed airspace as a component of MEB Final Exercises and MEB Building Block training. Both day and night operations would occur in this airspace.

Activation of the Turtle A, B, and C MOA/ATCAA sector(s) would be planned as described in Section 2.4.1 for Alternative 1, as required, to support the Alternative 4 training profile discussed below.

2.4.4.3 Alternative 4 Training

Marine Expeditionary Brigade Exercise Training Program

Though encompassing the same total area and the same two acquisition areas as Alternative 1, Alternative 4 was designed to support a west-to-east direction of maneuver, with three battalion task forces assembling near the center of any land acquired within the west study area and maneuvering eastward through commonly used corridors on the installation. Two of the battalions would converge at the MEB objective near the eastern edge of the current installation, while the southern battalion would terminate the exercise on any land acquired within the south study area.

The intent behind this alternative is to support restricted public access to the majority of acquired lands in Johnson Valley when MEB Exercises are not being conducted. An RPAA is defined as an area in which certain public uses may be permitted, subject to restrictions, institutional controls, and mitigating methods designed to provide for public safety. During Marine Corps training rotations in such an area, only certain types of non-dud producing ordnance and explosives would be used. Public access and use of such an area would only be authorized by the Marine Corps and would only be so authorized when the land is not being utilized for training. Specific proposed training restrictions and public access permitting procedures to be applied within any defined RPAA are described in Section 2.5.

Under Alternative 4, the RPAA would correspond to all of the acquired land in the west study area, with the exception of two 984 by 984-foot (300 by 300-meter) areas permanently designated as “Company Objective” areas. The two Company Objective areas would remain closed to public access/use year-round and would be clearly marked. Section 2.5 describes in more detail the proposed locations and management/use of Company Objective areas within the RPAA.

Table 2-15 lists various types of non-dud producing munitions that would be used. Alternative 4 would include two MEB training exercises per year, each consisting of 24 consecutive days of training. Allowing for pre-exercise range preparation, post-exercise range clearance, and public access certification, the RPAA would be closed to the public for approximately 2 months (two periods of approximately 30 days each) per year, and available for public recreation for the remaining 10 months of the year.

Table 2-15. Non-Dud Producing Ordnance

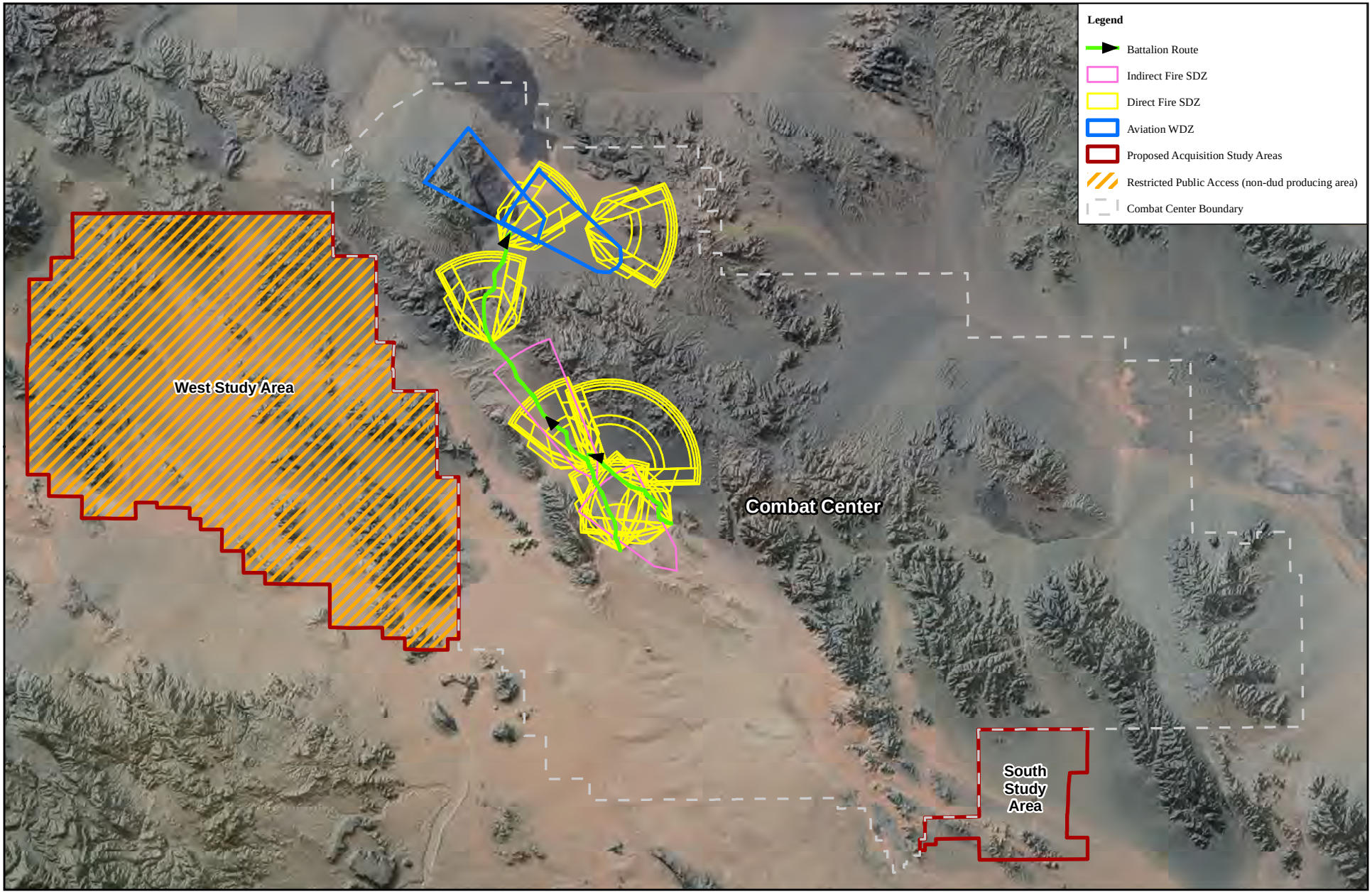
Munitions Type	Item #	Estimated # Used Per Exercise	Estimated # Used Annually
Air			
.50 cal	-	395,000	790,000
7.62mm	-	168,000	336,000
Ground			
5.56mm Ball Cartridge	A059	112,140	224,280
5.56mm Tracer Cartridges	A063	19,224	38,448
5.56mm Tracer Cartridges 4&1 Link	A064	153,594	307,188
7.62mm Tracer Cartridges 4&1 Link	A131	138,600	277,200
.50 cal Tracer Cartridges 4&1 Link	A576	40,500	81,000
25mm Target Practice-Tracer	A976	4,077	8,154
Redbag Propelling Charge	D533	2,338	4,676
Whitebag Propelling Charge	D541	7,154	14,308
Bangalore	M028	9	18
1-Pound Demolition Block Charge (TNT)	M032	36	72
Demolition Cratering 40-Pound Charge	M039	18	36
Electric Blasting Cap	M130	153	306
Non-electric Blasting Cap	M131	153	306
Demolition Shaped M3 Series 40-Pound Charge	M421	18	36
Detonation Cord	M456	7,650	15,300
Time Blasting Fuse	M670	603	1,206
Assembly Demolition M183 Composition C-4 Charge	M757	18	36
Time Blasting Fuse Igniter	M766	153	306
Primer	N523	6,156	12,312

Notes: cal = caliber; mm = millimeter; TNT = trinitrotoluene
Source: MAGTF Training Command 2009a.

The template for the MEB Exercise was described in detail in Section 2.2.3. A generic but representative scheme of maneuver for the first 9 days of MEB Work-up evolutions under Alternative 4 is illustrated in Figure 2-8c. The generic scheme of maneuver for the Final Exercise rehearsal and the Final Exercise itself under Alternative 4 is illustrated in Figure 2-8d. Both of these figures illustrate a representative pattern of SDZs associated with the types of live-fire weapons that would be used during those phases of the MEB Exercise. The actual pattern would vary from exercise to exercise and from day to day within each MEB Exercise to sustain optimal freedom of action for the commanders that devise the specific training plan each day.

Marine Expeditionary Brigade Exercise training under Alternative 4 would feature the same vehicles, weapons, munitions, and aircraft use as described in Section 2.4.1 for Alternative 1, except that only non-dud producing munitions would be used within the RPAA in Johnson Valley.

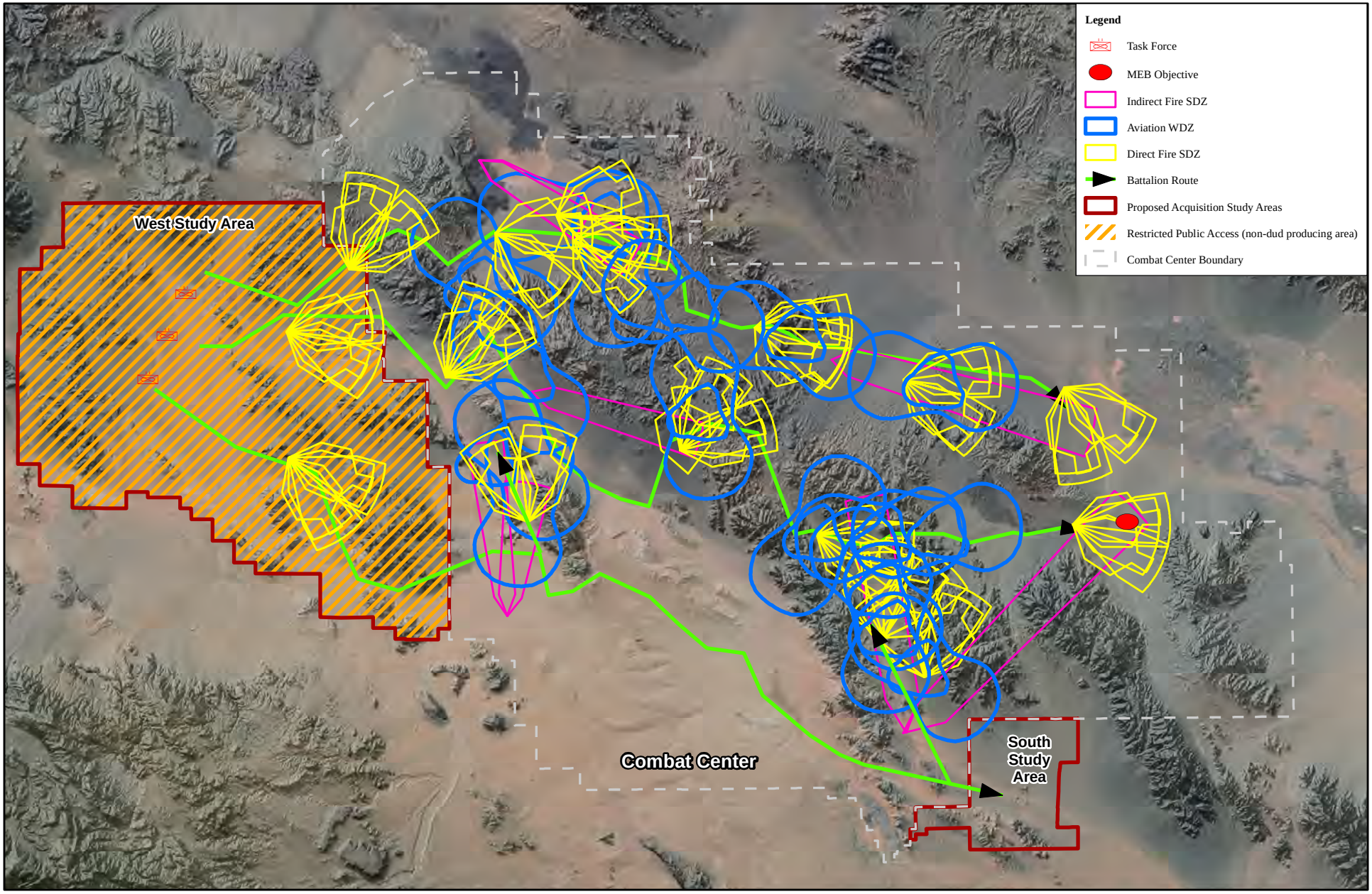
Flight activities associated with the proposed MEB Exercises would be conducted in the same manner and within the same existing and proposed airspace configuration as described for Alternative 1. In addition, the average number of sorties and flight windows for each airspace unit would be identical to Alternative 1 (Table 2-8). Appendix D contains a more detailed summary of proposed aircraft operations within the proposed airspace for Alternative 4.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 2-8c
Alternative 4: Representative MEB Exercise Work-up Training Scenario



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 2-8d
Alternative 4: Representative MEB Final Exercise Scenario

N

MEB Building Block Training in the Acquisition Study Areas

Under Alternative 4, MEB Building Block training by individual units (up to a single Battalion) would be restricted to existing range areas, subject to availability, within the current Combat Center boundaries. The south study area would be used for maneuver and marshalling of units as described previously for Alternative 1.

2.4.5 Alternative 5

2.4.5.1 Proposed Land Acquisition

Figure 2-9a illustrates the acquisition study area for proposed land acquisition under Alternative 5. This alternative would require the acquisition of the west study area only, comprising approximately 180,353 acres (72,987 hectares) on the west side of the Combat Center.

2.4.5.2 Proposed Airspace Configuration

The proposed airspace configuration associated with Alternative 5 would be identical in structure, stratification, and utility as was described in Section 2.4.4 for Alternative 4. No changes to R-2501 would occur. This configuration is depicted graphically in Figure 2-9b. Flight operations associated with this alternative would be identical to Alternative 4 and are summarized in Appendix D.

Table 2-16 provides a summary of the lateral airspace footprint for Alternative 5 as compared to the area affected by existing designated airspace.

Table 2-16. Airspace Footprint for Alternative 5

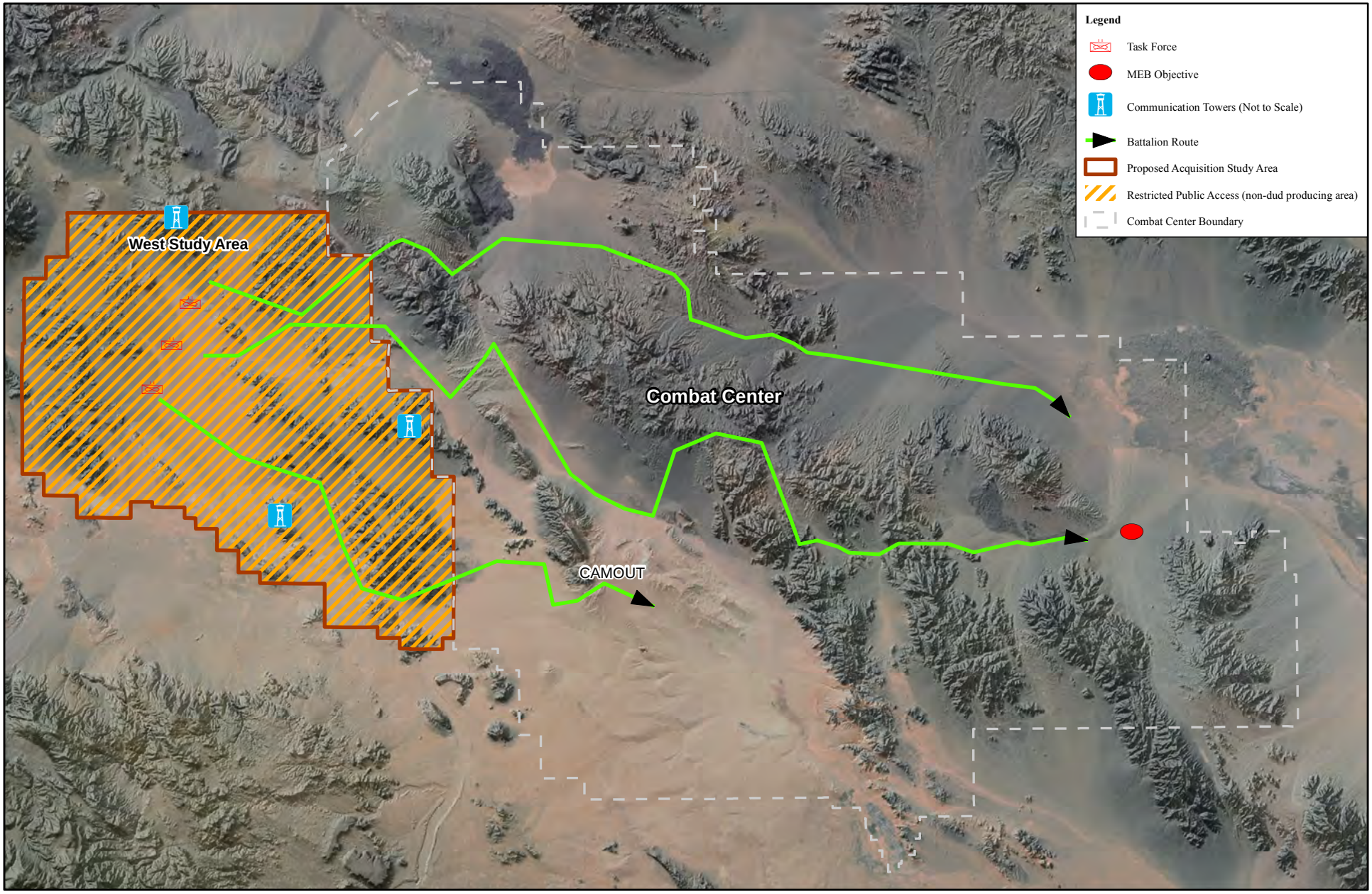
Airspace Area	Baseline Airspace (mi^2)	Alternative 5 (mi^2)
Existing Airspace Units		
R-2501	1,076	1,076
Sundance MOA/ATCAA	67	559
Bristol MOA/ATCAA	534	534
CAX Corridor (proposed MOA/ATCAA)	N/A	372
Turtle MOA/ATCAA	2,275	2,275
New Airspace Units		
R-XXXX	---	356
Johnson Valley MOA/ATCAA	---	183
Total	**3,952**	**5,355**

Notes: N/A = Not applicable. CAX corridor is not currently designated SUA.
ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; mi^2 = square mile; MOA = Military Operations Area.

2.4.5.3 Alternative 5 Training

Marine Expeditionary Brigade Exercise Training Program

Alternative 5 was designed to support a west-to-east direction of maneuver, with three battalion task forces assembling near the center of any land acquired within the west study area, and maneuvering eastward through commonly used corridors on the installation. Two of the battalions would converge at the MEB objective near the eastern edge of the current installation, while the southern battalion would terminate the exercise with training at the Combined Arms Military Operations on Urban Terrain (CAMOUT) facility located in the Gypsum Ridge Training Area (Figure 2-9a).

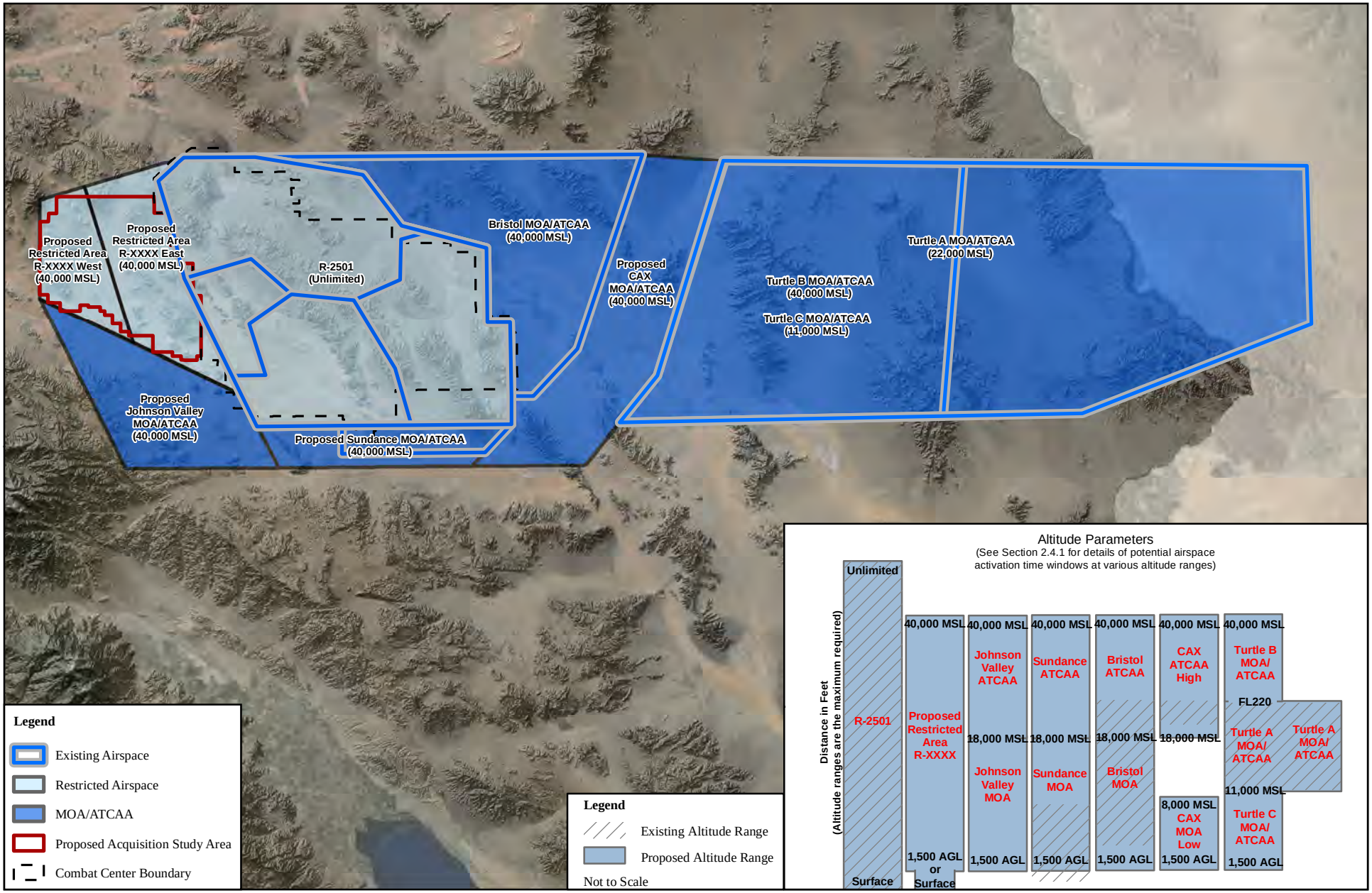


Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 2-9a
Alternative 5: Land Acquisition Study Area

N



Source: MAGTF Training Command 2009a

Figure 2-9b
Alternative 5: Airspace Establishment and Modification

The intent behind this alternative is to support restricted public access to the majority of acquired lands in Johnson Valley when MEB Exercises are not being conducted. Public access and use of such an area would only be authorized by the Marine Corps and would only be so authorized when the land is not being utilized for training. Specific proposed training restrictions and public access permitting procedures to be applied within any defined RPAA are described in Section 2.5.

Under Alternative 5, the RPAA would correspond to all of the acquired land in the west study area, with the exception of two 984 by 984-foot (300 by 300-meter) areas permanently designated as "Company Objective" areas. The two Company Objective areas would remain closed to public access/use year-round and would be clearly marked accordingly. Section 2.5 describes in more detail the proposed locations and management/use of Company Objective areas within the RPAA.

Table 2-15 lists various types of non-dud producing munitions that would be used. Alternative 5 would include two MEB training exercises per year, each consisting of 24 consecutive days of training. Allowing for pre-exercise range preparation, post-exercise range sweep and clearance, and public access certification, the RPAA would be closed to the public for approximately 2 months (60 days) per year, and available for public recreation for the remaining 10 months of the year.

The template for the MEB Exercise was described in detail in Section 2.2.3. A generic but representative scheme of maneuver for the first 9 days of MEB Work-up evolutions under Alternative 5 is illustrated in Figure 2-9c. The generic scheme of maneuver for the Final Exercise rehearsal and the Final Exercise itself under Alternative 5 is illustrated in Figure 2-9d. Both of these figures illustrate a representative pattern of SDZs associated with the types of live-fire weapons that would be used during those phases of the MEB Exercise. The actual pattern would vary from exercise to exercise and from day to day within each MEB Exercise to sustain optimal freedom of action for the commanders that devise the specific training plan each day.

Marine Expeditionary Brigade Exercise training under Alternative 5 would feature the same vehicles, weapons, munitions, and aircraft use as described in Section 2.4.1 for Alternative 1, except that only non-dud producing munitions would be used within the RPAA in Johnson Valley.

Under Alternative 5, flight activities would be conducted in the same manner and within the same existing and proposed airspace configuration as described for Alternative 1. In addition, the average number of sorties and flight windows for each airspace unit would be identical to Alternative 1 (Table 2-8). Appendix D contains a more detailed summary of proposed aircraft operations within the proposed SUA for Alternative 5.

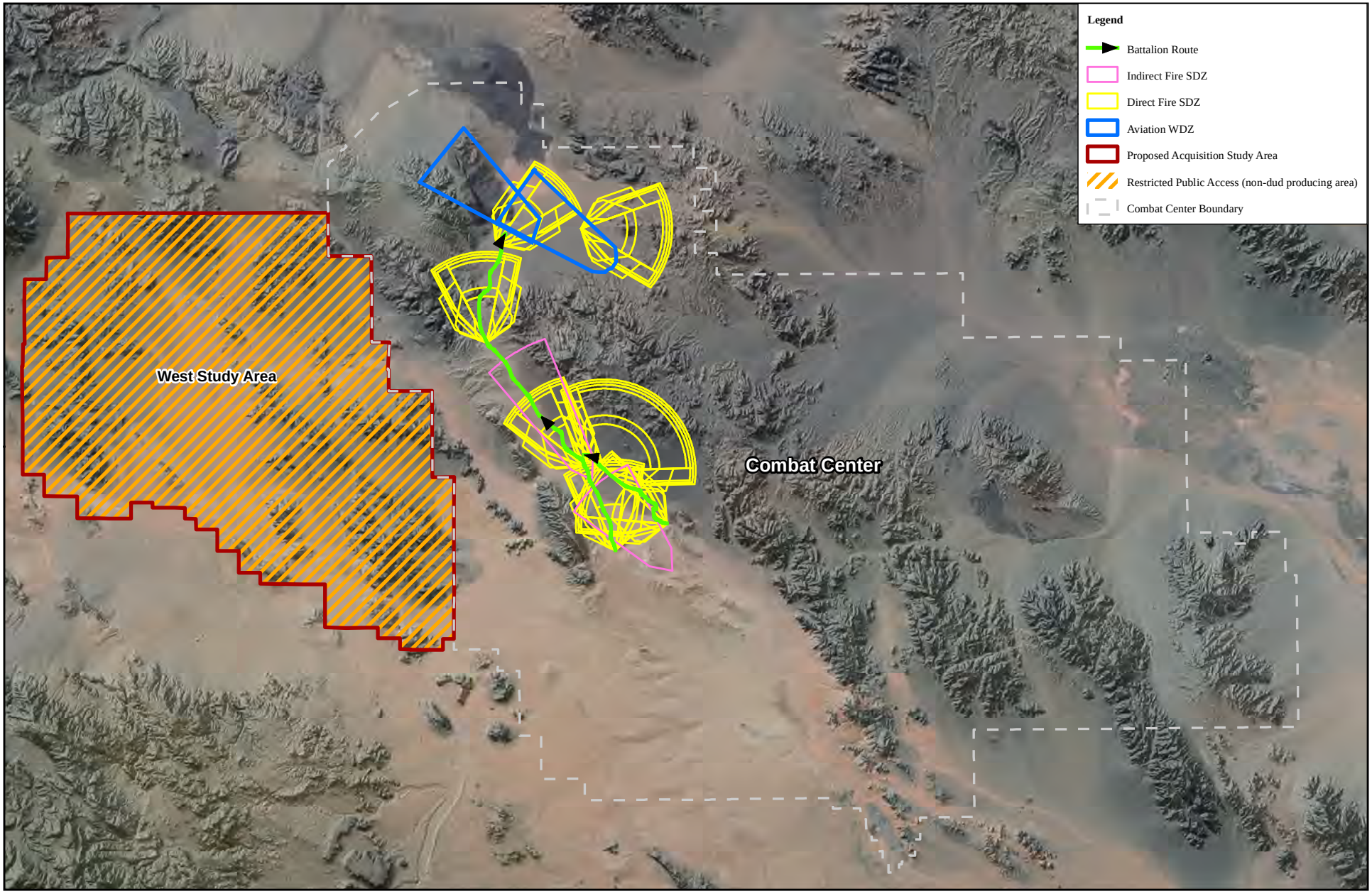
<u>MEB Building Block Training in the Acquisition Study Area</u>

Under Alternative 5, MEB Building Block training by individual units (up to a single Battalion) would be restricted to existing range areas, subject to availability, within the current Combat Center boundaries.

2.4.6 Alternative 6 (Preferred Alternative)

2.4.6.1 Proposed Land Acquisition

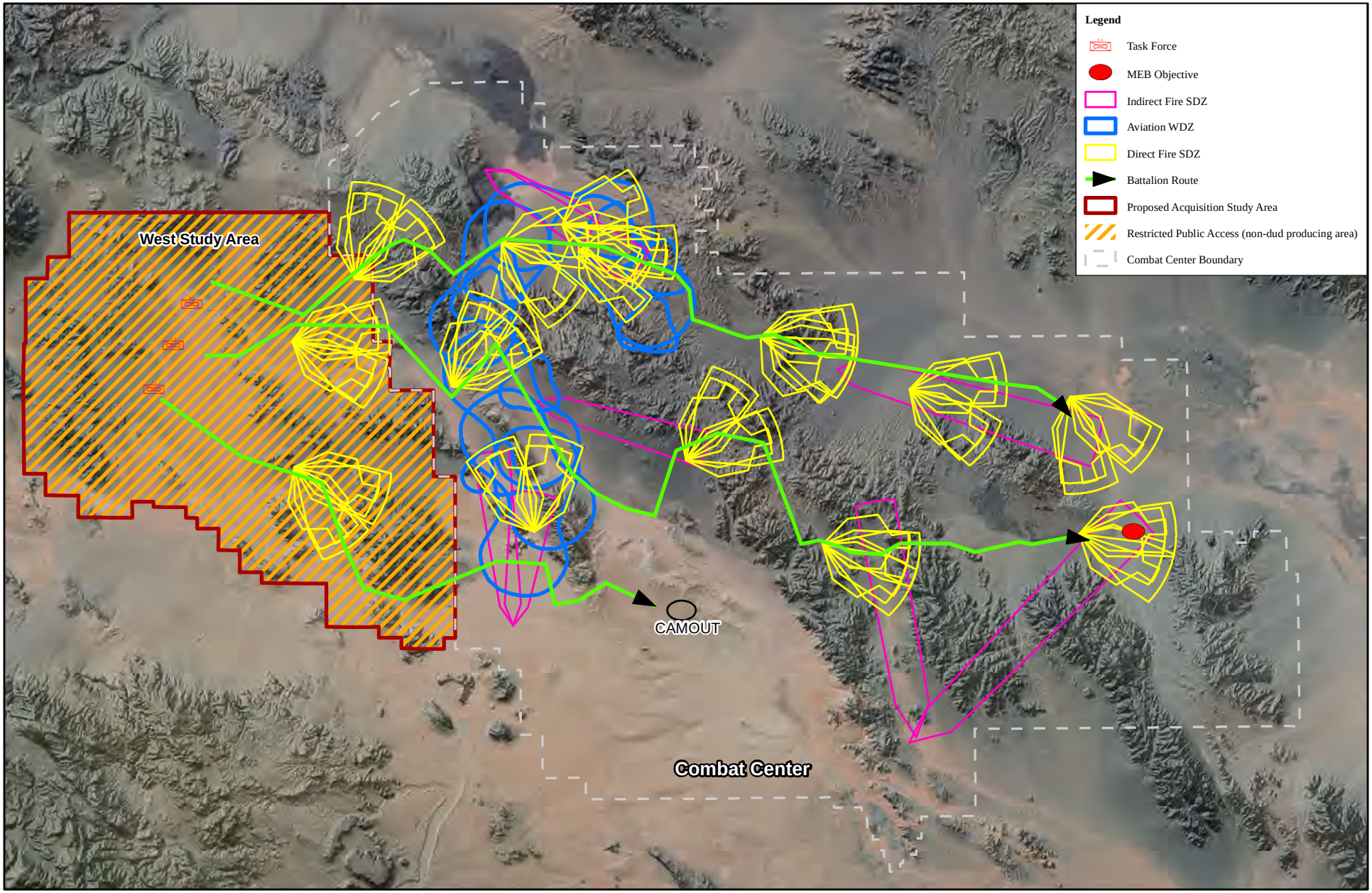
Figure 2-10a illustrates the acquisition study area for proposed land acquisition under Alternative 6. This alternative would require the acquisition of approximately 146,667 acres (59,354 hectares) in the west study area and approximately 21,304 acres (8,621 hectares) in the south study area. In the case of Alternative 6, the land acquired within the west study area in Johnson Valley would be divided into two areas (Figure 2-10a):



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 2-9c
Alternative 5: Representative MEB Exercise Work-up Training Scenario

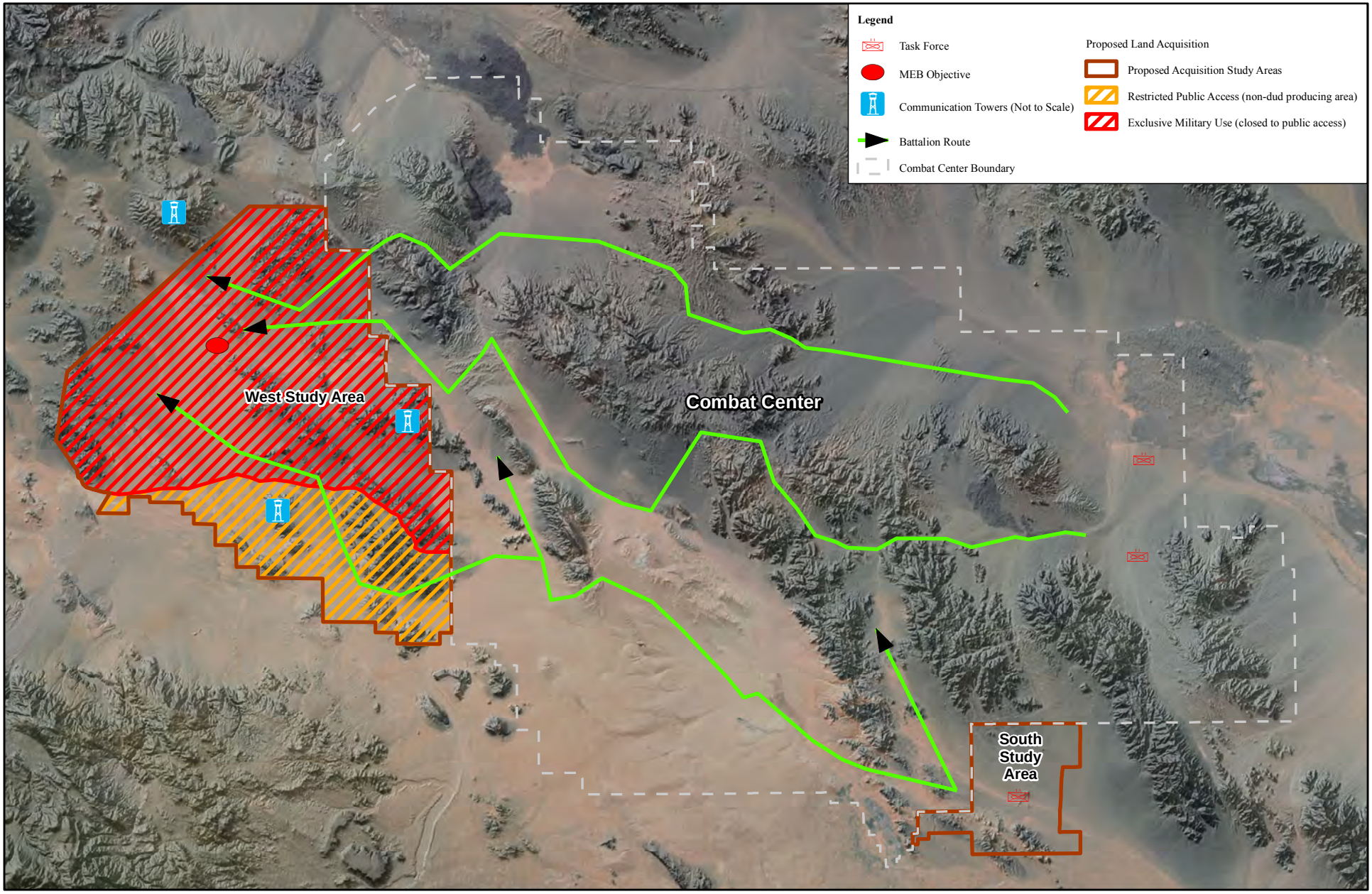


Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 2-9d
Alternative 5: Representative MEB Final Exercise Scenario

N



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 2-10a
Alternative 6: Land Acquisition Study Area

N

- Restricted Public Access Area. This approximately 38,137-acre (15,433-hectare) area would be open for restricted public access and use (subject to restrictions described in Section 2.5) during periods when the MEB Exercise is not occurring. During MEB Exercise periods (approximately 60 days/year) it would be closed to public use. Additionally, during MEB training, only non-dud producing ordnance would be used in this area (see Table 2-15).
- Exclusive Military Use Area. This approximately 108,530-acre (43,920-hectare) area would be used in support of MEB Exercises and MEB Building Block training. Dud-producing, as well as non-dud producing, ordnance would be used in this area, as described in more detail in Section 2.5.

2.4.6.2 Proposed Airspace Configuration

The proposed airspace configuration associated with Alternative 6 would be identical in structure, stratification, planned activation, and utility as was described in Section 2.4.1 for Alternative 1. As described under Alternative 1, no changes to R-2501 would occur. This configuration is depicted graphically in Figure 2-10b. Flight operations associated with this alternative would be identical to Alternative 1 (and summarized in Appendix D) except that airspace activation and use for MEB Building Block training would be focused within the Exclusive Military Use Area and not the RPAA. Table 2-17 provides a summary of the lateral airspace footprint for Alternative 6 as compared to the area affected by existing designated airspace.

Table 2-17. Airspace Footprint for Alternative 6

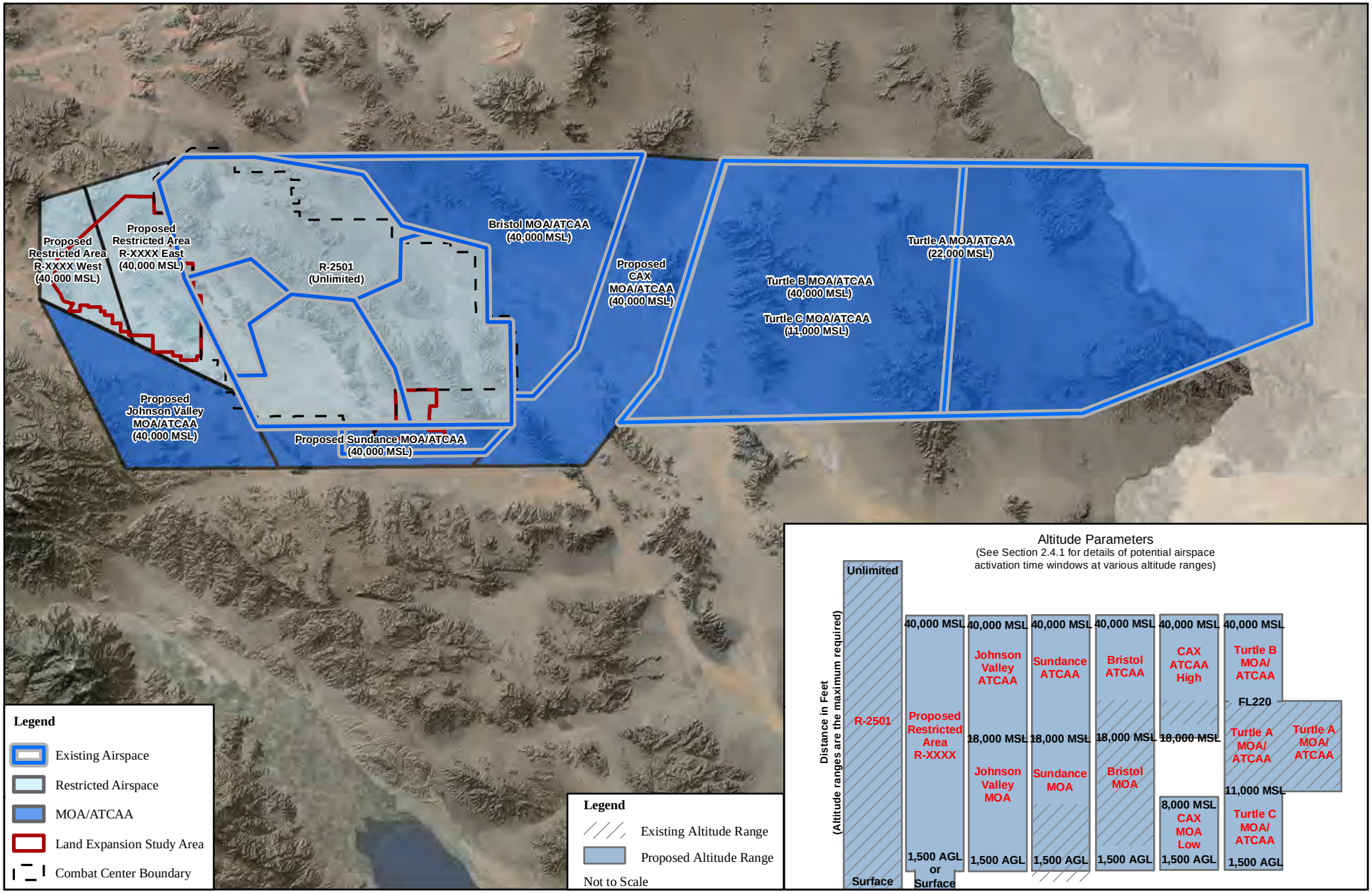
Airspace Area	Baseline Airspace (mi^2)	Alternative 6 (mi^2)
Existing Airspace Units		
R-2501	1,076	1,076
Sundance MOA/ATCAA	67	559
Bristol MOA/ATCAA	534	534
CAX Corridor (proposed MOA/ATCAA)	N/A	372
Turtle MOA/ATCAA	2,275	2,275
New Airspace Units		
R-XXXX	---	356
Johnson Valley MOA/ATCAA	---	183
Total	**3,952**	**5,355**

Notes: N/A = Not applicable. CAX corridor is not currently designated SUA.
ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; mi^2 = square mile; MOA = Military Operations Area.

2.4.6.3 Alternative 6 Training

Marine Expeditionary Brigade Exercise Training Program

Alternative 6 would support an east-to-west direction of maneuver, with two battalion task forces assembling near the eastern edge of the existing Combat Center boundary, and the third battalion assembling in land acquired in the south study area. All three task forces would maneuver westward through commonly used corridors on the installation and converge at the MEB objective located in about the middle of the proposed west study area.



Source: MAGTF Training Command 2009a

Figure 2-10b
Alternative 6: Airspace Establishment and Modification

The intent behind Alternative 6 is to achieve almost the same training advantages as provided by Alternative 1, but also support restricted public access to a substantial portion of acquired lands in Johnson Valley when MEB Exercises are not being conducted. Public access and use of such an area would only be authorized by the Marine Corps and would only be so authorized when the land is not being utilized for training. Specific proposed training restrictions and public access permitting procedures to be applied within any defined RPAA are described in Section 2.5.

Under Alternative 6, approximately 38,137 acres (14,811 hectares) in the southern part of the west study area would be designated and managed as an RPAA. Two areas within the RPAA, each measuring 984 by 984 feet (300 by 300 meters), would be permanently designated as "Company Objective" areas that would remain closed to public access/use year-round. Section 2.5 describes in more detail the proposed locations and management/use of Company Objective areas within the RPAA.

Alternative 6 would include two MEB training exercises per year, each consisting of 24 consecutive days of training. Allowing for pre-exercise notification, set-up, and post-exercise range sweep and clearance, the RPAA would be closed to the public for approximately 2 months (60 days) per year, and available for public recreation for the remaining 10 months of the year.

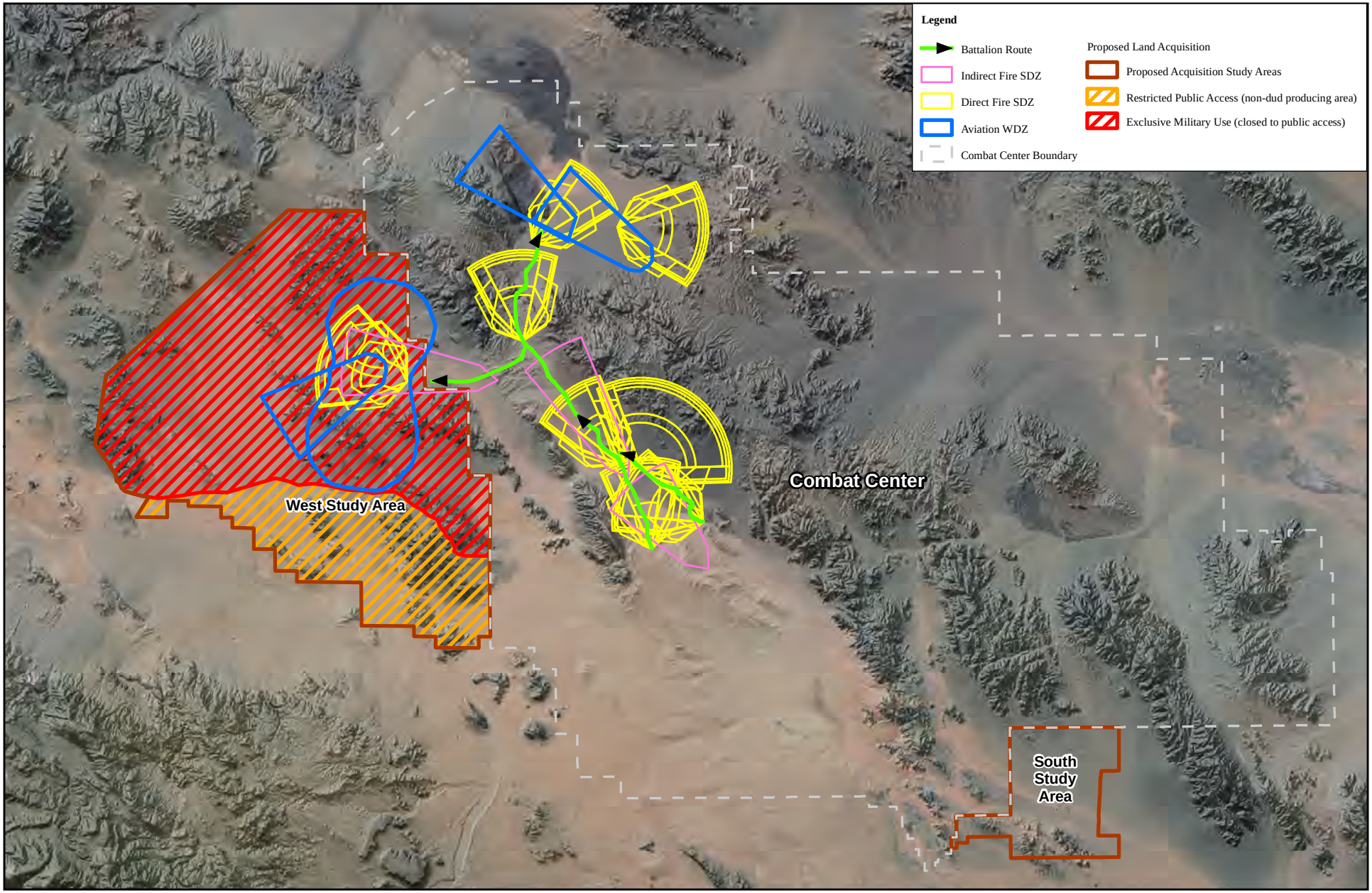
The template for the MEB Exercise was described in detail in Section 2.2.3. A generic but representative scheme of maneuver for the first 9 days of MEB Work-up evolutions under Alternative 6 is illustrated in Figure 2-10c. The generic scheme of maneuver for the Final Exercise rehearsal and the Final Exercise itself under Alternative 6 is illustrated in Figure 2-10d. Both of these figures illustrate a representative pattern of SDZs associated with the types of live-fire weapons that would be used during those phases of the MEB Exercise. The actual pattern would vary from exercise to exercise and from day to day within each MEB Exercise to sustain optimal freedom of action for the commanders that devise the specific training plan each day.

Marine Expeditionary Brigade Exercise training under Alternative 6 would feature the same vehicles, weapons, munitions, and aircraft use as described in Section 2.4.1 for Alternative 1, except that only non-dud producing munitions would be used within the RPAA of any acquired Johnson Valley land (see Table 2-15).

Under Alternative 6, flight activities associated with the proposed MEB Exercises would be conducted in the same manner and within the same existing and proposed airspace configuration as described for Alternative 1. In addition, the average number of sorties and flight windows for each airspace unit would be identical to Alternative 1 (see Table 2-8). Appendix D contains a more detailed summary of proposed aircraft operations within the proposed SUA for Alternative 6.

<u>MEB Building Block Training in the Acquisition Study Areas</u>

Under Alternative 6, MEB Building Block training activities would be conducted in the west study area by individual units (up to a single battalion in size) preparing for the MEB Exercise (as described in Section 2.4.1 for Alternative 1), but only in the exclusive military use area. The remaining portion of the west study area would be designated as an RPAA and no unit training would occur in that area. The associated SDZs for the 4-day MEB Building Block training evolution in the exclusive military use area are shown in Figure 2-10e. The south study area would be used for maneuver and marshalling of units as described previously for Alternative 1.

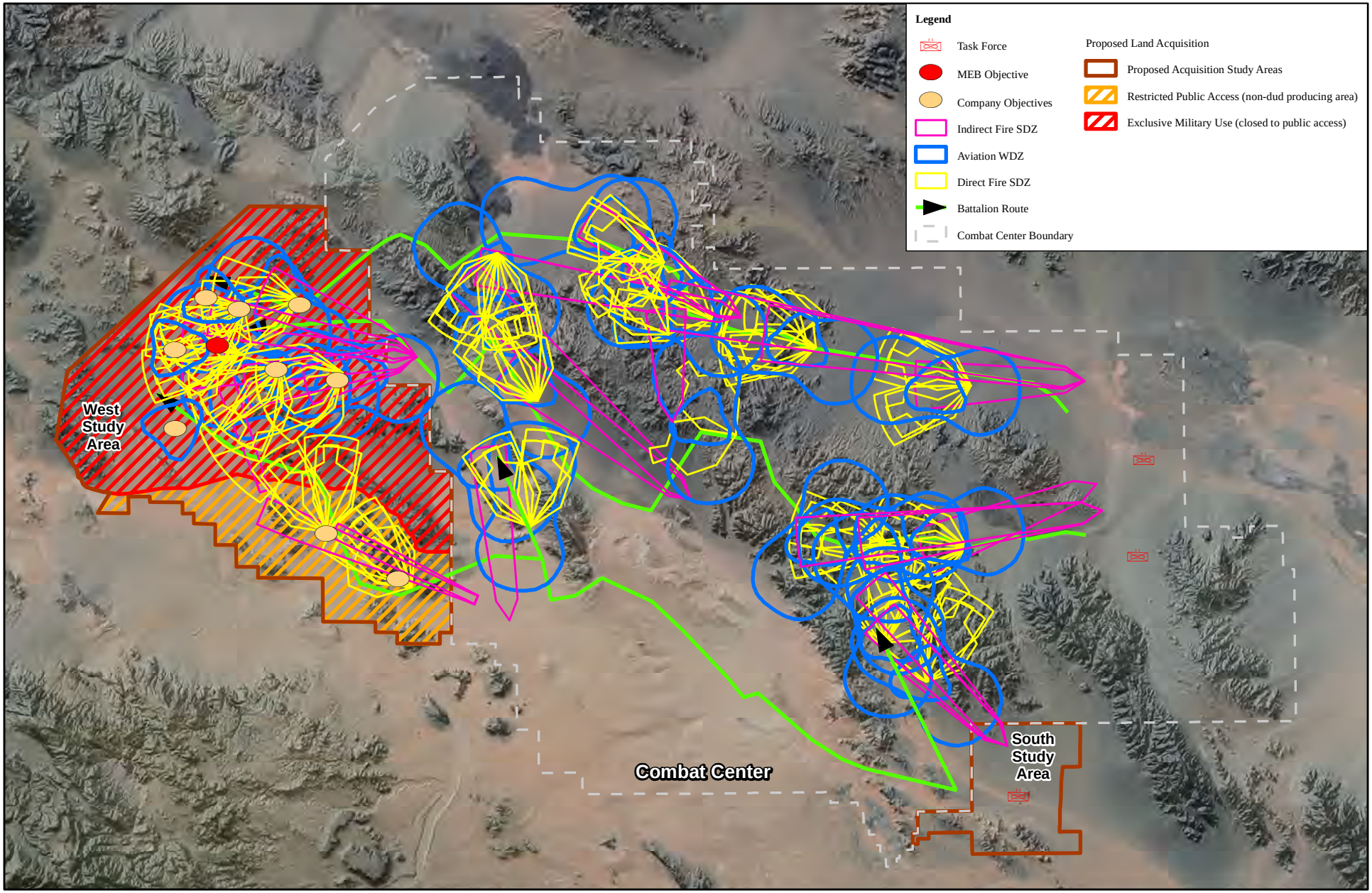


Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 2-10c
Alternative 6: Representative MEB Exercise Work-up Training Scenario

N

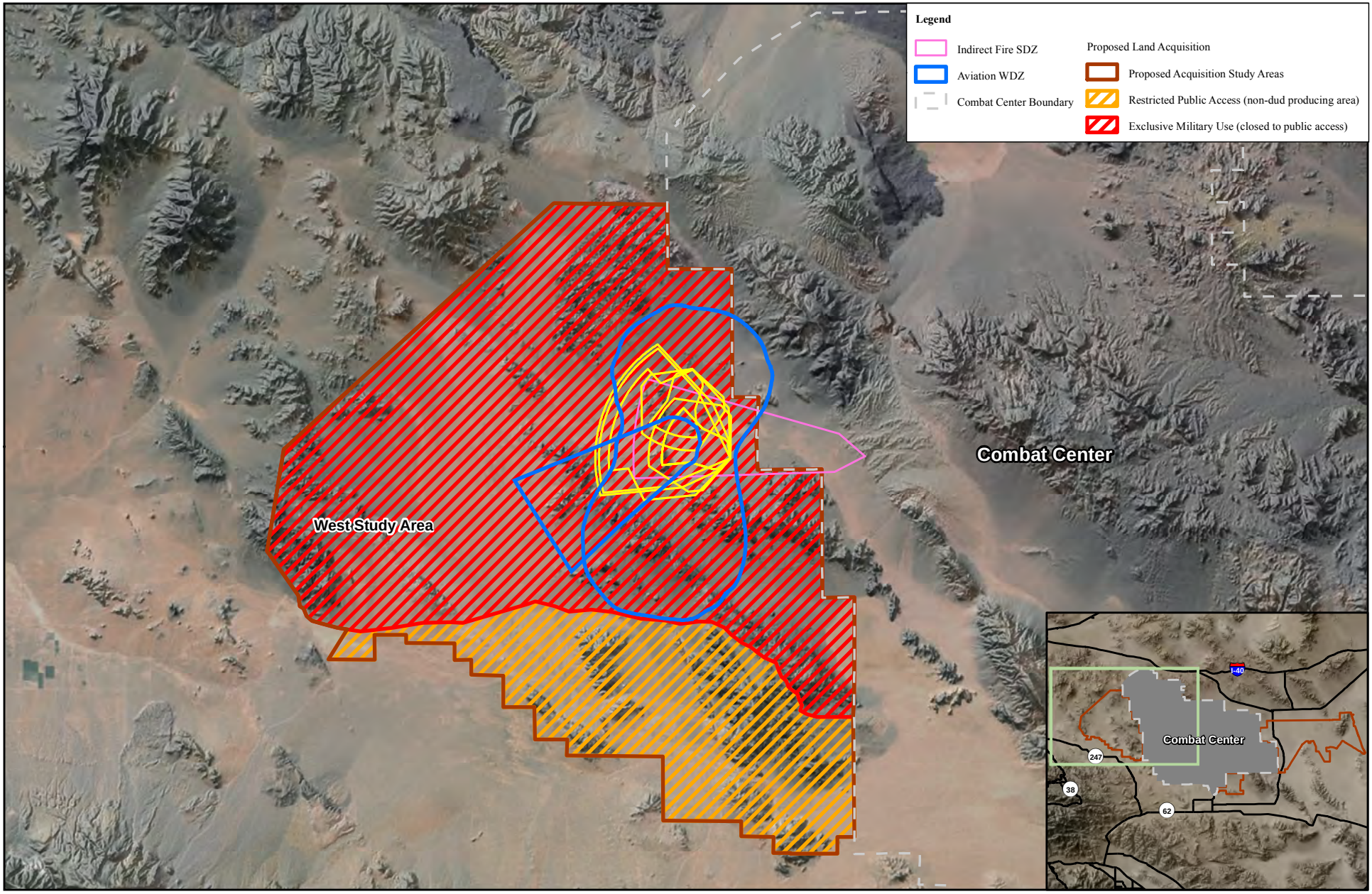


Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 2-10d
Alternative 6: Representative MEB Final Exercise Scenario

N



Kilometers
0 1.5 3 6
0 1.5 3 6
Miles
Source: MAGTF Training Command 2009a

Figure 2-10e
Representative MEB Building Block Training Footprint Associated With Alternative 6

N

2.4.7 No-Action Alternative

Analysis of the No-Action Alternative provides a baseline that enables decision-makers to evaluate the environmental consequences of the proposed action and alternatives. The CEQ regulations (40 CFR 1502.14[d]) requires an EIS to analyze the No-Action Alternative. "No action" means that an action would not take place, and the resulting environmental effects from taking no action would be compared with the effects of allowing the proposed action to go forward.

Under the No-Action Alternative, the Marine Corps would not establish a large-scale training facility to accommodate sustained, combined-arms, live-fire, and maneuver training exercises for a MEB-sized MAGTF. The Combat Center at Twentynine Palms would continue to support other ongoing CAX programs and training for at most two battalions (as well as smaller units and individual Marines), but the Marine Corps would be unable to adequately train MEB-sized MAGTFs, resulting in unacceptable deficiencies in mission readiness and capabilities at the MEB level. A MEB-sized MAGTF training environment has both operational and tactical requirements to fully support sustained, combined-arms, live-fire, and maneuver training. In addition, operational responsibilities that allow the Marines to manage multiple battles over large space and time are required. However, under the No-Action Alternative these requirements would not be met. Furthermore, the tactical MEB training area considers the training audience and the tactical functions that the training environment must support (movement, maneuver, fires). At present, the geography at the Combat Center channelizes individual battalions and separates multiple battalion movement and maneuver. Additionally, battalions have to reposition after 12 to 24 hours of training due to the limited length of corridors. Implementation of the No-Action Alternative would not support realistic full-unit ground and fires training for the required three battalion MEB-sized MAGTF and would not allow the Marine Corps to effectively improve the capabilities and readiness of its MEBs to defend the interests of the U.S. and its allies in the 21st century.

The No-Action Alternative would not meet the purpose of or need for the proposed action, but is carried forward as a baseline from which to compare the impacts of the proposed action and alternatives.

2.4.8 Preferred Alternative

Based on the analysis presented in this EIS, the Marine Corps has selected Alternative 6 as the Preferred Alternative. This determination is based on the training value afforded by Alternative 6 and the amount of land area that would still be available and accessible to the public for recreational purposes. In addition, Alternative 6 minimizes the impact to local and regional ground transportation and reasonably protects human health and safety.

As discussed in Section 2.2.1, the *threshold requirements* for an alternative to be considered feasible are:

- Independent, offensive maneuver of three battalion task forces abreast and associated air combat element operations, with at least two of the three battalion task forces converging on a single MEB objective;
- 48-72 hours of continuous offensive operations by all three task forces; and
- Integrated air and ground maneuver live-fire with optimized freedom of action to the greatest extent practicable considering operational range capabilities and munitions safety requirements.

Accordingly, an action alternative must be capable of providing land and associated airspace necessary to meet these minimum criteria. All six action alternatives meet these minimum criteria.

As also discussed in Section 2.2.1, the *objective requirements* for evaluating the desirability of an alternative are:

- Independent, offensive maneuver of three battalion task forces abreast and associated air combat element operations, with the three battalion task forces converging on a single MEB objective;
- 48-72 hours of continuous offensive operations by the three battalion task forces as they converge on a single MEB objective; and
- Integrated air and ground maneuver live-fire with optimized freedom of action to the greatest extent practicable considering operational range capabilities and munitions safety requirements.

The operational desirability of each alternative was weighed against these optimal criteria and is discussed below in order from least desirable to most desirable.

From the description of each alternative in Section 2.4, it is clear that Alternatives 4 and 5, while meeting minimum requirements, would not allow all three battalion task forces to converge on a single MEB objective. In addition, Alternatives 4 and 5 only minimally meet Screening Criteria 3 and 8 to provide open and unconstrained MEB training. Accordingly, from an operational perspective, these two alternatives are the least desirable.

Alternative 3 would afford an opportunity for at least two battalion task forces to converge on a single MEB objective. However, terrain features of the east study area (e.g., dry lake beds and Amboy Road) limit the ability to fire and maneuver in this acquisition study area. The two battalion task forces operating within the east study area would be funneled between the dry lake bed and the Sheephole Wilderness area. Furthermore, these two battalion task forces would have to administratively cross Amboy Road at hardened crossings. Live-fire would be restricted in the east study area to safeguard civilian traffic on Amboy Road. Accordingly, these terrain features reduce the desirability of Alternative 3 from an operational perspective.

With a considerable loss of freedom of action and flexibility, Alternative 2 would afford an opportunity for all three battalion task forces to converge on a single MEB objective. The west study area is sized to reduce the area of Johnson Valley to be acquired so that a greater portion of the Johnson Valley OHV area would remain. The reduced size of the west study area requires the MEB objective to be located further east than an optimal placement. In addition, location of the west boundary of this acquisition study area, without consideration of terrain features, increases the likelihood of unauthorized access by the public onto a range area, thus increasing the risk of potential harm to the public and increasing the potential to cause a pause during training to remove unauthorized persons from the training area. While this risk could be mitigated, the suboptimal location of the MEB objective and increased risk to human health and safety reduces the desirability of this alternative from an operational perspective.

Alternative 6 would afford an opportunity for all three battalion task forces to converge on a single MEB objective. The designation of a portion of the west study area as an RPAA would require the Marine Corps to limit the use of dud-producing ordnance. While this restriction still meets the optimal requirements for MEB training, this restriction prevents this alternative from being the best alternative from an operational perspective.

Alternative 1 would meet all optimal requirements with no training restrictions. Accordingly, it is the best alternative from an operational perspective.

The environmental effect of each alternative was also considered in determining the preferred alternative. Impacts on the following resources, as identified during the scoping process, were emphasized: (1)

human health and safety, (2) local and regional transportation infrastructure and use, and (3) public access for recreation. Impacts on airspace management, noise, water resources, geological resources, visual resources, and transportation would be very similar under all action alternatives.

Alternative 1 would remove a substantial portion of the Johnson Valley OHV Area from public access, causing a greater adverse impact on recreation and socioeconomics than would other alternatives. This alternative would minimize the risk to human health and safety as it largely follows terrain features, easing the effort necessary to prevent unauthorized public entry into range areas. Impacts on biological resources would be higher than for some alternatives and lower than for others. In addition, there would be no significant impacts to the local and regional transportation infrastructure.

Alternative 2 would have the greatest impact to public health and safety due to the risk of unauthorized access onto a range. However, this impact could be mitigated to an acceptable level through public education and outreach, and by law enforcement patrols to limit unauthorized access. Compared to Alternative 1, however, this alternative would retain public access to a large portion of the Johnson Valley OHV Recreation Area, likely reducing dispersion of unauthorized OHV impacts to new areas. Adverse impacts on recreation, socioeconomics, and biological resources would be similar to, but lower than, Alternative 1 due to fewer acres being proposed for acquisition.

Alternative 3 would retain complete public access to the Johnson Valley OHV Area and therefore would have the least adverse impact on recreation. Alternative 3 would have lower adverse impacts on desert tortoises but higher adverse impacts on some sensitive species. Alternative 3 would have both adverse and beneficial impacts on socioeconomics; there would be less adverse impact on businesses that depend on OHV recreation but greater adverse impact on cultural resources, operating mines, agriculture, water operations, railroad, gas infrastructure (pipelines), and a significant impact on the use of Amboy Road by the general public. Amboy Road is the principal route between Twentynine Palms, California and the I-40 corridor to the north.

Alternatives 4 and 5 would afford restricted public access to the Johnson Valley OHV Recreation Area. Alternative 5 would have lower adverse impacts on biological resources than would Alternatives 1, 2, 4, and 6 since MEB Building Block training would not be conducted in the west study area and the south study area would not be acquired. Furthermore, the overall exercise design and direction of maneuver would result in lower adverse impacts. Alternatives 4 and 5 would have greater adverse impacts on air quality and cultural resources due to continued OHV impacts in the RPAAs. Both alternatives would minimize the risk to human health and safety.

Compared to Alternatives 1 and 2, Alternative 6 would retain public access to a large portion of the Johnson Valley OHV Area, and would have no significant impact on the local and regional transportation infrastructure. This alternative has a higher potential risk to human health and safety, primarily associated with managing public recreation on the RPAA. However, these potential human health and safety considerations are outweighed by the increased public access. Compared to other alternatives, Alternative 6 would have high adverse impacts on air quality, cultural resources, and biological resources due to continued OHV impacts in the RPAAs and new military training in the exclusive use areas. The Marine Corps also developed numerous SCMs and mitigation measures, including those resulting from consultation with cooperating agencies and regulating agencies, to reduce adverse environmental impacts.

From an operational perspective, the best alternative is Alternative 1. Alternative 5 is the environmentally preferable alternative. However, Alternative 5 is a very poor alternative from an operational perspective. Alternative 6, while not the best alternative from either an operational or environmental impact perspective, is the optimal alternative given both the operational and environmental

impact factors considered together. Consequently, Alternative 6 is the Marine Corps' Preferred Alternative. This determination is based on the training value afforded by Alternative 6 and the amount of land area that would still be available and accessible to the public for recreational purposes, *subject to the restrictions identified in Section 2.5*.

2.5 MANAGEMENT OF RPAAS UNDER ALTERNATIVES 4, 5, AND 6

Alternatives 4 and 5 were introduced to the public during the EIS scoping period (October 2008 – January 2009). Following the conclusion of scoping, Alternative 6 was developed in response to public comment and key stakeholder input. The intent of all three alternatives was to create an area within which the Marine Corps could meet the live-fire and maneuver objective training requirements for a MEB, while maintaining public access to as much of the Johnson Valley area as possible for recreational uses.

These alternatives would achieve several key management objectives:

- Provide for continued use of certain public lands historically used for outdoor recreation and other pursuits, including OHV use, film production, and other public uses compatible with Marine Corps seasonal and priority use of the area for MEB training.
- Reduce distances traveled by the public to enjoy outdoor recreation activities within the Mojave Desert.
- Reduce the potential for migration of off-highway activities to environmentally sensitive areas.
- Provide for public safety while reducing potential conflicts with military training operations through the use of proactive mechanisms for scheduling, permitting, education, and notification.
- Provide resource management opportunities by enhancing cooperation between the Department of the Interior and Department of Defense (DoD).
- Strengthen mechanisms to monitor the progress of planned resource management actions in a collaborative and cooperative fashion between federal/state agencies and public land users.

Alternatives 4, 5, and 6 would allow for restricted public access to portions of the west study area in Johnson Valley. For the purposes of this EIS, an ***RPAA*** is defined as an area in which certain public uses may be permitted, subject to restrictions, institutional controls, and mitigating methods designed to provide for public safety. An RPAA would consist of withdrawn public land managed by the Marine Corps, and is designated for priority seasonal use for military training. During Marine Corps training activities in the RPAA, only certain types of non-dud producing ordnance would be used (see Table 2-15). Access to and use of the area by the general public would only be authorized by the Marine Corps and would only be so authorized when the land is not being utilized for training, and has been designated by the Commanding General as suitable for restricted activities to resume. Conversely, an ***exclusive military use area*** is defined as an area in which public access is prohibited at all times and military use may occur at any time. Dud-producing ordnance would be used in the exclusive military use area and the area would not receive the same level of range sweep and clearance (as discussed further below) as would the RPAAs.

Under Alternatives 4, 5, and 6, the Marine Corps proposes the establishment and exclusive military use of two specific 984 by 984-foot (300 by 300-meter) areas within the designated RPAA for each alternative, which would serve as "Company Objectives" during MEB Exercises. These areas would be clearly marked for exclusive military use and would not be made available for restricted public access at any time. Given the desire to accommodate restricted public access in as much of the acquired land area as

possible, establishment of these Company Objective areas is essential to maintaining an appropriate level of realism and training value in the design and conduct of MEB Exercises under these alternatives.

While similar Company Objective areas would also be established under Alternatives 1, 2, and 3, they are not discussed here because they would not be within an RPAA. Therefore, they do not receive focused attention in the description of those alternatives.

Figure 2-11 shows the proposed locations for the two Company Objective areas under Alternatives 4 and 5 (in which all of the west acquisition area would become an RPAA when training exercises are not being conducted), and the proposed locations of two Company Objective areas in the designated RPAA under Alternative 6.

It is anticipated that the RPAA would be closed to the public twice yearly, for approximately 30 days each time. This would allow for required range preparation, execution of training, and range clearance and public access certification. These periods would be well advertised and published a minimum of 60 to 90 days in advance.

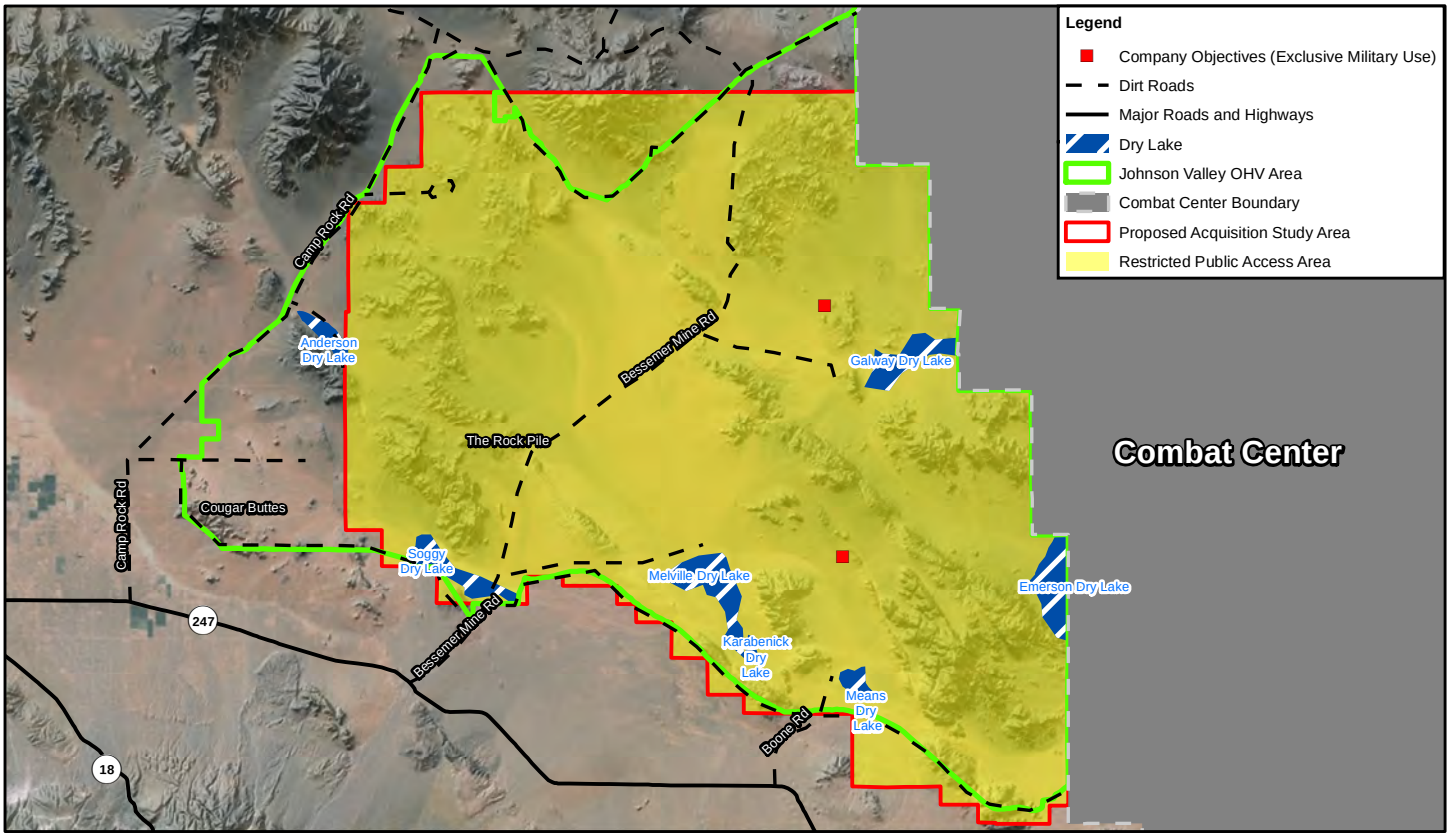
Upon any alternative being selected for acquisition, planning as discussed in Section 2.5.6 would include numerous meetings and coordination with BLM, U.S. Fish and Wildlife Service (USFWS), OHV groups, and any other stakeholders to ensure all procedures are achievable or modified in accordance with the Recreation planning. An RPAA Management Group would be established to assist the Commanding General with ongoing management of recreational activities on Marine Corps managed lands. .

The remainder of this section describes: 1) the training operations that would occur within the RPAAs for Alternatives 4, 5, and 6; 2) pre-exercise range control and management procedures that would be implemented in the RPAA; 3) post-exercise procedures to enhance public safety in RPAAs; 4) a proposed process for public outreach regarding the RPAA; 5) an overview of allowable public uses in the RPAA; and 6) the implications for future management planning within the RPAA.

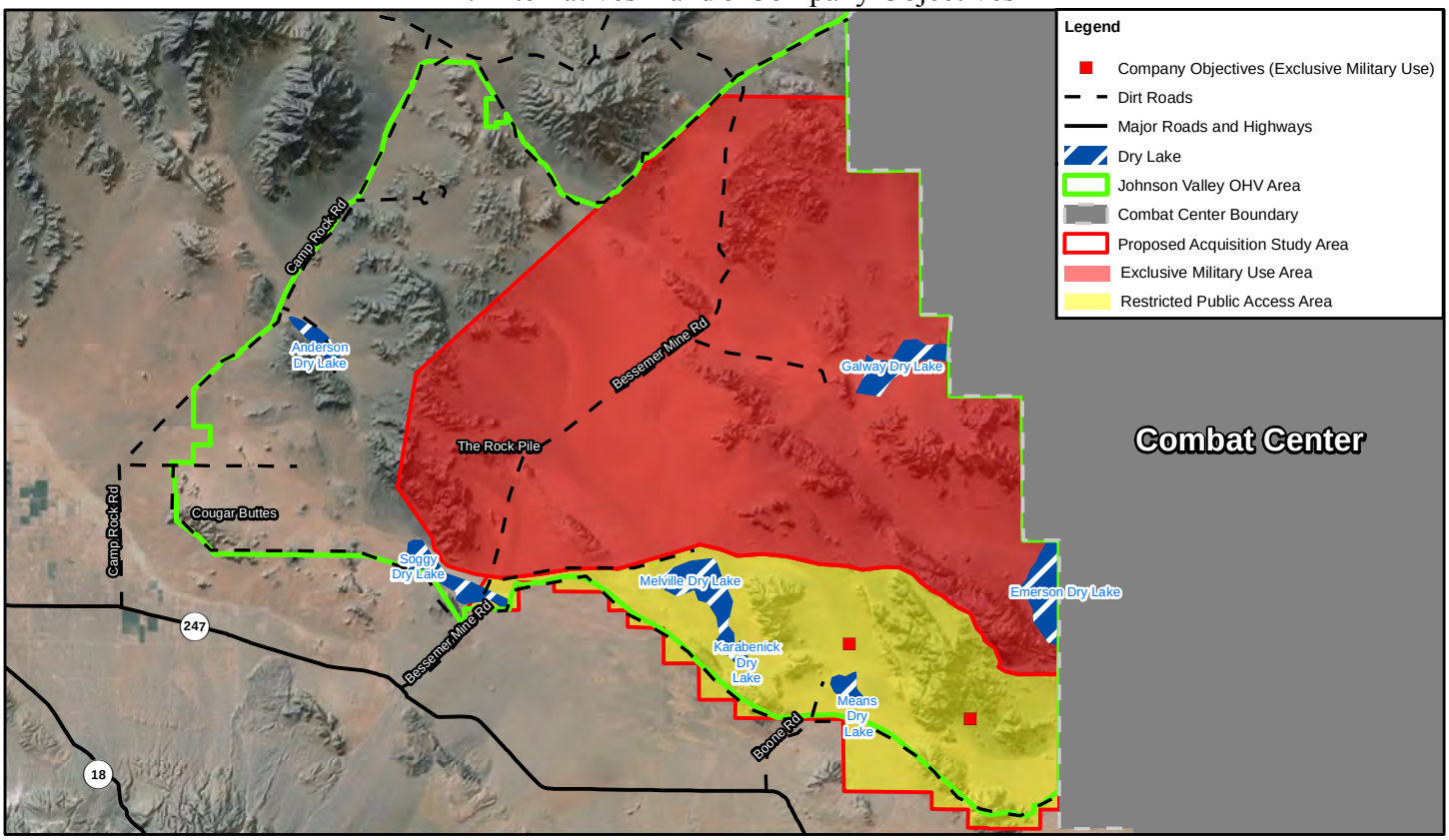
2.5.1 MEB Exercise Operations Within the RPAA

2.5.1.1 Alternative 4 and 5 Training Description

Under Alternatives 4 and 5, the MEB would occupy initial positions within the RPAA before commencement of the Final Exercise (Work-up training before the Final Exercise would occur within the existing Combat Center range complex – see Figures 2-8c and 2-8d). On order, the MEB would attack east towards the MEB objective. While still within the RPAA, the three battalion task forces would attack the two designated Company Objective areas (Figure 2-11). These areas would consist of trench lines, obstacles, and bunkers within a 984 by 984-foot (300 by 300-meter) area. During the event, temporary targets and battlefield effects simulators would be utilized to enhance realism. While the exercise forces operate in the RPAA, detailed information about the routes of advance and firing positions used by each force unit would be tabulated by exercise controllers using Global Positioning Systems (GPSs). Exercise controllers would document what training took place in the RPAA and exactly where, with particular emphasis on any live-fire operations.



A. Alternatives 4 and 5 Company Objectives



B. Alternative 6 Company Objectives

Kilometers
0 1.5 3 6
0 1.5 3 6
Miles

Figure 2-11
Proposed Locations of Company Objective Areas within the RPAA for Alternatives 4, 5, and 6

N

Artillery, mortar, and aviation fires would originate from within and above the RPAA with impacts into the existing range complex. These fires would be both dud and non-dud producing. All fires that are intended to impact in the RPAA would be non-dud producing only.

All fires in the RPAA would be either into the Company Objective areas or into the existing range complex. Fires from or over the RPAA into the existing range complex may be dud-producing. Allowable ammunition (inert practice rounds only) includes: 5.56mm, 7.62mm, .50 caliber (cal), 25mm, and 40mm. Rotary-wing aircraft would use 7.62mm, .50 cal and 20mm practice rounds only. Fixed-wing aircraft would only employ MK-76 and Bomb Dummy Unit (BDU)-45s, without marking charges.

Inside each Company Objective area, limited use of grenades, Bangalore torpedoes, and explosives could be authorized. These areas would be cleared by appropriate Explosive Ordnance Disposal (EOD) personnel after each training event. This would provide a high degree of confidence that dangerous ordnance have been cleared from these objective sites.

After appropriate actions at each Company Objective area, the battalion task forces would continue movement eastward as dictated by the exercise design. Once the battalion task forces have entered the existing range complex, they would employ both dud producing and non-dud producing ordnance.

2.5.1.2 Alternative 6 Training Description

Under Alternative 6, some MEB Exercise Work-up training would occur before the Final Exercise in the exclusive military use area of Johnson Valley (as well as in the existing Combat Center range complex – see Figure 2-10c), but no such operations would occur in the proposed RPAA. The only proposed operations that would affect the RPAA under Alternative 6 would be associated with the southernmost of the three battalion task forces that comprise the MEB during the Final Exercise. This battalion is referred to here as Task Force 3 (consisting of approximately 1,200 to 2,000 personnel and up to 200 tracked and wheeled vehicles).

On order, Task Force 3 would cross the line of departure in the south study area and attack north into Delta Training Area to secure task force objectives. Once secure, Task Force 3 would continue movement west and again attack north into Emerson Lake Training Area to secure additional task force objectives. Task Force 3 would continue into the RPAA where it would secure two Company Objective areas within the RPAA (Figure 2-11b) before continuing the attack into the exclusive military use area to converge simultaneously with Task Forces 1 and 2 on the MEB objective. Additionally, artillery units, up to a battalion, would occupy positions within the RPAA and fire into the exclusive military use area. All ordnance typically used by a MEB may be employed during the attacks. However, only non-dud producing and certain types of explosives (hand grenades, Bangalore torpedoes, C-4) would be fired into the RPAA.

Task Force 3 would conduct training activities through the RPAA primarily during the last day of the MEB Final Exercise (see Figure 2-10d). However, the area would be used during the preceding days of the Final Exercise for the insertion of reconnaissance before the battalion task force moving through. Reconnaissance would involve the placement of small teams of personnel that would not have ordnance with them other than emergency pyrotechnics. While Task Force 3 is operating in the RPAA, detailed information about the routes of advance and firing positions used by each exercise unit would be tabulated by exercise controllers using GPSs. Exercise controllers would document what training took place in the RPAA and exactly where, with particular emphasis on any live-fire operations.

The two Company Objective areas (984 by 984 feet [300 by 300 meters]) established at specific locations within the RPAA would support dismounted live-fire attacks by at least two of the rifle companies in the

infantry battalion. These objectives would primarily be composed of three integrated platoon-sized trench lines with some targets (composed of tires), obstacles, and bunkers. The trenches would be left in place as a permanent fixture and would be approximately 4 to 6 feet (1.8 meters) deep and 3 to 5 feet (0.9 to 1.5 meters) wide. During the event, temporary targets and battlefield effects simulators would be utilized to enhance realism. Marine Corps rifle companies would have approximately 200 personnel on foot. Only non-dud producing ordnance as delineated in Table 2-15 would be used. Inside the defined objective areas, limited use of grenades and demolitions would be authorized in specific areas. These areas would be cleared by appropriate EOD personnel after each training event.

Aviation assets would utilize landing zones from which to conduct medical evacuations and resupply of ground exercise units. Fixed-wing aviation would also be permitted to utilize non-dud producing aviation-delivered ordnance in this area as well. Additional activities would consist of refueling, logistic resupply, medical evacuation (MEDEVAC), and unit transit.

2.5.2 Pre-Exercise Range Control and Management in the RPAA

Before commencing a MEB Final Exercise through an RPAA, MEB leaders and assigned exercise controllers would be briefed on the necessity to carefully account for all ammunition and equipment within the RPAA, and to map the actual routes taken by all units and all actual firing positions within the RPAA. The exercise planners would minimize the number of personnel that bivouac within the RPAA. For artillery operations, battalion leadership would be briefed on the necessity to exercise extra vigilance in accounting for powder bags, fuses, and other hazards.

Increased military presence immediately preceding training would focus on enhancing public awareness. Military police and range personnel, along with other officials located aboard the installation, would increase presence patrols along major access routes and known assembly points in or close to the RPAA. Signs would be placed along the edges of the training area and barriers would be used to block access routes to reduce the possibility of public passage into the affected area during training (this would apply to both the RPAA and the exclusive military use area). Each exercise force would be required to establish manned roadblocks along all access routes, preventing any public access immediately before and throughout the training period.

Before training, an overflight would be conducted for a minimum of two consecutive days to document any identifiable public presence in the RPAA, followed by efforts to contact anyone discovered by those overflights and help them to secure their removal from the training area.

Finally, a range sweep would be required before any training events, live-fire or otherwise, and anyone discovered by a sweep would be escorted from the training area before the kick-off of the training event.

2.5.3 Post-Exercise Range Control and Management in the RPAA

Range control and safety staff would coordinate all activities and monitor the range for safety. Following a MEB Exercise, a range sweep, range clearance, and access control would be conducted in accordance with existing range procedures. A ***range sweep*** is defined as actions taken by exercise participants and associated personnel to find and remove or mark all identifiable material and surface items immediately following an exercise. A range sweep is also used to describe actions taken by the Range Safety Officer before an exercise to ensure there are no unknown personnel or obstacles in the designated training area, particularly in support of live-fire training. ***Range clearance*** is defined as actions taken by certified EOD personnel to ensure all identified potentially harmful explosive or other ordnance is removed or rendered safe before its return to a general use or even a restricted public use status. Range clearance implies a

very high level of confidence (though not 100%) that the area cleared is safe. The Marine Corps would implement the following procedures after a MEB Exercise to return the area to a condition that is suitable for restricted activities to resume:

- Access into the RPAA would not be permitted until the Commanding General of the Combat Center determined the RPAA has been returned to a condition that is suitable for restricted activities to resume.
- Once the MEB has completed the training exercise, all remaining ammunition would be turned in before designated personnel retracing their route of training to retrieve any discarded or lost equipment. Pre- and post-training inventory of ordnance would be compared. A detailed range sweep through the RPAA would occur over the precise routes of advance documented by the exercise controllers, with particular attention paid to firing positions, the Company Objective areas, and all bivouac and dismounted movement areas. The range sweep would be conducted to provide a reasonable assurance to the public that dangerous articles were not left in the area by the exercise force. This sweep would be conducted initially by the exercise force itself as they egress back across the routes of advance and any positions occupied during the exercise that are within the RPAA. Appropriate Safety and EOD personnel would conduct a second sweep of all areas in the RPAA where explosives were used, particularly the Company Objective areas.
- Range maintenance personnel would also ensure that temporary targets and battlefield effects are removed.
- Before removal of artillery emplacements, the artillery battalion and accompanying exercise controllers would carefully map battalion positions for a range sweep by the battalion following the exercise, followed by EOD and range safety personnel inspection.
- Range sweep procedures would involve multiple checks by multiple personnel before the Commanding General makes a decision to re-open the RPAA. Even with this level of inspection, there is no guarantee that all dangerous material would have been located. Maximum use of ammunition expenditure reporting and strict accountability of all ordnance carried into the RPAA would be required.
- The Range Control Officer would certify that these activities had been completed, and would then make a recommendation to the Commanding General regarding the re-opening of the RPAA to public access via the permit process.

At the conclusion of the exercise, the two Company Objective areas would consist of trench lines and bunkers made from sandbags and wood. These would be left in place as a permanent fixture allowing for only routine maintenance before each MEB Exercise. The two 984 by 984-foot (300 by 300-meter) areas would be clearly marked as closed to public access with signs and posts. Fencing would not be utilized.

During the interval between MEB Exercises, the following measures would also be implemented to enhance public safety within the RPAA:

- Significant and durable signage would be placed at all known and likely access points to the RPAA (as well as the exclusive military use area for Alternative 6) to ensure the public would be informed that the area they are entering is a military training area and that there are restrictions on public use. Signs would also be staggered across the boundary lines at an acceptable interval to make it difficult for anyone to actually enter the RPAA (and especially the exclusive military use area in the case of Alternative 6) without having seen a sign. Signage or other permanently placed infrastructure would be maintained.

- Access gates would be installed at every existing access route into the exclusive military use area.
- Simple access gates would be installed at existing dirt access roads to the RPAA and a routine military presence would be maintained at the major entry points into the RPAA during weekends and OHV events to provide persistent engagement with the local populace as well as users of the area to ensure a constant information loop is established.
- Routine overflights and patrols would be required to ensure situational awareness of activities within the RPAA.

2.5.4 Communication and Notification Procedures

Under Alternatives 4, 5, or 6, the Marine Corps would maintain a steady and persistent engagement with local leaders, communities, organizations, and groups that would be likely to use the RPAA for recreation, group events, races, and other events. The Combat Center would have primary responsibility for interaction throughout the community to ensure that there is easy access to authoritative personnel involved with the RPAA aboard the installation. This would be the key relationship between the Marine Corps and the local community. The current Range Management process would be used to manage the physical aspects of the lands.

Using existing and proposed new personnel, the Marine Corps engagement would occur at all levels of the local, county, and state government to ensure total situational awareness is maintained. An example of this would be continued participation in City Council agendas throughout the region. All available media outlets would also be used to notify and educate the public regarding the availability and safe use of the RPAA.

A designated web site (and links to other organization's web sites) would be used to support an informational effort to ensure public awareness regarding the RPAA, as well as to provide schedules for planned military activity. A web-based education and permit process would be established to require that any prospective user complete a free on-line safety course, much like the EOD/range safety briefing that current range visitors are required to complete. The interactive training brief would explain the policies/procedures used to ensure range clearance and safety, the rules/regulations that visitors would be expected to follow, safety risks, items they could potentially find and what to do if they find anything potentially dangerous, and what could happen to them if they don't follow the rules (e.g., injury, being escorted off the base, loss of access privileges, potential arrest and criminal prosecution for federal crimes). Appropriate permits would then be distributed to certified users and appropriate Combat Center officials would be notified of public presence in the RPAA.

The BLM, which currently manages the Johnson Valley OHV Area, communicates regularly with OHV enthusiasts and other recreational users who frequent the area. Several of the below listed communication procedures were modeled after BLM's management plan for Johnson Valley. The Marine Corps would implement actions to increase public awareness including, but not limited to, those listed below. Additional procedures would be developed as the communication process unfolds.

- Information relating to the availability of Johnson Valley to civilians would be placed on the Combat Center's website.
- Combat Center would request that BLM's website redirect users seeking information about Johnson Valley to the Combat Center's designated RPAA website.

- Combat Center would produce brochures and flyers describing the details of the RPAA. These would be placed at local community centers in the high desert and low desert, and sent to the organized OHV groups to provide to their members.
- Information kiosks and booths would be established at the staging areas for major organized OHV events inside and outside of Johnson Valley.
- Combat Center would communicate directly with OHV associations, the Inland Empire Film Commission, and recreational groups and organizations to advertise the availability and requirements for use of the RPAA. Combat Center would request that such organizations post a link from their respective websites to the Combat Center's website, and/or post information directly on their websites about the RPAA.
- The Combat Center would manage the scheduling and permitting of all organized events in the RPAA.
- Combat Center would maintain current information about the RPAA on Web 2.0 media, such as Facebook and webinars.
- The Combat Center would advertise information about the RPAA in OHV enthusiast publications.

Coordination with local officials and private organizations would occur before MEB Exercise training dates. Notification and coordination efforts may include, but would not be limited to, the following:

- Meetings would be held every six months with local officials, local media, and OHV recreation groups to disseminate the Marine Corps training schedule and restricted public access dates. Marine Corps personnel would attend community meetings, and all likely assembly points for groups likely to use the RPAA.
- The Combat Center web site would be regularly updated to include the Marine Corps training schedule, including dates when the public would be allowed to access the RPAA.
- A minimum of 60 days before a Marine Corps training event, additional notification and coordination would be conducted. This may include briefings to local leaders, key stakeholders, and interested community members. These contacts would assist the Marine Corps in ensuring a widespread sustained effort in raising public awareness. Media would also be used (e.g., public service television and radio announcements, print, website, 24-hour recorded information telephone number) to inform the public of the training schedule.
- Temporary signage (augmenting the permanent signs) would be placed along all known routes into the RPAA and at specific intervals along the property boundary (for those who may choose to avoid existing roads).
- Increased military presence immediately preceding training would focus on enhancing public awareness. Military police and range personnel along with other officials located aboard the installation would increase patrols along major access routes and known assembly points in or close to the RPAA. Additional Marine Corps personnel would be positioned at key entry points during the weekend(s) preceding a MEB training event to educate the public regarding upcoming training events.

2.5.5 Permitted Uses in the RPAA

One of the objectives of developing Alternatives 4, 5, and 6 was to provide for continued use of certain public lands historically used for outdoor recreation and other pursuits that would be compatible with Marine Corps seasonal and priority use of the area for MEB training. Such uses include OHV use, rock-hounding, hiking, rocketry, film production, camping, and other traditional desert activities. These and other uses would be permitted within the RPAA provided that all permit requirements and designated safety rules and use restrictions were followed. The Marine Corps would develop specific requirements and restrictions as appropriate to maximize safe and compatible use of the acquired land should one of these alternatives be selected in the Record of Decision (ROD) and implemented. At this time, the following restrictions have been identified:

- Organized recreational events (i.e., sponsored OHV races) would require special permits. These permits would require event sponsors to obtain liability insurance related to the event and are intended to enable the Marine Corps to schedule additional public outreach efforts, provide sufficient pamphlets and information to the event organizers, and to schedule sufficient Conservation Law Enforcement Officers, and state and local law enforcement.
- The possession of firearms would be prohibited. A special permit may be obtained for recreational shooting associated with sponsored events. Event organizers would be required to comply with Marine Corps range safety policies as part of the permit process.
- Model rocketry would be permitted, provided it complies with FAA and other applicable state and local regulations.
- The marking of race courses would be authorized; however, construction of courses (jumps, ramps, slopes, etc.) would be prohibited unless special authorization (as part of the permitting process) were obtained.
- Public access to the RPAA would require each individual (or responsible adult for minors), to certify that they have completed the required public education requirement. Sponsoring adults would be responsible for supervising minors at all times. Public education would be accessible through the internet or in person at the installation. Public materials would include clear delineation of go/no-go areas, pictures of ordnance/hazards that could potentially be encountered, unexploded ordnance (UXO) hazards and avoidance, and procedures to follow to report any observed hazards. The permitting process would inform users that handling of UXO if found in the RPAA is prohibited and disturbing it is in violation of the Federal Trespass Law, permit conditions, and with full knowledge of the potential danger.

2.5.6 Future Management Planning

The proposed RPAA under Alternatives 4, 5, and 6 falls within an area covered by the California Desert Conservation Area (CDCA) Plan, as amended, including the West Mojave Plan. The current and likely future uses and resource issues, as extrapolated from management priorities and planning decisions, are well articulated in the CDCA Plan and the BLM's West Mojave Plan (BLM 2004).

If legislation affecting the proposed acquisition study area is passed by Congress and becomes law, the BLM and DoN would prepare a Resource Management Plan or amend an existing plan to reflect changes brought about by any such law. Therefore, the Marine Corps would update its Integrated Natural Resources Management Plan (INRMP) and Integrated Cultural Resources Management Plan (ICRMP) to manage uses on any acquired lands, including those that would be designated as an RPAA.

These plans would be updated with the participation of the applicable BLM Field Manager, and would define, in a general way, how resources in the acquired areas would be managed. The plans for how to manage specific resources would be accompanied by an implementation program. As there should not be competing resource management plans for withdrawn lands, natural resource management responsibilities are as follows (unless otherwise directed by Congress in any legislation):

- If Congress assigns resource management responsibility to the DoN or is silent, the Marine Corps would prepare an INRMP pursuant to the Sikes Act, as amended (16 United States Code [USC] 670a, *et seq.*). Any additional plan requirements of the BLM would be addressed in a supplemental document to this plan, funded by the BLM, and consistent with the intent of the military land withdrawal.
- If Congress assigns resource management responsibility to the Secretary of the Interior, a Resource Management Plan under the Federal Land Policy and Management Act (FLPMA) would be prepared jointly by the BLM and the Marine Corps. Any additional plan requirements of the Marine Corps would be addressed in a supplemental document to this plan, funded by the DoN, and consistent with the BLM Resource Management Plan.

The updated INRMP and ICRMP or any new Resource Management Plan would establish resource coordination objectives, allowable uses, and management practices to be followed by the BLM and the Marine Corps. Should any lands be identified by Congress with dual administrative responsibilities, specific responsibilities for processing public-use authorizations would also be established through joint, coordinated planning. Subsequent NEPA documentation would be prepared, as appropriate, for the updated INRMP and ICRMP or any new Resource Management Plan.

2.6 DISPOSITION OF MINING CLAIMS

There are a number of mining claims in the acquisition study areas. Most of these are unpatented claims on public land, but a small number are patented claims on parcels that were withdrawn from public land and are now privately owned (see Section 3.12 for a more detailed description of mining claims). Only a few claims (patented or unpatented) in the acquisition study areas are currently being worked under federal and state laws and regulations. Bureau of Land Management policy for determining validity and marketability of mining claims on withdrawn lands is stated in *Location and Validity of Mining Claims and Sites in California 2006 Edition* (BLM 2006).

Under Alternatives 1, 2, or 6, the Marine Corps would acquire the patented and unpatented claims associated with the Morris Lode and Bessemer Mines, which are known to coincide with areas proposed for exclusive military use. All other owners of patented or unpatented mining claims within the boundaries of these alternatives (as illustrated in Section 2.4) would be offered fair market value for their claims or, depending on the location of the claim(s) relative to proposed MEB training locations or other factors, may be afforded reasonable access to their claims. Decisions on whether to provide access to a claim would be made on a case-by-case basis by the Marine Corps.

Under Alternatives 3, 4, or 5, all owners of patented or unpatented mining claims within the boundaries of each alternative would be offered fair market value for their claims or may be afforded reasonable access to their claims. Decisions on whether to provide access to a claim would be made on a case-by-case basis depending on the location of the claim(s) relative to proposed MEB training locations or other factors.

Under any of the six alternatives, if the owner of a claim is provided reasonable access, mining operations would be permitted to continue in compliance with applicable federal and state laws and regulations

governing the protection of human health and safety and the environment. The Marine Corps would develop an agreement with the mine operator that establishes the manner in which access would be afforded, including but not limited to the access route, times of use, and notification procedures. All other active or idle mines located on acquired claims (those for which access would not be permitted) would be closed and reclaimed in compliance with appropriate federal and state law. Any abandoned mines associated with such claims would be physically closed by the Marine Corps following protocols developed by the BLM and any contamination would be remediated in accordance with applicable federal, state, and local statutes and regulations.

2.7 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

The following alternatives were considered but eliminated from further analysis because they did not meet the purpose of and need for the proposed action. Reasonable alternatives include those that are practical or feasible from a technical Marine Corps training and economic standpoint. Alternatives eliminated from further analysis and rationale for elimination are provided below.

Conduct MEB-sized MAGTF Training at Other Marine Corps Bases in the U.S.: As explained in Section 1.3.2, the 2004 Center for Naval Analyses study project included three main tasks: 1) identify MEB training requirements; 2) determine the training environment required to support MEB training requirements; and 3) assess specific alternative ranges that support the training environment. The final report in the project series, entitled *MEB Training Exercise Study: Final Report* was released in December 2004. It summarized the entire project, presented findings of the analyses regarding the project tasks, and concluded with recommendations (Center for Naval Analyses 2004a). Regarding the second and third tasks, the Combat Center at Twentynine Palms was identified as having the strongest potential for meeting training requirements after land acquisition and airspace establishment. Other regions studied could not support MEB-sized MAGTF training without significant simulation and constructive forces; thereby failing to meet the criteria for live-fire maneuver training for three battalion task forces. There are various reasons that other bases in the U.S. would fail to meet the criteria for live-fire maneuver training for three battalion task forces. Marine Expeditionary Brigade training on Mid-Atlantic and Gulf of Mexico ranges would require significant use of non-Marine Corps ranges, representational forces, and simulation support. Mid-Atlantic ranges, including U.S. Army ranges, could support distributed MEB training, but the small size of these ranges and associated impact areas would require significant use of representational and/or constructive forces and simulator-supported integration of unit fires and maneuver training. Distances between battalion-level Gulf of Mexico ranges exceed planned MEB span of control. This constraint would require either simulator-supported distributed training on ranges separated by greater than 300 nautical miles (NM) or simulator-supported constructive maneuver of representational units combined with simulator-supported maneuver-fires training on a single range.

Train Using Simulated Environment: For training on the land, simulated computer environments do not adequately account for the physical, mechanical, and contextual challenges faced in a physical environment and are, therefore, not sufficient to fulfill the requirements of capabilities training. Simulated training is beneficial for certain types of training but taken alone is not consistent with the Marine Corps doctrine to "train as we fight." Regarding aircrew training, even the most effective, state-of-the-art simulators lack the realism of actual flying. Aircrews do not receive the same physical training challenges in simulators as they would in actual flight. Simulators also cannot replicate the problems and teamwork associated with real world flying with other aircraft, communication with air traffic controllers, and coordination with maneuvering ground units, as is required for a MEB. Aircrew combat mission readiness requires many flight tasks, including maneuvers, low-altitude flight, and defensive tactics.

Although simulation for both land and airspace operational training would continue to be used to complement existing training, an alternative relying solely on simulation failed to meet the purpose and need and was eliminated from further analysis.

De-Designate Existing Congressionally-Designated Wilderness Areas in the East Study Area: Section 2.3.2 explained the methodology used to identify areas potentially suitable for proposed MEB training. During the planning process, the Marine Corps determined that the de-designation of wilderness areas in or adjacent to the east study area was not a viable option as it would not meet the screening criteria. Screening criteria #5 specifically states that any alternatives selected would avoid congressionally-designated wilderness areas, parks, wildlife refuges, designated critical habitat for threatened or endangered species, cities/towns, and interstate highways. In addition, the requirement to administratively cross Amboy Road at hardened crossings and restrictions on live-fire to safeguard civilian traffic on Amboy Road reduce the viability of this alternative. For these reasons, this alternative would not meet the purpose of and need for the proposed action and was eliminated from further analysis.

Acquire Land to the North of the Combat Center: Section 2.3.2 explained the methodology to identify areas potentially suitable for acquisition. A comprehensive analysis indicated that areas to the north of the installation offered no MEB training value. Mountainous terrain would prohibit even a single battalion from maneuvering to converge on a MEB objective. In addition, active mining, the Town of Ludlow, a partially underground gas line, and a surface laid oil pipeline would severely restrict maneuver and the employment of live-fire weapons. Figure 2-3 shows the north area considered but eliminated for further analysis.

Acquire Land to the Southeast of the Combat Center: Section 2.3.2 explained the methodology to identify areas potentially suitable for acquisition. The southeast study area was also withdrawn as a potential candidate for acquisition at this stage because of access constraints, reduced freedom of action, and limited training exercise design flexibility for more than one battalion task force (all related to the presence of the Cadiz Dunes and Sheephole Valley Wilderness Areas). Figure 2-3 shows the southeast area considered but eliminated for further analysis.

Establish the MEB Objective in the East Study Area: Section 2.3.2 explained the methodology to identify areas potentially suitable for acquisition. During the initial planning process, it was noted that the east study area features large areas of open space for either an assembly area from which to begin maneuver or a MEB objective toward which the battalion task forces would converge. It was also acknowledged that this area has known constraints to maneuver such as dry lake beds and volcanic rock outcroppings (see Figure 1-6). Section 2.2.3 explained the MEB Exercise training template, including the fully integrated MEB "Final Exercise," which assesses each echelon at its full operational capability. This alternative would be constrained by reduced freedom of action, and limited training exercise design flexibility by more than one battalion task force, all related to the presence of the Cadiz Dunes and Sheephole Valley Wilderness Areas and the maneuverability limitations imposed by the dry lake beds, sand dunes, and volcanic rock outcroppings. The MEB Commander would not be provided with a training venue in which to realistically employ the MEB's full spectrum of combined arms in support of live-fire and maneuver. Thus, the development of an alternative with west-to-east maneuver and the MEB objective in the east study area was considered but eliminated from further analysis.

Expand to the Colorado River: This alternative presented unacceptable maneuver and live-fire constraints due to the large patchwork of wilderness areas, designated critical habitat for the desert tortoise, roads, transmission lines, and impassable terrain. For these reasons, this alternative would not meet the purpose and need and was eliminated from further analysis.

Expand to Marine Corps Logistics Base, Barstow: This alternative presented unacceptable maneuver and live-fire constraints due to the preponderance of roads, private lands, transmission lines, impassable mountainous terrain, wilderness areas, and designated critical habitat for the desert tortoise. For these reasons, this alternative would not meet the purpose and need and was eliminated from further analysis.

Link with Other Bases in the Southwest: Scheduling conflicts, administrative transportation distances, costs, and training constraints (e.g., no simultaneous live-fire maneuver at the U.S. Army's National Training Center, Fort Irwin – see below for a more detailed discussion of training at Fort Irwin) became apparent during consideration of this alternative. In addition, this alternative would not have supported the maneuver of three battalions abreast in a realistic MEB Final Exercise. Investigation of existing ranges owned by other services identified the following obstacles to Marine Corps use of these ranges to meet MEB training requirements:

- Scheduling, priority-of-use, and range loading factors at other services' ranges.
- No other installation has live-fire and maneuver areas and contiguous airspace that are large enough to support a realistic live-fire MEB combined arms training program.
- No other installation has the supporting infrastructure necessary to accommodate approximately 10,000 to 15,000 Marines of a MEB in an expeditionary environment for an extended MAGTF training program.
- No other installation has an Expeditionary Airfield (EAF) sufficient to accommodate a MEB Aviation Combat Element in a deployed exercise environment.
- Reliance on other service installations for recurring training requirements of the Combat Center's tenant operational units would require administrative transportation of individual Marines or units over extended distances, for extended periods, resulting in unacceptable personnel tempo demands and training inefficiencies.
- The additional cost of moving personnel and equipment between the Combat Center and another location would escalate the per exercise cost to an unsustainable level.

For these reasons, an alternative that linked the Combat Center with other military bases was eliminated from further analysis.

Conduct Training at U.S. Army's National Training Center, Fort Irwin: Although the Army and the Marine Corps often serve side-by-side and sometimes execute similar missions, they have very different training requirements. The MAGTF is the Marine Corps' principal organization for conducting missions across the range of military operations. MAGTFs employ and integrate air- and ground-based operations. The Marine Corps is legally required to provide forces of combined arms, which is a unique Marine Corps mission and capability. MAGTF training involves a fully integrated live fire environment. MAGTF training employs a progressive approach, starting with combined arms integration techniques and procedures at the company level and culminating in a final exercise involving all elements of the Exercise Force MAGTF, such as the MEB-sized training proposed for the Combat Center. Fort Irwin does not have ranges capable of supporting MEB-sized sustained, combined-arms, live-fire, and maneuver training and the modification of Fort Irwin to better accommodate Marine Corps training requirements would preclude the Army's ability to meet its own training requirements and be optimally prepared for deployment (MAGTF 2011). For these reasons, this alternative would not meet the purpose and need and was eliminated from further analysis.

Allow BLM to Manage the Restricted Public Access Area (RPAA): An option to allow BLM to manage the RPAA under Alternatives 4, 5, and 6 for public recreational purposes was considered. While

desirable from the aspect of a recreational user, Marine Corps analysis highlighted that BLM management of the RPAA under FLPMA would not be practical from a military use perspective, especially where large-scale, live-fire exercises are involved. The responsibility to ensure public safety after a military live-fire training exercise does not rest with BLM, whose mission is to administer public lands for multiple uses. Such a multiple use management regime would not satisfy the purpose of and need for a combined arms, live-fire and maneuver training range for a MEB-sized MAGTF. Marine Corps management of the RPAA, though, would ensure that public recreational use could safely resume following military training while maintaining the training regime necessary to meet sustained, combined-arms, live-fire MEB training requirements. The Marine Corps has proposed the formal establishment of an RPAA Management Group, with BLM as a partner agency, to develop best practices for recreational management of the RPAA consistent with military training needs. This partnership would provide continual BLM involvement and serve as a pathway to future recommendations and decisions based on lessons learned. Therefore, BLM management of the RPAA was eliminated from further analysis.

Non-Withdrawal of the RPAA: Under this alternative, the RPAA of Alternatives 4, 5, and 6 would not be withdrawn. BLM would maintain multiple use management authority under FLPMA over the RPAA. Marine Corps use of the RPAA would be through a permit issued by the BLM, with the Marine Corps being responsible for range clearance after a MEB exercise. The use of a permit system would be too unreliable for the long-term planning required for a MEB exercise. It would also not provide the necessary guarantee of the long-term availability of such training. Moreover, BLM does not currently possess the authority to issue such a permit to the Marine Corps for such military training activity on lands under its management. Therefore, this alternative would not meet the purpose and need and was eliminated from further analysis.

Alternatives Suggested During the Public Scoping Period: During the scoping period (October 30, 2008 through January 31, 2009), the public suggested various alternative actions for the Marine Corps to consider, and some suggested modifications to the scoping alternatives that had already been proposed at that time. The Final Scoping Report (published June 11, 2009 and available on-line at http://www.marines.mil/unit/29palms/las/pages/default.aspx) further elaborates on these suggestions. Besides the need for reasonable alternatives to meet the identified planning criteria and purpose/need for the proposed action, the Marine Corps considered fiscal, training, and environmental constraints associated with all of the suggestions from the public.

Elements (i.e., restricted public access when MEB Exercises are not occurring) have been incorporated into some alternatives carried forward for EIS analysis. Public comments influenced the development of a new action, Alternative 6 (following public scoping). Similar to the Marine Corps' intent with Alternatives 4 and 5 (formulated before scoping), the development of Alternative 6 is consistent with the public's suggestion to:

- Allow for controlled periodic access for occasional public access and activities.

A number of public suggestions for alternatives did not meet the purpose of and need for the proposed action and screening criteria for reasonable alternatives (see Section 2.3.1). These suggested alternatives included:

- De-designate existing congressionally-designated wilderness areas – This alternative is not consistent with screening criteria #5.

- Identify alternative locations outside the Mojave Desert – The Center for Naval Analyses Study identified the expansion of the Combat Center as the only location for creating a MEB capability. Accordingly, this alternative is not consistent with screening criteria #4.
- Train outside of the continental U.S. – The preponderance of forces to train are located in the U.S. Conducting MEB training outside of the U.S. is not logistically feasible. Accordingly, this alternative is not consistent with screening criteria #4.
- Construct a Military Operations on Urban Terrain (MOUT) training facility at the Marine Corps Air Station, Miramar – This installation is not large enough to support MEB training, and therefore would not meet the purpose of and need for the proposed action and is not consistent with screening criteria #1.
- Use an alternative site for MOUT and Multi-Range Training (e.g., Naval Air Weapons Station, China Lake) – MEB training is not compatible with the test and evaluation mission of this installation and is not consistent with screening criteria #4.

A number of public suggestions fell within the scope of the EIS but were deemed to be best analyzed as part of the impact assessment and development of potential mitigation:

- Avoid areas where alternative energy applications have been filed.
- Remove conflicts with transmission facilities in the areas being considered.
- Avoid conflicts with railways, natural gas pipelines, areas of critical environmental concern (ACECs), desert tortoise habitat, and proposed energy projects.
- Release, for public use, other DoD and/or BLM-administered public land currently not open to recreation.

Some other suggestions fell more appropriately within the purview of Marine Corps regional land use planning, encroachment control planning, or other programmatic planning efforts. Thus, they are not directly applicable to the purpose and need for the proposed action being analyzed in this EIS. Examples included:

- Plan compatible uses for both military and solar energy power development uses.
- Modernize existing facilities at Twentynine Palms to optimize available space.
- Redistribute and improve older infrastructure at Twentynine Palms.

Finally, following the public scoping period, some portions of lands originally requested for withdrawal in the west, south, and east study areas were released from further study after analysis demonstrated they did not contribute sufficiently to meeting the MEB training requirement due to terrain constraints or other factors. The release of some of these areas also addressed public concerns to avoid conflicts with a railroad line, proposed energy projects, ACECs, designated critical habitat for desert tortoise, and potential impacts to occupied private lands.

2.8 SPECIAL CONSERVATION MEASURES

Mitigation is an important mechanism federal agencies can use to minimize the potential adverse environmental impacts associated with their actions. Agencies can use mitigation to reduce environmental impacts in several ways. Mitigation includes:

- Avoiding an impact by not taking a certain action or parts of an action;

- Minimizing an impact by limiting the degree or magnitude of the action and its implementation;
- Rectifying an impact by repairing, rehabilitating, or restoring the affected environment;
- Reducing or eliminating an impact over time, through preservation and maintenance operations during the life of the action; and
- Compensating for an impact by replacing or providing substitute resources or environments.

Many federal agencies rely on mitigation to reduce adverse environmental impacts as part of the planning process for a project, incorporating mitigation as integral components of a proposed project design before making a determination about the significance of the project's environmental impacts. Such mitigation can lead to an environmentally preferred outcome and in some cases reduce the projected impacts of agency actions to below a threshold of significance. Such measures are often incorporated into the proposed action, as part of the planning process, such as agency standardized BMPs (e.g., to prevent stormwater runoff or fugitive dust emissions at a construction site). For the purposes of this EIS, such measures are referred to as SCMs. The SCMs would be included in the project design and, as an integral component of the proposed action, would be implemented with the proposed action. CEQ regulations also require inclusion of mitigation measures, which are not already included as part of the proposed action. Such mitigation is distinct from SCMs as they represent additional measures, beyond the proposed action, that are being considered for further reducing, avoiding, and/or compensating for adverse effects outlined in this EIS. SCMs and mitigation measures are summarized below.

In addition to those measures identified for managing an RPAA (see Section 2.5), the SCMs presented in this section would be included in the proposed action to avoid or minimize potential impacts.

2.8.1 Recreation

- Develop an Educational Outreach Plan and distribute educational materials (via website, public meetings, OHV events, etc.) to promote awareness of environmentally sensitive areas, responsible OHV use, and law enforcement penalties for illegal OHV use.
- Assist local governments and community members with posting of appropriate signage (for restricted use/limited use areas) at key points of entry, areas of concern, or areas that have experienced frequent illegal OHV use.
- Coordinate with County of San Bernardino law enforcement officials, other local government officials, OHV community leaders, interested community members, and other interested parties to reduce the illegal OHV use within the communities surrounding the acquisition study areas.

2.8.2 Public Health and Safety

- The Marine Corps would initiate and maintain a persistent informational outreach program with local leaders, communities, and groups to ensure that members of the general public are aware of the change in land ownership or management and public use/access.
- Permanent signage would be staggered across the boundary lines of acquired lands (for any RPAA or exclusive military use areas) at an acceptable interval to make it difficult for anyone to enter the area without having seen a sign. Signage would be maintained.
- Barriers would be used to block access routes to reduce the possibility of unauthorized access (this would apply to both the RPAA and the exclusive military use area). Each exercise force would be required to establish manned roadblocks along all access routes, preventing any public

access immediately before and throughout the training period. All barriers and roadblocks would be maintained.

- Increased military presence immediately preceding training would focus on enhancing public awareness. Military police and range personnel, along with other officials located aboard the installation, would increase presence patrols along major access routes and known assembly points in or close to acquired lands that were formerly used for public recreation.
- Before training, overflights would be conducted on two consecutive days to document any identifiable public presence in the acquired land areas, followed by efforts to contact anyone discovered by those overflights and help them to secure their removal from the training area.
- A range sweep would be required before any training events, live-fire or otherwise, and anyone discovered by a sweep would be escorted from the training area before initiation of the training event.
- As part of the permitting process for allowing public use of the RPAA on a case-by-case basis, the Marine Corps would prioritize safety as the primary consideration in permitting decisions; permits would potentially restrict the size, scope, type of activity, and location (relative to parts of the RPAA that are more intensively used during training) of any requested activity so as to minimize risks to the public.

2.8.3 Air Quality

Where applicable during project construction, the Combat Center would implement the following:

- Use water trucks to keep areas of vehicle movement damp enough to minimize the generation of fugitive dust.
- Minimize the amount of disturbed ground area at a given time.
- Minimize ground disturbing activities in proximity to the Combat Center boundary.
- Discontinue proposed ground disturbing activities within 3 miles (4.8 km) upwind of the Combat Center boundary when winds exceed 25 miles (40 km) per hour or when visible dust plumes emanate from the site and then stabilize all disturbed areas with water application.
- Designate personnel to monitor the dust control program and to increase dust suppression measures (e.g., watering), as necessary, to minimize the generation of dust.

2.8.4 Biological Resources

Four SCMs are proposed as part of the project to offset impacts to desert tortoises and desert tortoise habitat.[6] These measures have been developed by the Natural Resources and Environmental Affairs (NREA) Division at the Combat Center in consultation with the USFWS and are described in detail below.

[6] Concurrent with USFWS consultation to develop the Biological Opinion, the Marine Corps provided additional analysis on the potential impact of displaced OHV activity on nearby designated and non-designated off-road areas (see Appendix M). The analysis supported the formal consultation with USFWS.

- *New Special Use Areas.* The Combat Center would designate Special Use Areas (refer to text below for definition and categories) within the boundaries of acquired lands for the conservation of desert tortoises. Proposed Special Use Areas vary depending on the alternative, and are depicted in Figures 2-12 through 2-17. These Special Use Areas would be designated as Category 1 (no mechanized maneuver), with the exception of a portion of the northern Special Use Areas in the west study area, that would be designated as Category 2 from the existing road to the study area boundary. In a Category 2 Special Use Area, bivouacs, OHV use, or training involving vehicle activity are discouraged but not prohibited (MAGTF Training Command 2009b). The proposed Special Use Areas are areas that are not identified in training scenarios, but that have habitat supporting moderate densities of desert tortoises. Each Special Use Area would be evaluated for existing desert tortoise population density and size classes, habitat quality, and prevalence of disease, with the intent of identifying the suitability to receive tortoises translocated from areas that would experience moderate to high impact from military training. The population density and health of the resident population would be evaluated and assessed to determine whether desert tortoises from areas adversely affected by training exercises could be beneficially translocated into these Special Use Areas where use would be restricted. These areas would be fenced and signed to prevent vehicle transit into Special Use Areas and prevent tortoises from homing back to the high- and medium-impact areas.
- *Translocation Program.* The Combat Center would develop a scientifically rigorous program, consistent with current USFWS guidance, to translocate tortoises from high and moderate impact areas before the first MEB exercise (refer to Appendix I for preliminary methodology). Habitat quality, tortoise health, and population assessments would be performed for at least two years before translocating tortoises from areas proposed for high and moderate impact by military training (i.e., MEB or building block training). The assessments would evaluate translocatee, resident, and control sites and tortoises. Tortoises would be translocated before the first MEB or building block exercise to Special Use Areas based on scientific evaluation of population density estimates, habitat quality, and habitat potential for supporting augmented tortoise populations. Final health assessments would be conducted and radio transmitters would be attached to tortoises before translocation. Resident and control site tortoises would also be assessed (health) and monitored before translocation, with subsets fitted with radio transmitters. Short-term (≤ 5 years) and long-term (up to 50 years) metrics of translocation success would be evaluated and published in peer-reviewed, scientific journals. Before each MEB exercise, high- and moderate-impact areas would be surveyed to clear remaining desert tortoises to translocation sites where short- and long-term monitoring would be conducted.
- *Desert Tortoise "Headstarting" and Population Augmentation.* Based on survey, monitoring, and analysis of designated Special Use Areas, the Combat Center would devise a strategy for population augmentation supported by the Combat Center's ongoing headstart program based at the Tortoise Research and Captive Rearing Site (TRACRS). Population augmentation strategies would be developed with USFWS and would be integrated with translocation and monitoring efforts to provide a comprehensive population sustainment and recovery strategy.

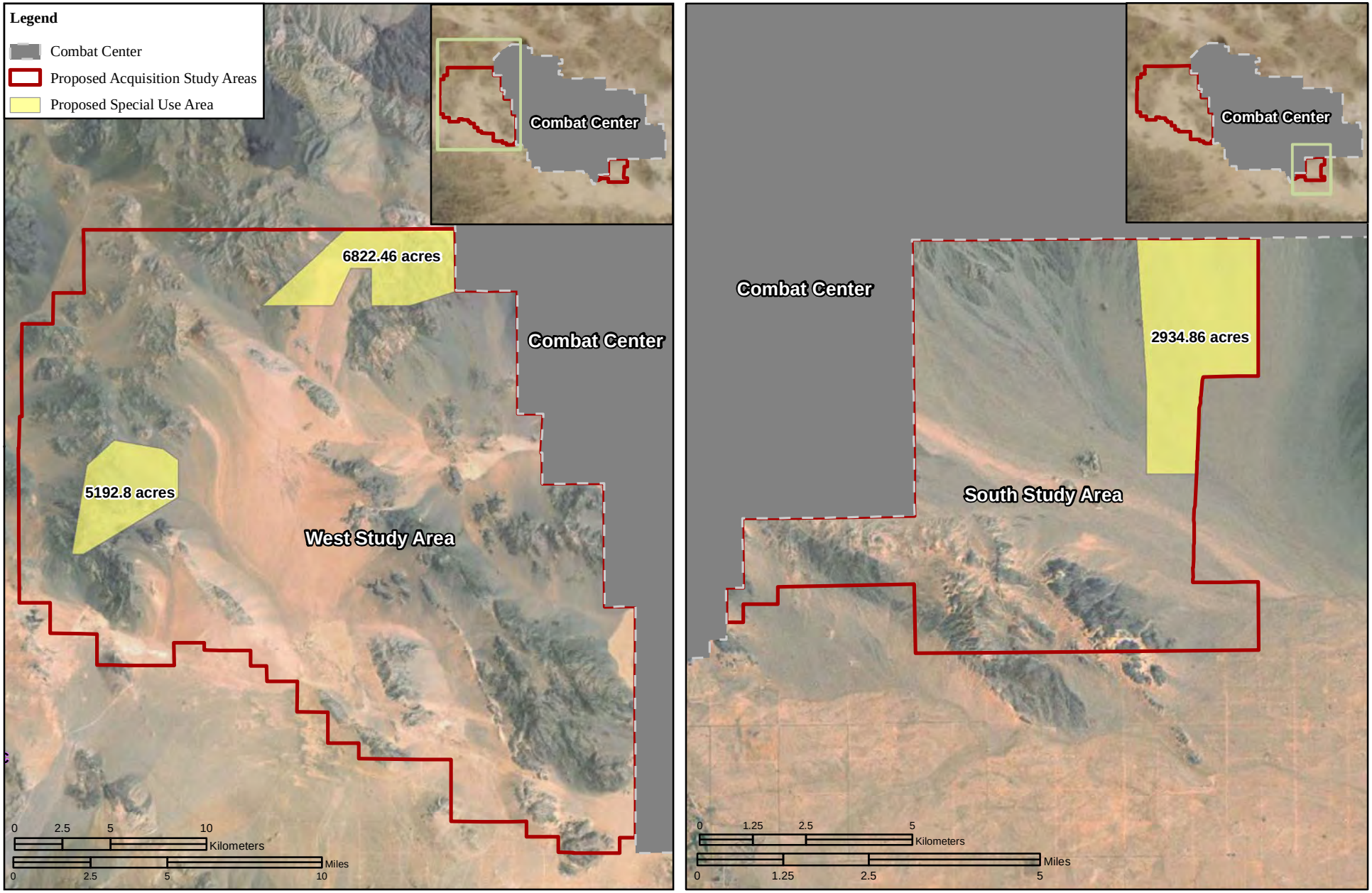


Figure 2-12
Preliminary Locations and Boundaries of Special Use Areas to Be Designated Under Alternative 1

Source: MAGTF Training Command 2011

N

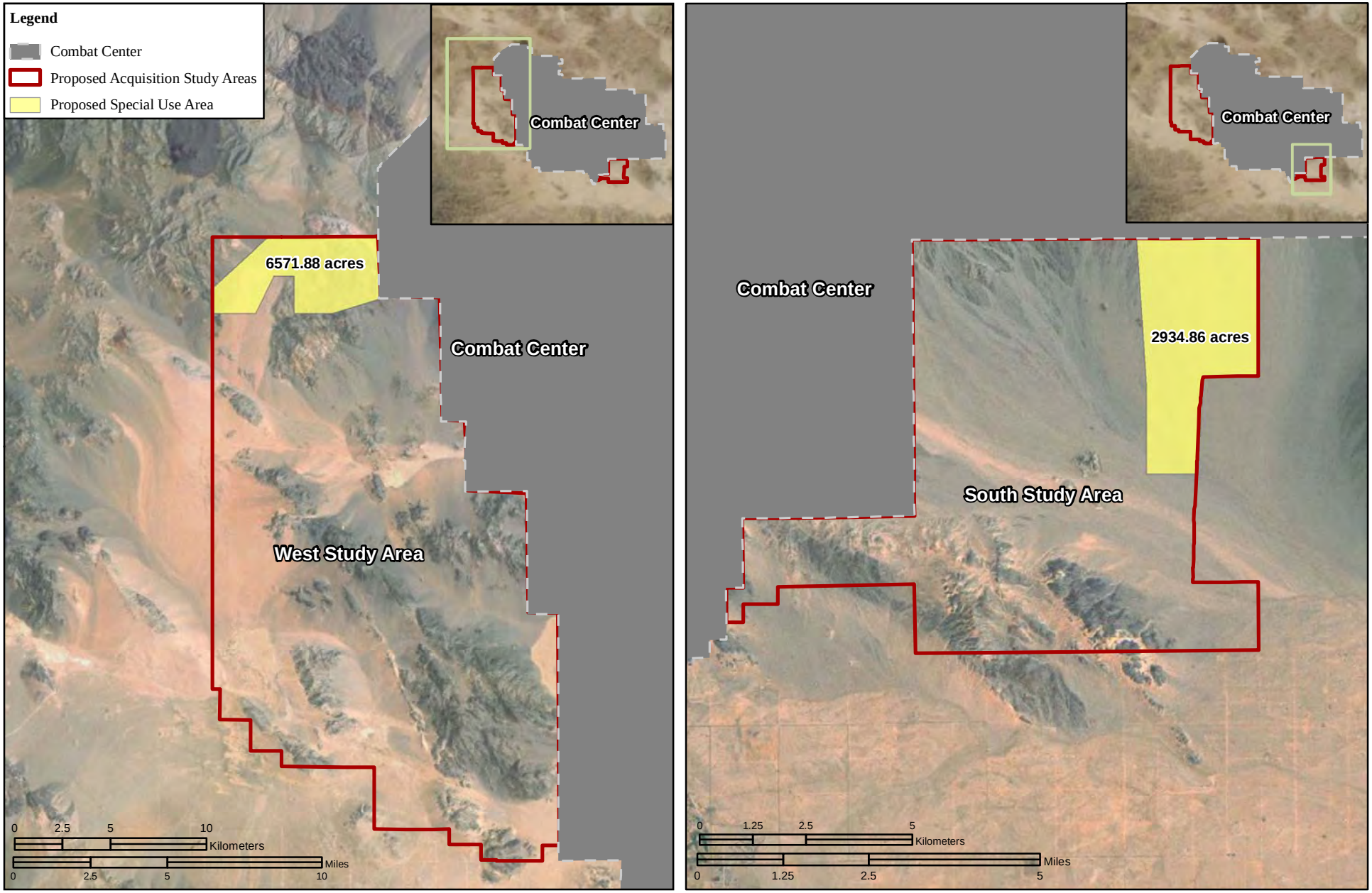
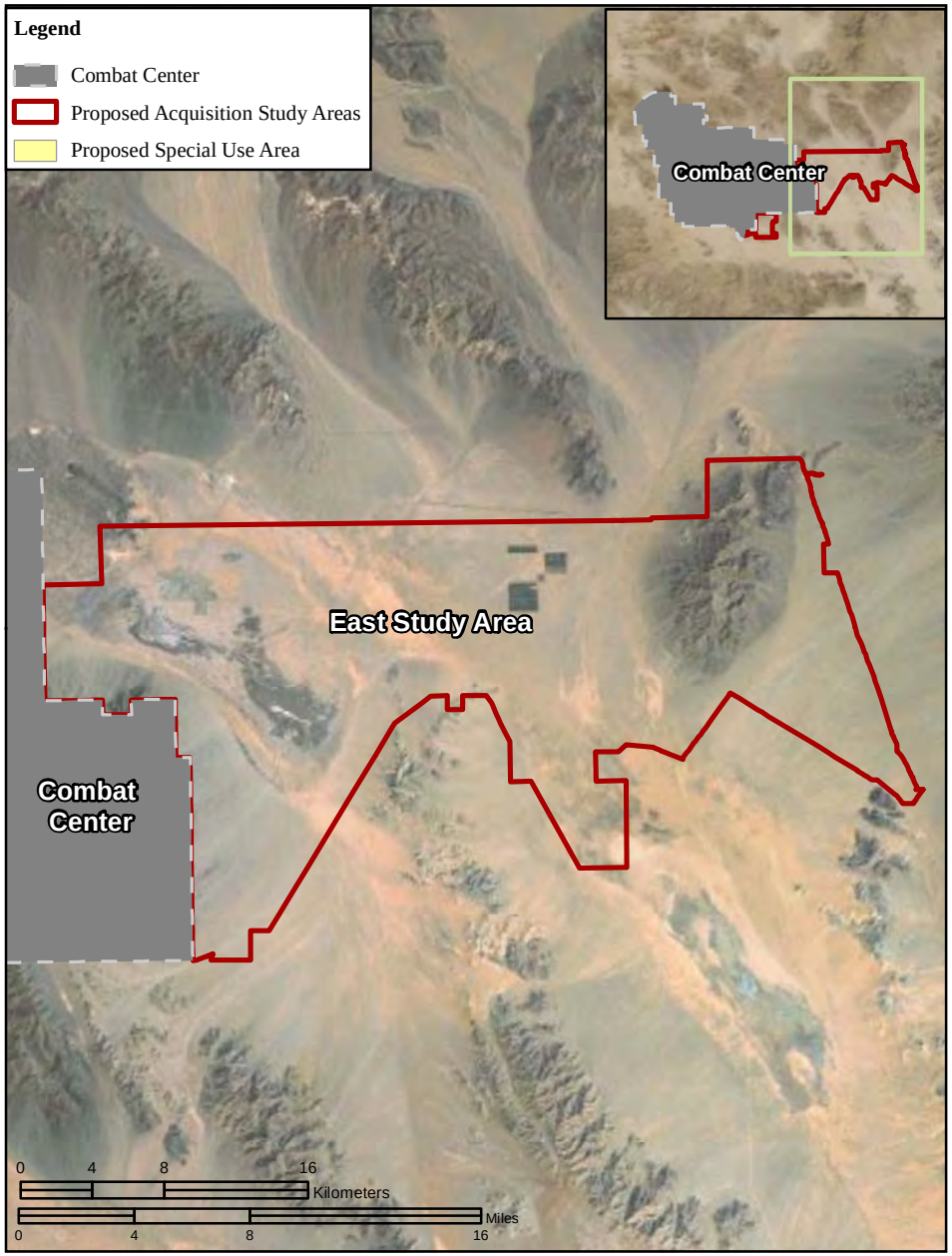


Figure 2-13
Preliminary Locations and Boundaries of Special Use Areas to Be Designated Under Alternative 2

Source: MAGTF Training Command 2011



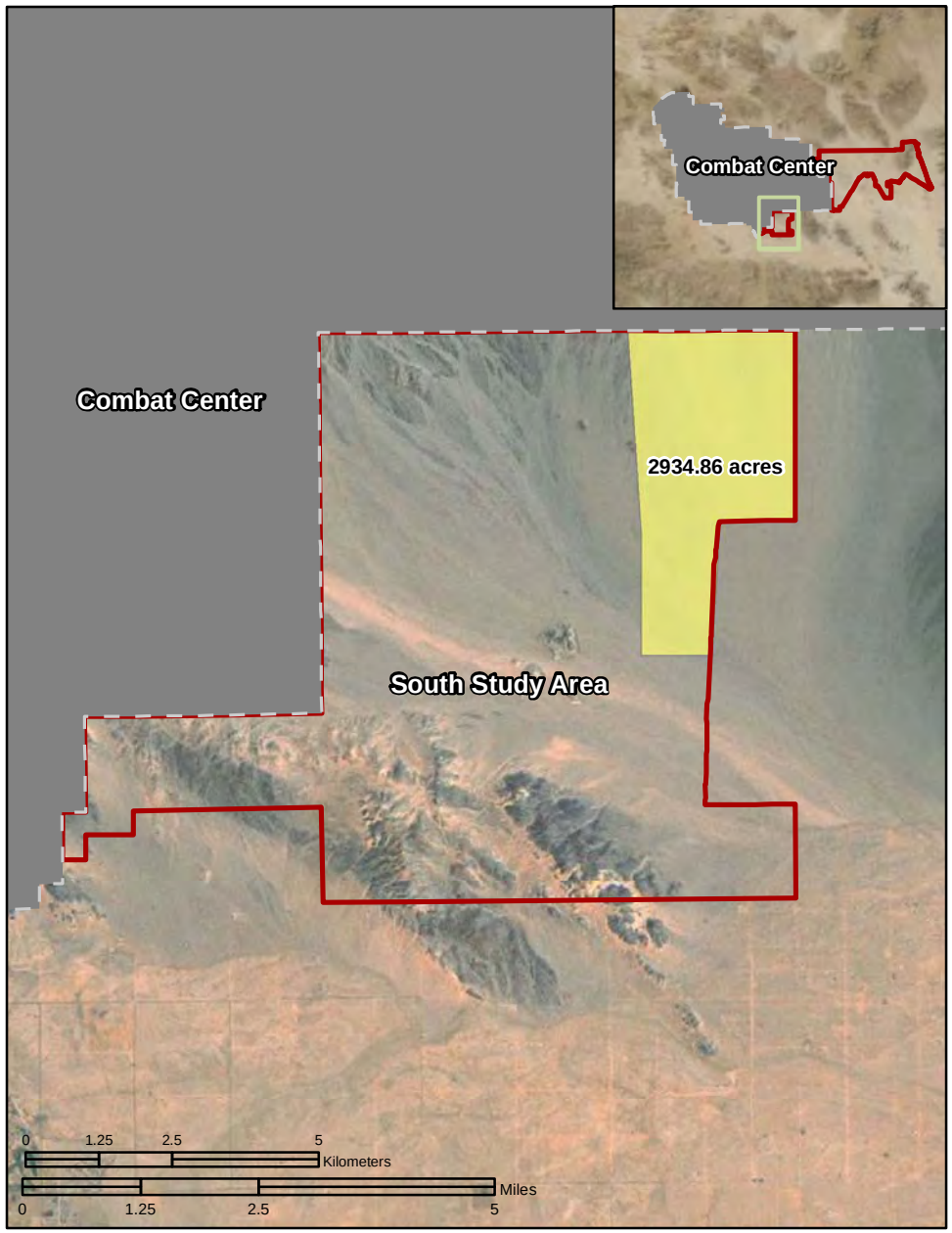


Figure 2-14
Preliminary Locations and Boundaries of Special Use Areas to Be Designated Under Alternative 3

Source: MAGTF Training Command 2011

N

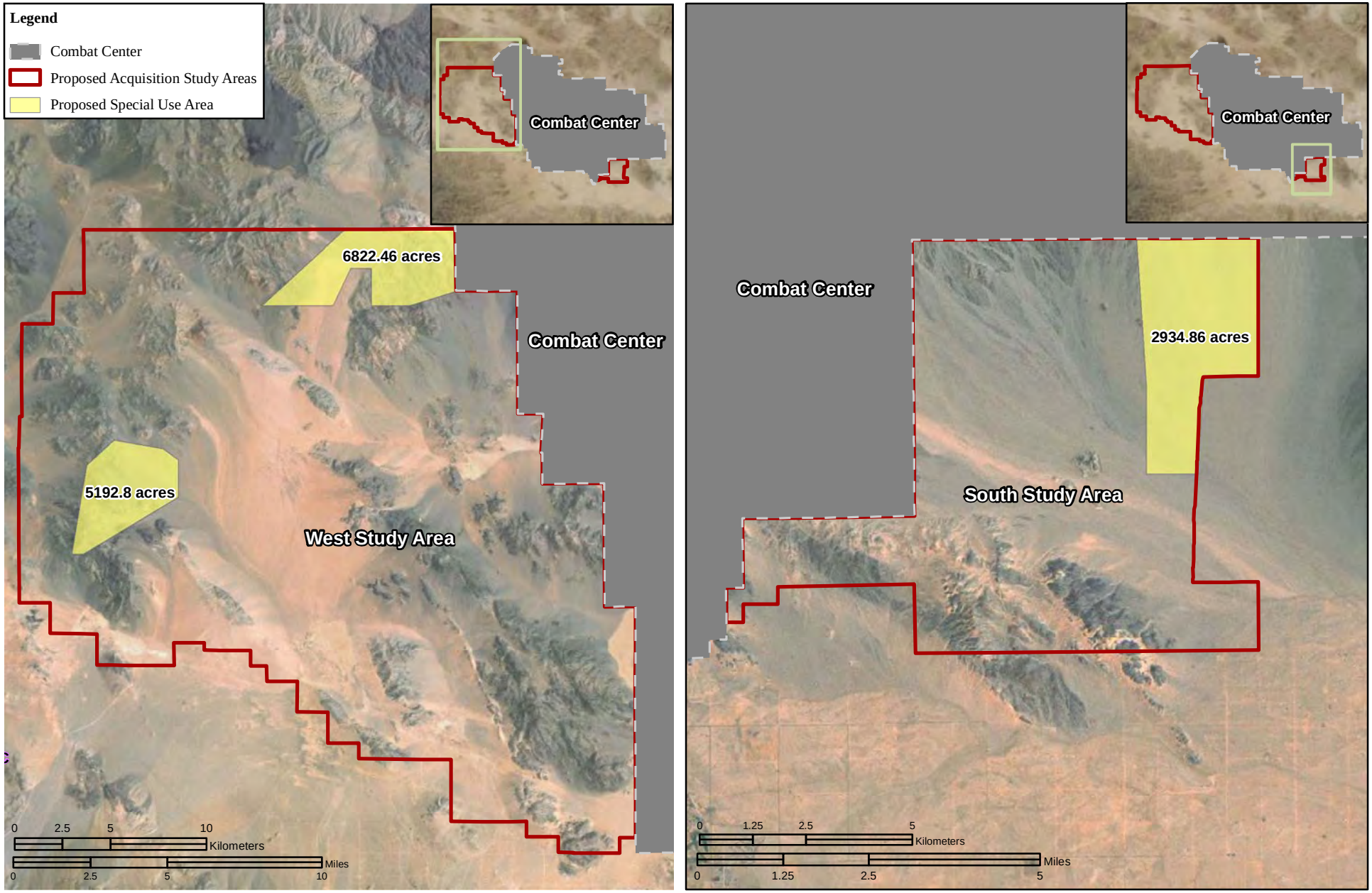


Figure 2-15
Preliminary Locations and Boundaries of Special Use Areas to Be Designated Under Alternative 4

Source: MAGTF Training Command 2011

N

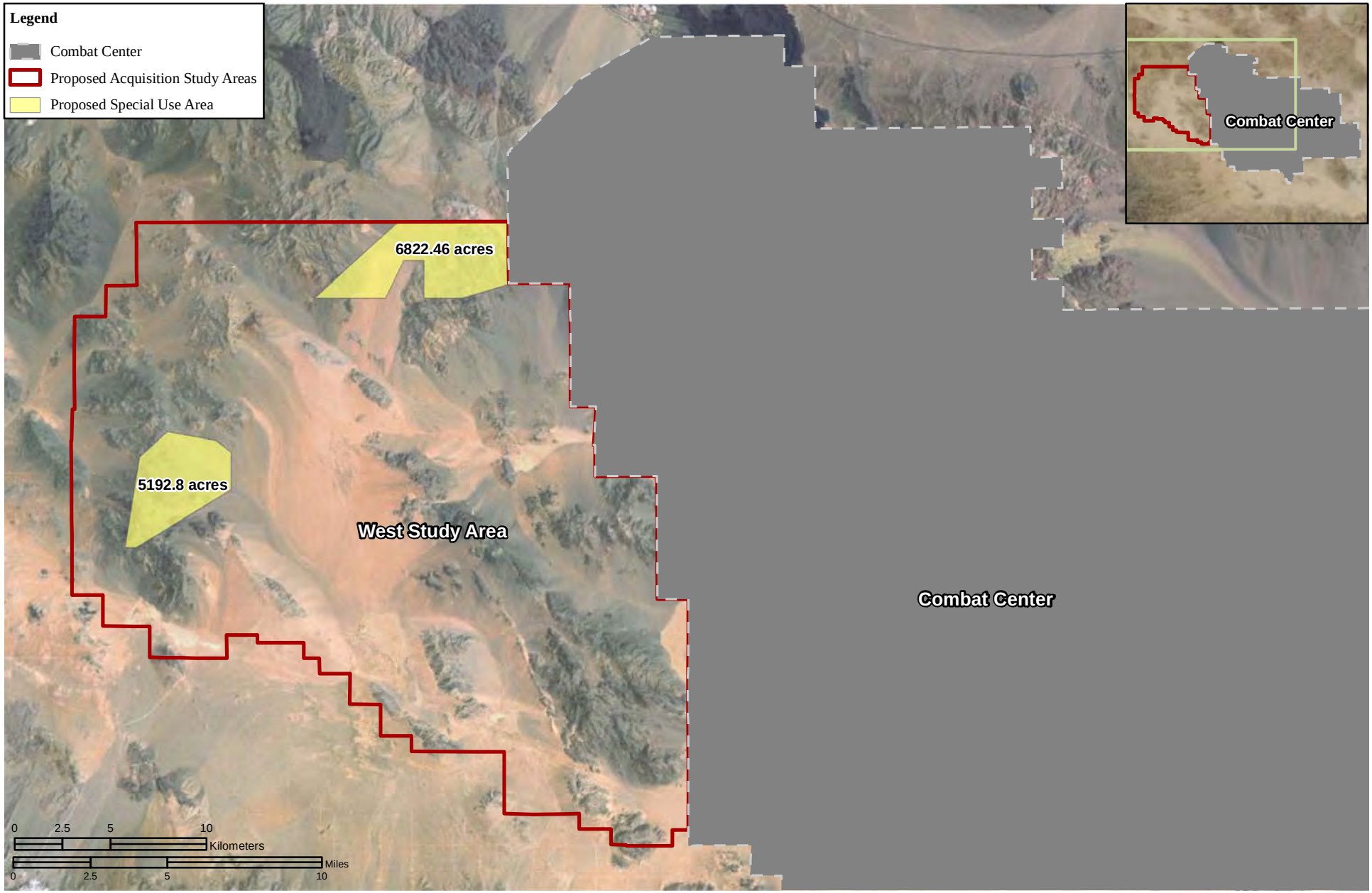


Figure 2-16
Preliminary Locations and Boundaries of Special Use Areas to Be Designated Under Alternative 5

Source: MAGTF Training Command 2011

N

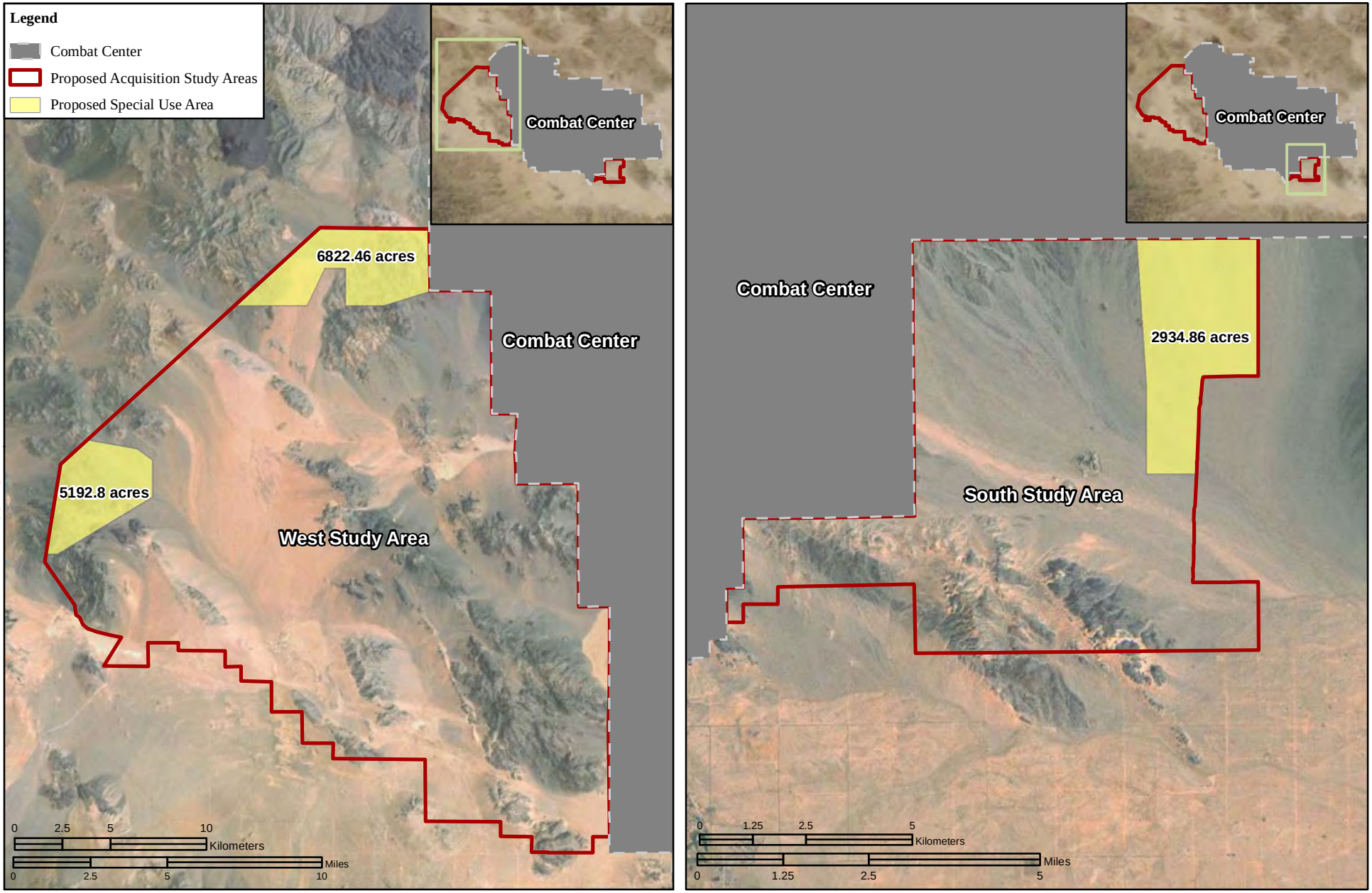


Figure 2-17
Preliminary Locations and Boundaries of Special Use Areas to Be Designated Under Alternative 6

Source: MAGTF Training Command 2011

N

- *Monitoring.* Monitoring would occur over 25 years to ascertain the long-term effects of translocation and augmentation upon resident, translocated, control and headstarted tortoises. Results of translocation and monitoring efforts would be submitted annually to USFWS, and would be reported annually to other agencies and interested parties in the INRMP report.

In addition, numerous standard or currently implemented SCMs, as described below, would be implemented as part of the proposed action.

- Upon issuance of the Biological Opinion for the proposed project, the Combat Center would amend its INRMP to incorporate the conditions for use associated with the new training areas and new/modified airspace.
- The following measures from the 2002 Basewide Biological Opinion (U.S. Fish and Wildlife Service [USFWS] 2002), the 2007 INRMP (MAGTF Training Command 2007), and the current Combat Center Order 5090.1D (MAGTF Training Command 2009b), would be extended to any acquired lands:
    - Before the initiation of military training exercises or mission-related construction projects, a desert tortoise education program would be presented to all personnel who would be on-site. This program would contain information concerning the biology and distribution of the desert tortoise; its legal status and occurrence on the Combat Center; the definition of "take" and associated penalties; the measures designed to reduce the effects on the desert tortoise of training exercises and mission-related construction activities; the means by which Command employees, military personnel, and construction contractors can help facilitate this process; and the procedures to be implemented in case a desert tortoise is encountered.
    - Only biologists authorized by the USFWS would be allowed to survey for desert tortoises before proposed action activities, serve as a desert tortoise monitor during training exercises and other mission-related construction activities, and handle desert tortoises (except in circumstances in which the life of the desert tortoise is in immediate danger). If the Marine Corps wishes to use additional people for these activities, it would submit their credentials to the USFWS for review and approval at least 30 days before the initiation of any activity within desert tortoise habitat.
    - Desert tortoises would be moved only by an authorized biologist and solely for the purpose of moving the animals out of harm's way, unless the animal is in imminent danger. In such instances, only units having direct radio or telephone communication with Range Control and appropriately briefed Marines would be authorized to move desert tortoises out of immediate danger. Desert tortoises would be moved the minimum distance to ensure their safety.
    - All handling of desert tortoises and their eggs and excavation of burrows would be conducted by an authorized biologist in accordance with protocols developed by the Desert Tortoise Council (1999), unless the animal was in imminent danger as noted above.
    - If the burrows of the desert tortoise cannot be avoided, they would be examined and excavated by hand, by or under the direct supervision of the authorized biologist. The authorized biologist would examine the burrow to determine whether it contains eggs of the desert tortoise.

- All desert tortoises observed by military personnel or workers within or adjacent to training exercises or mission-related construction projects where they may be killed or injured would be reported immediately to an authorized biologist. The authorized biologist would move the desert tortoise offsite into adjacent undisturbed desert tortoise habitat if it is in imminent danger.
- Any time a vehicle is parked in desert tortoise habitat, the ground around and underneath the vehicle would be inspected for desert tortoises before moving the vehicle. If a desert tortoise is observed beneath the vehicle, an authorized biologist would be contacted. If possible, the desert tortoise would be left to move on its own. Otherwise, the desert tortoise would be removed and relocated by the authorized biologist in accordance with the handling provisions of this biological opinion.
- Any excavations associated with construction and maintenance that would be left open in areas that are not being monitored would either be fenced temporarily to exclude desert tortoises, covered at the close of each work day, or provided with ramps so desert tortoises can escape. All excavations would be inspected for desert tortoises before filling.
- If maintenance or construction occurs during a time of year when desert tortoises are active, the authorized biologist would ensure that clearance surveys have been conducted in all work areas within appropriate habitat immediately before the onset of work; that is, the clearance surveys would be timed to reduce, to the extent possible, the likelihood that a desert tortoise could move into a work area between the time the site is surveyed and the onset of work. The NREA staff would determine whether desert tortoises are likely to be active with consideration of the time of year and the weather conditions at the time and place where work is to be conducted. If desert tortoises are unlikely to be active, the clearance surveys may be conducted within 48 hours before ground disturbance. When desert tortoise burrows are found, they would be checked for desert tortoises; when desert tortoises are found, the burrows would be flagged. All unoccupied burrows would be flagged in a different manner than the occupied burrows. During the construction period, an authorized biologist would re-check the burrows and remove any desert tortoises that would be endangered by the mission-related construction activity following the Desert Tortoise Council protocols.
- For maintenance or construction activity in areas of suitable habitat that support desert tortoises, the Marine Corps would install temporary fencing around work sites to prevent entry of desert tortoises. Any desert tortoises within the fenced area would then be relocated to nearby suitable habitat, before the start of ground disturbing activities. The presence of authorized biologists on site may be substituted for temporary fencing; NREA staff would determine which protective measure is appropriate, depending on the specific circumstances.

<u>Reporting Procedures (Adapted from 2002 Biological Opinion)</u>

- The NREA office would maintain a record of all observations of desert tortoises encountered at the Combat Center. The information gathered would include the date and time of observation; whether the desert tortoise was handled and whether it voided its bladder; general health of the desert tortoise; and, if it was moved, the locations from and to which the desert tortoise was moved.

- The Marine Corps would provide a written report to the USFWS by January 31 of each year, to document the numbers and locations of desert tortoises injured, killed, and handled; discuss the effectiveness of the Marine Corps' protective measures; and recommend other measures that allow for better protection of the desert tortoise or more workable implementation. The report would also include detailed information on the construction and maintenance projects that NREA personnel reviewed in the previous year; these projects include any actions that NREA staff determines are not likely to adversely affect the desert tortoise and those that are likely to adversely affect the desert tortoise and that are conducted under the auspices of a Biological Opinion.
- If the Marine Corps is required to prepare any additional written reports as a result of biological opinions for activities it conducts at the Combat Center, the information from these reports may be included in this annual report.

Disposition of Dead or Injured Desert Tortoises (Adapted from 2002 Biological Opinion)

- Upon locating desert tortoises killed or injured by military training, construction, or maintenance activities, initial notification within 3 days of their finding would be made in writing to the USFWS's Division of Law Enforcement (370 Amapola Avenue, Suite 113, Torrance, California 90501), and by telephone and writing to the Ventura Field Office (2493 Portola Road Suite B, Ventura, California 93003; tel: 805-644-1766). The report would include the date, time, location of the carcass, a photograph (if possible), cause of death, if known, and any other pertinent information.
- Care would be taken in handling injured animals to ensure effective treatment and care and in handling dead specimens to preserve biological material in the best possible state. Injured animals would be transported to a qualified veterinarian or a rehabilitator licensed by the State of California. Should any treated desert tortoises survive, the USFWS would be contacted regarding the final disposition of the animals.
- The Marine Corps would endeavor to place the remains of intact desert tortoises with educational or research institutions holding the appropriate state and federal permits per their instructions.
- If such institutions are not available or the shell has been damaged, the information noted in the Reporting Requirements section of this biological opinion would be obtained and the carcasses left in place. Arrangements regarding the proper disposition of potential museum specimens would be made with the institution by the Marine Corps before implementation of the action.

Desert Tortoise Conservation Efforts (Adapted from 2007 INRMP)

- Manage TRACRS to protect nests and hatchling tortoises from predation.
- Monitor tortoise growth and population changes over time to determine facility success.
- Continue non-native predator management.
- Minimize MSR and road proliferation.
- Continue tortoise awareness program.
- Cooperate with other agencies and academic institutions on research conducted on the cause, transmission, testing, and treatment of Upper Respiratory Tract Disease.

- Evaluate desert tortoise habitat condition and health.
- Identify areas of desert tortoise habitat at risk for negative impacts.
- Continue long-term tortoise density and trend-monitoring program using USFWS-approved protocols.
- Maintain established study plots.
- Monitor long-term study plots on a 2- to 4-year rotation.

Desert Tortoise Conservation Measures from the Combat Center Order 5090.1D (Adapted from MAGTF Training Command 2009b)

- Desert tortoises are not to be picked up unless it is necessary to save the animal's life. If a desert tortoise is impeding training, range control would be notified for additional instructions. If an emergency situation exists, and a tortoise would be moved out of immediate danger, the animal may be moved to an adjacent shaded area (normally plant cover) out of direct sunlight, then notify range control and NREA Division.
- The possession of otherwise legal captive desert tortoises aboard the Combat Center, including base housing, is prohibited. Under no circumstances are legal captive or wild tortoises from off-base to be released into the Combat Center's population.
- The feeding of wildlife on the Combat Center is prohibited. Unauthorized feeding of desert wildlife creates an imbalance in the food chain and reduces the animals' natural fear of humans, which places humans, wildlife, and domestic pets at risk.
- Hunting is prohibited on the Combat Center.
- Recreational use of the Combat Center's training areas is prohibited (with the exception of the proposed RPAAs). Designated locations in the Mainside area are authorized for certain recreational purposes.
- The introduction of any exotic plant life is prohibited on the Combat Center.
- Open fires and the harvesting or cutting of any native vegetation are prohibited.
- The "Cleghorn Lakes Wilderness Area," located to the south of the Cleghorn Pass, Bullion, and America Mine Training Areas, is managed by the BLM. Accessing or departing the southeastern ranges through this area is strictly prohibited. No entry is allowed in this protected area. There is no authorized access to the Cleghorn Pass, Bullion, or America Mine Training Ranges from a southerly direction.
- The "Ord-Rodman Critical Habitat" for desert tortoise and two associated wilderness areas are adjacent to the Sunshine Peak Training Area. No entry is allowed in these protected areas.
- All training units should limit off-road activity to that which is absolutely necessary to directly support the mission. Off-road maneuver exercises would be planned to emphasize the use of already damaged sites.
- "Neutral Steer" turns of tracked vehicles would be limited to emergency situations only. The Operations and Training Directorate would coordinate with NREA to identify authorized

areas for practicing "Neutral Steer" turns. No unit would practice neutral steers in sensitive areas such as the Sand Hill Training Area.

- Approval would be obtained from both the MAGTF Training Command and NREA before clearing land (grading) or conducting any vegetation removal action in the training areas.
- Trenches, defilades, "tank traps," and fighting positions would be filled to original grade and excess material leveled after each use.

Designation of Special Use Areas Under Combat Center Order 5090.1D

Under Combat Center Order 5090.1D (MAGTF Training Command 2009b), Special Use Areas would be designated as appropriate in which bivouacs, OHV use, or training involving vehicle activity, are either restricted (Category 1) or discouraged (Category 2).

- Special Use Areas (Category 1)

  The following sites are designated no impact, no mechanized maneuver areas on the Combat Center. These sites are set aside for the purpose of protecting and studying important biological and cultural resources. No bivouacs, no OHVs, nor any training involving vehicle activity is authorized within these areas:

  - Surprise Spring/Sand Hill: Only NREA and authorized Facilities Management Division (water and maintenance crews) personnel would enter areas off the MSRs.
  - Foxtrot Petroglyphs: This area, a site listed on the National Register of Historic Places (NRHP), is strictly off-limits to all military training, personnel, and equipment.
  - Deadman Lake Cultural Resource Management Area: The south and western shores of Deadman Lake. This area is fenced and all trespass within the fenced area is prohibited.
  - Emerson Lake/Lavic Lake Historic Sites: The south face of the Pisgah lava flow and the southern shore of Emerson Lake.
  - Historic Mines and prospects: All abandoned mines and prospects on the Combat Center are considered strictly off limits to all personnel and equipment.
  - Lead Mountain Study Plots: Grid 97/16 is off-limits to OHV and other training activity. Cultural and Biological Resources in this area are considered sensitive. In grid 00/22, vehicles are allowed on the MSR, only.

- Special Use Areas (Category 2)

  For the following sites, units are cautioned to be aware of the sensitive natural and cultural resources located in these areas. Improper utilization of these areas may result in future environmental constraints:

  - Sand Hill: the area south of the restricted area and west of the EAF.
  - Emerson Lake/Acorn: the area south of the 08 and west of the 58 gridlines.
  - Cleghorn Pass: southern Cleghorn Pass Training Area, less the fixed ranges (400, 410, 410A, 500, Battle Site Zero [BZO]).

2.8.4.1 Proposed New Conservation Measures for Non-Protected Biological Resources

The following conservation measures for non-protected biological resources would be included in the updated Combat Center INRMP, to be prepared following adoption of the ROD, but before use of newly acquired areas for ground-training.

- Conduct pre-surface-disturbance mapping surveys to identify noteworthy creosote ring Unusual Plant Assemblages (UPAs) occurring in the west study area. As practicable, fence noteworthy creosote ring UPAs and restrict vehicle access.
- Although training exercise impacts to Yucca Ring UPAs are not anticipated, if the west study area is acquired, the existing Yucca Ring ACEC designated in the west portion of the west study area would be managed in a manner consistent with UPA protection.
- When conducting species surveys or inventories, consider documentation of intact cryptobiotic soils in the survey area. Based on this data, consider avoiding large expanses of intact cryptobiotic soils when designing primary routes of travel for task forces during MEB Exercises.
- When conducting species surveys or inventories, consider wildlife movement corridors in the lands proposed for acquisition and on the existing Combat Center. Where practicable, route design for roadways constructed under the proposed action would take into consideration these wildlife corridors.
- Place anti-roosting and anti-nesting devices, as appropriate, on the communications towers to be installed in the acquisition study areas.
- Survey for potential bat roosting sites in the acquired lands before the initiation of training activities. Based on collected data, consider placement of gates over the entrances of mine sites that are currently occupied or which may provide potential roosting and/or hibernation habitat, especially if an alternative is adopted which includes public access to the mine site.

2.8.4.2 Existing General Special Status Species Conservation Measures for the Combat Center That Would Be Applied to the Acquired Lands (Adapted from 2007 INRMP)

The following conservation measures for non-protected biological resources are already in the 2007 Combat Center INRMP, and would be extended to any acquired lands during the INRMP update process along with all other measures in the INRMP.

- Maintain healthy xeroriparian washes and canyons, which are used by resident and passerine migrant bird species and other wildlife, by minimizing vegetation loss in washes and canyons (i.e., Wood Canyon, southwestern Lavic Lake Training Area, Rainbow Canyon, Petroglyph Wash in Lava Training Area).
- Expand the small mammal inventory emphasizing the pallid San Diego pocket mouse.
- Monitor current bat gates to inspect for trespass and condition. Evaluate mine entrances for installation of bat gates to those mines which are exceptional bat habitat but not culturally significant. Evaluate modification of bighorn sheep guzzlers for use by bats and other wildlife.
- Monitor burrowing owl populations and their habitat. Maintain a proactive management program to conserve the species.

- Minimize Mojave fringe-toed lizard mortality and injury from military training. Continue to monitor Mojave fringe-toed lizard populations and the condition of their habitat. Maintain a proactive management program in case of federal listing.
- Jointly monitor the Combat Center's bighorn sheep population and those within the lands proposed for acquisition with California Department of Fish and Game (CDFG) to determine status, distribution, and abundance.
- Monitor the use of natural and artificial water sources by large mammals, including bighorn sheep, through the use of remote cameras. Cooperate with military unmanned aerial vehicle units to integrate biological work into their training missions.
- Consider State-listed species in all Combat Center actions.

2.8.5 Cultural Resources

- Cultural resources would be managed in accordance with the provisions of federal laws and regulations as well as Marine Corps policy. The Programmatic Agreement (PA), *Programmatic Agreement Between the United States Marine Corps and the California State Historic Preservation Officer 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, California,* would be amended to include any lands acquired as a consequence of the proposed action alternative. The PA was fully executed on 9 April 2007 and is good through 8 April 2014.
- As required by the PA, an ICRMP would be prepared and the historic preservation program prescribed in the ICRMP would be implemented under the direct supervision of a person or persons, meeting at a minimum, the Secretary of the Interior's Professional Qualifications Standards (48 *Federal Register* 44738-44739).
- The ICRMP would detail the historic preservation program to inventory, manage, and treat any identified historic properties located on lands under the jurisdiction of the Marine Corps. The existing ICRMP for the Combat Center would be modified to include all newly acquired lands and cultural resources. The ICRMP would be modified and developed in consultation with the State Historic Preservation Office (SHPO) and the Native American Tribes that have an interest in lands under the jurisdiction of the Marine Corps. The SHPO would indicate acceptance of the ICRMP by endorsement and the ICRMP would be implemented under the authority of the amended PA.
- Additional measures would be developed in consultation with the California SHPO and affiliated Tribes.
- The Marine Corps would continue to provide training on the significance of cultural resources and the relevant federal laws that are intended to protect them.

2.8.6 Geological Resources

- A new INRMP for the Combat Center would be developed that would include any acquired land areas and would establish policies and procedures for managing geological resources that may be present.

- The same programs and procedures that apply to current training activities to avoid and minimize impacts to soils at the Combat Center (which are outlined in the INRMP) would be extended to the MEB training, including but not be limited to:
  - Designing tank traps and other modifications to maintain the natural flow of water during run-off events, to maintain the natural alluvial sediment transport processes.
  - Requiring vehicular traffic to stay on well-defined roads unless training scenarios require otherwise; and
  - Using previously disturbed sites as much as possible during off-road maneuvers to minimize damage to undisturbed sites (Naval Facilities Engineering Command [NAVFAC] Southwest Division 1996).

2.8.7 Water Resources

- The Combat Center would complete and implement the Installation Energy and Sustainability Strategy (IESS) that balances water demands (including those associated with the proposed action) with water supplies by increasing water conservation, using more recycled water, importing water, treating lower quality groundwater, and/or other methods deemed appropriate. The strategy would address sustainable water usage within the Combat Center, as well as regional water management, particularly if the strategy included groundwater extraction from other than the Surprise Springs aquifer.
- The Combat Center would review the Range Environmental Vulnerability Assessment (REVA) (Headquarters Marine Corps 2008) findings, including the activities associated with the MEB Exercises addressed by the proposed action, at a frequency of once every five years or sooner based on changes in training exercises that could potentially alter the risk by increasing or decreasing the loading factors, changing locations of where munitions are being used, or other factors that are different from current assumptions and model parameters.

CHAPTER 3.
AFFECTED ENVIRONMENT

This chapter describes the existing environmental conditions in the proposed project area. Information in this chapter serves as baseline data to which the proposed alternatives will be compared in Chapter 4 to identify and evaluate potential environmental impacts.

In compliance with the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations, and Navy and Marine Corps procedures for implementing NEPA, the description of the affected environment focuses only on those resources potentially subject to impacts. In addition, the level of analysis should be commensurate with the anticipated level of impact. Applying these guidelines to this Environmental Impact Statement (EIS), the discussion of the affected environment and associated environmental analysis presented herein focuses on: land use, recreation, socioeconomics and environmental justice, public health and safety, visual resources, transportation and circulation, airspace management, air quality, noise, biological resources, cultural resources, geological resources, and water resources.

Under the proposed action there would be no construction of buildings, housing, or utilities that would pose a demand on the existing utilities and infrastructure network. The proposed action would not require electricity or other utilities (e.g., sanitary sewer, phone, information technology, gas transmission lines). In addition, there would be a minimal increase in the number of personnel permanently stationed at the Marine Corps Air Ground Combat Center at Twentynine Palms, California (hereafter referred to as the "Combat Center") as a result of the proposed action (up to 77 personnel); the existing utilities and infrastructure is sufficient to accommodate the demand associated with the increase in personnel. Even with the slight increase in personnel under the proposed action, the Combat Center would still meet its goal to reduce its overall energy usage per the Energy Policy Act of 2005, Executive Order (EO) 13423, EO 13514, and Energy Independence and Security Act of 2007 (see Section 7.1 of this EIS) (Department of the Navy [DoN] 2010). A discussion of impacts to existing utilities and infrastructure is provided in the land use sections (Sections 3.1 and 4.1 of this EIS) and a discussion of impacts to potable water is presented in the water resources sections (Sections 3.13 and 4.13 of this EIS). A discussion of impacts to potential future utilities and infrastructure is addressed in the cumulative impacts section (see Chapter 5).

The following subsections provide a definition of each resource and describe the existing conditions that would potentially be affected by the proposed action.

3.1 LAND USE

3.1.1 Definition of Resource

Land use refers to the various ways in which land might be used or developed (i.e., military training, parks and preserves, agriculture, commercial, etc.) the kinds of activities allowed (i.e., factories, mines rights-of-way, etc.) and the type and size of structures permitted (i.e., towers, single family homes, multi-story office buildings, etc.). Land use is regulated by management plans, policies, ordinances, and regulations that determine the types of uses that are allowable and protect specially designated areas and environmentally sensitive resources, as described below.

The region of influence (ROI) for the land use analysis includes the following components: the Combat Center and lands underneath the associated airspace, the three proposed land acquisition study areas under

consideration (west, east, and south) and lands underneath airspace proposed for establishment or modification. The acquisition study area includes Johnson Valley to the west, northern Wonder Valley to the south, and the Bristol Lake area to the east. The airspace extends from the Combat Center west, north, and south within San Bernardino County and east approximately 10 to 20 miles (16 to 32 kilometers [km]) past the California/Arizona border (i.e., south of Needles). Information relevant to land use is also contained in Section 3.2, *Recreation*; Section 3.3, *Socioeconomics and Environmental Justice*; Section 3.4, *Public Health and Safety*; Section 3.6, *Transportation and Circulation*; Section 3.9, *Noise*; Section 3.10, *Biological Resources*; Section 3.11, *Cultural Resources*; and Section 3.12, *Geological Resources*.

Much of the ROI comprises public land. Key sources of information for existing conditions include government data sources, for example California Desert Conservation Area (CDCA) resource management plans and associated environmental impact studies adopted by the Bureau of Land Management (BLM); the Combat Center Integrated Natural Resources Management Plan (INRMP); Combat Center Master Plan, off-highway vehicle (OHV) area management plans; and the San Bernardino County General Plan.

In the section below, the regulatory environment is described first, followed by a description of Combat Center land use, and areas located outside the Combat Center (i.e., underneath existing airspace, airspace being considered for establishment or modification, and within the acquisition study area).

3.1.2 Regulatory Framework

3.1.2.1 Federal

Federal Land Policy and Management Act

The Barstow and Needles Field Offices of the BLM manage public lands in the vicinity of the Combat Center. Two pertinent BLM management directions outlined in the Federal Land Policy and Management Act (FLPMA) of 1976 for public lands are to establish a plan for the 12.1 million acres (4,896,696 hectares) of public lands forming the CDCA and to inventory the land for its wilderness characteristics, as required by the Wilderness Act of 1964.

California Desert Conservation Area Plan

The California Desert District of the BLM manages the CDCA, pursuant to Section 601 of FLPMA and the CDCA Plan. This plan is based on providing for multiple and sustained use of desert resources. "Multiple use" is defined in the plan as:

> *"the management of the public lands and various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people; …to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; …a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources…and harmonious and coordinated management of the various resources…"*

"Sustained use" is defined as:

> *"the achievement and maintenance in perpetuity of high-level annual or regular periodic output of the various renewable resources of the public lands consistent with multiple use."*

Over 100 amendments have been made to the CDCA Plan. Regional plans addressing sub-regions within the CDCA are among these amendments. They address protection of the desert tortoise, other special status species, and a variety of multiple use activities.

Multiple Use Class land management guidelines are outlined in the CDCA Plan that address varying levels of resource protection while providing for differing levels of sustained multiple use including limited, moderate, and controlled use.

Twelve elements are contained in the CDCA Plan that provide specific details on how balanced management of sensitive natural and cultural resources should occur relative to allowed multiple uses: Cultural Resources; Native American; Wildlife; Vegetation; Wilderness; Wild Horse and Burro: Livestock Grazing; Recreation; Motorized Vehicle Access; Geology, Energy, and Mineral Resources; Energy Production and Utility Corridors; and Land Tenure Adjustment.

The CDCA Plan also identifies a number of Areas of Critical Environmental Concern (ACECs) and Special Areas (including OHV use areas, discussed in Section 3.2), procedures for designating new special areas, implementation and monitoring requirements, and management prescriptions.

Three resource management plans are in effect in the California Desert in the vicinity of the project, each addressing a different portion of BLM's CDCA planning area. These plans constitute amendments of the 1980 CDCA Plan.

- **West Mojave Plan--Amendment to the CDCA Plan (BLM 2006).** This plan amendment addresses recovery of the desert tortoise and management of a number of other special status species in the western Mojave Desert. The planning area joins the Northern and Eastern Colorado planning area from southern Joshua Tree National Park to Amboy. This plan was cooperatively developed by federal, state, and local agencies. The west and south study areas and portions of the east study area are contained in this planning area.
- **Northern and Eastern Colorado Desert Coordinated Management Plan--Amendment to the CDCA Plan (BLM 2002a).** This plan amendment addresses recovery of the desert tortoise, conservation of other species and habitats, public land access, and resource uses. The planning area includes BLM lands, the eastern half of Joshua Tree National Park and all of the Chocolate Mountains Aerial Gunnery Range. Portions of the east study area are located within this planning area.
- **Northern and Eastern Mojave Desert Management Plan--Amendment to the CDCA Plan (BLM 2002b).** This plan amendment addresses recovery of the desert tortoise and management of additional species of concern in the area that generally lies between Death Valley National Park and the Mojave National Preserve. As with the Northern and Eastern Colorado Amendment, this plan only addresses federal lands. The southern boundary of the planning area is adjacent to the Northern and Eastern Colorado planning area, the separation being Interstate (I-) 40. Extensive areas of desert tortoise habitat lie in both planning areas on both sides of I-40. The Northern and Eastern Mojave planning area is north of the Combat Center but outside the acquisition study area.

<u>Integrated Natural Resources Management Plan</u>

Combat Center missions and associated land uses are managed according to direction outlined in an INRMP (Marine Air Ground Task Force [MAGTF] Training Command 2007). The INRMP provides for the management of natural resources, allows for multipurpose resource use, and provides public access

necessary and appropriate for these uses, without any net loss in the capability of the installation to support its military mission.

Executive Order 11644, amended by EO 11989 – Use of Off-Road Vehicles on the Public Lands

Executive Order 11644, as amended by EO 11989, pertains to the use of OHVs on the public lands. The purpose of this EO is to establish policies and procedures to ensure that OHV use on public lands "will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands." The Marine Corps implements this EO through development of INRMPs and associated plans.

Combat Center Master Plan

The *Combat Center Master Plan* was updated in 2003 (Marine Corps 2003) to provide the Marine Corps with realistic and orderly development proposals for MAGTF Training Command. The plan identifies specific sites for future projects that will utilize existing Mainside land assets as well as reinforce appropriate land use and circulation patterns.

3.1.2.2 State

California State Lands Commission – School Land Grant of 1853

Pursuant to the School Land Grant of 1853, school lands were granted to the State of California, some of which are within the ROI. These interests are under the jurisdiction of the California State Lands Commission (CSLC) and managed under the State School Lands Management Program. The CSLC, through this program, manages approximately 469,000 acres (189,798 hectares) of school lands held in fee ownership by the state and the reserved mineral interests on approximately 790,000 acres (319,702 hectares) where the surface estates previously have been sold (CSLC 2008).

Several State of California administered properties consisting of state school lands occur within the ROI, with additional such properties located along the acquisition study area boundary. CSLC administers 4,325 acres (1,750 hectares) of fee-owned school lands within the project area and, additionally, reserved mineral interests on these lands. Use of school lands by other entities requires either obtaining a lease from the Commission or, alternately, applying to purchase the fee-owned properties and the reserved mineral rights.

3.1.2.3 Local

San Bernardino County General Plan

The *San Bernardino County General Plan* (San Bernardino County 2007) divides the desert region of the county into five sub-regional planning areas that are coterminous with the boundaries of five Regional Statistical Areas for the desert portion of San Bernardino County. The County General Plan also includes mapping that ties allowable land uses to the availability of the basic infrastructure required for development (roads, water, and wastewater facilities). Required levels of service are established for all areas ranging from the most intense urban areas to the least intense rural areas. Development can be allowed to the degree allowed by a site's official land use designation only when infrastructure facilities are or are planned to be in place at levels consistent with the designations.

The west, east, and south study areas are situated in unincorporated areas of San Bernardino County, largely on public lands. Limited rural development that maximizes open space preservation, watershed, and wildlife habitat areas is encouraged in most of the privately owned lands.

3.1.3 Existing Conditions

3.1.3.1 Combat Center

The Combat Center is the Marine Corps' largest combined-arms, live-fire training range complex, encompassing 935 square miles (mi²) (2,420 square kilometers [km^2]) or approximately 600,000 acres (242,812 hectares). The Combat Center is divided into 23 training areas. Training areas are functional units that enable different types of training to be conducted simultaneously without jeopardizing safety. Certain portions of the Combat Center are also managed to provide for training support and safety, as well as the protection of specific natural resources.

Mainside

The majority of the Combat Center is undeveloped. Mainside, encompassing 3,942 acres (1,595 hectares) and located in the southernmost part of the Combat Center, comprises the developed portion of the Combat Center. It houses administrative, maintenance, storage, housing areas, and community support facilities.

Other developed areas include the Expeditionary Airfield (EAF) complex, the Exercise Support Base (Camp Wilson), Assault Landing Zone (ALZ) Sand Hill, Drop Zone (DZ) Sand Hill, Range Training Support sites, and various observation posts/repeater towers.

Training Areas

In most cases, boundaries of the 23 training areas listed below are defined by natural topographic features, which further reduce the risk of stray fire. Each training area varies by size, use, terrain type, and training restrictions (see Chapter 1, Figure 1-3, and Table 3.1-1).

Table 3.1-1. Combat Center Training Areas

Training Area	Acres	Description
Acorn	17,369	The Acorn Training Area is located in the southwestern area of Marine Corps Air Ground Combat Center at Twentynine Palms, CA (Combat Center) and is used as a non-live-fire maneuver area. A Special Use Area #1* is located at the southeastern portion of the Acorn Training Area, while a Special Use Area #2** is located at the southwestern portion and extends into the Sand Hill Training Area to the south. A second Special Use Area #2** is located at the northwestern portion of the Acorn Training Area and extends into the Emerson Lake Training Area.
America Mine	20,808	The America Mine Training Area is located on the eastern boundary of the Combat Center and is used for patrolling, mortar firing, infantry training, and light armored vehicle training. America Mine has a restricted sensitive fuse area only accessible by EOD personnel. America Mine is composed of both mountainous (37%) and rolling terrain.
Black Top	50,894	The Black Top Training Area is located on the northern boundary of the Combat Center and is used for tank gunnery, artillery and small arms training, and major exercises. Black Top Training Area is mostly gently sloping and only 13% of this area is mountainous or rough.

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Table 3.1-1. Combat Center Training Areas

Training Area	Acres	Description
Bullion	28,129	The Bullion Training Area is located to the west of America Mine Training Area and is used for aviation bombing and strafing, gunnery practice, artillery, and infantry maneuvers. Range is contained within the Bullion Training Area. Approximately 44% of the Bullion Training Area is mountainous. A Special Use Area #2** is located at the southern portion of the Bullion Training Area.
Cleghorn Pass	36,358	The Cleghorn Pass Training Area is located in the southeastern area of the Combat Center and is used for small arms, tank gunnery, light armored vehicle live-fire, and maneuvers. Cleghorn Pass contains several Fixed Ranges: Range 400, Range 410, Range 410A, Range 500, and a Battle Site Zero (BZO) Range. The Armor Multi-Purpose Range Complex, used for tank exercises, is located within Range 500. About 40% of the area within the Cleghorn Pass Training Area is mountainous or rough.
Delta	29,791	The Delta Training Area is located in the central area of the Combat Center and is used for live-fire maneuvers and major exercises. Live fire is limited due to safety considerations. Heavy use occurs during pre-Combined Arms Exercise (CAX) and by tenant commands. About 48% of the Delta Training Area is gently sloping and 52% is mountainous. A Special Use Area #1* is located at the southern boundary of the Delta Training Area. This Special Use Area extends into the Prospect Training Area.
East	6,502	The East Training Area is located in the southern area of the Combat Center, east of Mainside, and is used for non-live-fire activities, live-fire activities that impact in Prospect and Delta Training Areas, and as a staging area for major exercises. The majority of the East Training Area is gently sloping and only 12% is mountainous.
Emerson Lake	32,287	The Emerson Lake Training Area is located at the western boundary of Combat Center and is used for tank maneuvers, aviation bombardment, and aerial targetry. Principal use occurs during Enhanced Mojave Viper and Final Exercises. Approximately 70% of the land is gently sloping and the remaining is composed of low rolling terrain (only 13% is mountainous or rough). A Special Use Area #1* and a Special Use Area #2** are located at the western and southwestern portion of the Emerson Lake Training Area, respectively. The Special Use Area #2** extends into the Acorn Training Area to the south.
Gays Pass	18,316	Gays Pass Training Area is located in the northwestern area of the Combat Center and is used for ground-based, live-fire exercises and artillery. Principal use occurs during Enhanced Mojave Viper and Final Exercises. Gays Pass is characterized by gently sloping land and mountains on either side (approximately 44% is mountainous).
Gypsum Ridge	18,265	The Gypsum Ridge Training Area is a non-live-fire training area located in the southwestern area of the Combat Center and is used for bivouac and wheeled vehicle maneuvers. This area is used as a staging area for CAX Final Exercises. Gypsum Ridge consists of low rolling terrain and includes the northern section of Deadman Lake (a dry lake bed). The Gypsum Ridge Training Area has a Special Use Area #1* in its southeastern section.

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Table 3.1-1. Combat Center Training Areas

Training Area	Acres	Description
Lava	22,925	The Lava Training Area is located in the center of the Combat Center, to the north of the Cleghorn Pass Training Area, and is used primarily for battalion tactical training (including both ground-based and combined ground/air live-fire) and artillery. Principal use occurs during Enhanced Mojave Viper and Final Exercises. The Lava Training Area has exposed lava rock and consists of 26% mountainous or rough terrain. A Special Use Area #1* exists within the southwestern section of the Lava Training Area, while a second Special Use Area #1* is located at the southeastern edge and extends into the Lead Mountain Training Area. A Restricted Area exists in Lava Training Area for petroglyph sites containing Indian rock art up to 10,000 years old and is off limits to all personnel.
Lavic Lake	56,985	The Lavic Lake Training Area is located in the northwestern portion of the Combat Center and is used for aviation training exercises and live-fire maneuvers with major exercises. Principal use occurs during CAX Final Exercises. Most of the area is gently sloping and made up of lava rock. About 17% of the terrain is mountainous or rough. A Special Use Area #1* is located at the northern portion and a Special Use Area #2** is located at the northwestern portion of the Lavic Lake Training Area. A Special Use Area #2**extends into the Sunshine Peak Training Area to the west.
Lead Mountain	53,314	Located at the far northeastern boundary of the Combat Center, Lead Mountain Training Area is used for aviation, artillery, and ground-based live-fire. A dummy airfield is located in the southern portion of the Training Area. Principal use occurs during CAX Final Exercises. Lead Mountain Training Area is composed mostly of gently sloping land and only 8% of the terrain is rough. Three Special Use Area #1* exist within the Lead Mountain Training Area. The first is located at the southwestern edge and is shared with the Lava Training Area, the second is located at the northern section, and the third is at the western section where a radio repeater station is located. Two Special Use Area #2** also exist within the Lead Mountain Training Area; one is located at the western section and the other borders the eastern boundary of Dry lake.
Main Side	5,263	Mainside is located at the southern boundary of the Combat Center and includes administration, housing, maintenance, supply and support, and community facilities. Live fire is limited due to safety considerations. Mainside is periodically used for Military Operations on Urban Terrain (MOUT) training.
Maumee Mine	16,141	The Maumee Mine Training Area is located at the northwestern boundary of the Combat Center and is used for artillery and maneuver training exercises. Principal uses of this area occur during CAX Final Exercises. This area is 19% mountainous.
Noble Pass	24,314	The Noble Pass Training Area is located in the center of the Combat Center and is used for aviation and/or ground-based live-fire, tank maneuvers, infantry training, and CAX's with some artillery use. This area is approximately 59% mountainous.
Prospect	13,189	The Prospect Training Area is located just north of the East Training Area in the southern portion of Combat Center and is used for battalion and company level training. Principal use of this area occurs during Enhanced Mojave Viper and by tenant commands. Approximately 22% of the Prospect Training Area is mountainous. A Special Use Area #1* is located at the northwestern section of the Prospect Training Area, extending into the Delta Training Area.

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Table 3.1-1. Combat Center Training Areas

Training Area	Acres	Description
Quackenbush Lake	42,037	The Quackenbush Training Area is located east of the Emerson Lake Training Area, at the western section of the Combat Center. This area is used for ground-based live-fire, artillery, aviation training, and maneuvers. Heavy use occurs during Pre-CAX, Final Exercises, and by tenant units. Approximately 13% of the terrain is mountainous. A Special Use Area #2** is located at the eastern border of the Quackenbush Lake Training Area. This Special Use Area extends slightly into the northwestern portion of the Range Training Area.
Rainbow Canyon	25,348	The Rainbow Canyon Training Area is located to the west of the Black Top Training Area in the northwestern section of the Combat Center. It is used as a live-fire and maneuver area. Principal use occurs during Enhanced Mojave Viper and Final Exercises. Range 601 (Sensitive Fuse Impact Area), an abandoned air-to-ground range, is located within the Rainbow Canyon Training Area.
Range	2,158	The Range Training Area is located in the central part of the Combat Center and is used for training using fixed ranges and Sensitive Fuse Areas. Approximately 19% of the Range Training Area is mountainous or consists of rough terrain. A Special Use Area #2* *is located at the northwestern portion of the Range Training Area, extending into the Quackenbush Lake Training Area.
Sand Hill	15,810	The Sand Hill Training Area is located at the far southwestern border of the Combat Center and is used for maneuvers. Portions of the Exercise Support Base and Expeditionary Airfield (EAF), as well as Assault Landing Zone (ALZ) Sand Hill, are located within the Sand Hill Training Area. Portions of three Special Use Area #1* occupy the northeastern end and a Special Use Area #2** occupies the majority of the western and southern parts of the Training Area. Live-fire is not conducted due to proximity to Mainside which is located to the east.
Sunshine Peak	22,858	The Sunshine Peak Training Area is located at the far northwestern area of the Combat Center. This area is seldom used. When used, its primary use is an emergency aerial ordnance drop zone (DZ). This area is considered a "No Fire/Maneuver Area." Sunshine Peak is a restricted sensitive fuse area only accessible by EOD personnel. Approximately 38% of the Sunshine Peak Training Area is mountainous. A Special Use Area #1* is located at the southeastern portion, while a Special Use Area #2** occupies the northern portion of the Sunshine Peak Training Area, extending into the Lavic Lake Training Area.
West	9,966	The West Training Area is located in the southern area of the Combat Center, northwest of Mainside. Portions of DZ Sand Hill, the EAF, and Exercise Support base, as well as the ALZ are located within the West Training Area. No live-fire maneuvers occur at the West Training Area. This area is used as a staging area for major exercises. Most of the West Training Area consists of gently sloping terrain. A Special Use Area #1* occupies the northern section, while a Special Use Area #2** occupies the southern edge of the West Training Area.

Notes: *Special Use Area #1 are sites designated as no impact, no mechanized maneuver areas. These sites are set aside for the purpose of protecting and studying important biological and cultural resources.
**Special Use Area #2 are sites designated for different qualities of environmental sensitivity. While there are no limitations to training specified for these areas, units are cautioned to be aware of the sensitive natural and cultural resources located within these areas.

Source: MAGTF Training Command 2010, MAGTF Training Command 2007, MAGTF Training Command 2009, Headquarters Marine Corps 2008.

Areas Surrounding the Combat Center and Under the Airspace

Land Status and Ownership

Much of the area adjacent to the Combat Center and below the airspace contains public lands administered by BLM (Figure 3.1-1). As shown in Table 3.1-2, the west study area contains 180,353 total acres (72,987 hectares), the east study area 177,276 acres (71,741 hectares), and the south study area 21,304 acres (8,621 hectares). Non-federal land is defined as real property interests that are generally privately owned; however it also can include local/regional government owned, or some other miscellaneous real property interest. These lands include, but are not limited to, private real property, local government real property, rights-of-way, mining claims, local water district real property, or utility agency real property. The largest area of private landholdings in the acquisition study area is owned by Cadiz Inc. in the northern portion of the east study area. In addition to fee ownership of lands mentioned above, other types of interests such as mining claims, grazing allotments, and utility/transportation rights-of-way are present, primarily within the west and east study areas.

Table 3.1-2. Acquisition Study Area Ownership (acres)

Owner	West	South	East
Federal Land	165,663	20,649	147,386
Non-Federal Land	12,065	15	28,770
State Land	2,625	640	1,120
Total	**180,353**	**21,304**	**177,276**

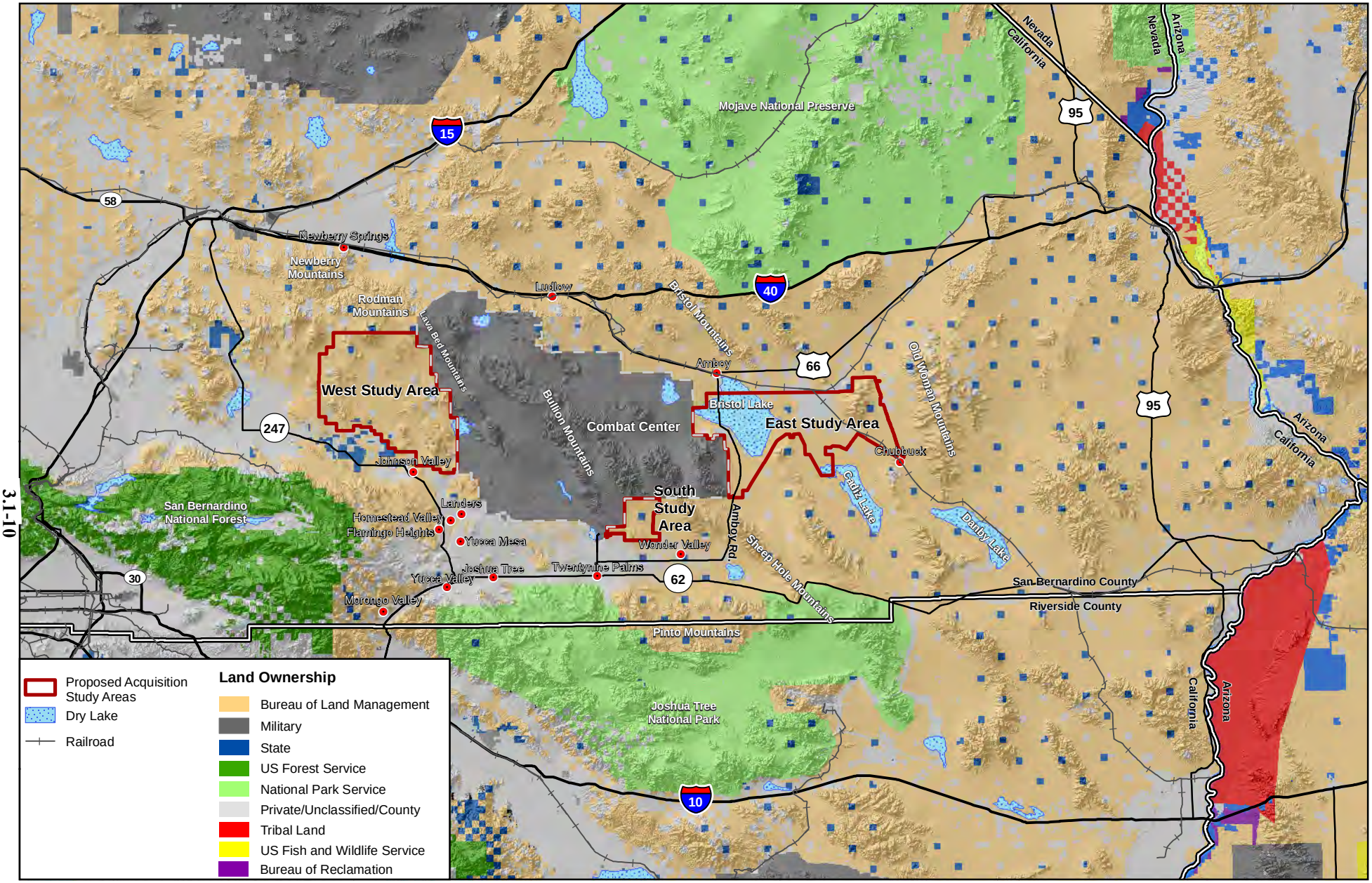
Source: Marine Corps 2009.

State Highway 62 (Twentynine Palms Highway) is located south of the south study area and connects the communities of Yucca Valley, Joshua Tree, Twentynine Palms, and Wonder Valley. Amboy Road bisects the east study area and connects the unincorporated rural communities of Wonder Valley and Amboy.

Airspace associated with the project consists of Restricted Airspace R-2501, Bristol Military Operations Area (MOA)/Air Traffic Control Assigned Airspace (ATCAA), the Sundance MOA, the Turtle MOA/ATCAA and additional airspace known as the "CAX Corridor." Areas underneath the airspace are primarily owned and administered by Department of Defense (DoD), BLM, National Park Service (NPS), and U.S. Forest Service (USFS). In addition, private landholdings and state school lands are interspersed within these public lands. The eastern-most portions of the airspace extend into Arizona, where tribal lands and lands administered by the U.S. Fish and Wildlife Service (USFWS) and Bureau of Reclamation are located.

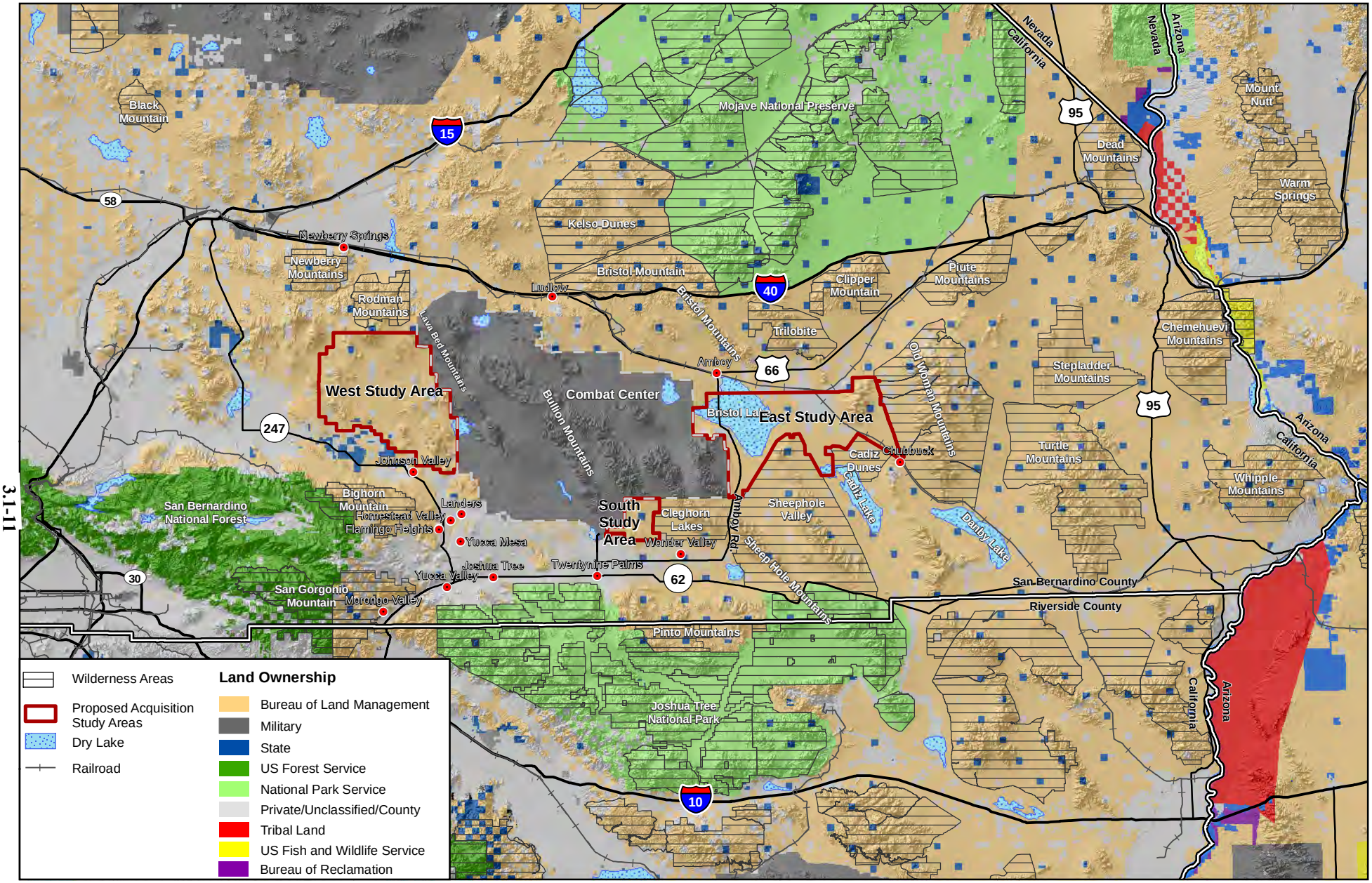
Figure 3.1-2 illustrates Wilderness Areas in the ROI. Several Wilderness Areas are located within approximately 20 miles (32 km) of the Combat Center and some are adjacent to or in the vicinity of the west, east, and south study areas. These Wilderness Areas include Rodman Mountains, Newberry Mountains, Kelso Dunes, Bristol Mountain, Trilobite, Cadiz Dunes, Sheephole Valley, Cleghorn Lakes, and Big Horn Mountain. Others in the vicinity include Clipper Mountain, Old Woman Mountains, Pinto Mountains, and San Gorgonio Mountain.

Joshua Tree National Park is located approximately 10 miles (16 km) south of the Combat Center, San Bernardino National Forest approximately 20 miles (32 km) southwest of the Combat Center, and the Mojave National Preserve approximately 20 miles (32 km) northeast of the Combat Center.



Source: MAGTF Training Command 2009, BLM 2009

Figure 3.1-1
Land Status and Land Ownership



Source: MAGTF Training Command 2009, BLM 2009

Figure 3.1-2
Wilderness Areas

The Mojave Desert Resource Conservation District (MDRCD) was established in 1951 and is the largest of 3,000 districts across the nation. The MDRCD works in partnership with other government entities and various cooperators to meet the needs of economic conservation concerns throughout the district areas. It currently provides services such as runoff control, soil erosion prevention, improvement of land capabilities, and habitat preservation. The MDRCD encompasses a total area of 11,500,000 acres (17,969 square miles), with boundaries that include the Arizona and Nevada borders to the east, the Los Angeles and Kern County lines to the west, the Inyo County line to the north, the San Bernardino Mountains to the southwest, and the Riverside County line to the southeast.

Figure 3.1-3 presents *San Bernardino County General Plan* land use designations in the vicinity of the acquisition study area and underneath the airspace. The predominant designation is open space and military, with residential to the south and southwest of the Combat Center, the west study area, and the south study area. An area designated for agriculture is located near Cadiz along the northern border of the east study area.

Specific land use topics are discussed in greater detail below.

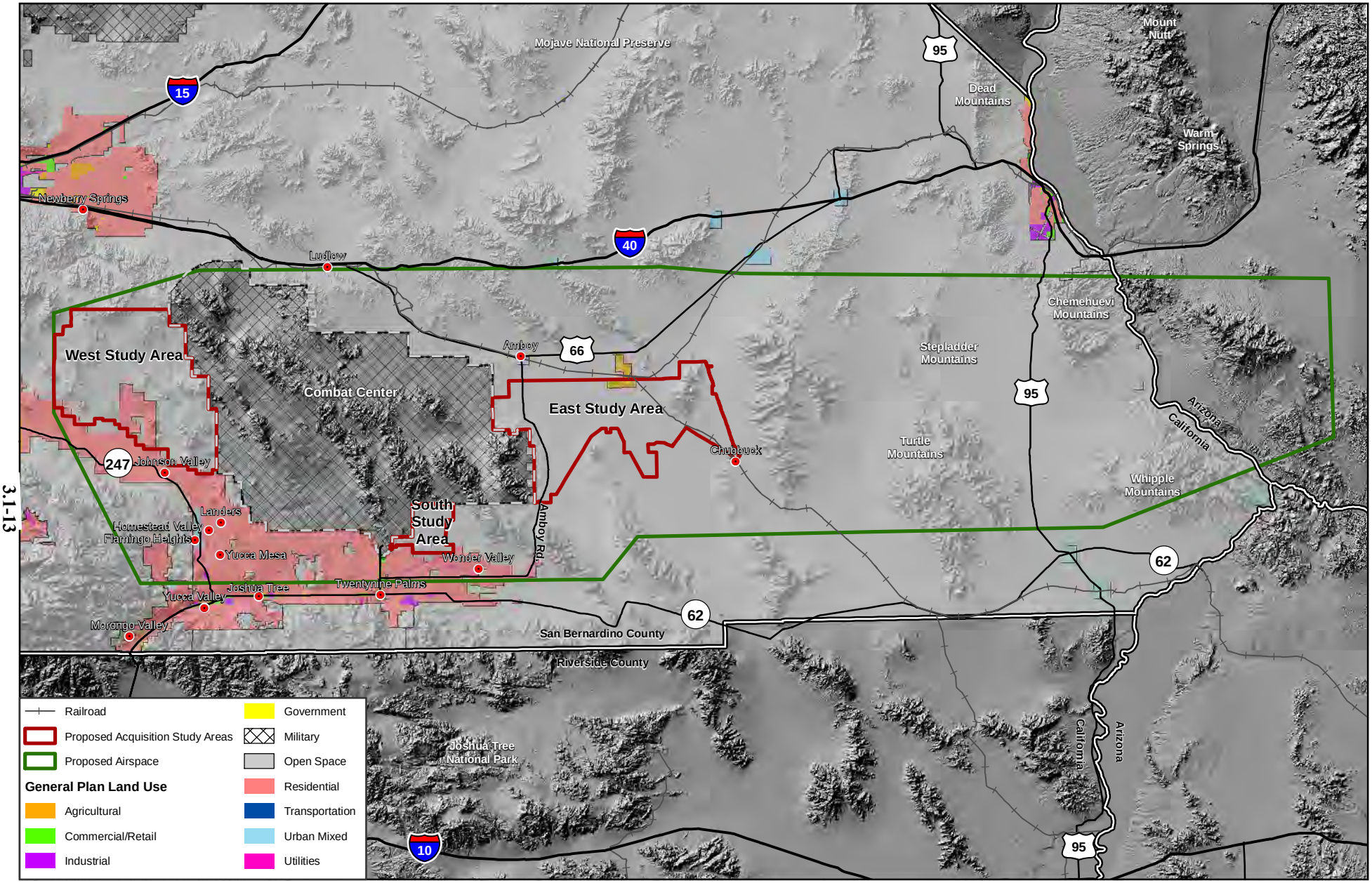
Recreation and Off-Highway Vehicle Use

The west study area contains the Johnson Valley OHV Area (Figure 3.1-4) which is managed by BLM through the *Johnson Valley OHV Area Management Plan* (BLM 1992). This OHV area, along with the Stoddard Valley OHV Area, is an open area where OHV use is not restricted to specific trails. The Johnson Valley OHV Area contains rugged terrain for OHV use. The area called "The Hammers" and nearby areas are especially popular for both organized events/competitions and non-competitive use. Rasor OHV Area is located just south of I-15, west of the Mojave National Preserve. BLM, San Bernardino County, and local OHV groups provide ongoing education and enforcement programs with the goal of minimizing trespass on adjacent private lands and improving stewardship of the land by recreation users.

The unique dry lake and mountainous terrain areas in and around Johnson Valley are popular for photo shoots and commercial filming. BLM requires permits for filming on public lands and monitors these activities in the field. Other types of recreation use in the area include hiking, sight-seeing, photography, rock-hounding, camping, and wildlife viewing. OHV use and other types of recreation are discussed further in Section 3.2, *Recreation*.

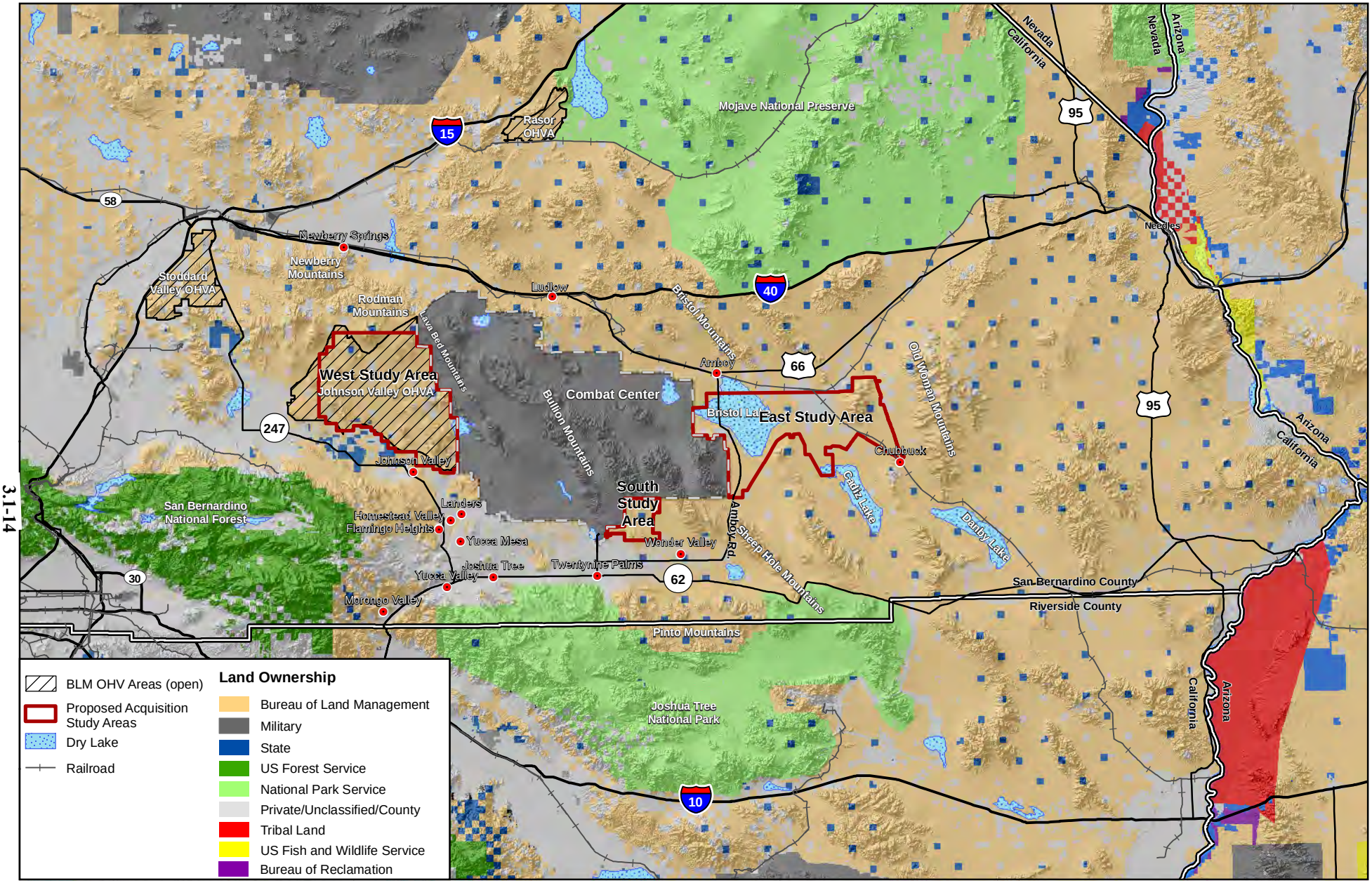
Mining

Figure 3.1-5 identifies mines and mining claims in the acquisition study area and illustrates the types of mineral resources that are present, including but not limited to calcium chloride, iron ore, gold, and sand and gravel. The focus of the land use analysis is on active (operating) mines, of which there are only two in the proposed acquisition study areas as of November 2011. Both of these operating mines are located in the east study area (see Figure 3.1-5) and both produce calcium chloride. The first of these mines is the TETRA Technologies Amboy Operation at Bristol Dry Lake, which is operated by TETRA Technologies, Inc., (TETRA) on approximately 10,856 acres (4,393 hectares). This mine has been in operation since 1908. The second operating mine, also located in the east study area at Bristol Dry Lake, is operated by National Chloride Company of America (National Chloride). The BLM has designated a portion of Bristol Dry Lake as a Known Sodium Leasing Area (BLM 2008, BLM 2012). Other Known Sodium Leasing Areas in California include Danby Lake, Cadiz, and Ridgecrest/Trona (BLM 2012). Two other abandoned mines are also located in the east study area: the America Mine, an abandoned gold mine located adjacent to the Combat Center; and the Vulcan Mine, an abandoned gold mine located in the northeast part of the east study area.



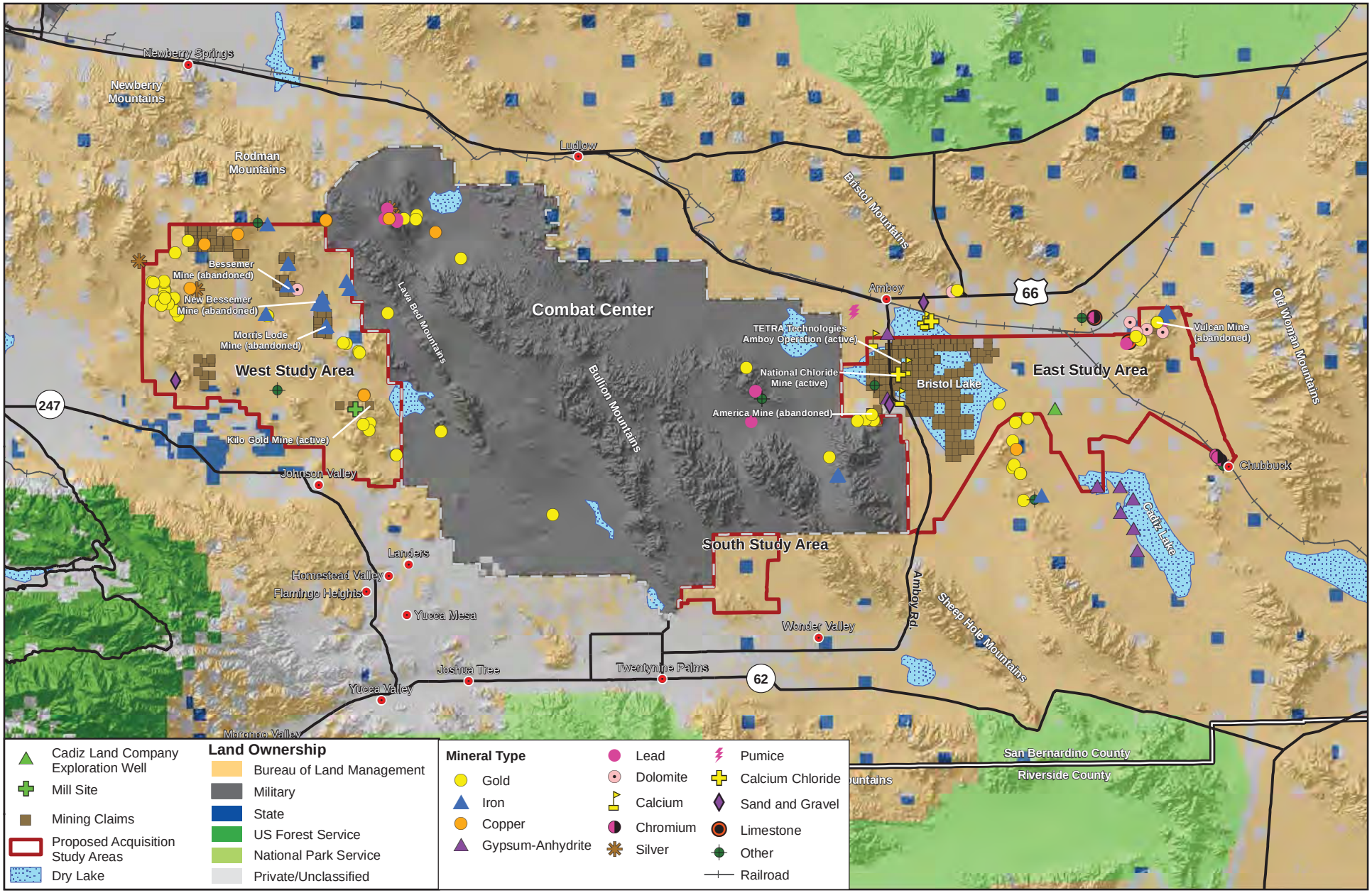
Source: MAGTF Training Command 2009, SANBAG 2009

Figure 3.1-3
San Bernardino County General Plan Land Use



Source: MAGTF Training Command 2009, BLM 2009

Figure 3.1-4
OHV Areas



Sources: MAGTF Training Command 2009; NAVFAC Southwest 2012

Figure 3.1-5
Mines, Mining Claims, and Mineral Resources in the Acquisition Study Areas

No producing mines have been identified in the west or south study areas. However, in accordance with BLM policy, Figure 3.1-5 identifies the Kilo Gold Mine, located in the west study area, as an active mine even though it is no longer operating. As landowner and administrator, BLM classifies a mine as active until the reclamation process is complete. As described in Section 3.12, *Geological Resources*, there have been no mining operations at the Kilo Gold Mine for several years, the County of San Bernardino and BLM are in the process of closing the mine, and the reclamation process will be completed by 2016 or earlier. For purposes of the land use impact analysis in this EIS, the Kilo Gold Mine is considered an abandoned mine, but it is shown as an active mine in Figure 3.1-5 to reflect its official status under BLM policy.

The Morris Lode Mine has an approved mining permit from the County of San Bernardino as of August 2011, and thus it may resume operations (as described in Section 3.12, *Geological Resources*). Figure 3.1-5 displays two other abandoned iron mines in the west study area: the Bessemer Mine and the New Bessemer Mine, both located in the vicinity of the Morris Lode Mine. Information about the abandoned mines shown in Figure 3.1-5 is based primarily on field surveys, agency coordination, and a state database. Abandoned mines are of note mostly because of public safety concerns. Based on the history of mining in the acquisition study area, other abandoned mines and abandoned mine features, such as mine shafts and tunnels, could also be present. Such features would be further identified as part of the real estate survey and appraisal process that would follow the NEPA process if one of the action alternatives was selected.

No active mines have been identified in the south study area, however, there are a number of abandoned mines within the study area. Additional information on the mines mentioned above and on the overall mineral resource potential of the acquisition study area is provided in Section 3.12, *Geological Resources*.

Figure 3.1-5 also displays public land mining claims as identified per Public Land Survey (also known as township and range) square mile Section, developed using mining claims density data (BLM 2010a; NAVFAC Southwest 2012). Mining claims can either be patented or unpatented claims (refer to Section 3.12 for mining claim definitions). Individual claimants frequently have multiple claims and it is possible for a single acre (0.4 hectare) to contain many claims.

Unpatented claims are the most common type of mining claim. The highest density of unpatented claims occurs in the east study area (516 unpatented mining claims). Most of these are in the vicinity of Bristol Lake (NAVFAC Southwest 2012). During preparation of the EIS, no data were available to indicate the number of patented mining claims in the east study area (three owners are currently known). Based on data available from the BLM and tax parcel maps, a total of 240 mining claims are located within the west study area: 19 patented claims and 221 unpatented claims (NAVFAC Southwest 2012). There are no patented mining claims located in the south study area, and all unpatented claims are closed (NAVFAC Southwest 2012). For all acquisition study areas a real estate title search is needed to confirm and identify the exact number of patented mining claims and the number of claim owners.

Grazing

A total of 31 public land grazing allotments (designated areas suitable for grazing) are present within the West Mojave planning area. The types of livestock and forage allocation for allotments are designated in BLM's CDCA Plan. Allotments are ephemeral, perennial, or ephemeral/perennial based on the type of forage that is available. Cattle, sheep, and horses, or a combination, may be authorized to graze on an allotment. Depending on the type of lease, livestock producers apply to graze livestock annually or as conditions permit. Grazing use is allowed with written authorization and terms and conditions for grazing are listed as necessary.

Two grazing allotments are located on BLM lands in and adjacent to the west study area (Figure 3.1-6):

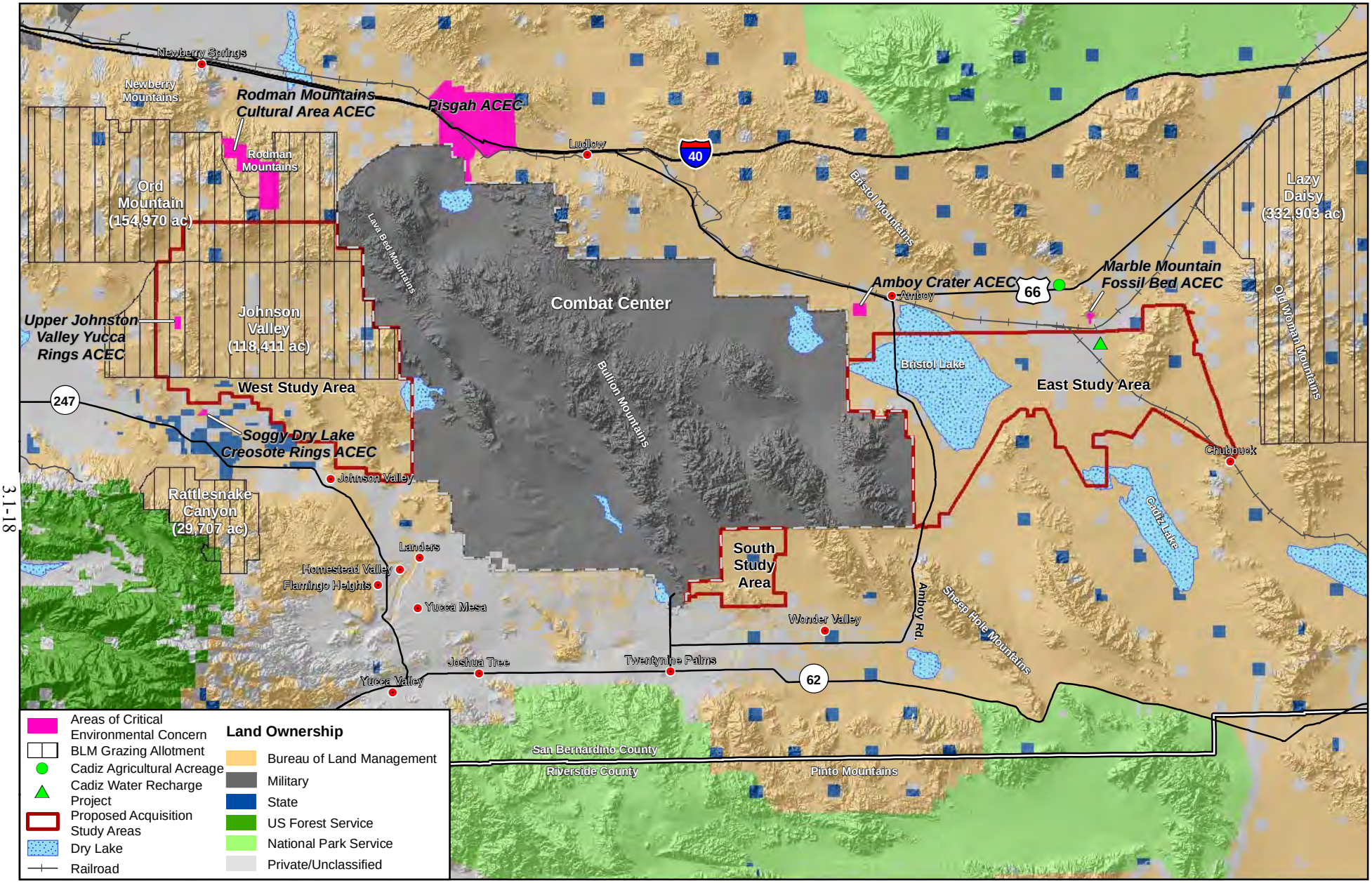
- **Johnson Valley Grazing Allotment** contains 118,411 acres (47,919 hectares) of which 102,888 acres (41,637 hectares) are within the west study area. Approximately 90% of the allotment is on Public Land. The grazing allotment is classified for ephemeral grazing use and is designated for sheep. However, this allotment has no active grazing currently, nor will it in the future due to a provision in the West Mojave Plan known as the "9-Mile Rule" that prohibits domestic sheep grazing within nine miles of occupied habitat for bighorn sheep.
- **Ord Mountain Grazing Allotment** contains 154,970 acres (62,714 hectares) of which 25,222 acres (10,207 hectares) are within the west study area. Approximately 90% of the allotment is on Public Land. The allotment is classified for perennial grazing use, with year-round grazing allowed whenever forage is available, and is designated for cattle. Portions of the allotment contain critical habitat for the desert tortoise. The allotment contains 3,632 active Animal Unit Months.

Agriculture

Lands in and adjacent to the acquisition study area are not generally suited for agricultural production due to the arid environment and available water constraints; however, some farming occurs near the northern boundary of the east study area operated by Cadiz Inc., and located within Public Land Survey Sections 21, 27, and 33. Approximately 1,600 acres (647 hectares) are cultivated with table grapes, citrus, and row crop acreage. A very small portion of this 1,600 acres (647 hectares), approximately 6 acres (2 hectares) or less, would be lost if a proposed groundwater banking project were built and operated (i.e., for the location of the project well field and water conveyance facilities). The proposed Cadiz Inc. groundwater project is the subject of an environmental impact study that contains crop data cited below (Metropolitan Water District of Southern California [MWD] and BLM 2001).

The crops cultivated include citrus, grapes, and cultivated acreage available for future row crop planting. Varieties being grown include Thompson seedless grapes (200 acres [81 hectares]), Red Flame seedless grapes (383 acres [155 hectares]), Lisbon and Eureka lemons (280 acres [113 hectares]), Royal Mandarin (14 acres [6 hectares]), Minneolas (27 acres [11 hectares]), and Valencia oranges (120 acres [49 hectares]); 520 acres (210 hectares) in row crops; and additional acreage for research and development. Water from seven existing wells is supplied via pipeline to the Cadiz Inc. agricultural operations. An extensive irrigation system consisting of pipes and hoses delivers water directly to each individual plant or tree.

Most of the Cadiz Inc. landholdings are designated in the *San Bernardino County General Plan* as Resource Conservation and Agriculture. The Resource Conservation designation provides for open space and recreational uses, single family residences on very large parcels and similar compatible uses. The Agriculture designation provides for commercial agricultural operations, agricultural support services, rural residential uses, open space and recreation uses, and similar, compatible uses. There are no Williamson Act contract lands in the area. The Williamson Act (officially, the California Land Conservation Act of 1965) is a California law that provides relief from property taxes to owners of farmland and open space land in exchange for a ten-year agreement that the land will not be developed or otherwise converted to another use. Because the U.S. Department of Agriculture Soil Conservation Service (SCS), now the Natural Resources Conservation Service (NRCS), has not mapped soils in the Cadiz area, no soils are currently designated as agricultural soils. Therefore, none of the cultivated lands are designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance.



Source: MAGTF Training Command 2009, BLM 2009

Figure 3.1-6
Grazing Allotments and Areas of Critical Environmental Concern

In 1993, the County of San Bernardino Board of Supervisors approved the Cadiz Valley Agricultural Development Project. This land use approval allows for the expansion of agricultural operations to encompass a total of 9,600 acres (3,885 hectares). Generally, changes in future agricultural production would be in response to market conditions such as changes in the demand for specific agricultural products at specific times of the year.

Areas of Critical Environmental Concern

Areas of Critical Environmental Concern are areas within BLM-managed lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values; fish and wildlife resources; or other natural systems or processes, or to protect life and safety from natural hazards.

One ACEC is located within the west study area, Upper Johnson Valley Yucca Ring ACEC, and several others in the vicinity but outside the acquisition study area (Figure 3.1-6).

- **Upper Johnson Valley Yucca Ring ACEC**. Upper Johnson Valley Yucca Ring ACEC is designated for protection of the Mojave yucca and is located in the western portion of the west study area.

Utilities and Other Similar Facilities

Figure 3.1-7 illustrates major transmission lines and pipelines in the acquisition study area. Transmission lines owned by Southern California Edison traverse the north portion of the west study area, branching into two lines south of the Cinder Mine off Camp Rock Road. The BLM anticipates receiving applications to amend these lines for upgrade and expansion (BLM 2010a).

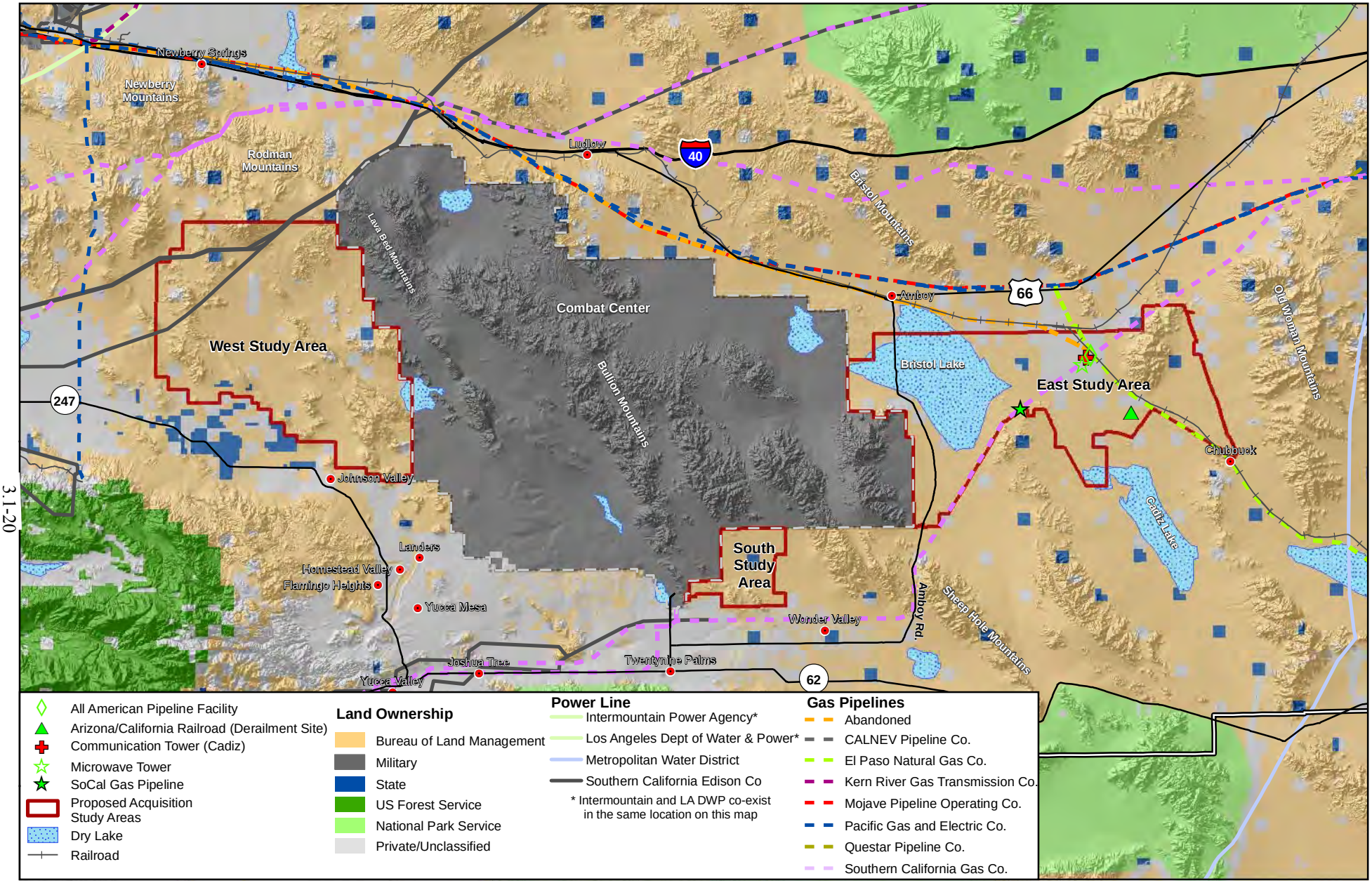
Major pipelines traverse areas north of the Combat Center, coming into San Bernardino County from Nevada, south of I-40. El Paso Natural Gas Company and Southern California Gas Company have pipelines that crisscross the east study area. The latter pipeline is the subject of a proposed north-south interconnect/upgrade project undergoing environmental review by BLM.

Large communication sites located in or near the west study area (i.e., West Ord and Rodman Mountains, off Camp Rock Road, within Johnson Valley) service the California Highway Patrol, wireless companies (AT&T and Verizon), San Bernardino County (Sheriff and school system) and BLM (a critical repeater) (BLM 2010a).

Two seismic detection stations (U.S. Geological Survey [USGS] and UNAVCO) are located in the west study area, one on private land and one at the West Ord communication site (BLM 2010b).

Sensitive Land Uses

This section identifies land uses that are sensitive to noise and provides an overview of noise measurements used in the analysis. Section 3.9, *Noise*, addresses existing noise in more detail. Tables 4.1-1 and 4.1-2 present baseline noise levels for sample points.

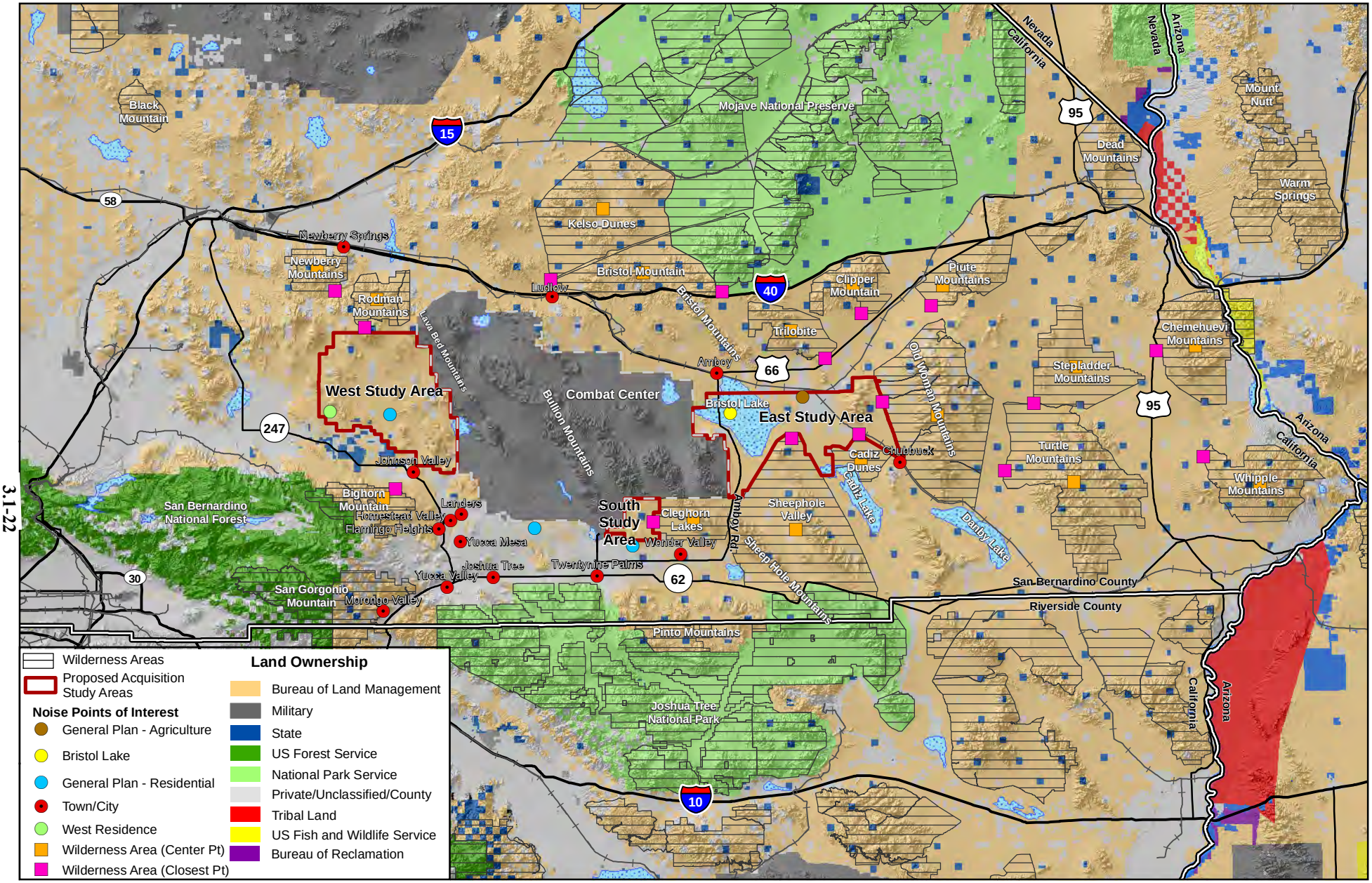


Source: MAGTF Training Command 2009, BLM 2009

Figure 3.1-7
Utilities

Communities in the vicinity of the acquisition study area include the City of Twentynine Palms, Town of Yucca Valley, and the unincorporated communities of Johnson Valley, Lucerne Valley, Homestead Valley, Landers, Flamingo Heights, Yucca Mesa, Yucca Valley, Joshua Tree, Wonder Valley, and Amboy. Figure 3.1-8 shows the locations of communities and other sample points used in the noise analysis. Most residential development in the vicinity of the project is to the south and southwest of the Combat Center. Field surveys and analysis of assessor's parcel data (Marine Corps 2009) indicate that the west, east, and south study areas are essentially uninhabited although there are a number of small cabins, shacks, and other scattered improvements. As described further in Section 4.1, *Land Use*, under the topic of Sensitive Land Uses, wilderness areas in the vicinity of the Combat Center were designated with the Congressional intent that military overflights would not be limited nor would buffer zones be created adjacent to the wilderness areas.

Airfield noise is described as a cumulative noise exposure measure that results from aircraft operations including flight activity in the immediate vicinity of the airfield as well as any engine run-ups that might be associated with aircraft maintenance operations. Day-night Average Sound Level (DNL) and Community Noise Equivalent Level (CNEL) are the most widely accepted metrics used to describe the environmental noise for land use planning and zoning decisions around both civilian and military airports. Aircraft noise does not exceed CNEL of 65 A-weighted decibels (dBA) for aircraft activity outside the Combat Center boundaries. The 65 decibel (dB) Onset-Rate Adjusted Monthly Community Noise Equivalent Level ($CNEL_{mr}$) contours for aircraft activities in the current airspace are fully located within the Combat Center. Blast noise does not exceed 62 C-weighted decibels (dBC) for ordnance activity outside the Combat Center boundaries.



Source: MAGTF Training Command 2009, BLM 2009

Figure 3.1-8
Points of Interest Modeled in Noise Analysis

3.2 RECREATION

3.2.1 Definition of Resource

Recreational areas are defined as public or private lands that provide for relaxation, rest, activity, education, or other opportunities for leisure services and community support that lead to an enhanced quality of life. Recreation may include any type of activity in which area residents, visitors, or tourists may participate. Typically (though not exclusively), use of recreational areas is focused on weekends, vacation periods, or for organized events.

Recreational visits can also be differentiated by their purpose: "event-related" visits are assumed to include those participants and spectators of organized OHV races or other similar events that visit exclusively because of a scheduled event (and would not have otherwise visited on that day if the event were not being held); while "dispersed use" visits are those that may occur for any other reason (e.g., family vacations, weekend excursions, etc.). Dispersed use visitors are also assumed to include a proportion of race spectators that would come to the project area anyway, even if race events did not occur.

To provide a regional context for recreational resources, this section describes the major recreation and OHV areas, activities, user profiles, and key recreation stakeholders and organizations within the Mojave Desert region, particularly the recreation areas and activities that occur in and around the west, south, and east study areas. The ROI for the discussion of recreational resources is the eastern portion of the western Mojave Desert within San Bernardino County. Additional recreational areas have been identified in other parts of southern California (see Appendix M of this EIS) as alternative sites that attract OHV use. Section 4.2 of this EIS discusses indirect impacts from potential displacement of OHV use to these alternative areas.

Recreational activities in the region are a source of economic value to desert communities and generate revenues to the nearby communities. Economic effects of recreation are discussed in Section 3.3, *Socioeconomics and Environmental Justice*, and, therefore, are not discussed further in this section.

3.2.2 Regulatory Framework

The federal, state, and local regulations discussed under Section 3.1, *Land Use*, also apply to recreational resources. These management plans, policies, and acts describe management guidelines for multiple land uses including recreation. The west, south, and east study areas are situated in unincorporated areas of San Bernardino County, largely on public lands. The BLM-administered public lands are managed in accordance with 43 CFR Title 43, Subtitle B, *Regulations Relating to Public Lands.* Regulations applicable to recreational use are further codified in 43 CFR 9268.3, *Recreation Management Procedures*, and include management guidelines for OHV use on all public lands, roads, and trails under administration of the BLM. The BLM Barstow Field Office works with the County of San Bernardino Law Enforcement Division to enforce these recreation management procedures in accordance with FLPMA, as amended.

Executive Order 11644, as amended by EO 11989, pertains to the use of OHVs on the public lands. The purpose of this EO is to establish policies and procedures to ensure that OHV use on public lands "will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands." The Marine Corps implements this EO through development of INRMPs and associated plans. Title 43 CFR Part 2930 contains BLM's regulations for permits for recreation on public lands. The BLM's recreational

management regulations addressing OHV use also implement or address other applicable environmental, wildlife, and cultural resource laws, including the FLPMA of 1976 (43 United States Code [USC] 1701, *et seq.*); the Taylor Grazing Act (43 USC 315a); the Endangered Species Act (ESA) (16 USC 1531, *et seq.*), and the Wild and Scenic Rivers Act (16 USC 1281c).

3.2.3 Existing Conditions

3.2.3.1 Regional Setting

San Bernardino County is home to numerous recreational opportunities (Figure 3.2-1). The Mojave Desert covers the majority of San Bernardino County and is known for open spaces, unique wildlife and vegetation, and spectacular scenery. Much of the Mojave Desert is sparsely populated and its proximity to the major population centers of southern California make it a popular resource for outdoor recreation. Both I-15 and I-40 pass through San Bernardino County, providing access to its many recreational opportunities.

Public lands in the region provide a number of recreational opportunities, these may include: hiking, camping, OHV activities and competitive events, horseback riding, land sailing (i.e., using a sail to propel a small vehicle over a flat area), group rendezvous, target shooting, hunting, wildflower and wildlife viewing, rock hounding, geocaching (i.e., scavenger hunt using Global Positioning System [GPS]), rocketeering, and model airplane and ultralight flying. A number of private land OHV parks and equestrian facilities also provide recreational pursuits sometimes enjoyed in conjunction with public land activities.

<u>Regional Recreation Areas</u>

There are numerous parks, preserves, and wilderness areas within the Mojave Desert providing visitors with the opportunity to engage in multiple types of activities. In addition to nearby National Parks, Preserves, and Forests, there are a variety of recreational opportunities within the CDCA. The CDCA covers more than 25 million acres (10,117,141 hectares), which is approximately a quarter of the size of California (BLM 1980). This area includes sand dunes, canyons, dry lakes, 90 mountain ranges, and 65 wilderness areas. In 1976, Congress initially designated the area, and in 1994 the area was further protected under the California Desert Protection Act (CDPA), which set aside 3.5 million of its acres as wilderness areas. Under the CDPA, Death Valley and Joshua Tree National Monuments were designated as National Parks and the 1.6 million-acre (647,497-hectare) Mojave National Preserve was created (Center for Biological Diversity 2010).

In addition to the recreation areas listed below, BLM land provides important recreation opportunities for the public. Wilderness areas in the region are restricted in terms of vehicular access and the open nature of BLM land allows access to remote and scenic areas by people who may require a vehicle for access, such as people with disabilities or the elderly. In addition to providing a variety of recreational opportunities, management of wilderness areas is often focused on maintaining a quiet natural setting with the absence of man-made visual and vehicular intrusion.

The major recreation areas in the vicinity of the Combat Center are listed in Table 3.2-1 and shown in Figure 3.2-1. Included within each description is an approximate distance of the recreation area to the nearest acquisition study area (west, south, or east study area).

Table 3.2-1. Major Recreation Areas in the Vicinity of the Combat Center

Name	Size	Approximate Distance to Nearest Acquisition Study Area	Description	Typical Recreation Activities
National Parks, National Preserves, National Forests, and Wilderness Areas				
Cleghorn Lakes Wilderness	39,165 acres	Adjacent to the south study area.	Cleghorn Lakes Wilderness is named for the dry lakes found near its center. The east portion is mountainous while the west portion is a vast alluvial slope or bajada. Elevations range from 1,400 feet at the desert floor to the rugged Bullion Mountains, which rise more than 4,100 feet across a 4-mile stretch. The Wilderness Act of 1964 prohibits the use of mechanized or motorized vehicles in Wilderness Areas, except under special provisions described under the Act. Mechanized or motorized vehicles are not allowed in any Wilderness Areas discussed herein.	Hiking, horseback riding, hunting, camping, rock hounding, photography, and backpacking are examples of activities that occur in this wilderness (BLM 2010a).
Old Woman Mountains Wilderness	183,538 acres	Adjacent to the east study area.	The Old Woman Mountains Wilderness consists of bajadas, extensive flat aprons of alluvium, and the fault-lifted Old Woman Mountains that extend some 35 miles north-south and up to 28 miles in an east-west direction. The elevations within the wilderness range from 800 feet in the drainage bottoms to over 5,300 feet at the top of Old Woman Peak. The Old Woman Mountains were the discovery site of the Old Woman Meteorite. This meteorite was discovered in 1975 and is the largest meteorite found in California and the second largest in the U.S.	Hiking, horseback riding, hunting, camping, rock hounding, photography, and backpacking are examples of activities that occur in this wilderness (BLM 2010a).
Cadiz Dunes Wilderness	21,298 acres	Adjacent to the east study area.	The Cadiz Dunes Wilderness is on SR 62. A major portion of the Cadiz Dune system and desert shrub lowlands just east of the dunes. Due to the remote location of these dunes, they received very little OHV use before their designation as wilderness.	Hiking, horseback riding, hunting, camping, rock hounding, photography, and backpacking are examples of activities that occur in this wilderness (BLM 2010b).
Sheephole Valley Wilderness	194,861 acres	Adjacent to the east study area.	Sheephole Valley Wilderness is located on SR 62. This area contains the basin and range topography typical in the Mojave Desert. The area consists of the northwest to southeast trending Sheep Hole and Calumet Mountains. The Sheep Hole Mountains rise to an elevation of 4,613 feet, while the Calumets rise to 3,732 feet. Sheephole Valley is located between the two ranges.	Hiking, horseback riding, hunting, camping, rock hounding, photography, and backpacking are examples of activities that occur in this wilderness (BLM 2010a).
Rodman Mountains Wilderness	34,320 acres	0.8 miles north of the west study area.	The Rodman Mountains Wilderness consists of a series of fault-created valleys and ridges that rise from 2,000 feet to almost 5,000 feet. A lava flow slices this area in two from northwest to southeast, forming a sloping mesa. Escarpments, mountains, maze-like canyons and bajadas characterize the area.	Camping, hiking, hunting, fishing, wildlife viewing, and photography are examples of activities that occur in this wilderness (BLM 2010a).

Continued on next page

Table 3.2-1. Major Recreation Areas in the Vicinity of the Combat Center

Name	Size	Approximate Distance to Nearest Acquisition Study Area	Description	Typical Recreation Activities
Amboy Crater	NA	2.2 miles west of the east study area.	Amboy Crater is located near the eastern border of the Combat Center. Designated a National Natural Landmark in 1973, Amboy Crater was recognized for its visual and geological significance and is an excellent example of a very symmetrical volcanic cinder cone (BLM 2010b).	Amboy Crater is a good place to observe volcanic features. Hiking, wildlife viewing, and photography are other examples of activities that occur at Amboy Crater.
Trilobite Wilderness	39,616 acres	4.7 miles north of the east study area.	The Trilobite Wilderness covers the Marble Mountains, a narrow volcanic range extending 12 miles in a northwest-southwest direction.	Hiking, horseback riding, hunting, camping, rock hounding, photography, and backpacking are examples of activities that occur in this wilderness (BLM 2010a).
Bighorn Mountains Wilderness	26,573 acres	5 miles south of the west study area.	The Bighorn Mountains Wilderness is located in the foothills of the San Bernardino Mountains. This area includes an ecological transition from Yucca and Joshua trees on the desert floor to stands of Jeffrey Pine at higher elevations, including the 7,500-foot Granite Peak.	Camping, hiking, hunting, fishing, wildlife viewing, and photography are examples of activities that occur in this wilderness (BLM 2010a).
Newberry Mountains Wilderness	26,102 acres	5.7 miles north of the west study area.	The Newberry Mountains Wilderness is noted for its rugged volcanic mountains and deep, maze-like canyons. Topography ranges from 2,200 feet in the north to 5,100 feet in the south.	Camping, hiking, hunting, fishing, wildlife viewing, photography, and wildflower viewing are examples of activities that occur in this wilderness (BLM 2010a).
San Bernardino National Forest	676,666 acres	7.5 miles southwest of the west study area.	The San Bernardino National Forest serves as a year-round outdoor recreation destination. The forest is managed by three Ranger Districts in San Bernardino and Riverside counties (USFS 2010a).	Camping, hiking, fishing, hunting, cross-country and alpine skiing, OHV activities, and scenic vistas are available within the forest (USFS 2010b).
Joshua Tree National Park	792,623 acres	7.6 miles south of the south study area.	The Joshua Tree National Monument was designated a National Park in 1994 under the CDPA. The park receives over 1.2 million annual visitors (National Park Service 2001; Twentynine Palms Visitor's Bureau 2004). The towns of Joshua Tree, Twentynine Palms, and Yucca Valley provide lodging, food, and other amenities to park visitors.	Joshua Tree is a world-famous rock climbing destination. Hiking, backpacking, horseback riding, and wildlife viewing opportunities are other examples of activities that occur in the park. Mountain bikes and 4-wheel drive vehicles are welcome in designated areas of the park.
Clipper Mountains Wilderness	33,844 acres	9.1 miles northeast of the east study area.	The Clipper Mountains Wilderness consists of rugged yellow and dark brown, horizontally striped mesas; narrow canyons with hidden springs; and sparsely vegetated alluvial fans. The small cluster of volcanic mountains is oriented northeast to southwest. In the center, the most prominent ridge, Clipper Mountain, reaches an elevation of 4,625 feet before it dramatically drops off in a series of sharp cliffs overlooking the Clipper and Fenner Valleys. Castle Dome, a local landmark, can be clearly seen from historic Route 66 to the south and east.	Hiking, horseback riding, hunting, camping, rock hounding, photography, and backpacking are examples of activities that occur in this wilderness (BLM 2010a).

Continued on next page

Table 3.2-1. Major Recreation Areas in the Vicinity of the Combat Center

Name	Size	Approximate Distance to Nearest Acquisition Study Area	Description	Typical Recreation Activities
Pisgah Lava Field	NA	10.1 miles northeast of the west study area.	Pisgah is a lava field in the Eastern Mojave Desert and consists of numerous thin flows extending from the vent approximately 11 miles to the west and 5 miles to the southeast. Pisgah Crater, the most dominant feature in the lava field, is a cinder cone with a height of 321 feet and a width at the base of 1,600 feet (Volcano World 2010).	Hiking, wildlife viewing, and photography are other examples of activities that occur at Pisgah Lava Field.
Pinto Mountains Wilderness	24,374 acres	12 miles southwest of the south study area.	The Pinto Mountains Wilderness was congressionally-designated a wilderness area in 2009. This area is noted for its rugged mountains that rise sharply from the northern edged of the Pinto Basin. Like all wilderness areas in California, this Wilderness is managed by BLM.	Hiking, backpacking, horseback riding, and wildlife viewing opportunities are examples of activities that occur in this area.
Piute Mountains Wilderness	48,080 acres	13.3 miles northeast of the east study area.	The northern boundary of the Piute Mountains Wilderness follows historic Route 66. This wilderness area consists of the Piute Mountains and the surrounding bajadas and extensive flat aprons of alluvium. The elevations within the wilderness range from 2,000 feet to 4,132 feet. The Piute Mountains form a dramatic landscape of rocks of contrasting colors, textures, and shapes. Very angular, jagged volcanics and rounded, smooth granite hills are cut by numerous canyons and washes.	Hiking, horseback riding, hunting, camping, rock hounding, photography, and backpacking are examples of activities that occur in this wilderness (BLM 2010a).
Mojave National Preserve	1.6 million acres	14 miles north of the east study area.	The Mojave National Preserve was established in 1994 through the CDPA. The preserve is located between I-15 and I-40 and has mountains, mesas, extinct volcanoes, dry lakebeds, and sand dunes.	Numerous camping, hiking, dirt road driving, wildlife and wildflower viewing, and hunting opportunities occur in the preserve (NPS 2002). The Wilderness Act of 1964 prohibits motor vehicles and all mechanical transport and motorized equipment in wilderness areas. Open roads in Mojave National Preserve do provide access to most Mojave Wilderness boundaries, and horses and other pack animals are allowed.
San Gorgonio Wilderness	39,233 acres	17.8 miles south of the west study area.	The San Gorgonio Wilderness is part of the eastern slope of the San Bernardino Mountains with topography rapidly changing from low, rolling foothills and canyons to steep, rugged mountains. Elevations range from 2,300 feet to 5,500 feet. Because of this elevation gradient, the wilderness reflects a unique transition between desert, coastal, and mountain environments.	Hiking, horseback riding, hunting, camping, photography, and backpacking are examples of activities that can occur in this wilderness (BLM 2010a).

Continued on next page

Table 3.2-1. Major Recreation Areas in the Vicinity of the Combat Center

Name	Size	Approximate Distance to Nearest Acquisition Study Area	Description	Typical Recreation Activities
Kelso Dunes Wilderness	154,175 acres	21 miles northeast of the west study area.	Kelso Dunes Wilderness derives its name from the large sand dunes complex located outside of its eastern boundary in the Mojave National Preserve. From the flat Broadwell dry lake bed in the west, the area slopes into the northern most end of the gentle rounded granite Bristol Mountains. Mixed in this central area are flat-topped volcanic mountains, such as Broadwell Mesa, and an extensive desert wash system.	Hiking, horseback riding, hunting, camping, rock hounding, photography, and backpacking are examples of activities that occur in this wilderness (BLM 2010a).
Bristol Mountains Wilderness	76,983 acres	21.3 miles northeast of the west study area.	The Bristol Mountains Wilderness contains the tilted and bisected old volcanic plain called Old Dad Mountains and the northern portion of the Bristol Mountains. The broad Budweiser Wash drains into the eastern portion of the wilderness.	Hiking, horseback riding, hunting, camping, rock hounding, photography, and backpacking are examples of activities that can occur in this wilderness (BLM 2010a).
Palen/McCoy Wilderness	236,488 acres	33 miles southeast of the east study area.	Within the Palen/McCoy Wilderness are five distinct mountain ranges separated by broad sloping bajadas: the Granite, McCoy, Palen, Little Maria, and Arica Mountains. Because this large area incorporates so many major geological features, there is exceptional diversity of vegetation and landforms.	Hiking, horseback riding, hunting, camping, photography, and backpacking are examples of activities occur in this wilderness (BLM 2010a).

Notes: BLM = Bureau of Land Management; CDPA = California Desert Protection Act; I- = Interstate; km = kilometer; NA = Not Applicable; NPS = National Park Service; OHV = off-highway vehicle; SR = State Route; USFS = U.S. Forest Service

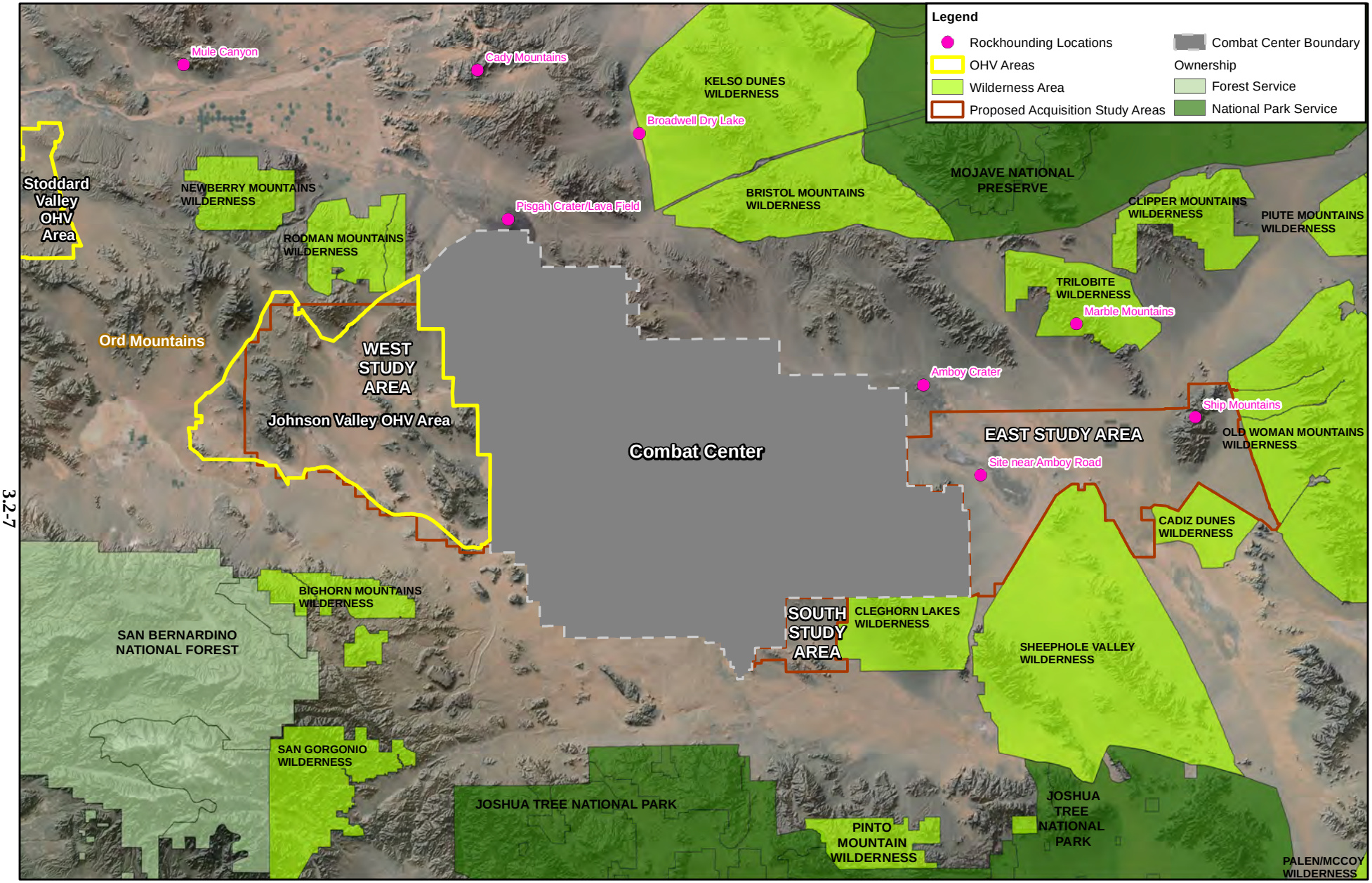


Figure 3.2-1
Recreation Areas in the Vicinity of the Combat Center

As illustrated in Figure 3.2-2, approximately 380,753 acres (154,086 hectares) of open OHV areas exist in the project area. The Johnson Valley OHV Area represents approximately half of this total acreage within the region. These OHV areas are also illustrated in Figure 3.2-3 and listed in Table 3.2-2. Appendix M presents additional information and maps pertaining to these and other OHV southern California recreation areas, including some located outside the project area.

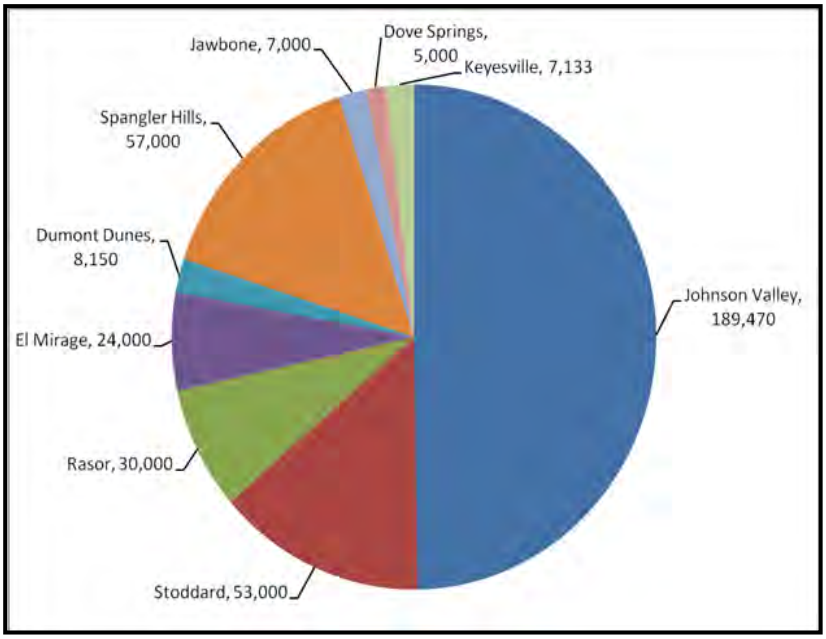


Figure 3.2-2. Regional OHV Area Acreages

In addition, the BLM, California Desert District has prepared several Resource Management Plans and amendments that include public route designations offering an array of recreational opportunities (e.g., OHV activities, hunting, hiking, wildlife viewing, and camping). The CDCA Plan amendments include the following route designations in the project area: West Mojave Route Designations, Northern and Eastern Mojave Route Designations, and Northern and Eastern Colorado Route Designations (BLM 2010j).

Regional Recreation Activities

Off-highway Vehicle Activities

Off-highway vehicle riding is one of the major recreational activities in Southern California. Public lands available for OHV use are designated as either "Limited Use" areas or "Open" areas (BLM 2009). Vehicles are required to remain on designated routes of travel within all of the "Limited Use" areas; "Open" areas are contained within a formal OHV boundary and allow cross-country travel.

Off-highway vehicles are operated off paved roads and highways, and consist of racing motorcycles, trail bikes, mini bikes, dune buggies, all-terrain vehicles (ATVs), sport utility vehicles, Jeeps, 4-wheel drive vehicles, trucks, or simply any vehicle used for touring on unpaved roads. In general, OHV recreation falls under three categories: general vehicular touring, motorcycle recreation, and ATVs and technical 4-wheel drive recreation (BLM 2005). General vehicular touring allows visitors to see vast areas of the desert and may occur on both flat and mountainous terrain. Often vehicles designed for normal street usage such as sport utility vehicles, trucks, or other vehicles with 4-wheel drive capabilities are used (BLM 2005). Motorcycle recreation involves either transporting motorcycles to recreation sites using street-legal vehicles or using dual sport motorcycles, which are designed to perform both off and on roads (BLM 2005). All terrain recreation generally occurs over rough terrain and sand dunes using ATVs and 4-wheel drive vehicles. Technical 4-wheel drive vehicles are a class of vehicle that includes jeeps, trucks, and sport utility vehicles that have been significantly modified through the addition of specialty tires, transmissions, engines, and suspensions to be effective in traversing otherwise impassible routes. "Rock Crawling" is an example of an activity that utilizes technical 4-wheel drive vehicles in which vehicles travel over large rocks and boulders typically at a slow pace (i.e., less than 5 miles [8 km] per hour) (BLM 2005).

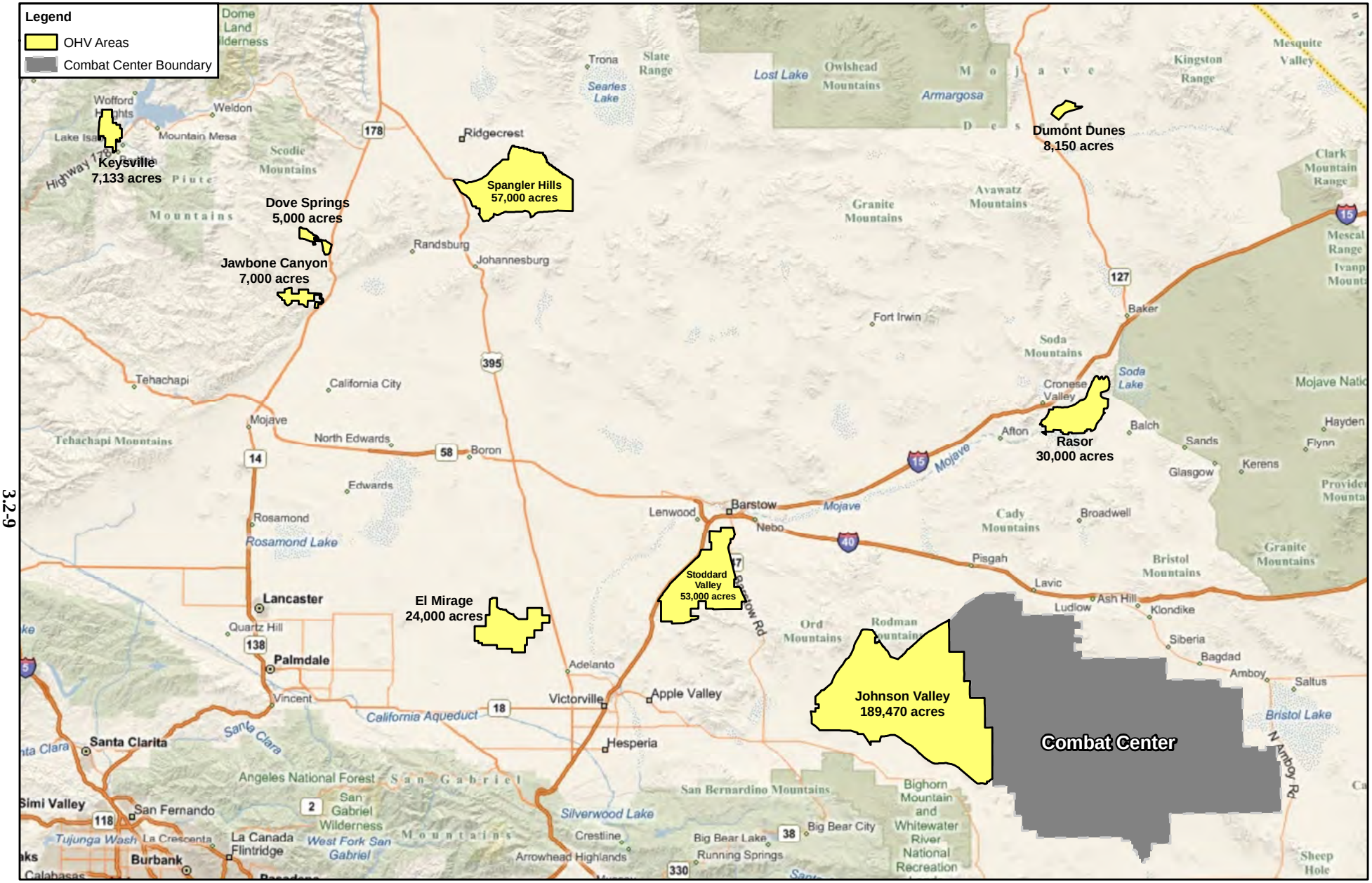


Figure 3.2-3
Regional OHV Recreation Areas

Table 3.2-2. Regional OHV Areas

Name	Size	Approximate Distance to Nearest Acquisition Study Area	Description	Typical Recreation Activities
Johnson Valley OHV Area	189,470 acres	Within the west study area.	The west study area encompasses the Johnson Valley OHV Area, one of the largest vehicle recreation areas in the country. Primary access is provided by Camp Rock Road, Bessemer Mine Road, and Boone Road from SR 247. These maintained roads lead to the western, interior, and eastern portions of the OHV area. Primary staging areas are located at Anderson Dry Lake in the west, Cougar Buttes in the southwest, Soggy Dry Lake in the south, the south-central "Rockpile," and Means Dry Lake in the southeast. The topography consists of rocky mountains, rolling hills, valleys, dry lake beds, and sandy washes with elevations ranging from 2,300 feet to 4,600 feet (BLM 2007).	In addition to OHV activities, the Johnson Valley OHV Area provides opportunities for hiking, biking, rock hounding, geocaching, rocketeering, and flying model airplanes.
Stoddard Valley OHV Area	53,000 acres	20 miles northwest of the west study area.	Stoddard Valley OHV Area offers a diverse landscape for OHV recreation and is characterized by steep rocky mountains, rolling hills, open valleys, and winding sandy washes (BLM 1993, 2010c). Elevations range from 5,000 feet on Stoddard Peak to 2,800 feet at Turtle Valley. The triangular-shaped riding area is formed by I-15 and SR 247 (Barstow Road), immediately south of Barstow. Most area visitors ride motorcycles or ATVs, or tour the area in 4-wheel drive vehicles. The easily accessed areas off Sidewinder Road are used extensively for OHV recreation (BLM 2010c).	The OHV area is used extensively for competitive events by permit, with some events attracting as many as 400 participants and 10,000 spectators (BLM 1993). Stoddard Valley is also the site for Cal4wheel's High Desert Round-Up event every Memorial Day. The event has taken place annually over the last two decades and includes many runs throughout the valley of varying levels of difficulty (Dirtopia 2010). A network of vehicle routes on Limited Use Class public lands in the Ord Mountains serve as a connector between the Johnson Valley and Stoddard Valley OHV Areas. In addition to OHV activities, the area provides opportunities for hiking, rock scrambling and hounding, wildlife watching, upland gamebird hunting, touring, trail riding, and free-play vehicular use. Camping is also a popular activity in conjunction with vehicular play (BLM 1993).
Rasor OHV Area	30,000 acres	31.4 miles northeast of the west study area.	The Rasor OHV Area is a remote area of rolling hills, open valleys, and sand dunes. The riding area is located between I-15 and the Mojave National Preserve, about 25 miles southwest of Baker. Elevations range from near 2,427 feet down to around 1,275 feet at the Mojave River. Besides the remote nature of the area, another attraction is the historic Mojave Road which runs through the riding area into the newly designated Mojave National Preserve.	The easily accessed areas off the Rasor Road exit are used extensively for OHV and sand rail staging and play. Due to the remoteness of the area, there have been no requests for competitive event permits, leaving this area exclusively for casual riders. In addition to OHV activities, there are many opportunities for hiking, rock scrambling, rock hounding, and plant, bird, and wildlife viewing (BLM 2010c).

Continued on next page

Table 3.2-2. Regional OHV Areas

Name	Size	Approximate Distance to Nearest Acquisition Study Area	Description	Typical Recreation Activities
El Mirage OHV Area	24,000 acres	40 miles west of the west study area.	The El Mirage OHV Area is located in the Mojave Desert on the western edge of San Bernardino County. This OHV area attracts a variety of activities and the areas of interests include El Mirage Dry Lakebed, the Shadow Mountains, El Mirage Basin, and the Twin Hills area. Elevations range from about 2,800 feet at the El Mirage Dry Lake to more than 3,800 feet in the Shadow Mountains.	This area is used extensively for competitive racing events and its unique flat lakebed makes it possible for ultra-light and other aircraft activities. In addition, there are opportunities for hiking, rock scrambling, rock hounding, and wildlife viewing (BLM 2010c).
Dumont Dunes OHV Area	8,150 acres	71.7 miles northeast of the west study area.	The Dumont Dunes OHV Area is a remote area bordered by steep volcanic hills and the Amargosa River and can easily be recognized from a distance by its distinctive sand dunes (Dumont Dune Riders 2010). The elevation ranges from 700 feet at the river to 1,200 feet at the top of Competition Hill, the tallest of the dunes (BLM 2010c).	Most visitors ride motorcycles or ATVs, sand rails, or tour the area in 4-wheel drive vehicles. The area off Dumont Road is used extensively for OHV and sand rail staging and play. In addition, there are many opportunities for hiking, rock scrambling, rock hounding, and wildlife viewing in the hills away from the dunes (BLM 2010c).
Spangler Hills OHV Area	57,000 acres	70 miles northwest of the west study area.	The Spangler Hills OHV Area is located to the southeast of the City of Ridgecrest and east of U.S. Highway 395.	The Spangler Hills OHV Area provides a wide variety of riding opportunities including cross country play, trail riding, advanced technical routes, 4-wheel drive trails, and a variety of competitive events (BLM 2010d). In addition, there are opportunities for hiking, camping, and wildlife viewing.
Jawbone Canyon OHV Area	7,000 acres	86.4 miles northwest of the west study area.	Jawbone Canyon OHV Area is located off SR 14 approximately 30 miles north of Mojave.	In addition to OHV recreation, this OHV area and surrounding public lands are open to camping, hiking, and wildlife viewing (BLM 2010d).
Dove Springs OHV Area	5,000 acres	88.6 miles northwest of the west study area.	Dove Springs OHV Area is located off SR 14 approximately 30 miles north of Mojave.	In addition to OHV recreation, this OHV area and surrounding public lands are open to camping, hiking, and wildlife viewing (BLM 2010d).
Keysville OHV Area	7,133 acres	120.1 miles northwest of the west study area.	The Keyesville OHV Area is located southwest of the Lake Isabella Dam. The area is bounded by Sequoia National Forest to the north and west and by SR 178 to the south.	The Keyesville area receives a high amount of recreational use because of the access to the Lower Kern River and the availability of trails for OHVs and mountain bikes. By far the most dramatic natural feature of the area is an approximately 3.5-mile stretch of the Lower Kern River Gorge. This important whitewater river attracts about 12,000 commercial and non-commercial rafters each year. The river and its tributaries are also used by recreationists for gold panning. Another attraction to the Keyesville area is fishing (BLM 2010e).

Notes: ATV = all-terrain vehicle; BLM = Bureau of Land Management; I- = Interstate; km = kilometer; OHV = off-highway vehicle; SR = State Route

With the exception of organized events, public land recreational activities do not require a specific government permit for recreational use, though these activities must comply with BLM regulations and management plan constraints, as well as certain other agency guidelines and/or permits. Any motor vehicles used on public lands are required to be registered with the California Department of Motor Vehicles and either a street-legal license plate or a valid "green sticker" or "red sticker" registration decal must be displayed on any vehicle used in off-road recreation. Green stickers are issued to 2002 year model and older OHVs, for year round use at all California OHV riding areas. Red stickers are issued to 2003 year model and newer OHVs that are not certified to California OHV emission standards, and are permitted for seasonal use within California OHV riding areas.

For non-California residents a "Nonresident" OHV permit, issued by the California Department of Parks and Recreation, is required to legally operate an OHV in the state of California (BLM 2010f). The Nonresident decal is to be displayed in the same location on the OHV as that specified for California "green sticker" registration decals.

From 1982 to 2001, OHV use was one of the fastest growing categories of outdoor activity in the country (Cordell *et al.* 2008). There was a consistent upward trend in the number of OHV participants between 1999 and 2003, during which time the estimated number of OHV participants increased 37%, from 37.6 to 51.6 million people. A slight decrease was beginning to show in late 2003 and this trend continued through 2007, to just over 44.4 million people participating in OHV recreation. Overall, these numbers represent an 18% increase in the number of OHV participants between 1999 and 2007 (Cordell *et al.* 2008).

Table 3.2-3 lists the top 10 states for number of OHV participants (Cordell *et al.* 2008). From 1999 to 2007, California had, on average, the highest number of OHV participants in the country, with 4.99 million OHV users accounting for 11.6% of the U.S. total (Cordell *et al.* 2008). This is more than 1.5 times the number of participants in second-ranked Texas (Cordell *et al.* 2008).

Table 3.2-3. Population and Estimated Number of Participants Ordered from Highest to Lowest by the Number of OHV Recreation Participants in the Top 10 States

State	Population Age 16 & Older (1,000s)	Percent of U.S. Population Age 16 & Older	Sample Size	Percent Participating in OHV Recreation	OHV Participants (1,000s)	Percent of Total U.S. Participants
California	27,609	12	6,090	17.6	4,986	11.6
Texas	17,466	7.6	3,845	16.5	2,957	6.9
Florida	14,340	6.2	2,950	13.8	2,028	4.7
New York	15,116	6.5	3,765	12.9	1,991	4.6
Pennsylvania	9,849	4.3	2,768	18.8	1,900	4.4
Michigan	7,808	3.4	2,321	20	1,601	3.7
Ohio	8,911	3.9	2,579	15.6	1,427	3.3
North Carolina	6,847	3	2,017	19.6	1,378	3.2
Illinois	9,844	4.3	2,611	13.6	1,374	3.2
Georgia	7,085	3.1	1,899	18.2	1,319	3.1
Total	**124,875**	**54.3**	**30,845**		**20,961**	**48.7**

Note: OHV = off-highway vehicle
Source: Cordell *et al.* 2008.

As illustrated in Figures 3.2-4 and 3.2-5, from 1980 to 2000, California OHV registrations increased 108%, and attendance at California's State Vehicular Recreation Areas increased 52% between 1985 and 2000 (BLM 2005; California State Parks 2002).

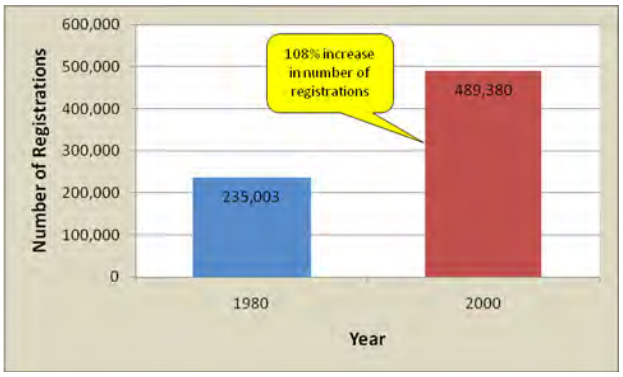


Figure 3.2-4 OHV "Green Sticker" Registrations

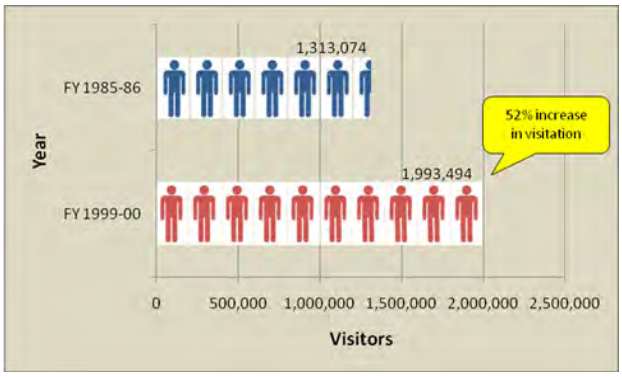


Figure 3.2-5 Increased Visitation to State Vehicular Recreation Areas

However, as shown in Figure 3.2-6, between 1980 and 2000, the number of acres available for OHV use in California's deserts has decreased by 48% (from 13.5 million acres [5,463,256 hectares] to 7 million acres [2,832,799 hectares]) (BLM 2005; California State Parks 2002). During this same period the number of street licensed 4-wheel drive vehicles increased by 74% in California (Figure 3.2-7) (California State Parks 2002).

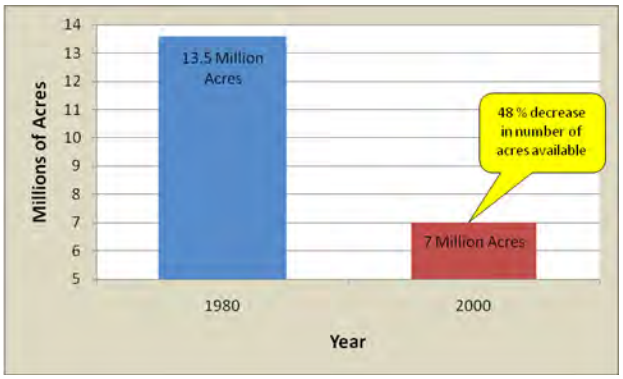


Figure 3.2-6 Acres Available to "Green Sticker" Vehicles in the California Desert

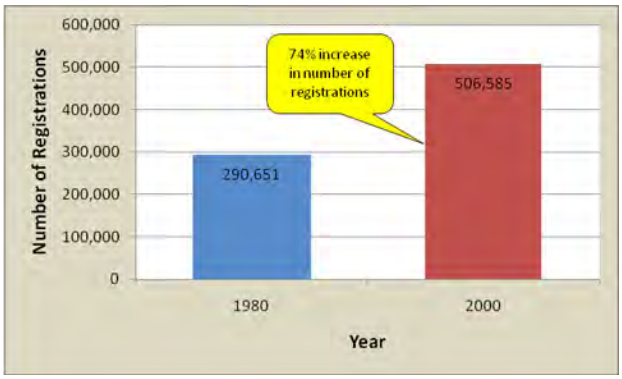


Figure 3.2-7 Street Licensed 4-Wheel Drive Vehicle Registrations

Data provided by the Motorcycle Industry Council also illustrates the increase in OHV use since 1990 (Table 3.2-4).

Table 3.2-4. Average Off-Highway Miles by Model Type (1990-2008)

OHV Model Type	Average Off-Highway Miles by Model Type				
	1990	1998	2003	2008	% Change 2003 to 2008
Dual/Off-Highway/Competition (Net)	329	291	336	430	28%
ATVs	263	*	282	418	48%
Total	294	*	295	421	43%
Motorcycle Type					
Dual	276	345	335	444	33%
Off-Highway/Competition (Net)	362	270	336	426	27%
Off-Highway	313	222	235	408	74%
Competition	396	305	455	446	-2%

Note: *1998 survey did not include ATVs.
ATV = all-terrain vehicle; OHV = off-highway vehicle

Source: Motorcycle Industry Council 2010. Disclosed with permission of the Motorcycle Industry Council from the 2008 Motorcycle/ATV Owner Survey© 2009.

Many OHV users and clubs and organizations contribute time and effort to desert clean-ups, projects combating erosion, trail renovations, and patrolling of OHV areas, in addition to participating in several national land-use ethics programs (e.g., Tread Lightly, Off Road Pals, Leave No Trace) (BLM 2005, 2009). In addition, other forms of recreation often depend on OHVs for access to recreation areas, such as camping, hiking, hunting, and rock hounding (BLM 2005).

Camping

The majority of camping opportunities near the acquisition study areas occur in primitive, undeveloped areas. Campers generally stay at locations that are fairly remote to obtain the level of solitude that is associated with the camping experience and these areas are typically not located along major highways (BLM 2005). Therefore, campers usually need 4-wheel drive vehicles or OHVs to access camping areas and they must pack in all their necessary supplies including water (BLM 2005). In areas where motorized vehicle access is allowed, camping is allowed within 300 feet (91 meters) of routes, except in specified sensitive areas where the limit is 100 feet (31 meters) (BLM 2005). Developed campgrounds are also available in the region, including Joshua Tree National Park, San Bernardino National Forest, and Mojave National Preserve.

No developed campgrounds are located within the acquisition study areas. However, as described above, camping may occur anywhere along travel routes within the acquisition study areas. There are major staging areas for camping associated with OHV activities in Johnson Valley within the west study area (see Figure 3.2-8). These staging areas include Soggy Dry Lake, Cougar Buttes, Anderson Dry Lake, The Rockpile, and Means Dry Lake (DuneGuide 2010).

Rock Hounding

Rock hounding is the collecting of rocks and minerals by amateur mineralogists for recreational enjoyment. Rock hounding includes people who casually pick up something that catches their eye and serious collectors who travel around the country to display their discoveries at rock and gem shows (BLM 2002). These individuals are often referred to as “Rock Hounds.” Rock hounding in the California

desert generally relies on motorized-vehicle access because the weight of rocks and minerals often necessitates a vehicle for transport if more than small samples are collected (BLM 2002).

While no established rock hounding areas have been identified within or near the acquisition study areas (BLM 2002, 2010c, 2010g), rock hounding could occur anywhere within these areas, especially where motorized vehicle access occurs.

Other Recreational Activities

Many other regional recreational activities are available within and near the acquisition study areas, including rock climbing, hiking, backpacking, horseback riding, photography, scenic viewing, wildflower and wildlife viewing, hunting, shooting, geocaching, rocketeering, and ultralight flying.

Geocaching is a popular activity in the vicinity of the project areas, and involves a high-tech version of hide-and-seek in which geocachers seek out hidden "caches" utilizing GPS coordinates posted on the Internet by those hiding the cache (University of Northern British Columbia Geographic Information System [GIS] Lab 2010).

The open spaces of the desert environment in the vicinity of the acquisition study areas are ideal for rocketeering and ultralight flying. Rocketeering is the sport of construction and launching model rockets. Rockets found in the sport range from simple, unpainted cardboard rockets made from items found around the house, to beautifully constructed, complicated rocket kits and scratch built designs, which range in size from 5 inches (13 centimeters) to over 25 feet (8 meters) tall (Fly Rockets 2010).

Ultralights are small lightweight aircraft designed to operate at low speeds. They are generally operated by a single occupant and are used only for sport and recreation. They cannot be used in congested areas, making the wide open areas of the desert an ideal location for this sport (U.S. Ultralight Association 2010). The dry lake beds near the acquisition study areas are ideal take-off and landing areas for ultralights.

Regional Recreation Organizations

A sampling of various organizations, associations, event promoters, and other recreation stakeholders were contacted to gather additional information on local and regional recreation opportunities and economic conditions. Since recreation opportunities often stimulate the local economy, some recreation and economic stakeholders were contacted collectively. The following list of organizations, while not all-inclusive, represents a sample of organizations with recreation interests in the vicinity of the acquisition study areas (Table 3.2-5). These contacts were asked a variety of questions pertaining to existing recreation opportunities and economic conditions, and their individual responses are documented as part of the Administrative Record. Information obtained during the interviews was also evaluated and incorporated in the recreation and socioeconomic impact analysis as appropriate (see Sections 4.2 and 4.3, respectively).

Table 3.2-5. Recreation Stakeholders, Organizations, and Event Promoters Contacted

Organization	Organization Type
Partnership for Johnson Valley[1]	A non-profit organization formed by a group of recreationists who frequently use Johnson Valley. The organization started in 2008 as a direct response to the Marine Corps expansion project. The group encompasses property owners, miners, recreationists, horseback riders, hikers, sightseers, amateur geologists, OHV users (dune buggies, OHV, motorcycles, trucks), etc. The organization is a subset of the California Trail Users Coalition.
Johnson Valley Improvement Association[2]	A volunteer-based, non-profit organization that provides support for the community of Johnson Valley. It holds weekly activities at the community center.
Valley Vista Fliers[3]	A 15 member flying club that shares ownership and use of one Cessna 172at the Valley Vista Airport, a private dirt airstrip located just south of SR 247.
California Federation of Mineralogical Societies[4]	A non-profit organization that promotes popular interest and education in the various earth sciences, and in particular the subjects of geology, mineralogy, paleontology, lapidary, and other related subjects.
California Off-Road Vehicle Association[5]	A non-profit group that focuses on promoting the positive aspects of vehicular access on public lands and preserving access to public lands.
Off-Road Business Association Inc.[6]	Off-Road Business Association is a national non-profit trade association of motorized off-road related businesses formed to promote and preserve off-road recreation.
American Motorcycle Association District 37[7]	A non-profit association that organizes family oriented events, and protects the rights of motorcyclists.
Lucerne Valley Market and Hardware[8]	A local business in Lucerne Valley.
Lucerne Valley Economic Development Association[9]	A non-profit association that provides a forum for discussion and action on important community issue.
Community Off-Road Vehicle Watch[9]	A community group organized to respond to unlawful OHV use in the Morongo Basin and Wonder Valley.
Motorcycle Industry Council, Specialty Vehicle Institute of America, Recreational Off-Highway Vehicle Association[10]	Non-profit trade associations for off-road related businesses.

Note: OHV = off-highway vehicle; SR = State Route

Sources: [1]Partnership for Johnson Valley 2010; [2]Johnson Valley Improvement Association 2010; [3]Valley Vista Flyers 2010; [4]California Federation of Mineralogical Societies 2010; [5]California Off-Road Vehicle Association 2010; [6]Off-Road Business Association 2010; [7]American Motorcycle Association District 37 2010; [8]Lucerne Valley Market and Hardware and Lucerne Valley Economic Development Association 2010; [9]Community Off-Road Vehicle Watch 2010; [10]Motorcycle Industry Council 2010

3.2.3.2 West Study Area

Johnson Valley OHV Area

Johnson Valley, located within the west study area, is the largest OHV open area in the U.S. It has been designated by the BLM as an open OHV area, meaning OHV use is allowed anywhere within the designated area (BLM 2001) (Figure 3.2-8). This recreation area includes 1% state land (2,570 acres [1,040 hectares]) and 10% private lands (18,110 acres [7,329 hectares]). OHV use has occurred in the OHV area since World War II, when it was part of the largest desert training base in the world. In the past 50 years, the Johnson Valley OHV Area has evolved into one of the most intensively-used OHV areas in California (BLM 1992).

The Johnson Valley OHV Area is situated between the communities of Apple Valley and Lucerne Valley to the north and Yucca Valley to the south (see Figure 3.2-3). Specific areas within Johnson Valley that are OHV destinations include Means Dry Lake, Melville Dry Lake, Soggy Dry Lake, Anderson Dry Lake, Galway Dry Lake, the Hammers, the Rockpile, Cougar Buttes, and Giant Rock (see Figure 3.2-8).

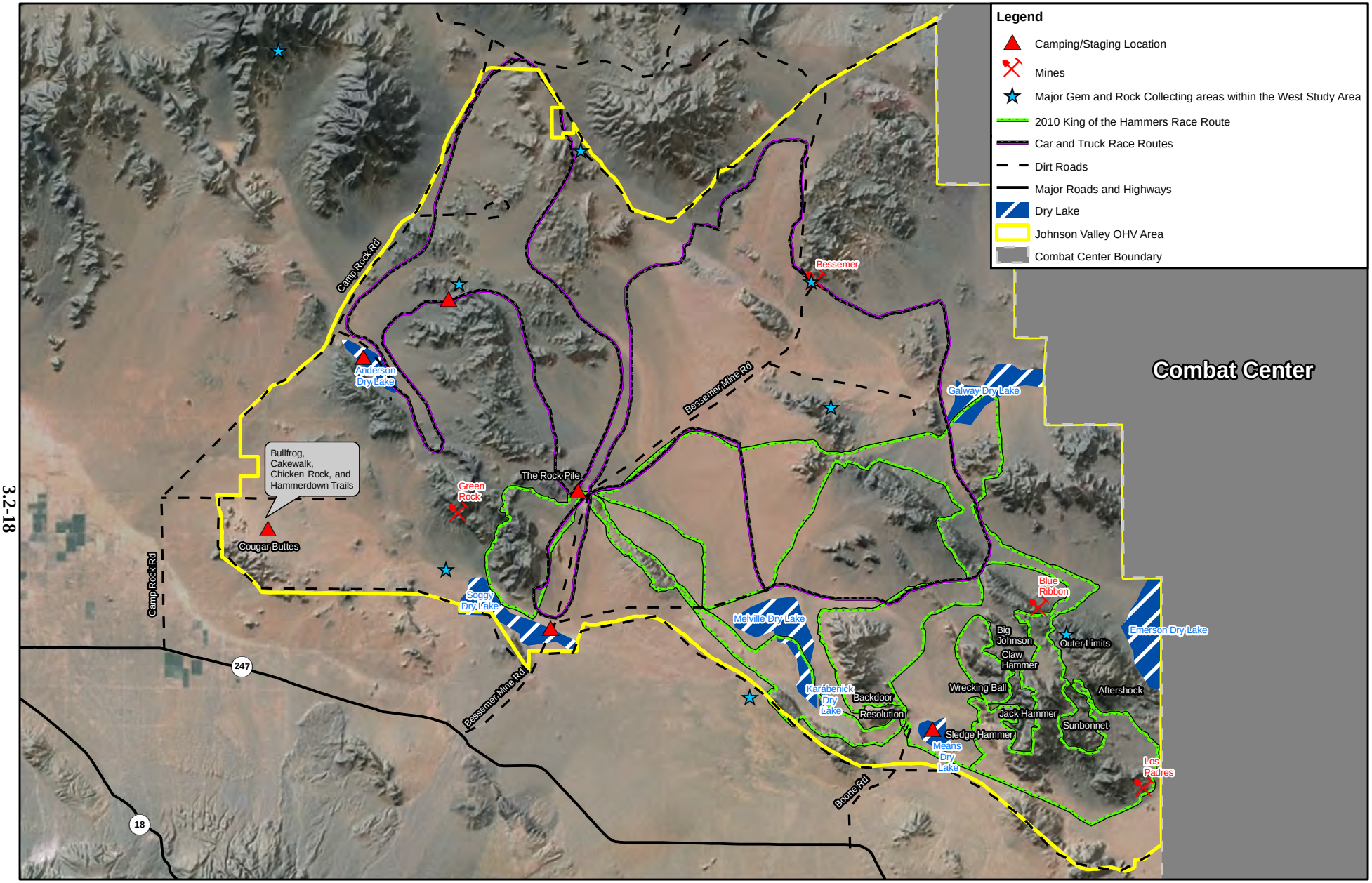
The terrain contains steep rock-covered mountains, gently rolling hills, open valleys, several dry lake beds, and sandy washes. Figure 3.2-9 illustrates the diverse landscape, topography, and vistas of the area. Trails that snake all over the rolling hills and the dry lake beds make great speedways and are used regularly for competitive events. Elevations range from 2,300 feet (701 meters) at Melville Dry Lake to 4,600 feet (1,402 meters) at Hartwell Hills (BLM 2007). The Hammers Trails located in the Hartwell Hills are world famous extreme trails. The diverse terrain provides opportunities for OHV participants of all skill levels. Johnson Valley is unique from other nearby OHV areas, such as Stoddard Valley and Rasor OHV Areas, because of its large size (189,470 acres [76,676 hectares]). It offers a much more remote experience, free from the views and sounds of interstate highways.

As illustrated in Figure 3.2-10, a wide variety of recreational opportunities exist in the Johnson Valley OHV Area. This figure represents the visitor use by type of recreation activity in Johnson Valley between 1998 and 2002, the most recent years for which data are available (BLM 2004). Although these data do not represent current usage of the area, they do provide a representation of the types of activities that occur in Johnson Valley.

Recreational Activities

Unorganized OHV recreation consisting of cross-country riding, trail use and free-play commonly involves family groups who use motorcycles and ATVs. This includes exploring areas where no trails exist and going from point to point over varied terrain, as well as riding on a concentrated network of trails and touring. The primary users of Johnson Valley are OHV participants who engage in dirt bike motorcycle use, dual-sport motorcycles, and 4-wheel drive touring (on ATVs and sport utility vehicles) (BLM 2004). While OHV use is the predominant activity within the Johnson Valley OHV Area, additional recreational opportunities include camping, picnicking, sightseeing, wildlife observation, photography, hiking, rock climbing, shotgun target shooting and hunting, horseback riding, rock hounding, and model rocket/airplane flying (BLM 1992). Other people come to Johnson Valley simply to get away with their families or friends to enjoy the remote experience and outstanding vistas. There are several popular areas within the west study area that are important to the gem and rock hounding enthusiast and other geological and mineralogical societies.

Table 3.2-6 lists the major gem and rock collecting areas within the west study areas. This data has been provided by the American Federation of Mineralogical Societies through data compiled from various rock and gem clubs, available internet information, and extensive contact with BLM.



Kilometers
0 1.5 3 6
0 1.5 3 6
Miles

Figure 3.2-8
Johnson Valley OHV Area

a) Johnson Valley OHV Area looking north towards Means Dry Lake (Photo taken off Boone Road)

b) Johnson Valley OHV Area looking south towards the San Bernardino Mountains (Photo taken off Boone Road)

c) Johnson Valley OHV Area looking northeast towards Soggy Dry Lake (Photo taken from Green Rock Mine Road)

d) Cougar Buttes Staging/Camping Area

e) View from the Hammers looking east

f) Jack Hammer Trail

Figure 3.2-9
Views of the Johnson Valley OHV Area

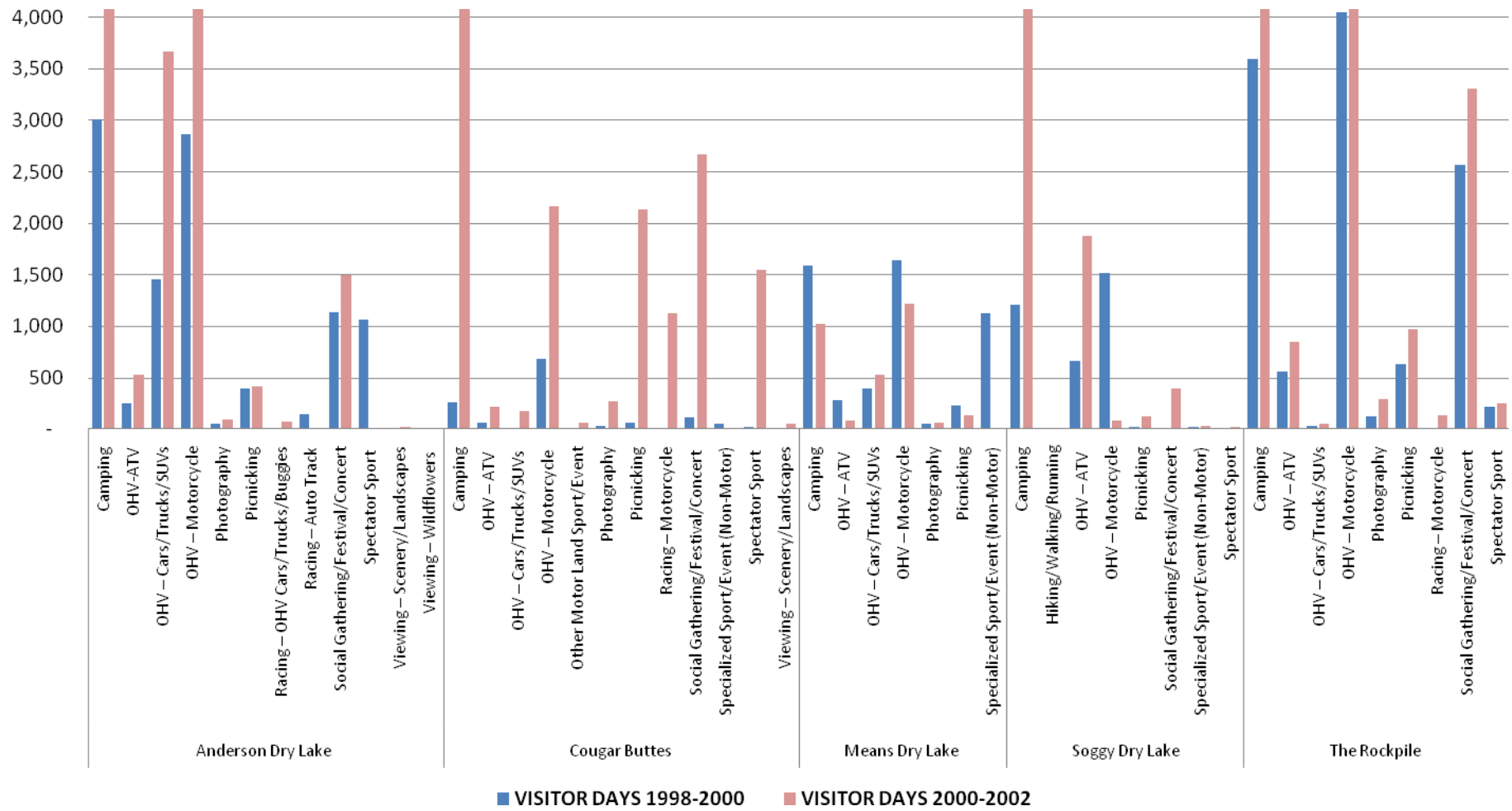


Figure 3.2-10
Johnson Valley OHV Area Visitor Days by Activity

Source: BLM 2004

Table 3.2-6. Major Gem and Rock Collecting areas within the West Study Area

Lat/Long Location	Collecting Area Description
N34º 42.067” W116º 29.932”	On the northeastern edge of Johnson Valley, about 10 miles north of the abandoned Bessemer Mine and on the northeast slope of the Newberry Mountains are the abandoned Silver Cliff and Silver Bell Silver Mines. Silver ore can be found in the mine’s dumps in small quantities.
N34º 34.880” W116º 33.735”	On the eastern side of Johnson Valley, northwest of Galway Lake on the south slope of Iron Ridge, is the abandoned Bessemer Mine. Collecting of iron ore specimens and secondary minerals such as magnetite and other associated minerals occur in tailing piles.
N34º 32.037” W116º 33.201”	Southwest of Galway Lake in the Regal Mountains is the earthquake escarpment, a geological feature from the 1992 Landers Earthquake.
N34º 26.886” W116º 26.808”	On the southeast edge of Johnson Valley lies the abandoned Emerson Gold Mine. Mineral specimens associated with the gold mining are collecting. Collecting occurs in the mine’s tailing pile and the mine dump and agates and jasper are found near the mining claim.
N34º 25.482” W116º 35.454”	Located at the end of Boone Road northwest of Means Lake and just south of Melville Dry Lake are the Johnson Valley Sand Dunes, a favorite rock hounding location.
N34º 40.143” W116º 48.298”	Along the western side of Johnson Valley near the Rodman Mountains is Camp Rock Mine dry wash where placer (i.e., the ore occurs in gravel deposits not hard rock) gold can be found. This area is privately owned and access is allowed with prior permission.
N34º 37.880” W116º 40.026”	On the northeast slope of the Fry Mountains and east of the abandoned Camp Rock Mine is the abandoned Copper Strand Mine. Copper minerals (malachite, azurite, chrysocolla) can be found in the mine’s dump.
N34º 34.863” W116º 43.375”	The abandoned Fry Mountain gold mines are located north of Anderson Dry Lake. Gold related minerals can be found in the mine dumps.
N34 º 29.581” W116 º 43.320”	On the southern slope of the Fry Mountains and west of Soggy Dry Lake is the abandoned Green Rock Mine. The rock is solid green and makes good material for lapidary work. It is locally known as Desert Jade and is a silicate epidote colored by the copper mineral content.

Note: km = kilometer
Source: American Federation of Mineralogical Societies 2010.

Camping within the west study area may occur anywhere within the Johnson Valley OHV Area that does not block travel on a road. Major staging areas for camping associated with OHV activities in Johnson Valley include Soggy Dry Lake, Cougar Buttes, Anderson Dry Lake, The Rockpile, and Means Dry Lake (DuneGuide 2010). Staging areas refer to areas where users typically set up “camp” or “home base” for either the day or multiple days. Off-highway vehicle riders typically unload their OHVs at the staging areas, then ride throughout the open area. The BLM Barstow Field Office maintains five restrooms within Johnson Valley; one at Anderson Dry Lake, two at Cougar Buttes, and two at Soggy Dry Lake (BLM 2009).

The Rockpile, located near Bessemer Mine Road, is also a popular camping and vehicle staging area and is used during the annual Desert Motocross Hare and Hound Event. The Rock Pile is also the location of an informal memorial site for individuals who were killed in an accident that occurred at the location during the August 2010 Mojave Desert Racing California 200 Race. A formal public memorial is located at the Slash X Café Ranch in Barstow, CA.

Anderson and Soggy Dry Lakes are also frequently used as staging and camping areas during a variety of competitive vehicle events. Motor home and large rendezvous camping commonly occurs at these locations.

Cougar Buttes and The Hammers are popular rock crawling localities where rendezvous camping also occurs. Cougar Buttes, located in the western portion of the Johnson Valley OHV Area, is well known for the Bullfrog, Cakewalk, Chicken Rock, and Hammerdown Trails. The Hammers, located between Means Dry Lake and the Combat Center, is also well known for the Aftershock, Big Johnson, Claw Hammer, Jackhammer, Outer Limits, Sledgehammer, Sunbonnet Pass, and Wrecking Ball Trails that provide very unique, extreme rock crawling opportunities. The Backdoor and Resolution Trails provide similarly challenging rock crawling opportunities in the terrain northwest of Means Dry Lake. Areas providing sand hill riding opportunities are located south of Anderson Dry Lake, in the Karabeniok Dry Lake region and between Emerson and Galway Dry Lakes.

Upland gamebird hunting and target shooting (shotgun shooting only) occur primarily in rocky and hilly areas providing a backdrop, such as in the Bessemer Mine vicinity and in the northeast corner of the Johnson Valley OHV Area. Model rocket and ultralight flying recreation occurs primarily on any one of the dry lake beds (i.e., Anderson, Emerson, Galway, Means, Soggy Dry Lakes) within the OHV area.

Scheduled Events

Several types of organized OHV events have been allowed in the Johnson Valley OHV Area over the years, including enduro, hare and hound, hare scrambles, European scrambles, timed trials, rallies, car races, and poker runs. The annual King of the Hammers race is considered by many to be the premier event of the year in Johnson Valley, and involves full-sized OHVs and extreme rock crawling activities. As shown in Figure 3.2-8, the course starts and ends at Means Dry Lake. Figure 3.2-11 includes photographs representing a variety of activities that occurred at the 2010 King of the Hammers Event.

Annual events in Johnson Valley draw large crowds, with approximately 50% of the annual use occurring during permitted events (BLM 2005). In 2009, 52 OHV events were scheduled with the BLM Barstow Field Office. Of these 52 events, 32 were located within Johnson Valley (BLM 2010f) (Table 3.2-7). For Fiscal Year (FY) 2010 (starting October 1, 2009), there were already 31 scheduled events in Johnson Valley (BLM 2009).

Visitor Use

A wide range of visitor use data for Johnson Valley has been documented. By some estimates there are 800,000 to 1 million visitors to Johnson Valley annually (California Off-Road Vehicle Association 2009; Motorcycle Industry Council 2009). According to recent usage estimates provided by the Partnership for Johnson Valley, there are nearly 700,000 annual visitor-days of use in Johnson Valley (Partnership for Johnson Valley 2010). This estimate reportedly includes the wide range of recreational activities that occur in Johnson Valley; however, the assumptions and data used to generate this estimate could not be verified or independently confirmed. The BLM's 2010 estimate is nearly 300,000 annual visitor-days of use in Johnson Valley (BLM 2009, 2010h, see Appendix A). Because Johnson Valley is so large, and there are numerous points of entry, it is extremely difficult to accurately track the number of visitor-days of use throughout Johnson Valley during any given year. This section includes the range of visitor estimates, methodology for those estimates, and concludes with a reasonable estimate that takes into account projected increase in use from 2010-2015.

a) Competitors in Hammer Town

b) Competitor on Jack Hammer Trail

c) Competitor on Sledge Hammer Trail

d) Competitor on Sledge Hammer Trail

e) Crowds on Sledge Hammer Trail

f) View from Jack Hammer Trail

g) View of Hammer Town RV Camping Area

Figure 3.2-11
2010 King of the Hammers Race

Table 3.2-7. OHV Schedule of Events in Johnson Valley for Calendar Year 2009 Season

Sponsor	Event Name or Event Type	Start Date-End Date	Event Days Total
Mojave Off-Road Racing Enthusiast Racing	Car/Truck	01/10/2009	1
American Motorcycle Association District 37	United Enduro Association	01/18/2009	1
American Motorcycle Association District 37	Desert Motocross	01/25/2009	1
Sports Car Club of America	Rally Sport	02/21/2009	1
American Motorcycle Association District 37	Checkers	02/22/2009	1
Hammer King	King of the Hammers	02/25/2009- 02/27/2009	3
Plonkers Trials Club	Trials	03/01/2009	1
American Motorcycle Association District 37	Huntington Beach	03/07/2009 - 03/08/2009	2
VOTE Trials Club	Trials	03/28/2009 - 03/29/2009	2
Sports Car Club of America	Rally Sport	04/11/2009	1
American Motorcycle Association District 37	Rovers MC	04/17/2009	1
American Motorcycle Association District 37	Rovers MC	04/19/2009	1
Tin Benders	4WD	04/25/2009	1
American Motorcycle Association District 37	Vikings MC	04/26/2009	1
Sports Car Club of America	Rally Sport	05/09/2009	1
MORE Racing	Car/Truck	05/23/2009	1
American Motorcycle Association District 37	100's MC (Night)	05/30/2009	1
American Motorcycle Association District 37	RUTS MC	06/13/2009 - 06/14/2009	2
Mojave Desert Racing	Car/Truck	06/27/2009	1
American Motorcycle Association District 37	VCMC	07/18/2009	1
MDR	Car/ Truck	08/15/2009	1
American Motorcycle Association District 37	Invaders	08/23/2009	1
MORE Racing	Car/Truck	09/12/2009	1
American Motorcycle Association District 37	Plonkers	09/19/2009	1
Victor Valley 4WD	4WD	09/25/2009 - 09/27/2009	3
MDR	Car/Truck	09/26/2009	1
American Motorcycle Association District 37	Hill Toppers	09/27/2009	1
Morongo Basin Search and Rescue	30th Annual Desert Run	10/02/2009- 10/04/2009	3
American Motorcycle Association District 37	So. Cal MC	10/10/2009 - 10/11/2009	2
American Motorcycle Association District 37	100's MC	10/25/2009	1
American Motorcycle Association District 37	4 Aces MC	11/15/2009	1
American Motorcycle Association District 37	Riders Helping Riders	11/22/2009	1
		Event Days Total =	**42**

Source: BLM 2010f.

According to the BLM Barstow Field Office Recreation Coordinator, March, April, and May tend to be the busiest months of the year for recreational activity in Johnson Valley, and July and August receive the fewest number of visitors. The annual King of the Hammers event, which occurs in February, represents the largest concentration of visitors at one time. According to BLM, in 2008 there were approximately 40 participants in the race event with 200 spectators, and in 2009 there were 90 participants and 10,000 spectators (BLM 2009). In 2010 there were 146 participants and approximately 15,000 spectators, including approximately 45 different vendors providing services (food, photos, filming, product and organization information, etc.). The King of the Hammers race is a 2-day annual event; however, many participants and spectators visit Johnson Valley throughout the week. For the purposes of providing an estimated number of visitors for this event alone, it was assumed that the 15,146 visitors estimated for 2010, visited Johnson Valley for an average of 3 days; therefore, the total visitor-days of use for this event in 2010 was estimated to be 45,438 visitor-days of use. Additional descriptive information on visitors to the King of Hammers race was gathered at the 2011 event in an informal survey conducted by Hammer King Productions. Survey results noted that:

- 27.6% of King of the Hammers visitors were at Johnson Valley for the first time;
- The average group attending the event consisted of approximately 3 people; and
- Each group brought an average of 2.7 vehicles to Johnson Valley.

Bureau of Land Management offices are responsible for collecting and maintaining various data relating to the outdoor recreation program. These data are then aggregated into the BLM's *Recreation Management Information System* (RMIS) database. The RMIS was first developed during the early 1990s and the BLM Barstow Field Office started including data into the RMIS database in 2003 (BLM 2009). During this time, BLM adjusted the baseline formula by approximately 15% to account for increases in use trends. This increase was further validated through visitor count data collected at the major points of entry (BLM 2009). The RMIS database is a collection of "dispersed use" visitor data, which refers to visitor use not associated with scheduled or unscheduled events. Dispersed use visitors are also sometimes referred to as "weekend warriors" and represent visitors during weekends, mid-week, holidays, vacations, etc. Typical dispersed use visitors frequent Johnson Valley Friday through Sunday, except during scheduled events, many of which occur during the weekdays to avoid weekend overcrowding (BLM 2009).

To account for current visitor trends in Johnson Valley, BLM estimates that the baseline formula can reasonably be increased by another 15% (BLM 2009). Table 3.2-8 shows the 2010 RMIS dispersed use visitor-days of use estimates with an additional 15% adjusted value to account for BLM's visitor use trends assumption.

According to BLM's RMIS database, there were an estimated 127,000 dispersed use visitor-days in Johnson Valley in 2008 and 142,000 in 2009. Projected use for 2010 is 165,147; this number represents the 15% adjusted value (BLM 2009). These numbers indicate that visitor use in Johnson Valley is increasing each year.

Table 3.2-8. BLM FY 2010 RMIS Projected Dispersed Use Visitor-Days for Johnson Valley

Location	Visitor-Days
Dispersed Use	100,455
Anderson Dry Lake	14,071
Cougar Buttes	9,702
The Rockpile	16,240
Soggy Dry Lake	18,127
Means Dry Lake	6,552
Total	**165,147**

Source: BLM 2009.

As previously mentioned, the RMIS database estimates dispersed use visitor-days but does not account for visitor-days associated with organized events. Through data gathered from permit applications, the BLM Barstow Field Office has projected that there will be approximately 47,451 visitor-days associated with organized events in 2010 (BLM 2010h). The visitor-days of use for the King of the Hammers event was estimated separately (45,438 visitor-days). To estimate the visitor-days of use of activity related to other organized events throughout the year, 50% of remaining event visitors were assumed to recreate in Johnson Valley for 2 days and the other 50% of event visitors was estimated to recreate in Johnson Valley for 3 days (BLM 2009). Therefore, the number of visitor-days of use associated with organized events in 2010 was estimated to be 80,763 visitor-days of use. To estimate the number of visitor-days of use for organized events in 2008 and 2009, the same 2010 event estimate was used as the baseline number; then the estimated number of visitor-days of use for the King of the Hammers event, as described above, was added to the 2010 baseline value. This gives an estimate of 81,483 visitor-days of use for organized events in 2008, 111,033 in 2009, and 126,201 in 2010. Table 3.2-9 shows the BLM estimates of total visitor-days of use including dispersed use and organized events for 2008-2010 in Johnson Valley. This table also includes an estimate of projected visitor-days of use through 2015. For the purposes of this analysis, the 2015 projected estimate (nearly 337,000 visitor-days of use) has been carried forward as the baseline visitor-days estimate (BLM 2010k).

Table 3.2-9. BLM Estimated Visitor-Days in Johnson Valley (2008-2015)

Year	Dispersed Use Visitor-Days	Event-Related Visitor-Days		TOTAL Visitor-Days
		All Events Except King of Hammers Event[1]	King of the Hammers Event	
2008[2]	127,000	80,763	720	208,483
2009[3]	142,000	80,763	30,270	253,033
2010[4]	165,147	80,763	45,438	291,348
2011[5]	173,404	80,763	45,438	229,605
2012[5]	182,075	80,763	45,438	308,276
2013[5]	191,178	80,763	45,438	317,379
2014[5]	200,737	80,763	45,438	326,938
2015[5]	210,774	80,763	45,438	336,975

Notes: [1]47,451 – 15,146 = 32,305 (50% x 2 days and 50% x 3 days) = 80,763 baseline events (excluding King of Hammers event).
[2]240 x 3 days = 720 King of Hammers event only + 80,763 = 81,483 + 127,000 = 208,483 total visitor-days.
[3]10,090 x 3 days = 30,270 King of Hammers event only + 80,763 = 111,033 + 142,000 = 253,033 total visitor-days.
[4]15,146 x 3 days = 45,438 King of Hammers event only + 80,763 = 126,201 + 165,147 = 291,348 total visitor-days.
[5]2011-2015 project estimates account for a 5% increase from the previous year and no increase in event-related visits.
Sources: BLM 2009, 2010h, 2010k.

3.2.3.3 South Study Area

This area consists of a mixture of BLM land and private property. Most of the private property is not fenced or identified through signage. Likewise, the authorized BLM routes are not generally signed. No established recreation areas, such as OHV "open" areas, wilderness areas, or parks are located within the proposed south study area. However, dispersed use on BLM land occurs along roads. As described above, camping is allowed on BLM land within 300 feet (91.4 meters) of established routes. Other potential activities within this area include hiking, wildflower and wildlife viewing, and OHV activities along established routes. There is no quantified recreational usage data available for this area. However, based on interviews with several recreation organizations, this area does not receive frequent recreational use. For the purposes of this analysis, it is estimated that approximately 800 annual visitor-days of use occur within the south study area.

The community of Wonder Valley is located to the south of the south study area and OHV use in this area has been the subject of much controversy. OHV use is allowed in designated areas; however, some OHV riders leave established routes and illegally ride on private property. On holiday weekends there can be large numbers of OHV riders in the area, causing an increase in noise and dust. Residents who are looking for quiet and solitude or those who are concerned about the environmental impacts of OHVs have advocated for limited OHV use in the area (Los Angeles Times 2010).

3.2.3.4 East Study Area

No established recreation areas, such as OHV areas, wilderness areas, or parks, are located within the proposed east study area. However, dispersed recreational use on BLM land occurs along dirt roads. Camping is allowed on BLM land within 300 feet (91.4 meters) of established routes. In addition, known rock hounding areas occur within the east study area, as illustrated on Figure 3.2-1. Other potential activities within this area include hiking, wildflower and wildlife viewing, and OHV activities along established routes. There is no quantified recreational usage data available for this area. However, based on interviews with several recreation organizations, this area does not receive frequent recreational use. For the purposes of this analysis, it is estimated that approximately 500 annual visitor-days of use occur within the south study area.

There is no data available that addresses the extent of illegal OHV use in and around the east study area; however, based on interviews with BLM and other OHV organizations, illegal OHV use does not currently appear to be a widespread problem within the east study area, particularly since the area receives very few recreational visitors.

3.3 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

3.3.1 Definition of Resource

Socioeconomics is a social science discipline that focuses on the attributes of human social and economic interactions within an area. Socioeconomic analyses typically address issues such as population demographics; business activity and economic output; employment and income; and environmental justice. Impacts to these fundamental socioeconomic components can also influence other systemic issues such as the availability and affordability of housing, the provision of public services (e.g., emergency services, education, health services, etc.), and the general quality of life in a community.

The primary focus of the socioeconomic analysis in this EIS is on the economic effects of net changes in retail business activity and employment/income related to anticipated reductions in recreational and film industry expenditures, mining and agricultural business activities, and the anticipated small increase in the number of Combat Center personnel. The proposed action would involve no change in housing supply, minimal construction activities, and relatively small changes in population and demand for housing and public services; therefore, these issues are addressed qualitatively and in limited detail.

The ROI for socioeconomic impacts is defined as San Bernardino County, though some attention is focused as appropriate on individual cities and unincorporated communities within the county that would potentially bear a disproportionate share of the impacts. Socioeconomic data provided in this section to establish baseline conditions consist primarily of publicly-available information about San Bernardino County and the following cities and towns in the vicinity of the proposed action: Twentynine Palms, Joshua Tree, Yucca Valley, Victorville, Apple Valley, Johnson Valley, Lucerne Valley, and Landers.

3.3.2 Regulatory Framework

The CEQ regulations implementing NEPA state that when economic or social effects and natural or physical environmental effects are interrelated, the EIS will discuss these effects on the human environment (40 CFR 1508.14). The CEQ regulations further state that the "human environment shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment." Following from these CEQ regulations, the socioeconomic analysis evaluates how elements of the human environment such as population, employment, housing, and public services might be affected by the proposed action.

In 1994, EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was issued to focus the attention of federal agencies on human health and environmental conditions in minority and low-income communities. In addition, EO 12898 aims to ensure that the environmental effects of federal actions do not fall disproportionately on low-income and minority populations. To support an evaluation of environmental justice issues, this section includes data related to the existence of minority and low-income populations in the vicinity of the proposed action that could potentially be disproportionately affected.

3.3.3 Existing Conditions

3.3.3.1 Population and Trends

<u>Population</u>

The proposed acquisition study areas are essentially uninhabited (tax rolls indicate that there is only one known inhabited structure that would be acquired under any of the project alternatives), so no population

data are presented for areas proposed for acquisition. Table 3.3-1 and Figure 3.3-1 show the population growth for San Bernardino County and the communities in the vicinity of the project area. Between 2000 and 2010, the communities surrounding the proposed acquisition study areas experienced a relatively high percentage increase in population in comparison to San Bernardino County as a whole. During that time period, population increased by 69.7% in Twentynine Palms, 76.2% in Joshua Tree, 22.7% in Yucca Valley, 81% in Victorville, and 27.4% in Apple Valley, while the population of San Bernardino County increased by 19% (U.S. Census Bureau [USCB] 1990; USCB 2000; USCB 2010a; Joshua Tree Chamber of Commerce 2009; State of California Department of Finance 2009). The population of the City of Twentynine Palms increased dramatically from 2000 – 2001 due to the city's annexation of the Mainside portion of the Combat Center in February 2000 (San Bernardino County 2000). Mainside is the primary operations and housing sector of the Combat Center and is located at the southern boundary of the installation, within the city limits of Twentynine Palms, approximately 6.0 miles (9.7 km) north of State Route (SR) 62.

The population associated with the Combat Center varies throughout the year, due in part to the 2- to 3-year military personnel rotation cycle. As of July 2009, the installation supported 14,740 military personnel, 10,557 military family members, and 1,947 civilian employees, for a total strength of 27,279 persons (Combat Center 2009a).

Socioeconomic Trends

From 2008 to 2010, 52,400 total jobs were lost in San Bernardino County, representing a negative growth rate of -8.1%, while the unemployment rate increased to 14.2%. From 2008 to 2009, employment in the construction, manufacturing, and retail trade sectors all declined, while employment in the education and health services sectors increased slightly; the County's population growth rate fell to 0.8% in 2009 due to significant out-migration from the county for the first time since the mid-1990s (U.S. Department of Transportation 2010).

Table 3.3-2 shows the projected economic growth between 2010 and 2035 for San Bernardino County in terms of population, new homes permitted, total taxable sales, real per capita income, and unemployment rate. Overall, the economies of San Bernardino County and the entire Inland Empire were expected to begin to recover in 2010; however, general economic growth is expected to average only 2.0% per year from 2010 to 2015. During the 2010 to 2015 timeframe, manufacturing, professional and business services, information, construction, financial activities, and wholesale and retail trade are all expected to grow between 10 and 25% (U.S. Department of Transportation 2010). Population is also expected to increase 1.5% from 2010 to 2015 as new job creation occurs. Average salaries adjusted for inflation are currently below the California state average, and will remain so for the foreseeable future. Real average salaries are forecast to rise an average of just 0.3% per year from 2010 to 2015. During the 2010 to 2015 period, growth in real per capita incomes is forecast to average +0.9% per year. Total taxable sales are expected to increase by an average of 2.5% per year from 2010 to 2015. Farm production is forecast to decline by 3.7% per year between 2010 and 2015 (U.S. Department of Transportation 2010).

Table 3.3-1. Population Estimates for San Bernardino County and Communities in the Vicinity of the Project Area

Year	Apple Valley[1]	Twentynine Palms[1]	Victorville[1]	Yucca Valley[1]	Joshua Tree	Lucerne Valley*	Flamingo Heights/ Landers/ Johnson Valley**	Homestead Valley CDP	Yucca Mesa ****	Amboy*****	Wonder Valley	San Bernardino County[1]
2000	54,239	14,764	64,029	16,865	4,207[2]	5,521[4]	2,181[4]	N/A	N/A	23	N/A	1,710,139
2001	55,417	30,126***	66,720	17,092	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,746,874
2002	57,172	25,517	69,757	17,555	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,793,009
2003	59,057	25,106	72,694	18,018	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,840,628
2004	61,477	26,281	77,860	18,765	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,893,861
2005	63,754	27,453	86,345	19,695	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,946,312
2006	67,291	29,914	94,853	20,470	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,990,390
2007	69,975	29,526	102,093	20,949	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2,022,710
2008	69,654	30,492	106,765	21,136	N/A	5,698[4]	2,366[4]	N/A	N/A	N/A	N/A	2,044,895
2009	69,861	30,832	109,441	21,239	9,000[3]	N/A	N/A	N/A	N/A	N/A	N/A	2,060,950
2010	69,135[5]	25,048[5]	115,903[5]	20,700[5]	7,414[5]	5,811[4]	N/A	3,032[5]	885[4]	7[4]	819[4]	2,035,210[5]
% Change (2000-2010)	**27.4%**	**69.7%**	**81.0%**	**22.7%**	**76.2%**	**5.3%**	**8.5%********	**-**	**-**	**-69.6%**	**-**	**19.0%**

Note: N/A = Population estimates were not available, * = Data are for zip code 92356, ** = Data are for zip code 92285; Homestead Valley, Johnson Valley, Landers, and Flamingo Heights are parts of Homestead Valley CDP, *** = The City of Twentynine Palms annexed Mainside in 2000, **** = Yucca Mesa is part of Yucca Valley, ***** = Data are for zip code 92304, ****** % Change are for the 2000-2008 timeframe.

Source: [1]State of California Department of Finance 2009; [2]USCB 2000; [3]Joshua Tree Chamber of Commerce 2009 (2009 population estimate); [4]City Data 2010; [5] USCB 2010a.

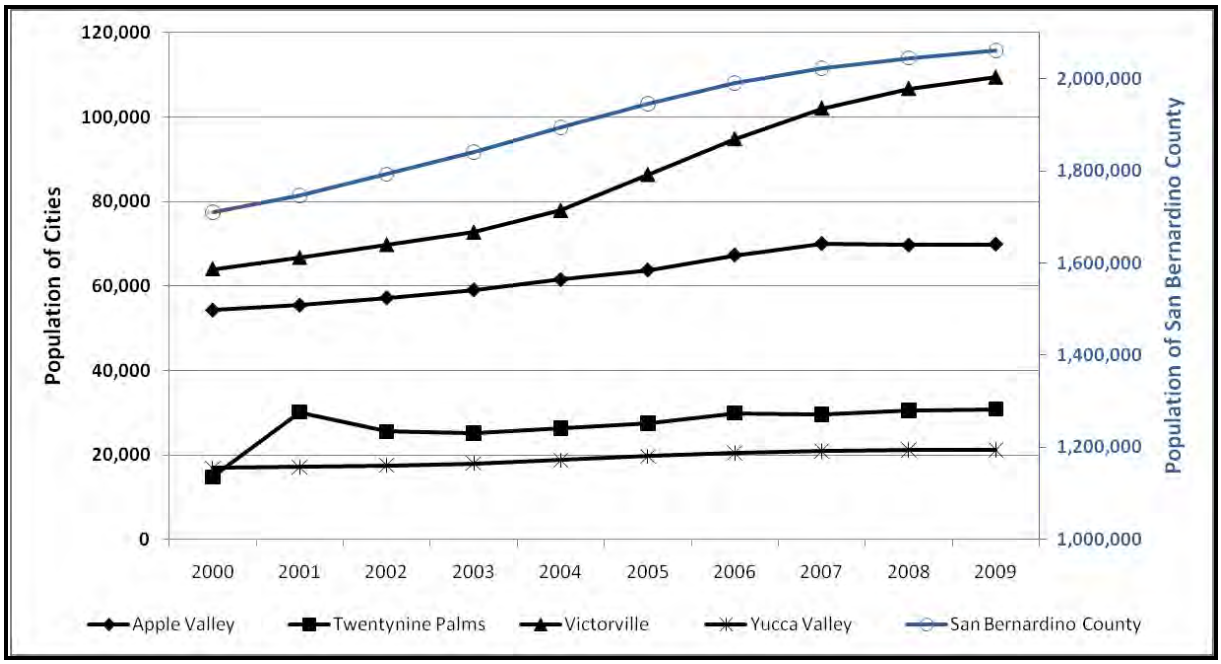


Figure 3.3-1. Population Estimates for San Bernardino County and Cities in the Vicinity of the Project Area

Table 3.3-2. Economic Projections for San Bernardino County

Year	Population	New Homes Permitted	Total Taxable Sales ($ billions)	Real Per Capita Income ($)	Unemployment Rate (%)
2010	2,092,117	4,450	28.3	27,055	12.3
2020	2,467,918	11,958	43.1	28,700	6.0
2030	2,935,609	12,542	70.5	29,424	5.3
2035	3,155,167	11,917	90.6	29,480	5.4

Source: U.S. Department of Transportation 2010.

3.3.3.2 Employment and Income

In 2010, there were 733,800 employed and 121,900 unemployed individuals residing in San Bernardino County, resulting in an unemployment rate of 14.2%. Yucca Valley had an unemployment rate below the county-wide rate, while Apple Valley, Joshua Tree, Twentynine Palms, and Victorville all had unemployment rates higher than the county rate. Table 3.3-3 shows the employment figures for San Bernardino County and the communities in the vicinity of the project area.

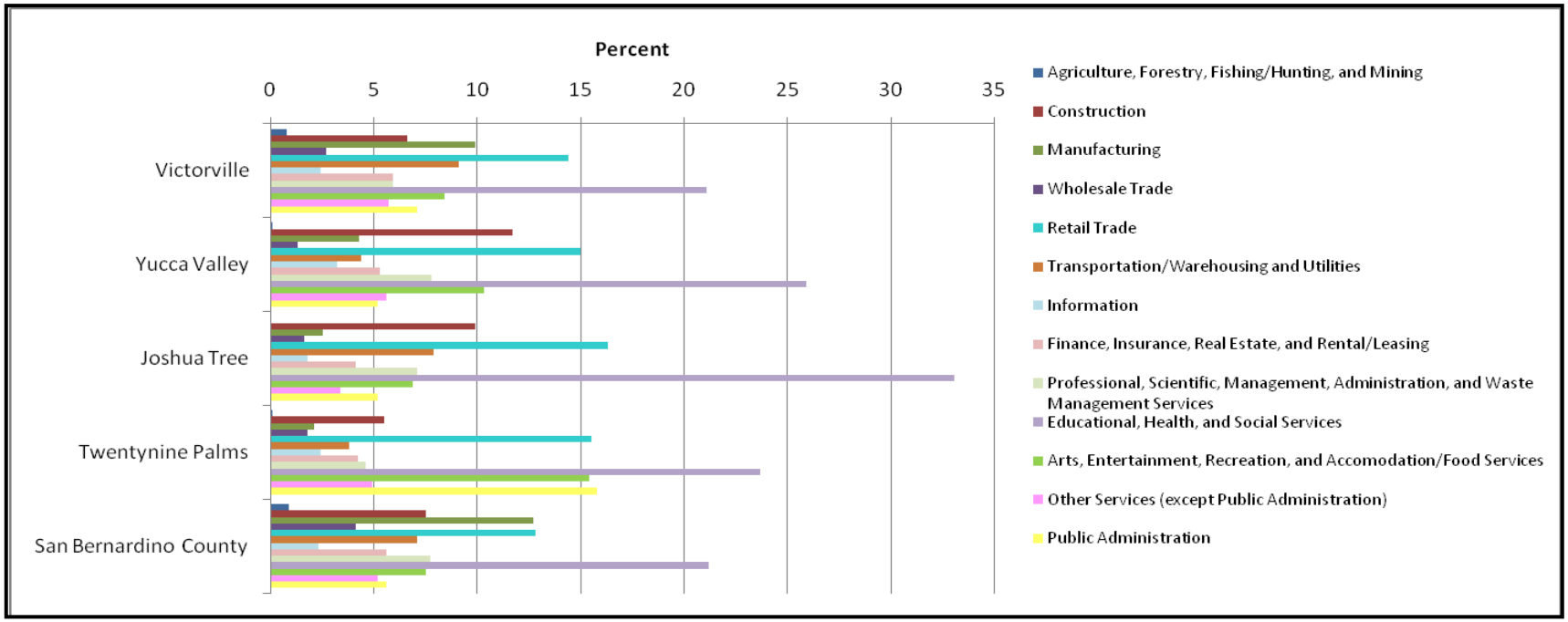
Table 3.3-3. Employment Figures: Twentynine Palms, Joshua Tree, Yucca Valley, and San Bernardino County, 2010

Area	Civilian Labor Force	Employed	Unemployed	Rate (%)
Apple Valley	26,042	22,000	4,050	15.5
Joshua Tree	1,892	1,600	300	16.0
Twentynine Palms	6,133	5,092	1,050	17.0
Victorville	29,983	24,867	5,125	17.1
Yucca Valley	7,317	6,350	958	13.1
Lucerne Valley	1,852	1,553	299	16.1
Landers/Johnson Valley*	727	665	62	8.5
San Bernardino County	855,700	733,800	121,900	14.2

Note: *Data for Landers/Johnson Valley are from 2000.
Source: State of California Employment Development Department 2010; USCB 2000a; USCB 2010b.

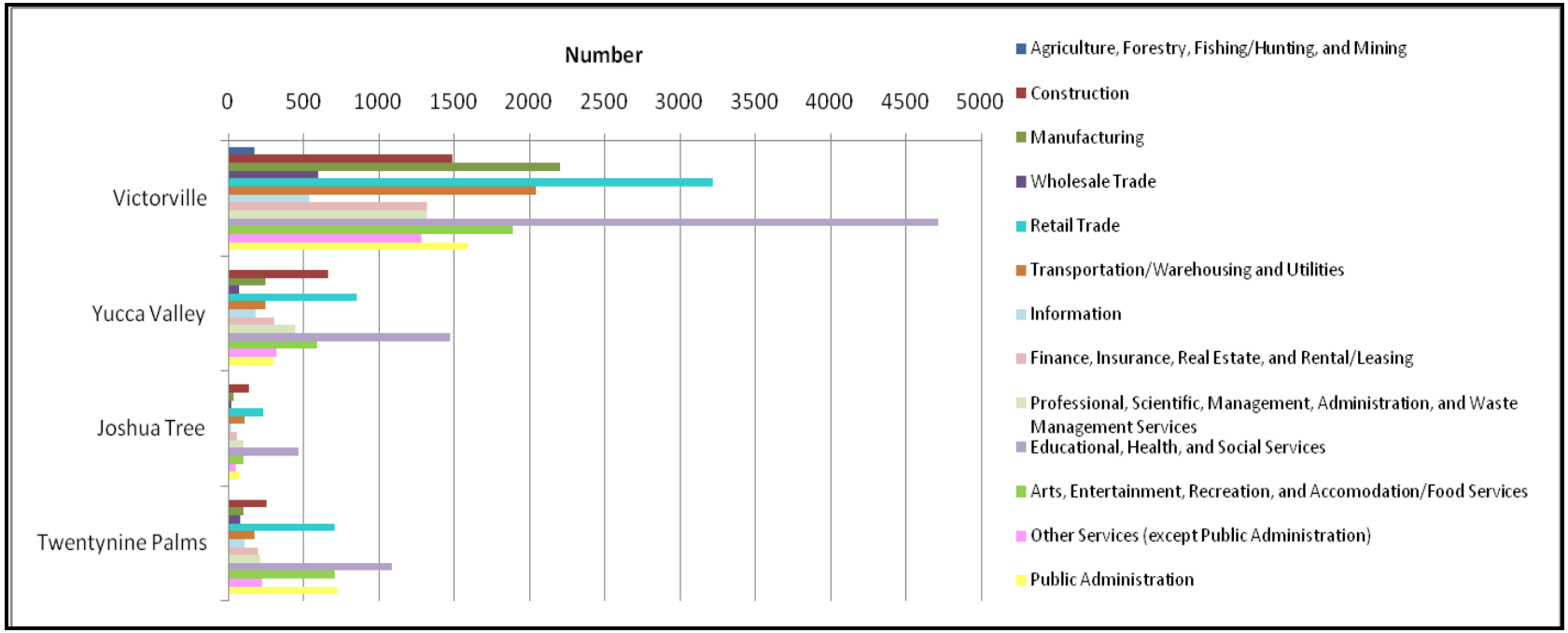
The Combat Center is the largest employer in the immediate area and is a significant contributor to the regional economy. The installation employs 14,740 military personnel and a civilian workforce of 1,947 (Combat Center 2009a).

Employment in San Bernardino County is dominated by the educational, health, and social services sector (21.2%); the retail trade sector (12.8%); and the manufacturing sector (12.7%) (USCB 2000). Employment in Twentynine Palms has been dominated by the educational, health, and social services sector (23.7%); the public administration industry sector (15.8%); the retail trade sector (15.5%); and the arts, entertainment, recreation, accommodation and food services sector (15.4%). The construction sector accounted for a moderate portion of employment in Joshua Tree (9.9%), Twentynine Palms (5.5%), Yucca Valley (11.7%), and San Bernardino County (7.5%) (USCB 2000) (see Figures 3.3-2 and 3.3-3). Table 3.3-4 lists the number of business establishments in local cities/towns/communities in the vicinity of the proposed action and Table 3.3-5 lists the major employers in each.



Source: USCB 2000.

Figure 3.3-2. Percentage of Population Employed in Various Sectors for Victorville, Yucca Valley, Joshua Tree, Twentynine Palms, and San Bernardino County



Note: San Bernardino County was omitted due to the much larger overall population.
Source: USCB 2000.

Figure 3.3-3. Number of Individuals Employed in Various Sectors for Victorville, Yucca Valley, Joshua Tree, and Twentynine Palms

Table 3.3-4. Number of Business Establishments by City/Town/Community

City/Town/Community	Number of Business Establishments
Homestead Valley	No data available
Johnson Valley/Landers/Flamingo Heights	11
Yucca Valley	442
Yucca Mesa	13
Lucerne Valley	52
Joshua Tree	77
Amboy	5
Twentynine Palms	205
Wonder Valley	No data available

Source: USCB 2009.

Table 3.3-5. Major Employers by City/Town/Community

Apple Valley[1]	
Albertson's Supermarket	St. Mary Medical Center
Apple Valley Christian Care Centers	Target Stores, Inc.
Apple Valley Unified School District	Town of Apple Valley
Hi Desert Law & Justice Center	Wal-Mart Stores, Inc.
Lowe's Home Improvement	WinCo Foods
Stater Bros. Market	
Joshua Tree[2]	
Copper Mountain Community College	Joshua Basin Water District
Hi-Desert Medical Center	Morongo Basin Ambulance Association
Lucerne Valley[2]	
Butcher's Block Lucerne Valley	OMYA-CA
Lucerne Valley Market	Specialty Minerals
Lucerne Valley Union School District	SS Hert Trucking
Mitsubishi Cement Corp.	
Landers/Johnson Valley[3]	
Gubler Orchid Farm	Big Horn Desert View Water Agency
County of San Bernardino Water District	Hero Catering Co.
Twentynine Palms[2]	
City of Twentynine Palms	Stater Bros. Markets
Joshua Tree National Park	Twentynine Palms Water District
Morongo Basin Unified School District	Combat Center
	U.S. Department of the Interior
Victorville[4]	
City of Victorville	Verizon
Desert Valley Hospital & Medical Group	Victor Elementary School District
Federal Correction Complex Victorville	Victor Valley College
Victor Valley Union High School District	Victor Valley Community Hospital
Southern California Logistics Airport	Wal-Mart Stores, Inc.
Yucca Valley[2]	
Hi-Desert Medical Center	Stater Bros. Markets
Hi-Desert Star	Town of Yucca Valley
Hi-Desert Water District	Von's Markets
JC Penney	Wal-Mart Stores, Inc.
Morongo Basin Unified School District	

Sources: [1]Town of Apple Valley 2010; [2]County of San Bernardino 2005; [3]Yucca Valley Chamber of Commerce 2010; [4]City of Victorville Economic Development Department 2010.

Table 3.3-6 indicates that Year 2000 mean household earnings and average per capita income were the highest at the county level in Apple Valley and Victorville. Joshua Tree had the lowest mean household earnings and per capita income in the vicinity of the project area (USCB 2000).

Table 3.3-6. 2010 Income Data for Communities in the Project Area

Area	Mean Household Earnings ($)	Average Per Capita Income ($)
Apple Valley	67,008	22,878
Joshua Tree	43,103	17,779
Twentynine Palms	44,811	18,750
Victorville	58,157	18,546
Yucca Valley	50,393	20,555
Lucerne Valley	50,393	18,121
Landers/Johnson Valley	42,001	18,429
San Bernardino County	68,546	21,628

Note: Presented in 2000 dollars in source document and translated here into 2010 dollars.
Source: USCB 2000.

3.3.3.3 Environmental Justice

There are no known concentrations of minority populations in the immediate vicinity of the project area. As shown in Table 3.3-7, excluding Victorville, the communities surrounding the installation had a higher percentage of white residents than San Bernardino County as a whole. Victorville had a higher percentage of all other minority groups than the surrounding communities, with the exception of Native American populations, which had a slightly higher representation in Lucerne Valley, and Asian/Native Hawaiian and Other Pacific Islander, which had a larger representation in Twentynine Palms and the County overall (USCB 2010a).

Table 3.3-7. Population Ethnicity (2010) in the Vicinity of the Project Area (Percent of Population)

Ethnicity	Apple Valley	Homestead Valley	Joshua Tree	Twenty-nine Palms	Victor-ville	Yucca Valley	Lucerne Valley	Landers/ Johnson Valley	San Bernardino County
White	73.5	88.9	88.4	77.1	53.5	87.0	81.7	90.7	60.8
Black or African American	10.8	1.9	4.7	10.8	19.1	4.3	3.8	1.5	10.3
American Indian and Alaska Native	2.7	4.4	3.4	2.9	2.7	2.6	4.0	3.7	2.2
Asian/Native Hawaiian and Other Pacific Islander	4.7	2.0	3.1	8.5	6.4	3.8	2.2	2.0	8.3
Hispanic or Latino	13.6	6.8	6.5	8.0	24.8	6.6	12.9	5.5	23.6
Other Races	0.3	0.2	0.2	0.2	0.5	0.2	0.3	0.1	0.4

Note: Summed percentages may exceed 100% because individuals may fall under more than one category.
Source: USCB 2010a.

There are three locations in the vicinity of the Combat Center that meet the USCB definition of a "poverty area." A poverty area is an area where 20% or more of the population live below the poverty line (USCB 1995). According to the USCB (2010b), in 2010 Homestead Valley (24.3% below the poverty line), Lucerne Valley (23.8% below the poverty line), and Joshua Tree (22.2% below the poverty line) met the

definition of a poverty area. Of these identified poverty areas, Homestead Valley had the fewest residents living below the poverty line (702) but had the lowest median household income ($23,350 per year). Lucerne Valley had 1,337 residents living below the poverty line and a median household income of $32,577 per year. Joshua Tree had 1,702 residents living below the poverty line and a median income of $40,344 per year.

3.3.3.4 Housing

As described in Section 4.3, the net change in population due to the proposed action is not expected to have a noticeable effect on the regional housing market. However, since the action proposes an increase of between 59 and 77 new Combat Center personnel and their families, and since current personnel primarily live within a 30-mile commuting distance of the Combat Center, a brief overview of local housing market conditions in the primary housing market area of the installation is warranted.

In 2005, a majority of the personnel that lived off the installation resided in Twentynine Palms, Joshua Tree, and Yucca Valley (Marine Corps 2006): 63% in Twentynine Palms, 24% in Yucca Valley, 12% in Joshua Tree, and the remaining 1% in other areas (Combat Center 2007). The total population in this local housing market was 76,720 persons in 2000, having increased at an average annual rate of 1.7% since 1990 (USCB 1990, 2000). The population of the housing market area has continued to grow since 2000 at an estimated rate of 2.3% per year, for a 2005 population of 87,307 persons (Marine Corps 2006).

The Combat Center prepares a Housing Market Analysis report that evaluates the current and projected availability of housing for both accompanied and unaccompanied military personnel stationed at the installation. The primary focus of the Housing Market Analysis process is to assess the balance between projected acceptable off-base rental housing and the projected off-base military rental housing requirement (Marine Corps 2006). The Housing Market Analysis report is based on criteria and methods approved by Headquarters Marine Corps and reflects current guidance by the Office of the Secretary of Defense. The most recent Housing Market Analysis report for the installation (Marine Corps 2006) evaluates housing requirements in 2005 and 2010, and this report is the primary source of the information presented below.

In 2005, the market area housing stock was an estimated 43,737 housing units. Of these units, 72.9% were single-family homes, 12.9% were mobile homes, and 14.2% were multiple-family units. An estimated 33,999 units were occupied. Of these occupied units, approximately 12,442 units (36.6%) were renter-occupied, and approximately 21,557 housing units (63.4%) were owner-occupied. The overall vacancy rate in the market area was estimated to be 22.3%, including vacant units for sale, for rent, and held for seasonal or recreational use. The vacancy rate for homes in the for-sale market was estimated at 4.9%, and the vacancy rate for units for rent was estimated to be 8.7%, which was lower than the national average (Marine Corps 2006).

The Housing Market Analysis report projects that the housing market area population will grow 2.9% per year between 2005 and 2010, and new housing development in the market area is forecasted to add 933 units per year to the housing stock. Total housing units are projected to increase at a rate of 2.0% per year based on expected residential construction activity. This is higher than the historic pace of development over the 1990 to 2000 period. Vacancy rates for 2010 are projected to be 8.0% in the rental market and 4.4% in the for-sale market. By 2010 there will be an estimated 15,544 renter-occupied units and 1,348 vacant units for rent. Renter-occupied units are projected to represent about 36.5% of the occupied housing stock, consistent with the projected mix of single-family versus multi-family housing construction from 2005 to 2010 (Marine Corps 2006).

Military family housing available at the installation includes 2,167 units (Combat Center 2009a). As of August 2009, a total of 1,695 military personnel plus 3,985 family members were housed in family housing (Combat Center 2009a), an occupancy rate of approximately 91%. A total of 311 military personnel were on a waiting list for family housing. Approximately 285 new units have been constructed since 2009 (Combat Center 2009a) to serve current and future needs.

Bachelor housing at the installation includes 25 barracks, providing approximately 8,408 spaces. As of August 2009, a total of 7,596 military personnel were housed in the barracks, an occupancy rate of approximately 89% (Combat Center 2009b). There are plans to construct a total of seven new barracks buildings, four are scheduled for construction in 2010 and three in 2011 (Combat Center 2009b). These new units are expected to provide for future anticipated needs.

3.3.3.5 Community Services

Community services include police and fire protection; childcare, family, and educational services; health services; and educational facilities. Any impacts to fundamental socioeconomic components (e.g., population demographics; business activity and economic output; employment and income) may have an effect on community services. Two recently completed Environmental Assessments (EAs) (Department of the Navy [DoN] 2007, 2009) evaluated the environmental effects of adding a projected 2,125 Marines (plus dependents) associated with the Marine Corps Grow the Force Initiative and constructing the temporary and portable facilities necessary to support the increase in personnel in the same area as the proposed action. Both EAs found that community services had sufficient capacity to accommodate the projected increase in personnel as well as any natural increase in demand.

3.3.3.6 Baseline Economic Spending

The economy of the Mojave region is dominated by recreation, resource extraction, and military installations (Kroeger and Manalo 2007). As shown in this section, all of these activities support local businesses and related employment.

<u>The Combat Center</u>

In 2007, the installation generated over $650 million in salaries to military and civilian employees. In addition, the installation awarded $88.6 million in service contracts in 2007, of which $76.3 million or 86% went to California firms (Combat Center 2007).

<u>West Study Area</u>

Recreation

As discussed in Section 3.2, *Recreation*, the area contained in the west study area is predominantly BLM open land area (i.e., Johnson Valley OHV Area) used for a variety of recreational pursuits (e.g., OHVs, hiking, rock hounding, model airplane club, etc.). Users of the Johnson Valley area contribute to the economic spending in the local area and the broader economic region. Currently, there is no known source of data that quantifies the direct and indirect spending associated with users of the Johnson Valley area. Therefore, assumptions on direct and indirect spending from OHV use and recreation have been based on a review of various focused studies outside the area (see Table 3.3-8).

Table 3.3-8. Summary of Studies on Economic Impact of OHV Use and Recreation

Name of Study	Location	Date	Economic Impact
Economic Contribution of Off-Highway Vehicle Recreation in Colorado[1]	Colorado	2007-2008	For 2007-2008 season, $784 million related to recreational activity. Downstream impacts of $243 million gross sales (labor, property type income, indirect business taxes).
Economic Benefits Provided by Natural Lands: Case Study of California's Mojave Desert[2]	Mojave Desert	2007 (dollars and statistics in 2003)	Tourism generates an estimated income of around $8 million per year in Twentynine Palms (2/3 of which is related to recreation and does not include equipment purchases). Recreationist trip expenditures and OHV equipment-related expenditures throughout the Mojave Desert region in 2003 totaled $338.8 million in "earnings."
Taking the High Road - The Future of California's Off-Highway Vehicle Recreation Program[3]	California	2002	More than 4 million people visit lands designated for off-highway recreational vehicle use each year, and this form of recreation contributes more than $3 billion ($3,049,000,000) to the state's economy each year.
Economic Benefits of Off-Highway Vehicle Recreation in Arizona[4]	Arizona	2002	In 2002, OHV recreation in Arizona created a statewide economic impact of $4.25 billion. 12.2 million recreation days. 1.1 million people in Arizona participated.
Economic Impacts of Land Use Restrictions on OHV Recreation in Utah[5]	Utah	2008	Despite relatively high rates of visitation, the economic impact of OHV recreation is small compared to the rest of the economic activity in the area. Resulting economic impacts of land use restrictions would be negligible.
Economic Impacts and Motivations of Off-Highway Vehicle Recreationalists: A Case Study from Florida[6]	Citrus, Sumter, Hernando, and Pasco Counties in Florida	2006	A total estimated 71,500 user days (resident and non-resident combined). Total resident and non-resident spending on travel and equipment expenditures is $13,594,000 per year.
The Impact of Spending by ATV/Trailbike Travel Parties on New Hampshire's Economy during July 2002 to June 2003[7]	New Hampshire	July 2002 to June 2003	The average spending per visitor day by ATV/trailbiking travel parties was $60.12 for in state and $46.40 for out of state. In state users spent $3,101 annually on equipment and other purchases, while out of state spent $2,667 within New Hampshire for purchases. Direct spending was $124 million and indirect was $52 million. Total impact on the state's economy (direct, indirect, and induced) was $318 million.
Economic Summary of Recreation in the Northern Red Desert[8]	Sand Dunes Specialized Sport Site, Wyoming	2006	OHV users spent an estimated $124.70 per day with an estimated 156,580 visitor days in this popular OHV riding area, for a total expenditure of $19,525,526.

Continued on next page

Table 3.3-8. Summary of Studies on Economic Impact of OHV Use and Recreation

Name of Study	Location	Date	Economic Impact
Estimated Economic Impacts of Upper Tellico Off-Highway Vehicle Users and Tellico River Trout Anglers[9]	North Carolina	2008	Total impact estimated to be $4.80 million from OHV users and OHV related expenditures. Estimated total number of jobs was 66, with total value added estimated at close to $2.74 million. Indirect business taxes from OHV users and OHV related expenditures were estimated at $0.41 million. For every dollar OHV users spent on capital or trip related expenditures, an additional $0.55 is generated throughout the region.

Notes: ATV = all-terrain vehicle; OHV = off-highway vehicle
Sources [1]Colorado Off-Highway Vehicle Coalition 2009; [2]Kroeger and Manalo 2007; [3]California State Parks 2002; [4]National Trails Training Partnership 2008; [5]Jakus *et al.* 2008; [6]Parent *et al.* 2006; [7]Okrant and Goss 2004; [8]Friends of the Red Desert 2006; [9]English *et al.* n.d.

Off-Highway Vehicle Use

Motorized recreation enthusiasts contribute to the state's economy by purchasing vehicles, making expenditures while on recreational activity trips (day and overnight), spending money to operate and maintain vehicles, purchasing other accessories needed while riding (clothing, safety equipment), and making other expenditures for items that support their activities (food and fuel, etc.). According to a study conducted by the California Department of Parks and Recreation in 1993 (summarized in Kroeger and Manalo 2007), the average expenditures for OHV recreationists from the Los Angeles area riding in state OHV areas was the equivalent of $31.53 per person per day in 2010 dollars (Table 3.3-9).

Table 3.3-9. Average Expenditures of OHV Recreationists, Los Angeles Area, California

Expenditure Category	Year 2003 $$ per OHV trip	Year 2010 $$ per OHV trip [1]
Overnight lodging	43.28	50.97
Groceries, food, and drinks	305.04	359.25
First aid supplies/ medical	22.44	26.43
OHV activity equipment, supplies, and services	246.75	290.60
Other recreational related expenses	47.21	55.60
Other non-OHV travel expenses	221.08	260.37
Total Trip Expenditures	**885.80**	**1,043.22**
Average group size per trip (number of persons)	9.73	9.73
Average trip length (days)	3.4	3.4
Average OHV Trip Expenditures (per person per day)	**26.78**	**31.53**

Notes: [1]Data presented in 2003 dollars in the source document (which summarizes 1993 survey data by California Department of Parks and Recreation 1994); the data have been translated here into 2010 dollars.
OHV = off-highway vehicle
Source: Kroeger and Manalo 2007.

California has more than twice the number of registered OHVs than any other state in the nation as indicated by the California State Parks' Off-Highway Motor Vehicle Recreation Division. Seventy-three percent of OHV use occurs on weekends (California State Parks 2010). From 1980 to 2000, California OHV registrations increased 108%, and between 1985 and 2000 attendance at California's State Vehicular Recreation Areas increased 52% (BLM 2005; California State Parks 2002).

Film Industry

Due to its many remote areas and the diversity of its landscapes, the Mojave Desert serves as an important resource for the motion picture industry. Over the years, it has provided a unique and convenient backdrop for a large number of major Hollywood productions. The desert has also inspired countless other media, such as books, catalogues, music videos and commercials, and was the topic of a number of documentary productions.

According to the Inland Empire Film Commission, the Johnson Valley OHV Area and El Mirage OHV Area are the two primary desert locations that attract the film industry (Inland Empire Film Commission 2010a). Johnson Valley is popular due to its vast open space, unique geologic features, and the variety of different quintessential desert looks within one remote location. It is the primary location for films about Iraq, Afghanistan, Africa, etc. El Mirage is a very different setting compared with Johnson Valley; its large flat dry lake is popular for filming cars driving at very high speeds (Inland Empire Film Commission 2010a). These locations are popular because they save the industry substantial funds by not having to drive to multiple sites and locations. For filming, Johnson Valley is one of the most diverse locations available in the U.S (Inland Empire Film Commission 2010a). No filming occurs in the south or east study areas.

According to permit records obtained through the BLM Barstow Field Office, there were 24 film shoots over the course of 59 days in Johnson Valley in 2007 (BLM 2010a). In 2008, there were 31 shoots over 64 days, and in 2009 there were 28 shoots over 71 days (BLM 2010a). The local economic impact of filming in Johnson Valley (for lodging, food, fuel, catering, security, and other similar services) was estimated by the Inland Empire Film Commission to be $12.5 million between 2001 and 2008 (see Table 3.3-10). The specific distribution of the economic benefits within the region is not known, but the Film Commission identified Barstow, Victorville, Apple Valley, Yucca Valley, Lucerne Valley, and Landers as communities that collectively benefit from filming in Johnson Valley (Inland Empire Film Commission 2010a).The economic contribution of filming depends on the size of crew, length of stay, and days of filming. The estimated average daily economic impact to the region when filming occurs is $70,000 per day (Inland Empire Film Commission 2010a).

Table 3.3-10. Economic Impact[1] of Filming in Johnson Valley, 2001-2008

Type of Filming	Production Days	Economic Impact ($)
Features	18	987,000
Television	12	720,000
Commercials	116	5,590,000
Stills	183	3,640,000
Music Videos	3	78,000
Documentary, Other	57	1,215,875
Student Production	55	275,000
Total Economic Impact 2001-2008		**12,505,875**
Average $ Per Year		1,563,234

Note: [1] The specific distribution of economic impacts within the region is not known, but local communities that typically benefit from filming in Johnson Valley include Barstow, Victorville, Apple Valley, Yucca Valley, Lucerne Valley, and Landers (Inland Empire Film Commission 2010a).

Source: Inland Empire Film Commission 2010b.

Revenue to Local Businesses

As described in Section 3.2, *Recreation*, visitors travel through the cities and towns near the west study area on their way to enjoy recreation in Johnson Valley and other BLM public lands. Table 3.3-11 presents information on the number of recreation-related retail trade and accommodation / food service establishments, and Year 2007 revenue for such businesses in Victorville, Apple Valley, and Yucca Valley. In 2007 the total county-wide revenues for the same recreation-related sectors in San Bernardino County were $13.8 billion (USCB 2007a).

While many OHV users travel in recreational vehicles that are self-contained and have been stocked with supplies at the origin of the trip, OHV users contribute to the local economy by purchasing gas and other supplies while traveling through towns like Lucerne Valley on their way to or from Johnson Valley. Some visitors make excursions to Lucerne Valley or Yucca Valley (the two nearest towns with appreciable retail presence) during their visit to restock supplies or patronize local restaurants. The owners of Lucerne Valley Market provided data for this EIS that indicate approximately 7.5% of their average daily sales are attributable to OHV and other recreational visitors to Johnson Valley (Lucerne Valley Market and Hardware and Lucerne Valley Economic Development Association 2010). The Johnson Valley Improvement Association is a volunteer organization that provides weekly activities at the community center, including Cardiopulmonary Resuscitation and yoga classes, a card club, and a craft club. The primary source of income for this association is from a morning breakfast that is held every Saturday and has become popular with visitors to the Johnson Valley OHV Area (Johnson Valley Improvement Association 2010).

OHV Manufacture and Retail Industries

All-terrain vehicles and ATV parts manufacturing data are published, in limited geographic detail under the North American Industry Classification System product codes 3369994101 and 3369994103, respectively. The most recent Economic Census reports that, in 2007, there were 51 manufacturing companies in the U.S. that shipped at least $100,000 worth of ATV's or ATV parts. Twenty-nine of these companies manufactured ATVs and 22 manufactured ATV parts. The 51 manufacturers combined to ship $4.3 billion in ATVs and ATV parts. All-terrain vehicle manufacturers made up the bulk of the shipments, $4 billion, while parts manufacturers shipped $300 million. On average, ATV manufacturers had shipments of $181 million per company while parts manufacturers were smaller, shipping $9.9 million in ATV parts per company (USCB 2007a).

OHV retail sales are included in North American Industry Classification System 441221, Motorcycle, ATV, and Personal Watercraft Dealers. Industry 441221 is defined as being composed of establishments that are "primarily engaged in retailing new and/or used motorcycles, motor scooters, motorbikes, mopeds, off-road all-terrain vehicles, and personal watercraft, or retailing these new vehicles in combination with repair services and selling replacement parts and accessories" (USCB 2007b). In 2007, U.S. sales in the Motorcycle, ATV, and Personal Watercraft Dealers industry were over $23 billion. Over $2.5 billion of those sales took place in California, including $205 million in San Bernardino County. Also in 2007, the industry employed over 70,000 people nationwide; over 8,000 of those jobs were in California, including 635 in San Bernardino County (USCB 2007a).

Table 3.3-11. Revenue from the Retail Trade and Accommodation / Food Services Sectors Near the West Study Area 2007

Retail Trade/Accommodation and Food Services Sectors	Number of Establishments	Revenue[1] ($1,000)
Victorville		
Retail Trade[2]	**109**	**460,297**
Motorcycle, boat, and other motor vehicle dealers (including ATVs)	6	20,388
Automotive parts, accessories, and tire stores	25	34,173
Food and beverage stores	33	195,572
Pharmacies and drug stores	13	64,396
Gasoline stations	27	167,734
Sporting goods stores	5	8,034
Accommodation/Food Services	**199**	**181,981**
Total for Retail Trade and Accommodation/Food Services Sectors	**308**	**642,278**
Yucca Valley		
Retail Trade[2]	**26**	**177,319**
Motor vehicle and parts dealers (including parts, accessories, and tire stores)	11	65,606
Food and beverage stores	8	79,734
Gasoline stations	7	31,979
Accommodation/Food Services	**46**	**29,671**
Total for Retail Trade and Accommodation/Food Services Sectors	**72**	**206,990**
Apple Valley		
Retail Trade[2]	**51**	**244,520**
Motor vehicle and parts dealers	11	11,544
Food and beverage stores	16	135,955
Pharmacies and drug stores	9	33,295
Gasoline stations	10	58,692
Sporting goods, hobby, book, and music stores	5	5,034
Accommodation/Food Services	**67**	**49,484**
Total for Retail Trade and Accommodation/Food Services Sectors	**118**	**294,004**

Note: [1]Revenue includes sales, shipments, receipts, revenue, or business done.
[2]Not all retail trade categories are listed. Only categories related to recreation have been listed.
ATV = all-terrain vehicle
Source: USCB 2007a.

Local Cement Industry

Data for the cement manufacturing industry is published under North American Industry Classification System Code 32731. The USCB defines the industry as comprised of establishments primarily engaged in manufacturing portland, natural, masonry, pozzolanic, and other hydraulic cements and adds that cement manufacturing establishments may calcine earths or mine, quarry, manufacture, or purchase lime (USCB 2007c). According to the Economic Census, in 2007 there were 297 cement manufacturing establishments in the U.S. that employed 17,833 people and had total sales of approximately $10 billion. In California, there were 26 cement manufacturing establishments that employed 2,035 people and had sales of approximately $1.5 billion (USCB 2007a).

Sales data for San Bernardino County cement manufacturers are unavailable due to disclosure issues; however, a general idea of size and scope can be obtained by reviewing data for the Los Angeles-Long Beach-Riverside, CA Combined Statistical Area (CSA) (which includes San Bernardino County) and comparing it to data that are available for the County. In the CSA, there were eight cement

manufacturing establishments that employed 1,003 people and had sales of $804 million. Of the eight establishments in the CSA, five were in San Bernardino County, and of the 1,003 employees in the CSA establishments in San Bernardino County, they employed 839 (84% of the CSA total). Cement manufacturing establishments in San Bernardino County are relatively large, employing 168 people per establishment compared to a national average of 60 and a state average of 78 (USCB 2007a).

Local Government Revenue

Property taxes are a principal source of revenue for local communities and school districts, and are calculated by multiplying the nominal property-tax rate by the assessment ratio (the percentage of the value of the property that is taxed) of the value of the property. Taxes are paid on a number of land parcels located in the west study area (Table 3.3-12). The total number of tax bills issued for property tax collection in San Bernardino County was 764,713 for 2008-2009. The total tax charge for that time period was over $2 billion (California State Controller's Office 2010). Total taxes paid in 2009 for all properties located in the project acquisition study areas comprised 0.009% of total taxes paid in San Bernardino County.

Table 3.3-12. Government Revenue from Property Taxes in Acquisition Study Areas

Area	Total Number of Parcels	Total Acreage	Total Property Value ($)	Total Tax for 2009 ($)
West Study Area	445	180,353	2,869,771	34,283
South Study Area	39	21,304	12,120	151
East Study Area	335	177,276	13,607,307	160,760
San Bernardino County	764,713	N/A	N/A	2,070,141,126

Note: N/A = Not available.
Source: California State Controller's Office 2010.

South Study Area

No established recreation areas, such as OHV "open" areas, wilderness areas, or parks are located within the south study area. However, dispersed-use OHV activity occurs on BLM land in this area. Potential recreational activities within this area include hiking, wildflower and wildlife viewing, camping, and OHV activities along established routes. There are no quantified recreational usage data available for this area. However, as noted in Section 3.2, *Recreation*, this area does not receive frequent recreational use. Consequently, any recreational expenditures from users of the south study area are negligible.

The south study area consists of a mixture of BLM land and private property. Property taxes are paid on a number of land parcels located in the south study area (see Table 3.3-12), which contributes to local government revenue. There are no known businesses or other economic activities located in the south study area.

East Study Area

No established recreation areas are located within the east study area. Potential activities within this area include hiking, wildflower and wildlife viewing, camping, rockhounding, and OHV activities along established routes. There are no quantified recreational usage data available for this area. However, as described in Section 3.2, *Recreation*, this area does not receive frequent recreational use. There are no data available that address the extent of illegal OHV use in and around the east study area; however, based on interviews with BLM and other OHV organizations, illegal OHV use does not currently appear to be a widespread problem within the east study area, particularly since the area attracts relatively few recreational visitors. Consequently, recreational expenditures from users of the east study area are expected to be negligible.

Property taxes are paid on a number of land parcels located in the east study area (see Table 3.3-12), contributing to local government revenue. A portion of the land area in the east study area is dedicated to agricultural and mining operations. Cadiz Inc. owns approximately 17,000 acres (7,000 hectares) in the east study area that are currently used for agricultural operations. Cadiz Inc. employs approximately 100 full-time employees, with a seasonal increase to about 300 employees during harvest time. In addition, two active sodium mining operations exist in the east study area. TETRA operates the TETRA Technologies Amboy Operation at Bristol Dry Lake on approximately 10,856 acres (4,393 hectares). The mine has been in operation since 1908. National Chloride also operates a sodium mine in this area. Additional information on the mines mentioned above and on the overall mineral resource potential of the east study area is provided in Section 3.12, *Geological Resources*.

3.4 PUBLIC HEALTH AND SAFETY

3.4.1 Definition of Resource

Health and safety issues addressed in this EIS include: risks of public exposure to military operations, hazardous materials and wastes, and active or abandoned mines; disproportionate health or environmental risks to children; and local/regional emergency response capacity. Risks related to military operations may be related to flight safety, ground training and munitions-related hazards, and energy hazards. Flight safety issues may include potential accidents resulting from mid-air collisions, collisions with manmade structures or terrain, weather-related accidents, mechanical failure, pilot error, or wildlife-aircraft collisions, which are covered under the Bird/Wildlife Aircraft Strike Hazards (BASH) program. Ground safety issues may be related to vehicle and infantry maneuvers, munitions use, range maintenance activities, traffic safety, and other military activities. Energy hazards may include human exposure to electromagnetic frequencies and lasers, as well as hazards that electromagnetic radiation may present to storage and use of ordnance.

The terms "*hazardous materials*" and "*hazardous waste*" refer to substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA). In general, *hazardous materials* include substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may present substantial danger to public health or the environment when released into the environment. *Hazardous wastes* are regulated under RCRA and defined as any solid, liquid, contained gaseous, or semisolid waste, or any combination of wastes that either exhibit one or more of the hazardous characteristics of ignitability, corrosivity, toxicity, or reactivity, or are listed as a hazardous waste under 40 CFR Part 261. Petroleum products include petroleum-based fuels, oils, and their wastes.

Hazardous waste issues may also include the presence of asbestos and lead-based paint in structures and exposure to contaminated sites. Asbestos was once used in building construction as a fire and noise retardant, but was linked to several diseases and has not been used in construction materials since 1987. Friable (brittle) asbestos becomes hazardous when fibers become airborne and are inhaled. Lead, which was used as an additive and pigment in paints for many years before 1978, has been associated with central nervous system disorders, particularly among children and other sensitive populations. Exposure to lead is usually through inhalation during renovation and demolition activities or through ingestion of paint chips or lead-contaminated drinking water. Contaminated sites are locations that have been rendered unsafe due to the presence of hazardous wastes. To facilitate the investigation and cleanup of contaminated sites at military installations, the DoD has developed the Installation Restoration Program (IRP). The IRP is the process by which contaminated sites and facilities are identified and characterized, and existing contamination is contained, removed, and disposed of to allow for the future beneficial use of the property.

There are active mines, abandoned mines, and abandoned mine features within the acquisition study areas, as described in Sections 3.1.3.1., *Land Use* and 3.12.3.2, *Geological Resources*. Active and abandoned mines can pose a risk to public health and safety.

Children are considered sensitive receptors in terms of exposure to environmental hazards and health/safety risks. Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, addresses the potential for children to be disproportionately exposed to such hazards and safety risks.

Lastly, the evaluation of health and safety in this EIS addresses issues related to the capacity of emergency response organizations (police, fire, medical) to respond to emergencies as needed in the project area.

Key sources of information on existing conditions relative to public safety and hazardous materials/wastes include the *Range Environmental Vulnerability Assessment* (REVA) (Headquarters Marine Corps 2008); the installation's INRMP (MAGTF Training Command 2007a), *Integrated Contingency and Operations Plan* (ICOP) (DoN 2004); Air Installation Compatible Use Zone (AICUZ) Study (DoN 2003a); *Programmatic Environmental Assessment for Ongoing and Proposed Training Activities at the Marine Corps Air Ground Combat Center Twentynine Palms, California* (DoN 2003b); and *Final Environmental Assessment, Permanent Facilities Bed-Down of Increased End-Strength at Marine Corps Air Ground Combat Center, Twentynine Palms, California* (DoN 2009). Information from the MAGTF Training Command Twentynine Palms web site and various Marine Corps or base-specific procedures is also included.

Additional information relevant to public health and safety is contained in the following sections of this EIS: Section 3.1, *Land Use*; Section 3.2, *Recreation*; Section 3.3, *Socioeconomics and Environmental Justice*; Section 3.6, *Transportation and Circulation*; Section 3.7, *Airspace Management*; Section 3.9, *Noise*; Section 3.10, *Biological Resources*; and Section 3.13, *Water Resources*.

3.4.2 Regulatory Framework

Operational Risk Management. The Marine Corps practices Operational Risk Management as specified in Office of the Chief of Naval Operations Instruction (OPNAVINST) 3500.39C (July 2010) and Marine Corps Order (MCO) 3500.27B (2004). Requirements addressed in these documents provide a process for maintaining readiness in peacetime and achieving success in combat while safeguarding people and resources. Additionally, Combat Center Order 5090.1D provides guidelines for on-base facility environmental issues including: waste management, air quality, water usage, natural resources protection, cultural resources, and training area activities. Marine Corps and base-specific standard operating and training procedures are also utilized to ensure safety during aircraft and ground operations, use of ordnance and munitions, and possible encounters with unexploded ordnance (UXO).

Energy Hazards. Although there are no NEPA or California Environmental Quality Act (CEQA) standards regarding the analysis of potential human risks associated with electromagnetic frequency (EMF) exposure, the California Public Utilities Commission reviewed and updated its EMF policy in 2006 (California Public Utilities Commission Decision 06-01-042, Southern California Edison 2009) for California's regulated electric utilities. This policy decision update reaffirmed the finding that state and federal public health regulatory agencies have not established a direct link between exposure to EMF and human health effects, and that the existing "no-cost and low-cost" precautionary-based EMF policy should be continued for electrical facilities (Southern California Edison 2009). The Marine Corps has adopted this precautionary attitude towards energy hazards.

Range control procedures and safety precautions associated with laser training are described in MCO 5104.2, *Marine Corps Radiofrequency Electromagnetic Field Personnel Protection Program*, (27 Apr 1995). The regulations and guidelines listed therein are designed to prevent exposure to hazardous levels of laser radiation (MAGTF Training Command 1995).

Hazardous Materials. Hazardous materials include, but are not limited to, hazardous substances, hazardous wastes, or any materials that pose a potential hazard to human health and safety or the environment due to their quantity, concentration, or physical and chemical properties (California Health and Safety Code § 25501[o]) (DoN 2009). The ICOP for the Combat Center meets specific regulatory requirements for an Oil and Hazardous Substance Spill Contingency Plan (SCP); Spill Prevention, Control, and Countermeasures

Plan (SPCC); a Business Emergency and Contingency Plan (BECP); Clean Air Act (CAA) Risk Management Plan; and Marine Corps requirements for a Hazardous Waste Management Plan (HWMP) (DoN 2004). The SCP, SPCC, BECP, Risk Management Plan, and HWMP have been combined into an ICOP following the Integrated Contingency Plan guidance published in the *Federal Register*, Volume 61, Number 109, dated June 5, 1996. The purpose of the ICOP is to eliminate the redundancy of information among the existing plans, and to update current facility operations (DoN 2004).

Hazardous Wastes. Hazardous wastes are characterized and regulated, in part, according to their ignitability, corrosivity, reactivity, and toxicity. Hazardous wastes include any waste which, due to its quantity, concentration, physical, or chemical characteristics may either 1) cause or significantly contribute to an increase in mortality, serious irreversible illness, or incapacitating reversible illness; or 2) pose a substantial threat to human health or the environment (DoN 2009).

Title 22, Division 4.5 of the California Code of Regulations prescribes regulatory requirements for the management of hazardous waste, and MCO P5090.2A (*Environmental Compliance and Protection Manual [10 Jul 1998])* establishes Marine Corps policy and responsibilities for compliance with statutory requirements for hazardous waste management. Hazardous materials and wastes could potentially affect areas that would be exposed to an accidental release of hazardous substances from construction activities, other specific geographic areas affected by past and current hazardous waste operations, and areas where hazardous materials would be utilized and hazardous wastes generated by the installation (DoN 2009).

Asbestos-containing materials (ACMs) may be present in buildings or other facilities that would be modified or demolished, such as abandoned mills on property that might be acquired. Asbestos regulations fall primarily under two different federal laws: CAA and Toxic Substances Control Act (TSCA); both laws ban the use of certain ACMs. Asbestos-containing materials have been classified as a hazardous air pollutant by the U.S. Environmental Protection Agency (USEPA), in accordance with Section 112 of the CAA. 40 CFR 61.145 and OPNAVINST 5100.23G require that surveys be conducted before demolition of any structure(s). The Mojave Desert Air Quality Management District (MDAQMD) provides the requirements for removal and/or handling of regulated ACM.

Installation Restoration Program. As part of the Defense Environmental Restoration Program, the DoD has created the IRP. This program was instituted to satisfy requirements of CERCLA, for former and current hazardous waste sites. Comprehensive Environmental Response, Compensation, and Liability Act definitions of hazardous substances (42 USC § 9601[14]) and pollutants or contaminants (42 USC § 9601[33]) exclude petroleum unless specifically listed. The USEPA interprets the term petroleum to include hazardous substances found naturally in crude oil and crude oil fractions, such as benzene, and hazardous substances normally added to crude oil during refining. Petroleum additives or contaminants that increase in concentration in petroleum during use are not excluded from CERCLA regulations.

Disproportionate Risks to Children. Children may suffer negative environmental influences, disproportionately compared to adults. To address these environmental health and safety risks, EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, was introduced in 1997. Executive Order 13045 helps to ensure that federal agencies' policies, programs, activities, and standards address environmental risks and safety risks to children. Executive Order 13045 defines "environmental health risks and safety risks" [to] "mean risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest (such as the air we breathe, the food we eat, the water we drink or use for recreation, the soil we live on, and the products we use or are exposed to)."

Emergency Response. Police protection at the installation is provided by a military police force. San Bernardino County Sheriff's Department and the California Highway Patrol tour, guard, or watch the communities surrounding the installation. Sheriff's Department officers work with installation police and have the authority to arrest individuals at Mainside on the installation; however, they usually will not do so unless requested by the Marine Corps (DoN 2009).

Fire Protection for the Morongo Basin is provided by the California State Department of Forestry and Fire Protection, the County of San Bernardino, the Twentynine Palms Fire Department, and the San Bernardino County Fire Protection District (previously known as the Yucca Valley Fire Protection District) (DoN 2009). The City of Twentynine Palms is served entirely by Twentynine Palms Fire Department. The installation fire department operates under mutual aid and automatic response agreements with all local fire agencies including Twentynine Palms Fire Department and Joshua Tree National Park. The installation fire department's agreement with the California State Department of Forestry and Fire Protection is primarily for Strike Team Response (DoN 2009). In addition, other agencies will respond to fires on installation property if requested to do so by the Marine Corps.

Medical Evacuation (MEDEVAC) procedures are described in Range Standard Operating Procedure (SOP) 1013, Combat Center Order 3500.4H (MAGTF Training Command 2010g). The Combat Center has contracted dedicated civilian air ambulance services to support training. In addition to contracted air ambulance MEDEVAC support, the Combat Center Fire Department also provides advanced life support MEDEVAC response via ground ambulance, including response to training accidents within the training areas.

3.4.3 Existing Conditions

3.4.3.1 Combat Center

Aircraft Operations

The primary public health and safety risks associated with military aircraft operations are aircraft-related accidents and use of aircraft-delivered ordnance. Exposure to noise associated with aircraft operations can present a health and safety issue to the public but is typically limited to an annoyance. Residents of the municipalities in the Morongo Basin occasionally contact the Combat Center with noise complaints from aircraft operations. However, these complaints have not been attributed to aircraft operations at the Strategic Expeditionary Landing Field (SELF) (DoN 2003a). Rather, they usually stem from DoD aircraft of all services transiting through the region and generally occur during climatic conditions that favor sound focusing. Aircraft-related noise complaints directly attributable to aircraft noise from the Combat Center or aircraft on the SELF approach or departure tracks are extremely infrequent (DoN 2003a).

Aircraft-related Accidents. Airspace management and flight rules are the primary method used for avoidance of mid-air accidents. The Federal Aviation Administration (FAA) designates Special Use Airspace (SUA) to identify areas where military activity or unusual flight conditions may occur. Special Use Airspace 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" (FAA 2011). These airspace designations alert non-participating aircraft (civilian or military) to the possible presence of hazardous activities. The Notice to Airmen (NOTAM) system is used to alert pilots of hazards or other conditions important to maintaining flight safety. Notices to Airmen are an unclassified notice, distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely

knowledge of which is essential to personnel concerned with flight operations (U.S. Air Force 2009). The enroute structure in this region is used extensively by commercial air traffic transiting between Los Angeles basin airports and eastern destinations. Real time coordination between Los Angeles Air Route Traffic Control Center (LA ARTCC), terminal Air Traffic Control (ATC) facilities, and the range scheduling agencies ensure the smooth flow of air traffic through this region with little impact on either civil or military flight activities. The Marine Corps has also established a Letter of Agreement (LOA) with the FAA to facilitate transit of exercise aircraft between blocks of airspace to accommodate refueling and other tactical operations.

For air operations, Accident Potential Zones (APZs) describe a probable impact area if an accident occurred, not the probability of an accident occurring (DoN 2003a). They are based on review of local historical accident and operations data and on DoD criteria developed from analysis of all tri-service aircraft accidents. The AICUZ criteria define three APZs – the Clear Zone, APZ I, and APZ II. Airfield safety is determined using various programs, including identification of hazards within the airfield vicinity that obstruct or interfere with aircraft movement, designation of APZs where the potential for mishaps may be higher, and tracking the history of aircraft accidents to ensure that programs are instituted that reflect actual conditions (DoN 2003a). Military aircraft operations are inherently dangerous, and occasionally a mishap or incidents occur. Aircraft mishaps include all reportable accidents and range from the most serious to less significant events such as a fuel flap opening during flight (DoN 2003a). Aircraft mishaps are classified as A, B, or C. Class A mishaps are the most severe with total property damage of $2 million or more and a fatality and/or permanent total disability. Class B mishaps are less severe with total property damage of $500,000 or more but less than $1,000,000 and a permanent partial disability or three or more persons hospitalized as inpatients.

Class C mishaps are the least severe with total property damage of $50,000 or more but less than $200,000 and a nonfatal injury resulting in loss of time from work beyond day/shift when injury occurred. APZs are established to delineate recommended surrounding land uses for the protection of people and property on the ground. Accident potential zones define the areas in the vicinity of an airfield that would have the highest potential to be affected if an aircraft mishap were to occur. Air Installation Compatible Use Zone guidelines identify three types of APZs for airfields based on aircraft mishap patterns: the Clear Zone, APZ I, and APZ II. The standard Clear Zone is a trapezoidal area that extends 3,000 feet (914 meters) from the end of a runway and has the highest probability of being impacted by a mishap. Accident Potential Zone I, which typically extends 5,000 feet (1,524 meters) from the end of the Clear Zone, has a lower mishap probability. Accident Potential Zone II, which typically extends 7,000 feet (2,134 meters) from the end of APZ I, has the lowest mishap probability of the three zones. To minimize the results of a potential accident involving aircraft operating from the Combat Center, APZs have been established for the Combat Center's EAF.

Since 1980, seven Class A accidents have occurred within a 5-mile (8-km) radius of the SELF, the most recent in 1992 (DoN 2003a). Accidents within a 5-mile (8-km) radius are reviewed because these aircraft are more likely to be approaching or departing the field. Aircraft crashes are described in Table 3.4-1 and locations are depicted on Figure 3.4-1. All of the nine identified incidents or mishaps occurred within the Combat Center (DoN 2003a). No recent Class A mishaps have occurred within the vicinity of the SELF since 2003.

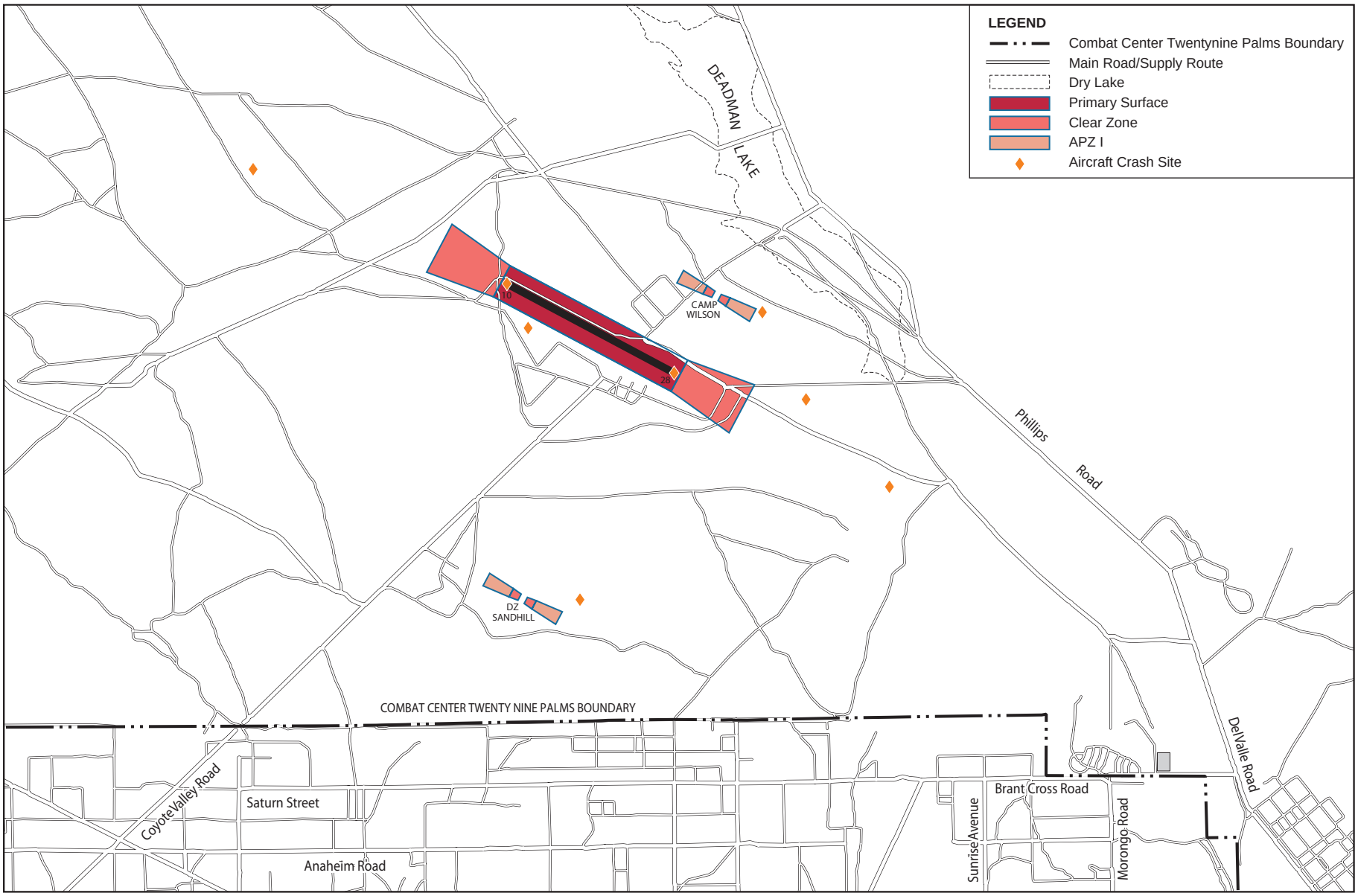
Table 3.4-1. Aircraft Crashes 1980 - 2001

No.	Type	Date	Comment
1	AV-8B	02 Feb 1983	Equipment failure on Runway 28
2	A4	18 Feb 1983	Caught fire on Runway 28 approach
3	F/A-18	07 Feb 1984	Caught fire on departure; ditched off Runway 10 end
4	A-7E	15 Aug 1984	Equipment failure on Runway 10 departure
5	OV-10	10 Sep 1985	Crashed after take-off from Runway 10
6	CH-53E	09 May 1986	Crashed and exploded after take-off from ALZ Sandhill
7	CH-46	04May 1990	Equipment failure on take-off from Landing Zone Wilson
8	UH-1	31 May 1991	Attempted run-on landing after equipment failure
9	F/A-18	01 Nov 1992	Equipment failure on Runway 28 on departure

Note: ALZ = Assault Landing Zone
Source: DoN 2003a.

Bird/wildlife aircraft strike hazard is a serious threat to aircraft. Most bird strikes do not result in any aircraft damage, but some bird strikes have led to serious accidents involving aircraft of every size (AirSafe.com, LLC 2010). According to Birdstrike Committee USA, bird and other wildlife strikes to aircraft result in over $600 million in damage to U.S. civil and military aviation each year. Since 1988, over 200 people have been killed worldwide as a result of aircraft encounters with birds and other wildlife (AirSafe.com, LLC 2010). There have been no significant bird strikes to large military aircraft since 1960 (Air Force Safety Center 2010). A BASH Plan is not maintained by the Combat Center due to the negligible BASH incidents (MAGTF Training Command 2010a).

Aircraft-delivered Ordnance. The delivery of air-to-ground ordnance is one of the characteristic training activities conducted at the Combat Center. The manner and type of ordnance delivered are highly variable due to differences in aircraft, weapon platforms and systems, munitions, and missions. There are a number of existing procedures related to aviation operations that maintain standards to ensure safety during training, for example, SOP Range/Training Areas and Airspace (RTAA), Chapter 4 Airspace and Aviation Operations, specifically, 4008, Aviation Ordnance Delivery Procedures (MAGTF Training Command 2010g). Air-to-ground ordnance weapon safety requires development of Weapons Danger Zones (WDZs) for all targets, which translate aviation safety concerns into degrees of safety that can be reasonably attained. To ensure additional safety, Allowable Target Placement Areas have been established to keep weapon impacts within the installation and ensure that weapon safety footprints do not extend off range onto public or private lands (DoN 2003c).



Statute Miles
0 1
0 Nautical Miles 1

Figure 3.4-1
Accident Potential Zones
Combat Center Twentynine Palms

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Ground Training Operations

The Combat Center is the Marine Corps' largest combined-arms, live-fire training range complex, encompassing 935 mi^2 (2,420 km^2) (598,178 acres [242,080 hectares]). The Combat Center is divided into 23 distinct training areas (Figure 1-3). Training areas are functional administrative units that enable different types of training to be conducted simultaneously without jeopardizing safety. The boundaries of training areas, though not marked in the field, are defined by training requirements, topography, and constraints. The training areas also vary in size, terrain, and use restrictions. Training areas, or portions thereof, are subject to range regulations/SOPs to provide for range safety. Range safety policy is provided in Marine Corps range safety documents, with local policy established by the Commanding General of the Combat Center. Appendix B provides a more detailed description of all 23 training areas and any current restrictions or focused uses that may apply. Safety with live-fire operations is ensured by first planning and developing fixed ranges, setting surface danger zones (SDZs), and following Combat Center Order 3500.4H *Standard Operating Procedure for Range/Training Area and Airspace* (MAGTF Training Command 2010g). Each of the fixed training ranges are designed so the ordnance fired from weapons are contained within the SDZs (DoN 2003c). Each field commander must ensure that the SDZs are determined and enforced when a training area is in operation.

Combat Center Order 3500.4H (MAGTF Training Command 2010g) provides guidance for operations. For example, explosive ordnance personnel clear ranges routinely to neutralize UXO and reduce safety risks. Explosive ordnance disposal (EOD) units are constantly assessing the accumulation of UXO on the ranges. A routine clearance schedule has been developed, with individual training areas cleared on a rotating basis. Range sweeps are conducted following every major exercise by unit personnel. Any UXO found is marked and reported to EOD units for disarming, disposal, and destruction. Visiting EOD units also assist in the range clearances as a part of their training. The MAGTF Training Command EOD Unit performs surface range clearance by systematically sweeping each training area and fixed ranges throughout the year. EOD performs limited subsurface clearance. Subsurface clearance is conducted in conjunction with contracted construction activities on the Combat Center. Range clearance operations conducted by EOD teams play a crucial role in creating and maintaining a safe training environment at the Combat Center. The mission of the EOD unit is to 1) reduce the hazard from UXO and 2) provide a safe and constructive training area for all training units (DoN 2003b). The Combat Center's EOD Unit is currently drafting an SOP for future use and guidance with additional procedures and requirements for range sweeps and clearance which will branch to the newly acquired lands.

Munitions debris and other range debris are processed through the Natural Resources and Environmental Affairs Division (NREA) Range Residue Processing Section for recovery and resale of metal (Headquarters Marine Corps 2008). In addition, target maintenance, repair, and replacement is done throughout the year on fixed ranges and other locations by both military units and private contractors. Maintenance includes upkeep of firing berms for tanks, tank trap maintenance, and repair to other berms and trenches as required.

In many Combat Center areas there is no fencing to delineate installation boundaries due to practical limitations over the very large perimeter, so there is some potential for the public to cross onto military property. The Combat Center provides signage on, around, and near the installation property, road crossings, and likely access points to ensure the public are informed that the area they are entering is an exclusive military use area with active military exercises. Unauthorized public access occurs by scrappers, OHV users, and recreational users. Scrappers are of particular concern, representing civilians who are illegally on the Combat Center removing salvageable materials (aluminum, brass, copper, etc.)

from the training areas. Scrappers have been armed and can present a danger to anyone who approaches them. The Marine Corps has the following procedures in place that are employed if someone is seen or suspected of scrapping in the training areas (MAGTF Training Command 2010g):

- Notify Range Control immediately to indicate the location and provide a brief description of the vehicle of the suspected scrapper(s); then
- Make contact with the suspect(s);
- During contact, observe the suspect(s), paying close attention for signs of weapons or drug paraphernalia; and
- During contact, observe the suspect(s) vehicle paying close attention for signs of weapons, drugs or drug paraphernalia, and evidence of scrapping activities (government property, torching equipment, etc.).

Unauthorized individuals have the potential to encounter bodily injury or death, property damage, or contamination from training or non-training events, particularly from UXO and ordnance fragments. Scrapper information at the Combat Center for 2007 through 2010 is presented below (MAGTF Training Command 2010b):

- Number of reported scrappers/trespassers: 75 in 2007; 41 in 2008; 26 in 2009; and 3 in 2010.
- Two shootings involving Provost Marshal's officers (2008, 2009).
- Three deaths, one on base due to climate exposure (August 2008) and two in Barstow from an explosion (rocket the scrappers took blew up) (July 2007).
- One vehicle had to be destroyed by EOD due to sensitive munitions in the vehicle (around December 2009).

Ordnance Use (ground-delivered)

Explosives and ammunition are stowed in specially-designed structures (magazines) or in associated hardstand areas. Explosive safety quantity distance (ESQD) arcs surround each magazine used for the storage or handling of ordnance (DoN 2003c). The type and quantity of the explosives stored in a magazine determine the type and size of ESQD arcs. ESQD arcs have been developed to protect humans from possible sabotage or accidental detonation of explosives or ammunition. Regulations associated with ESQD arcs prohibit the placement of inhabited buildings, public traffic routes, and other human activities within unsafe distances from ordnance storage facilities (DoN 2003c). Training activities are not permitted within an ESQD arc associated with ordnance storage facilities.

Marine Corps Order 5104.2, *Marine Corps Radiofrequency Electromagnetic Field Personnel Protection Program* (27 Apr 1995) establishes strict guidelines and procedures for the control of ammunition and explosives that are used during training exercises. The Officer in Charge of each firing site has overall responsibility for the control, handling, and accountability of ammunition and explosives at that range.

Ground-delivered ordnance consists of the following:

- ***Artillery*** – Artillery use occurs on approximately 110,000 acres (44,515 hectares) (18%) of the installation, but is concentrated on approximately 45,000 acres (18,211 hectares) (7.5%). Most artillery firing is directed at fixed targets and areas that are already heavily disturbed. Very little artillery use occurs in the mountainous areas of the Combat Center.
- ***Tank and Other Armor Ordnance*** – Tank operations are conducted over approximately 200,000 acres (80,937 hectares) (33%) of the Combat Center, but most of the ordnance delivered from tanks and associated maneuvers are concentrated in 132,000 acres (53,419 hectares) (22%). The majority of tank operations take place in areas that are already moderately to highly disturbed.
- ***Other Ordnance*** – A wide variety of small arms, mortars, ground missiles, and other ordnance is used during infantry maneuvers and related training activities (see Appendix F). These operations occur at certain fixed ranges such as the 400 Series Ranges and throughout various training areas during major exercises. In addition to the small arms component of major exercises, qualification and annual requalification with the service rifle and service pistol occurs at the Marksmanship Training Unit ranges located at the north end of Mainside.
- ***Grenades, Demolitions, and Signal Illumination*** – Infantry maneuvers and other training exercises also rely on a variety of explosive charges, signal illumination, smoke grenades, practice grenades, and other ordnance to increase the realism of the battlefield environment.

Appendix F, *Ammunition Identification and Hazard Information*, provides representative ammunition identification and hazard information for munitions used for training at the Combat Center. The exact type, platform, nomenclature (e.g., Cartridges 75 millimeter [mm] >, 81mm Mortar, 81mm High Explosive [HE] M821), whether the device is dud-producing, a photograph, description of use, and hazards are listed for each.

With the exception of Mainside (which is considered a special use area) and several restricted areas, the entire area within the Combat Center has been designated as an operational training range complex. Five of the training areas are designated for non-live-fire and maneuver training; these training areas are located in the southwestern section of the installation, west of Mainside. Live-fire is approved within the remaining training areas, with some exceptions (e.g., live-fire is not allowed within 3,280 feet [1,000 meters] of the installation boundary). Forty five fixed ranges covering approximately 19,240 acres (7,786 hectares) are also present across the installation, with the majority located in the range training area (Figure 1-4). The fixed ranges vary in the types of weapons and munitions used, allowable maneuvers, and impact areas (DoN 2003b). The installation also contains 12 small arms ranges (SARs), all located within the range training area (Figure 1-4). The boundaries of each training area are defined by training requirements, topography, and other constraints. Different types of training can be conducted simultaneously in multiple training areas without jeopardizing safety. The training areas (or portions thereof) may also be subject to limitations or restrictions on the use for maneuvers, live-fire, or other training activities (DoN 2003b). The training areas are managed by the Range Operations Section/Range Control. The current operational profile at the Combat Center, including the location and general training conducted at the training areas, fixed ranges, and SARs includes:

Training Areas and Fixed Ranges

<u>Training Areas.</u> Training areas provide the Marine Corps with large open areas of land on which to conduct live-fire maneuver training. A training area is defined as an area that does not have specific firing or target points, and its boundaries are limited by natural barriers (U.S. Army Corps of Engineers

[USACE] 2001). Artillery and aviation firing and target points on training areas are generally exercise-dependent and are moved accordingly. Thus, few specific impact areas are designated at the Combat Center, and munitions are distributed throughout the training area. Firing is allowed anywhere throughout the training area, with the exception of a 3,280-foot (1,000-meter) buffer established along the interior of the installation boundary to prevent military munitions from being fired beyond the installation borders, as well as the restricted areas noted above. Five training areas (Acorn, East, Gypsum Ridge, Sand Hill, and West) located in the southwest corner of the installation are designated as non-live-fire maneuver areas. Limited live firing is allowed from the East training area; however, all fire from this zone is directed into the Prospect and Delta training areas. Training is not conducted in the Mainside cantonment area or the 7,900-acre (3,197-hectare) Restricted Area. The remaining 17 training areas allow live-fire training anywhere within the training area, although most firing is directed at combined arms exercise (CAX) targets and typically no higher in elevation than the base of any nearby mountain ranges (Headquarters Marine Corps 2008). Detailed descriptions of the training areas and fixed ranges are in Appendix B, *Current Training Areas and Fixed Ranges*.

The types of military munitions used at the World War II-era California Arizona Maneuver Area before the establishment of the Combat Center are mostly undocumented. The limited types of munitions documented from this area include practice and live HE munitions (USACE 2001).

Small Arms Ranges. There are 12 SARs located at the Combat Center; all are in the range training area. Seven of these ranges are located within the Marksmanship Training Unit range complex. The Marksmanship Training Unit trains more than 10,000 active duty Marines per year for service rifle and pistol requalification. The other remaining SARs, which are part of the 100 Series fixed ranges, are located further north in the training area. Operational ranges that are exclusively used for small arms training at the Combat Center include those described in Table 3.4-2.

Table 3.4-2. Operational SARs at the Combat Center

Range Number	Range Type
Range 1	Known distance rifle range
Range 1A	Unknown distance rifle range
Range 2	Known distance pistol range
Range 2A	Combat pistol range
Range 3	BZO grouping range
Range 3A	BZO grouping range
Range 101	Armor, gun training range (subcaliber)
Range 105A	Small arms BZO range
Range 113	Multipurpose machine gun range
Range 113A	Machine gun BZO range

Notes: BZO = battle sight zero
Source: Headquarters Marine Corps 2008.

Restricted Areas. Although the fire of military munitions generally is allowed anywhere within a live-fire training area, several areas within the installation are protected due to the presence of cultural and natural resources, as defined in Combat Center Order 5090.1D (MAGTF Training Command 2006). Restricted areas that have been established are prescribed as areas with no impact, no mechanized maneuvers, no bivouacs, no OHVs, nor any training involving vehicle activity. Therefore, these restricted areas are not expected to contain hazardous or other wastes related to military training activities. These areas include the following:

- Restricted Area training area – Surprise Spring/Sand Hill
- Foxtrot petroglyphs
- Cultural Resources Management Area
- Historical sites
- Historical mines or prospects
- Lead Mountain acquisition study plots

Areas designated as Environmentally Sensitive Areas do not have limitations to training; however, military units are cautioned to be aware of sensitive natural and cultural resources. Therefore, these sensitive areas could have hazardous or other wastes related to military training activities. These areas include the following:

- Sand Hill Training Area
- Emerson Lake and Acorn Training Areas
- Cleghorn Pass (outside the fixed ranges)
- Wood Canyon
- Northern Sunshine Peak
- Southern Bullion Training Area
- All dry lake beds (playas)

Transportation

Vehicles involved in training operations are described in Chapter 1, and Appendix E contains photographs and specifications for major vehicles, equipment, weapons, and aircraft that would be used in proposed MEB Exercises. Table 2-5 lists the types of vehicles that would typically participate in the average MEB Exercise and provides an estimated distance traveled by each type. These are typical of vehicles currently used for existing training activities at the Combat Center.

Energy Hazards (Electromagnetic Radiation, Lasers)

Electromagnetic radiation (EMR) emitted from communications, radar, and similar systems has the potential to create hazards to ordnance systems containing sensitive electro-explosive devices, thereby resulting in degradation of these devices as well as premature device actuation due to propellant ignition and/or warhead detonation (DoN 2003b). Hazards of Electromagnetic Radiation to Ordnance is the danger of accidental actuation of electro-explosive devices or otherwise electrically activating ordnance because of radio frequency electromagnetic fields. This unintended actuation could have safety (premature firing) or reliability (dudding) consequences. Safety measures, responsibilities, and SOPs associated with Hazards of Electromagnetic Radiation to Ordnance (HERO) are contained in MCO 5104.2 (*Marine Corps Radiofrequency Electromagnetic Field Personnel Protection Program, 27 Apr 1995*), which is incorporated herein by reference (MAGTF Training Command 1995).

A total of 16 training areas at the Combat Center contain laser target areas, which are used for laser ground-to-ground and air-to-ground firing. Regulations and guidelines designed to protect human health and safety and the environment are strictly enforced to prevent exposure to hazardous levels of laser radiation (MCO 5104.2, *Marine Corps Radiofrequency Electromagnetic Field Personnel Protection Program, 27 Apr 1995*). Laser-guided ammunition, both air and ground ammunition and platforms, does not have an active laser source in the munition. The munition has a sensor that detects a target that has

been "painted" with light from a laser target designation device. The designation device is usually operated by a third party, not on the munition, and not on the weapons delivery platform (i.e., a Marine on the ground or in another platform). The explosive component delivered by the laser-guided delivery system may still not function as intended and may result in a "dud." The primary hazard associated with laser use is eye damage. This damage can vary from small burns, undetectable by the injured person, to severe impairment. Range control procedures and safety precautions associated with laser training are described in MCO 5104.2, *Marine Corps Radiofrequency Electromagnetic Field Personnel Protection Program* (27 Apr 1995). The regulations and guidelines listed therein are designed to prevent exposure to hazardous levels of laser radiation (MAGTF Training Command 2007a). Therefore, impact analysis discussions are limited to potential EMR impacts.

Hazardous Materials and Hazardous/Solid Waste

This section describes existing conditions with regard to storage, use, and handling of hazardous materials; munitions constituents; hazardous waste; solid waste; and contaminated sites.

Hazardous Materials

A variety of hazardous materials are used and stored at the Combat Center for daily training and other operations. The primary hazardous materials used during a typical CAX training exercise are fuels of various types (diesel, JP-8, and JP-5). A total of 165,000 gallons of fuel was used during a past CAX training event (DoN 2003b). Other hazardous materials used during CAX events include batteries, petroleum, oils, and lubricants, hydraulic fluid, antifreeze, cleaning products, and printer cartridges (MAGTF Training Command 2010g).

The Combat Center records toxic chemical release inventory chemicals generated during training events as part of the Emergency Planning and Community Right-to-Know Act (EPCRA). The EPCRA establishes requirements for federal, state, and local governments and industry regarding reporting of hazardous and toxic chemicals. Access to this information contributes to improving chemical safety and protecting public health and the environment. Hazardous material releases to the environment from ordnance used in training require annual reporting to the USEPA under the EPCRA Toxic Release Inventory (TRI) program. Under TRI, an installation must report on the TRI Form R the quantity of ordnance-related chemicals that exceeds applicable reporting thresholds. The Form R must also include information related to how these chemicals were released to the environment, recovered, or recycled. The Form R for each calendar year must be submitted to the USEPA by July 1 of the following year.

The Combat Center has developed procedures to comply with TRI reporting requirements. During 2009, the following seven chemicals associated with ordnance use were reported by the Combat Center on the Form R report: aluminum (fume or dust), copper, dibutyl phthalate, dinitrotoluene, lead compounds, nitroglycerin, and phosphorus (yellow or white) (USEPA 2010).

The NREA Abatement Section responds to hazardous material spills in two ways: 1) Completely excavate all contaminated soil and then backfill with clean soil, with the excavated, contaminated soil taken to an on-base bioremediation lot, where it is treated following procedures summarized below. 2) Alternately, the material is remediated in place, which only occurs when the spill site is inaccessible to equipment or when dealing with soil that has an abundance of rocks. In-place remediation incorporates the consideration of installing temporary fences or barriers to keep wildlife out of spill areas and other known contaminated areas that have not yet been remediated (MAGTF Training Command 2007a).

Soils contaminated with jet fuel, diesel fuel, and oils/lubricants are treated at the MAGTF Training Command bioremediation facility. The contaminated soil is placed on a pad and atmospheric air is pulled

through the soil pile by using blowers. The soil is sampled after several months and, if the fuel and oil are reduced to regulatory compliance levels, then the soil can be used in the Combat Center landfill to cover solid waste being deposited there on a daily basis. This biopile treatment process saves the Combat Center the cost of transporting soil to a landfill that can accept this material (the Combat Center landfill cannot accept soil with fuel or oil contaminants above regulatory limits) (MAGTF Training Command 2007a).

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

Munitions Constituents

Munitions constituents (MC) are any materials originating from unexploded ordnance, discarded military munitions, or other military munitions, including explosive and nonexplosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions (10 USC Section 2710). An evaluation of MC is used to describe estimated baseline conditions for contamination related to munitions use on the operational ranges. Discrete MC loading areas associated with the operational ranges on the installation are those areas where MC have been deposited. These areas can be target or impact areas associated with current ranges or historical ranges that lie within the footprint of the operational ranges and training areas. These discrete MC loading areas are not likely to resemble the operational SDZs or range fans, as they are intended to reflect the area where the majority of the MC was likely to have been deposited. At the Combat Center in particular, training operations are conducted across large-scale maneuver areas that contain few specifically designated firing points and impact areas; consequently, weapons can be fired from and toward any location within the training areas. Although designated fixed ranges are present at the installation, the majority of training (live-fire and non-live-fire) is conducted within these large-scale maneuver areas. The primary MC loading areas identified for the Combat Center are shown in Figure 3.4-2. These are based on logical assumptions regarding the zones within the training areas in which weapons fire is concentrated. Interviews with Range Control, a review of historical expenditure data, and GIS-marked CAX target locations and topography indicate that areas within the Quackenbush, Lavic Lake, Delta, Lead Mountain, and range training areas receive the greatest amount of live-fire military munitions related training and, thus, the estimated greatest amount of MC loading at the installation (Headquarters Marine Corps 2008).

MC accumulated in the MC loading areas can migrate to potential receptors via the following exposure pathways:

- Surface water runoff
- Leaching to groundwater and subsequent groundwater flow

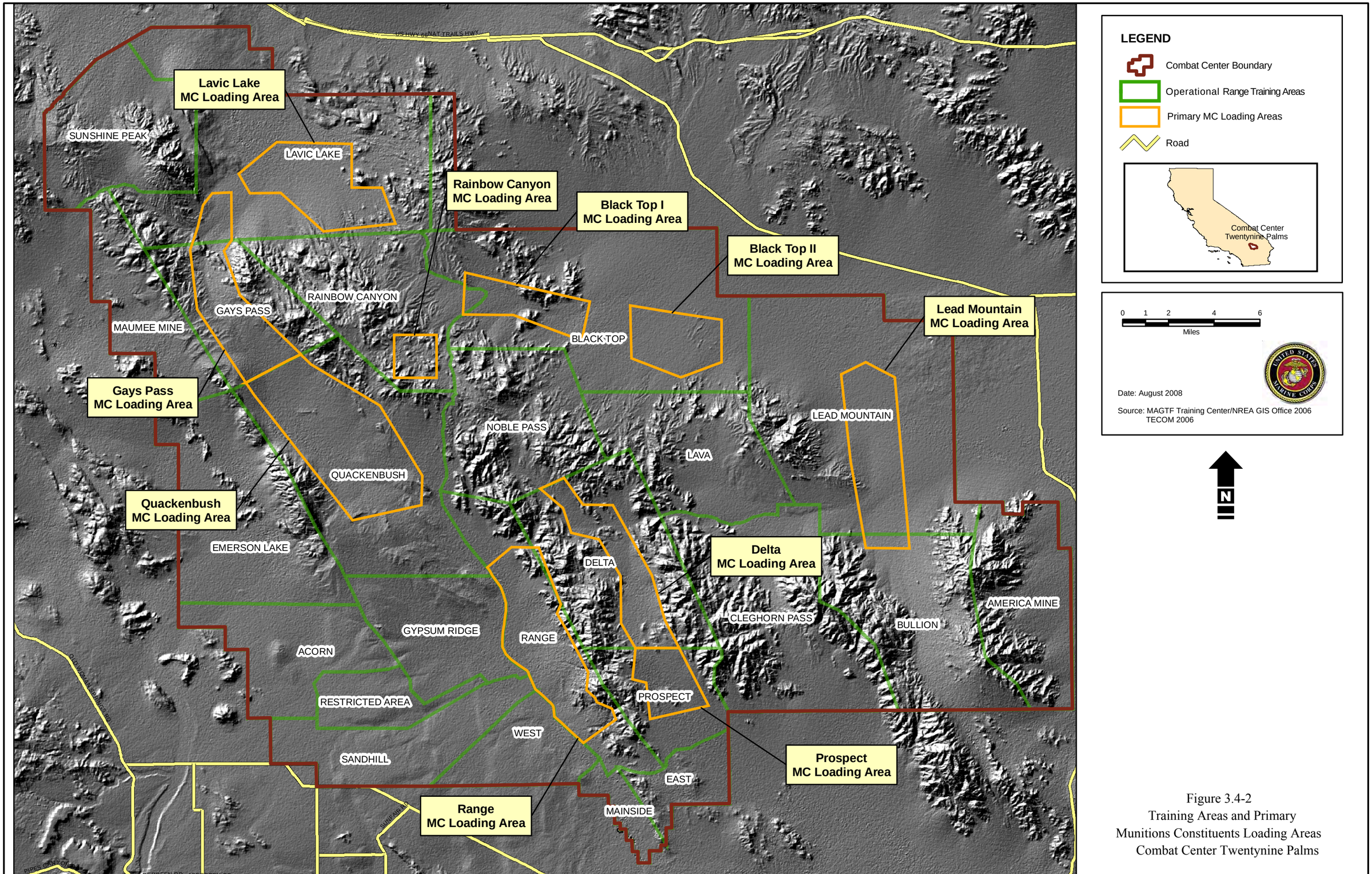


Figure 3.4-2
Training Areas and Primary
Munitions Constituents Loading Areas
Combat Center Twentynine Palms

Exposure pathways considered in the REVA process for the Combat Center include consumption of surface water and groundwater for off-range human and ecological receptors, as described in the *REVA Reference Manual* (Headquarters Marine Corps 2008). Other off-range exposures scenarios (e.g., soil ingestion, incidental dermal contact, bioaccumulation, and food chain exposure) are not currently considered in the REVA process. The potential points of exposure for receptors of MC at the Combat Center installation include the following:

- Active drinking water supply wells;
- Special status ecological receptors, such as the desert tortoise; and
- Salt mining activities east of the installation that pump groundwater down gradient of the training areas or can be flooded by surface runoff following storm events.

The MC evaluated in the REVA program for training areas include trinitrotoluene (TNT), cyclotetramethylene tetranitramine (HMX), cyclotrimethylene trinitramine (RDX), perchlorate, and lead. TNT, HMX, and RDX are considered to be indicator MC. Studies have shown that they are detected in a high percentage of samples containing MC due to their chemical stability within the environment. They are common HEs used in a wide variety of military munitions. Perchlorate is a component of the solid propellants used in some military munitions. Perchlorate is also considered an indicator MC, as its high solubility, low sorption potential (the taking up and holding of one substance by another, which includes the processes of absorption and adsorption), and low natural degradation rate make the compound highly mobile in the environment. Additional information pertaining to the physical and chemical characteristics of the REVA indicator compounds is provided in the *REVA Reference Manual* (Headquarters Marine Corps 2008).

The MC TNT and RDX are predicted by screening level evaluation of surface water transport to potentially migrate from operational ranges via surface water runoff at the Combat Center to adjacent playa lakes. Potential ecological exposure to TNT and RDX accumulating in the lake waters and the effects of that exposure were evaluated. The desert tortoise was a receptor of concern. However, the playa lake habitat is limited and its use by this receptor is considered negligible. In addition, this receptor is unlikely to drink water that occasionally accumulates in the playa lakes because of the saline nature of playa water. Even if the desert tortoise were to drink water from the lakes, concentrations of TNT and RDX predicted to occur in lake waters are well below concentrations that would cause adverse effects. Therefore, TNT and RDX predicted to potentially migrate to playa lakes adjacent to the Combat Center are highly unlikely to pose a threat to ecological receptors of concern. This evaluation used elements of the exposure and toxicity assessment processes or risk assessment to make a qualitative determination of potential impact to receptors of concern (Headquarters Marine Corps 2008).

The REVA indicator MC for SARs is lead, as it is the most prevalent (by weight) potentially hazardous constituent associated with small arms ammunition. Lead is geochemically specific regarding its mobility in the environment; modeling of lead would require site-specific geochemical data that are generally unavailable during a baseline assessment. These factors include a range's design and layout, the physical and environmental conditions of the area, and current and past operation and maintenance practices. The amount of lead that has been loaded to the operational ranges was also determined qualitatively (Headquarters Marine Corps 2008).

Ranges that perform joint small arms and live-fire training with HE munitions are assessed through the MC loading process previously described, and no lead loading is performed. In addition, only operational SARs are addressed in this protocol; historical use of SARs that are no longer used are not assessed due to lack of information to adequately perform an assessment (Headquarters Marine Corps 2008).

Existing data characterizing range operations, the physical environment, transport mechanisms, and potential receptors were gathered to complete the SAR assessments. The data were used to populate the SAR Assessment Protocol tables, which produce scores for specific factors that may influence potential MC transport and exposure to receptors. A summary of the results of these assessments for each range is provided in Table 3.4-3.

Table 3.4-3. Summary of SAR Prioritizations

Range Number	Range Type	Surface Water Environmental Concern	Groundwater Environmental Concern
Range 1	Known distance rifle range	Minimal	Minimal
Range 1A	Unknown distance rifle range	Minimal	Minimal
Range 2	Known distance pistol range	Minimal	Minimal
Range 2A	Combat pistol range	Minimal	Minimal
Range 3	BZO grouping range	Minimal	Minimal
Range 3A	BZO grouping range	Minimal	Minimal
Range 4	Multipurpose range	Minimal	Minimal
Range 101	Armor, gun training range (subcaliber)	Minimal	Minimal
Range 101A	Small arms BZO range	Minimal	Minimal
Range 105A	Small arms BZO range	Minimal	Minimal
Range 113	Multipurpose machine gun range	Minimal	Minimal
Range 113A	Machine gun BZO range	Minimal	Minimal

Note: BZO = battle sight zero
Source: Headquarters Marine Corps 2008.

Hazardous Wastes

Hazardous wastes are products characterized by their ignitability, corrosiveness, reactivity, and toxicity. Hazardous wastes include any waste which, due to its quantity, concentration, or physical, chemical, or infectious characteristics may either 1) cause or significantly contribute to an increase in mortality, serious irreversible illness, or incapacitating reversible illness, or 2) pose a substantial threat to human health or the environment. A total of 38,014 pounds of hazardous waste were generated during a past CAX training exercise (DoN 2003b). A variety of hazardous waste was generated, including alkaline batteries, fuels, used oil, oily rags, petroleum, oils, and lubricants, and cleaning fluids. Hazardous waste is inventoried and managed by the Hazardous Waste Management Section before disposal off-site by a certified contractor to a permitted treatment, storage, or disposal facility that accepts hazardous waste (MAGTF Training Command 2007a).

Management and control of hazardous materials and wastes at the Combat Center is guided by the ICOP (DoN 2004). This comprehensive plan consolidates a number of related management action plans and policies into one central source, which is made available to all appropriate personnel and is posted on the installation's Internet site. Among the many components of the ICOP are an Oil and Hazardous Substance SCP; SPCC Plan; BECP; Stormwater Pollution Prevention Plan (SWPPP); and a Hazardous Waste Minimization Plan. The content and purpose of these plans is summarized in Table 3.4-4. The ICOP clearly defines all responsibilities, procedures, requirements, and responses associated with hazardous material and waste management (MAGTF Training Command 2007a). The ICOP also provides a hazardous materials inventory summary for the Combat Center and identifies all operations and facilities at the Combat Center that use or store hazardous materials and generate or manage hazardous wastes.

Table 3.4-4. Summary of Contingency and Operations Plans for the Combat Center

Plan Name	Plan Summary Content
Oil and Hazardous Substance SCP	The SCP describes the actions facility personnel must take in response to fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water at a hazardous waste facility. The purpose of the SCP is to prevent or minimize personnel exposure to hazardous substances, personnel injuries, and environmental impact through advance planning for potential hazardous waste releases.
SPCC	The SPCC details oil storage and handling procedures, compliance with storage requirements, and response and mitigation procedures for oil releases. The purpose of the SPCC is to minimize environmental impact from improper storage or accidental release of oil. Storage and handling details and procedures are provided in Annex 9 in the ICOP, storage tank locations are shown on maps in Annex 1, and response and mitigation procedures are integrated into Section II.
BECP	The BECP is a public information document that details hazardous materials and hazardous waste quantities and locations, facility information, and emergency response procedures. The purpose of the BECP is to provide readily available information regarding the location, type, and health risks of hazardous materials to emergency response personnel, authorized government officials, and the public. The information is also used to help safeguard the public health through disclosure of the potential risks of a hazardous material release.
SWPPP	MAGTF Training Command will continue to utilize programs under the CWA, RCRA, EPCRA, CAA, and the NCP in the prevention of pollutants from being discharged from industrial-related activities. These BMPs include, secondary containment, inspections of industrial areas, maintenance of storm channels, covered storage, etc. MAGTF Training Command will meet the intent of the General Permit requirements.
HWMP	The HWMP is required by Marine Corps regulation to provide installation and tenant personnel with procedures and responsibilities to properly manage hazardous waste and recyclable waste. The purpose of the HWMP is to detail requirements and procedures to prevent improper storage and handling of hazardous waste and recyclable waste to minimize potential accidental hazardous substance release, personnel exposure, or violation of hazardous waste storage time and quantity limitations.
Waste Minimization Plan	Elements included in the ICOP include a Hazardous Waste Minimization Report, a Hazardous Waste Minimization Plan, and a Summary Progress Report that document progress achieved and plans for further waste minimization at the Combat Center. The Summary Progress Report summarizes hazardous waste source reductions for the 1998 through 2002 time periods and plans for further reductions in the 2003 through 2006 time period. The source reduction plan and reports have been included in Annex 11 of the ICOP.
Risk Management Plan	The Risk Management Plan addresses facility information and procedures developed to meet requirements of the California Accidental Release Prevention program for aqua ammonia storage at the Cogeneration facility. The purposes of the Risk Management Plan are to document the program implemented to reduce risks associated with the handling of regulated substances and to provide personnel with standard material handling safety and response procedures. A copy of the Risk Management Plan submittal to San Bernardino County Fire Department Hazardous Materials Division and the USEPA is included as Annex 12 to the ICOP.

Notes: BECP = Business Emergency and Contingency Plan; BMP = Best Management Practice; CAA = Clean Air Act; CWA = Clean Water Act; EPCRA = Emergency Planning and Community Right-to-Know Act; HWMP = Hazardous Waste Management Plan; ICOP = Integrated Contingency and Operations Plan; MAGTF = Marine Air Ground Task Force; NCP = National Contingency Plan; RCRA = Resource Conservation and Recovery Act; SCP = Spill Contingency Plan; SPCC = Spill Prevention, Control, and Countermeasures; SWPPP = Stormwater Pollution Prevention Plan; USEPA = U.S. Environmental Protection Agency

Source: MAGTF Training Command 2007a.

Solid Waste

A wide variety of non-hazardous waste is generated during training events. During a past CAX training exercise, a total of 123,133 pounds of non-hazardous waste was generated (DoN 2003b). These wastes included small arms brass, artillery shells and casings, ammunition cans, wood, cardboard, scrap metal, paper products, and food wrappers. Management and control responsibilities and procedures associated with these types of wastes are defined in Combat Center Order 3500.4H. Waste generated during training exercises is collected by each unit at the conclusion of training and is taken to the Range Residue Processing Center, a state-of-the-art facility that is responsible for safely managing, inspecting, processing, and certifying all ordnance-derived materials and range residue generated at the Combat Center. Large amounts of brass, copper, aluminum, and other materials collected from the training areas are processed and recycled. The facility certifies that all materials posing a potential explosive hazard coming from the range and/or being turned in by the Marines are safe for further processing. The Range Residue Processing Center's staff of qualified personnel having EOD, range operation and maintenance, or ordnance experience is required to visually inspect and/or mechanically process and certify all scrap. A summary of amounts processed in FY 2001-2006 are shown in Table 3.4-5.

Table 3.4-5. Materials Processed at the MAGTF Training Command Combat Center Range Residue Processing Center, FY 2001-2006, in Pounds

Year	2001	2002	2003	2004	2005	2006	Total
Aluminum	74,145	183,795	164,280	80,029	150,035	200,673	852,957
Brass	318,270	214,286	72,022	100,210	214,136	311,166	1,230,090
Steel (various types)	2,081,475	986,306	624,692	1,568,480	1,729,835	1,455,260	8,446,048
High Density Polyethylene plastic	(Totals not kept before 2006)					92,791	92,791
Totals	2,473,795	1,384,387	860,994	1,748,719	2,094,006	2,059,890	9,237,404

Source: MAGTF Training Command 2007a.

Once the process of certifying the material is completed, the Range Residue Processing Center offers those materials to the Qualified Recycling Program or the Defense Reutilization and Marketing Office for sale.

The installation landfill accepts only non-hazardous wastes, including soil contaminated with low levels of fuel or petroleum wastes.

Contaminated Sites

To facilitate the investigation and cleanup of contaminated sites (i.e., Installation Restoration Sites) at military installations, the DoD has developed the IRP. The IRP is the process by which contaminated sites and facilities are identified and characterized and existing contamination is contained, removed, and disposed of to allow for the future beneficial use of the property.

There have been 63 Installation Restoration Sites identified on the installation through the IRP (Combat Center 2012). Of that total, 55 Installation Restoration Sites are considered closed with no environmental land use restrictions (NAVFAC 2012). Eight sites are undergoing investigation and/or have regulatory closure with environmental land use restrictions (NAVFAC 2012).

The following environmental databases provided by USEPA Region 9 were searched to identify any contaminated sites near the installation (Science Applications International Corporation 2010):

- Superfund Quick Finder, Superfund Site Overviews by State and County, in particular for San Bernardino.
- Federal Facilities Cleanup lists Region 9 Federal Facility cleanup sites with USEPA contact information, Federal Facilities Site Information National Priority List Sites, and Region 9's, Pacific Southwest, Federal Facility National Priority Superfund List.
- Emergency Response, On-Scene Coordinator Site for information about emergency response and removal sites in Region 9.
- Prevention and Preparedness site for information about emergency prevention and preparedness programs.
- Oil Program site for information about oil spills, Facility Response Plans.
- Brownfields site, State Brownfields Programs in the Pacific Southwest site that linked to the California Department of Toxic Substance Control's (DTSC) website are discussed below.

Search results of these databases did not reveal any relevant sites.

The following environmental databases provided by DTSC were searched to identify any contaminated sites at the installation:

- EnviroStor to search for properties where extensive investigation and/or cleanup actions are planned or have been completed at permitted facilities and cleanup sites (Federal Superfund sites; National Priority List; State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites).

Search results listed four formerly used defense sites (FUDS) at the installation. The FUDS Program cleans up environmental contamination at properties formerly owned, leased, possessed, or used by the military services (Army, Navy, Air Force, or other Defense agencies). The Army is the DoD executive agent for the FUDS Program and the USACE is responsible for carrying out the program.

The four FUDS within the installation have been identified as "Victorville Precision Bombing Range No. 17", "Victorville Precision Bombing Range No. 18", "Upper Rainbow Basin", and "Bullions Mtns Agr", and assigned FUDS project numbers (Table 3.4-6). However, since these properties are actively used DoD sites, they are excluded from cleanup eligibility under the Defense Environmental Restoration Program for FUDS which applies to formerly (not currently) used defense sites, and instead become the responsibility of the installation itself (DTSC 2012a). In general, however, other similar FUDS outside of the installation are in the DTSC site cleanup program for lead, as these sites were used as firing ranges. Potential contaminants of concern at those FUDS are explosives (UXO, MC) and munitions debris (refer to Table 3.4-6 in Section 3.4.3.2). Two of the FUDS listed on EnviroStor as being within the Installation have no records or reports associated with them at DTSC. Evidence of a target ring approximately 0.21 mi. (0.34 km) in diameter was identified in the vicinity of the "Bullions Mtns Agr" FUDS, and evidence of crater-like features were identified in the vicinity of the "Upper Rainbow Basin" FUDS, using Google Earth and historical aerial photos.

Table 3.4-6. Existing FUDS within the Combat Center

Site Name	Site Location	Site Status	Site Use	Description of Contamination	Address Description	City, Zip, County
Victorville Precision Bombing Range No. 17	Combat Center/MAGTF Training Command	Inventory Project Report completed 1993. Excluded from Defense Environmental Restoration Program cleanup eligibility.	Precision bombing range.	Potential UXO and munitions debris. DTSC listed for lead.	8 miles north of Landers	Twentynine Palms, 92278, San Bernardino
Victorville Precision Bombing Range No. 18	Combat Center/MAGTF Training Command	Inventory Project Report completed 1993. Excluded from Defense Environmental Restoration Program cleanup eligibility.	Precision bombing range.	Potential UXO and munitions debris. DTSC listed for lead.	6 miles northeast of Landers	Twentynine Palms, 92278, San Bernardino
Upper Rainbow Basin	Combat Center/MAGTF Training Command	Unknown. No information or reports available.	Unknown. Crater – like features identified on aerial photos.	DTSC listed for lead.	5.5 miles north of Mainside Area	Twentynine Palms, 92278, San Bernardino
Bullions Mtns Agr	Combat Center/MAGTF Training Command	Unknown. No information or reports available.	Unknown. Target ring identified on aerial photos.	DTSC listed for lead.	8 miles northeast of Landers	Twentynine Palms, 92278, San Bernardino

Notes: DTSC = Department of Toxic Substance Control; FUDS = formerly used defense sites; MAGTF = Marine Air Ground Task Force; UXO = unexploded ordnance

Source: DTSC 2012b; USACE 2012.

- Deed-Restricted Sites: A land use restricted site is a property where DTSC has placed limits or requirements on future use of the property due to varying levels of cleanup possible, practical, or necessary at the site.

This search resulted in 362 sites with Land Use Restrictions (523 Total Land Use Restrictions). Several sites were listed for San Bernardino, but none were relevant.

- Hazardous Waste Management Program Facility Sites with Deed/Land Use Restriction: the DTSC Hazardous Waste Management Program has developed a list of current or former hazardous waste facilities that have a recorded land use restriction at the local county recorder's office. The land use restrictions on this list were required by the DTSC Hazardous Waste Management Program as a result of the presence of hazardous substances that remain on site after the facility (or part of the facility) has been closed or cleaned up. The types of land use restriction include deed notice, deed restriction, or a land use restriction that binds current and future owners.

This search resulted in no relevant sites.

- Hazardous Waste and Substances Site List (also known as the *Cortese List*) is a planning document used by the state, local agencies, and developers to comply with CEQA requirements in providing information about the location of hazardous materials releases.

This search resulted in no relevant sites.

<u>Other Safety Issues</u>

Mining

The California State Surface Mining and Reclamation Act (SMARA) of 1975 divides mines into three categories - active, idle, and abandoned. There are abandoned mines at Emerson Lake, Bullion, Delta, Prospect, Maumee Mine, Sunshine Peak, Lavic Lake, and Lead Mountain Training Areas (MAGTF Training Command 2007a). Mineral resources on the Combat Center are discussed in detail in Section 3.12.3.1, *Geological Resources*. Historic mining and mineral exploration have left behind a legacy of abandoned mines, safety hazards, and contaminated land and water (BLM 2010a). These sites are considered extremely hazardous and should not be entered due to potentials for unstable shafts, debris and chemical contamination, among other hazards. Guidelines for abandoned mines including discovery of abandoned mines, are found in SOP RTAA 1018 Mine Shafts, Appendix B, Restricted Area (MAGTF Training Command 2007a).

Protection of Children

In 1997, EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (Protection of Children), was issued to identify and address issues that affect the protection of children. Socioeconomic data specific to distribution of the population by age and the proximity of youth-related facilities (e.g., day care centers and schools) are used to analyze potentially incompatible activities associated with a proposed action (DoN 2003b). As of 2010, the percentage of the population under the age of 18 living within the City of Twentynine Palms was 25.6%; that was slightly more than the state average of 25.0% and less than the San Bernardino County average (29.2%)(USCB 2010). The percentage of population under 18 years old in Landers/Johnson Valley, in 2010, was 16.7% - lower than either the state or county proportions. There are no schools, parks, residences, or other areas in the vicinity of the training ranges where children would congregate (DoN 2003b). All on-installation housing

and school or playground locations are located in the Mainside Area of the Combat Center, well removed from any training activities and associated hazards (DoN 2003b).

Emergency Response (Police, Fire, Medical, Mutual Aid)

Police Protection. San Bernardino County Sheriff's Department and the California Highway Patrol police the communities surrounding the installation. The closest San Bernardino County Sheriff's Department Station is in Joshua Tree. In addition, a satellite law enforcement facility is located on the Yucca Valley Community Center property (DoN 2009). Patrol units concentrate on the Morongo Basin communities and provide limited monitoring north and east of the Combat Center. Twentynine Palms and Yucca Valley each contract two deputies on 24-hour patrol. Supplementing the city's uniformed patrol officers is the citizens patrol unit in Twentynine Palms, which is comprised of 24 members who donated more than 7,400 hours of volunteer time in 2006 (DoN 2009). As of 2007, the San Bernardino County Sheriff's Office was adequately staffed (DoN 2009).

Fire Protection. Fire Protection for the Morongo Basin is provided by the California State Department of Forestry and Fire Protection, the County of San Bernardino, the Twentynine Palms Fire Department, and the San Bernardino County Fire Protection District.

The City of Twentynine Palms is served entirely by the Twentynine Palms Fire Department. The installation fire department operates under mutual aid and automatic response agreements with all local fire agencies including the Twentynine Palms Fire Department and Joshua Tree National Park. The installation fire department's agreement with the California State Department of Forestry and Fire Protection is primarily for Strike Team Response (DoN 2009). The City of Twentynine Palms has two fire stations (on Adobe Road and Lear Avenue). Currently, the fire department is adequately staffed (DoN 2009).

The San Bernardino County Fire Protection District, which encompasses the areas of San Bernardino County that is not within an independent fire provider's jurisdiction, contains four Regional Service Zones (Mountain, North Desert, South Desert and Valley) to serve 64 unincorporated communities, the City of Grand Terrace, and the Town of Yucca Valley. In addition, there are also six ambulance enterprise operations that provide service within these Regional Service Zones. In addition, five cities or Independent Fire Protection Districts contract with County Fire: Adelanto, Fontana, Hesperia, Needles and Victorville. Two stations, Station #121 on SR 62 near Joshua Lane and Station #122 on Aberdeen Road in the Yucca Mesa area, are staffed seven days a week. The district's personnel participate with other agencies on the Morongo Basin Emergency Preparedness Committee, working to ensure multi-agency readiness in the event of a local disaster. The professional staff is also involved in developing and conducting Citizens Emergency Response Team training (DoN 2009). Due to steady growth in the area, the San Bernardino County Fire Protection District is in need of increased staffing and equipment; however, current needs are being met (DoN 2009).

The community of Joshua Tree employs the San Bernardino County Fire Department for major emergency services and has a local fire station, which is located off of Park Boulevard, for all other needs (DoN 2009). Due to steady growth in the area, the San Bernardino County Fire Department and the Joshua Tree Fire Department are in need of increased staffing and equipment; however, current needs are being met (DoN 2009).

The Combat Center has a staff of firefighters working out of two stations, and is responsible for fire suppression, fire code enforcement, public education, hazardous materials response (Level A), life safety code enforcement, technical rescue, heavy rescue, safety inspections, and basic life support ambulance

service. The first station is located at Building 1516 in Mainside, and the second station is located at Camp Wilson approximately 6.0 miles (9.7 km) northwest of Mainside. A military crash crew located at Camp Wilson provides primary coverage for the airfield only and responds to fires at Mainside upon request from the installation fire department (DoN 2009). The installation's fire department has reciprocal aid agreements with the other agencies and responds to community calls as needed. In addition, other agencies will respond to fires on installation property if requested to do so by the Marine Corps.

Medical Evacuation Support. Medical Evacuation procedures are described in Range SOP 1013, Combat Center Order 3500.4H (MAGTF Training Command 2010g). The Combat Center has contracted dedicated civilian air ambulance services (Mercy Air) to support training. The civilian air ambulance company is stationed on board the Combat Center during all training operations. The civilian air ambulance company provides advanced life support for Marines and other service members training on board the installation. The civilian air ambulance company maintains communications with Range Control at all times; and is normally positioned on the installation when not airborne. In addition to contracted air ambulance MEDEVAC support, the Combat Center Fire Department also provides advanced life support MEDEVAC response via ground ambulance, including response to training accidents within the training areas.

Mutual Aid Services to the Surrounding Communities. The installation contributes positively in a direct way to local communities by supplying mutual aid services. Rescue, fire, emergency, law enforcement, and explosive hazard response services extend beyond the boundaries of the Combat Center and into surrounding communities. As an example, in 2006 the Combat Center Fire Department responded to 172 calls off the installation. This included 78 calls to the City of Twentynine Palms, 68 to Wonder Valley, and over 600 man-hours expended fighting the Pioneertown fire in July 2006. The fire department also opens up Combat Center training opportunities to firefighters throughout the region, providing invaluable structural firefighting training at no cost. The Combat Center Fire Department also provides continuing education classes, Emergency Medical Technician recertification classes, and Cardiopulmonary Resuscitation/First Aid classes to the public throughout the year. The EOD team also responds to explosive threats in the eastern portion of San Bernardino County and hosts cutting edge conferences for city and federal law enforcement professionals from Los Angeles to Boston. These services are described in detail in the Community Impact Assessment (MAGTF Training Command 2008).

3.4.3.2 West Study Area

Since military operations do not presently occur in the west study area, the discussion of existing health and safety conditions is limited to contaminated sites, mining sites, and emergency response.

Contaminated Sites

Contaminated sites that occur in the west study area include World War II-era bombing ranges and FUDS. Contamination from chemicals, munitions, or UXO that may exist at these sites poses a health and safety risk to the public. The known FUDS that exist in the west study area are summarized in Table 3.4-7. All of these sites are recommended for further investigation and remediation to render them non-hazardous. During site visits conducted in July, September, and October 2011, evidence was found that munitions or explosives of concern are likely to be present in the west and south study areas. Historical artillery impact areas and training areas are located within the surveyed properties. Seven FUDS are located within the west study area; these were used as bombing ranges in the World War II Era (NAVFAC 2011). No range activity has occurred in the west study area since that time. All identified precision bombing ranges within the west study area were visually inspected.

Table 3.4-7. Existing FUDS within the West Study Area

Site Name	Site Location	Site Status	Site Use	Description of Contamination	Address Description	City, Zip, County
Victorville Precision Bombing Range Y	West Study Area	SS completed 1989 (revised 1994 and 1999). SI completed 2008 and RI/FS recommended.	Demolition bombing target practice with 100, 250, 500, and 2,000 pound bombs.	Surface cleared and dedudded as of 22 June 1945. Subsurface ordnance may be present. DTSC listed for lead.	43 miles east of Victorville	Barstow, 92356, San Bernardino
Victorville Precision Bombing Range Z	West Study Area	SS completed 1999. SI completed 2011 and RI/FS recommended.	Demolition bombing target practice with 100, 250, and 500 pound bombs.	Surface cleared and dedudded as of 4 June 1948. Subsurface ordnance may be present. DTSC listed for lead.	43 miles east of Victorville	Barstow, 92356, San Bernardino
Victorville Precision Bombing Range No. 9	West Study Area	SS completed 1991. SI completed 2008 and RI/FS recommended.	Precision bombing range.	Potential UXO and munitions debris. DTSC listed for lead.	36 miles east of Victorville	Barstow, 92356, San Bernardino
Victorville Precision Bombing Range No. 10	West Study Area	SS completed 1991. SI completed 2008 and RI/FS recommended.	Precision bombing range and artillery and small arms firing range.	Potential UXO and munitions debris. DTSC listed for lead.	34 miles east of Victorville	Barstow, 92356, San Bernardino
Victorville Precision Bombing Range No. 11	West Study Area	SS completed 1991. ASR completed 1998. SI completed 2008 and RI/FS recommended.	Precision bombing range and artillery and small arms firing range.	Potential UXO and munitions debris. DTSC listed for lead.	42 miles east of Victorville	Barstow, 92356, San Bernardino
Victorville Precision Bombing Range No. 12	West Study Area	SS completed 1991. SI completed 2008 and RI/FS recommended.	Precision bombing range.	Potential UXO and munitions debris. DTSC listed for lead.	43 miles east of Victorville	Barstow, 92356, San Bernardino

Continued on next page

Site Name	Site Location	Site Status	Site Use	Description of Contamination	Address Description	City, Zip, County
Victorville Precision Bombing Range No. 14	West Study Area	SS completed 1991. ASR completed 1998. SI completed 2008 and RI/FS recommended.	Precision bombing range and artillery and small arms firing range.	Potential UXO and munitions debris. DTSC listed for lead.	42 miles east of Victorville	Barstow, 92356, San Bernardino
Victorville Precision Bombing Range No. 15	West Study Area	SS completed 1991. SI completed 2008 and RI/FS recommended. DTSC lead.	Precision bombing range.	Potential UXO and munitions debris. DTSC listed for lead.	44 miles east of Victorville	Barstow, 92356, San Bernardino
Victorville Precision Bombing Range No. 16	West Study Area	SS completed 1991. SI completed 2008 and RI/FS recommended.	Precision bombing range.	Potential UXO and munitions debris. DTSC listed for lead.	42 miles east of Victorville	Barstow, 92356, San Bernardino

Notes: According to DTSC records, an additional FUDS titled the "Johnson Valley Open Area" is also located in the west study area. However, there are no records for this site and no evidence has been found to substantiate its existence. The USACE considers this site to be a database anomaly and the FUDS does not exist. As a result of the lack of records or evidence of existence, USACE received a CATEX for Johnson Valley Open Area in 1998.
ASR = Archive Search Report; DTSC = Department of Toxic Substance Control; FS = feasibility study; FUDS = formerly used defense sites; RI = remedial investigation; SI = site investigation; SS = site survey; USACE = U.S. Army Corps of Engineers; UXO = unexploded ordnance

Source: California Department of Toxic Substances Control 2012b; U.S. Army Corps of Engineers 2008a-2008h; 2011; 2012..

The west study area is used extensively for competitive racing events and OHV activities. There are no commercial refueling services in this area; however, recreational users may bring their own fuel tanks into the area. There are no available records of any spills that may have occurred as a result of these activities (NAVFAC 2011). However, small areas (typically less than 2 feet [0.6 meters] in diameter) of petroleum, oil, or lubricant stains were observed in areas frequented by the recreational vehicles associated with off-roading events. These stains are likely from greases, fuels, or other fluids used in operating the OHVs (NAVFAC 2011). No petroleum, oil, or lubricant stains were observed in the south study area (NAVFAC 2011). No evidence was found of any commercial or industrial quantities of petroleum and/or hazardous materials being used or stored in either the west study area or the south study area.

Five structures were identified within or adjacent to the west study area that may have asbestos containing material (ACM) integrated into their construction. Most of these structures appear to be abandoned and are in various states of disrepair. Many of the potential ACMs, such as wall, ceiling, or floor tiles, are broken, scattered, and in friable[7] condition (NAVFAC 2011).

Although no clandestine drug labs were identified within or adjacent to the west study area, documented illicit drug manufacture in the surrounding areas suggest that drug-producing labs could exist in some of the residential buildings. Clandestine drug labs, if present, have the potential to contain hazardous materials, such as acids and solvents (NAVFAC 2011). However, no obvious indications of drug manufacture were observed at any of the known residences or other structures that were visited during the course of three field reviews conducted in 2011. In addition, small amounts of solid waste are currently generated in the west study area in the form of trash from dispersed private residences, recreational activities, and mining operations. No known bio-hazardous waste is generated or disposed of in the west study area, and no potential bio-hazardous waste was identified (NAVFAC 2011). Additionally, no records were found to suggest that past or current landfill facilities are located within either the west study area or the south study area. Unauthorized dumping was noted at several locations, and included vehicles, appliances, tires, furniture, mattresses, electronics, and e-waste. Additionally, makeshift dump sites, containing metal cans from consumable provisions (i.e., food and drink containers) are located near a number of former mining sites.

Mining

There are no known mines producing ore within the west study area (BLM 2010a). Mineral resources and locations, and the status of mines and claims in the west study area are described in Sections 3.1.3.1, *Land Use*, and 3.12.3.2, *Geological Resources*. The California Department of Conservation State Mining and Geology Board and BLM have a Memorandum of Understanding (MOU) regarding reclamation of abandoned mine sites on BLM lands. There is currently no agreement between the Navy or Marine Corps and the California Department of Conservation State Mining and Geology Board regarding abandoned mine site reclamation (MAGTF Training Command 2010e). The BLM's primary goal in the Abandoned Mine Lands program is to provide a safe experience to the public when they are visiting public lands, as well as ensuring that mining-related features and facilities abandoned on public land are remediated to minimize damage to the natural environment, while recognizing and protecting the historical importance of selected features and facilities (BLM 2010b). The BLM posts signs such as "Stay Out and Stay

[7] ACM that when dry, can be crumbled, pulverized or reduced to powder by hand pressure.

Alive!" and distributes information brochures to educate the public about mines (BLM 2010c). Similar guidance is given to the Marine Corps regarding abandoned mines.

A number of mines were identified in the west study area. None of these mines are currently in operation (see Tables 3.12-4 and 3.12-5). These mines may involve potential physical and/or chemical hazards. Physical hazards may result from unsecured access to open mine shafts, adits, and pits. (No wells were identified within or adjacent to any of the mine sites.) Chemical hazards may result from the historical storage and/or use of various chemicals in the mining process. Processes involving the use cyanide and chlorine are suspected at several of these mine sites. Residual chemicals may be present in mine tailings located near several of the mines. In addition, gasoline and diesel containers and partially full 55-gallon drums of oxides and corrosives were found at the Kilo Gold Mine site, which is located in the west study area.

Emergency Response

Since Johnson Valley is popular with OHV enthusiasts, hikers, campers, and others enjoying recreation in the west study area, public safety in this area is very important. Law enforcement procedures within Johnson Valley are partly constrained by the current lack of a Memorandum of Understanding (MOU) between BLM and the county for law enforcement, but essentially BLM works cooperatively with the county Sheriff's department for law enforcement. Bureau of Land Management Rangers have jurisdiction in Johnson Valley and would also call the county if a problem was identified. If someone calls 911 in Johnson Valley, the Sheriff's department and BLM Rangers are notified. If they both show up at the same time, BLM defers to the county for law enforcement but assists as needed. Local and community emergency service providers identified in Section 3.4.3.1 also serve the west study area.

Other Services

The San Bernardino County Service Area 29 is a county service organization that provides cemetery, television translator, park and recreation, street lighting, and water services within its boundaries. The district is also authorized to provide sewer service and has the ability to provide such service in the future, if needed. The Service Area is generally identified as the Lucerne Valley area and encompasses the very western edge of the west study area. Impacts to County Service Area 29 from reduced property tax revenue is discussed in Section 4.3 (*Socioeconomics*).

3.4.3.3 South Study Area

Since military operations do not presently occur in the south study area, the discussion of existing health and safety conditions is limited to contaminated sites, mining sites, and emergency response.

Contaminated Sites

No known contaminated sites occur within the south study area and no potential ACM containing structures were identified in the vicinity of the south study area. One possible UXO was identified during an inspection in the south study area (NAVFAC 2011). The item was located outside of the south study area and was encountered during transit through a rugged off-road area, in a desert wash, on route towards the south study area. It was later determined by Combat Center EOD personnel to be a smoke canister used in contemporary training exercises, does not pose an immediate threat, and the Combat Center plans to recover it at a later date (NAVFAC 2011). There are many illegal solid waste dump sites that have been used for decades for disposal of trash, including appliances, furniture, tires, and electronics.

Mining

No operating mines have been identified in the south study area. Five abandoned mines are located within the south study area, as described in Section 3.12.3.3, *Geological Resources*.

Emergency Response

No unique attributes have been identified within the south study area that require additional emergency service support. Local and community emergency service providers identified in Section 3.4.3.1 also serve the south study area.

Other Services

The San Bernardino County Service Area 70 Improvement Zone M is a county service organization that provides park and recreation services within its current boundaries through imposition of taxes. The Service Area is generally identified as the Wonder Valley area and encompasses the very small area in the southwest corner of the south study area. Impacts to County Service Area 70 Improvement Zone M from reduced property tax revenue is discussed in Section 4.3 (*Socioeconomics*).

3.4.3.4 East Study Area

Since military operations do not presently occur in the east study area, the discussion of existing health and safety conditions is limited to contaminated sites, mining sites, and emergency response. In addition, the east study area contains some energy hazards, a railroad line, and utility lines that may have public health and safety implications.

Mining

As described in Section 3.12.3.4, *Geological Resources,* there are two active (operating) mines and several abandoned mines located in the east study area.

Emergency Response

No unique attributes have been identified within the east study area that require additional emergency service support. Local and community emergency service providers identified in Section 3.4.3.1 also serve the east study area.

Contaminated Sites

A number of FUDS exist in the east study area, and are summarized in Table 3.4-8. In addition, damaged rail cars and debris are buried over a multiple-acre area in township 4 north, range 15 east, section 8. The age of the derailment could not be determined, but the presence of aluminum debris indicates it likely occurred since the 1940s (MAGTF Training Command 2010e).

Table 3.4-8. Existing FUDS within the East Study Area

Site Name	Site Location	Site Status	Site Use	Description of Contamination	Address Description	City, Zip, County
Cadiz Lake Sonic Target #3	Southeast Study Area[1]	Preliminary assessment/Site inspection completed in 2009: RI/FS recommended.	Desert warfare training during World War II, including ordnance use.	Potential UXO and munitions debris. DTSC listed for lead.	49 miles east of Twentynine Palms	Cadiz, 92277, San Bernardino
Cadiz Lake Sonic Target #4	East Study Area	Site inspection completed in 2008; RI/FS recommended.	Desert warfare training during World War II, including ordnance use.	Potential UXO, lead, and munitions debris. DTSC listed for lead.	40 miles northeast of Twentynine Palms	Cadiz, 92277, San Bernardino
Cadiz Lake Sonic Target #5	East Study Area	Preliminary assessment/site inspection completed in 2009; RI/FS recommended.	Sonic target for desert warfare training during World War II, including ordnance use.	Potential UXO and munitions debris. DTSC listed for lead.	39 miles east of Twentynine Palms	Cadiz, 92277, San Bernardino
Cadiz Lake Sonic Target #6	East Study Area	Preliminary assessment/Site inspection completed in 2009; RI/FS recommended.	Gunnery range and sonic target during World War II, including ordnance use.	Potential UXO and munitions debris. DTSC listed for lead.	28 miles east of Twentynine Palms	Cadiz, 92277, San Bernardino

Notes: [1]Former southeast study area, see Figure 2-3.
DTSC = Department of Toxic Substance Control; FS = feasibility study; FUDS = formerly used defense sites; RI = remedial investigation; UXO = unexploded ordnance
Source: California Department of Toxic Substances Control 2007.

Energy Hazards

Communication towers are present within the east study area (MAGTF Training Command 2010c).

Railroad Line

The Arizona/California Railroad line is the main railway route to Blythe, California and then further east into Arizona. The line runs southeastward across Cadiz Lake and extends through the east study area (MAGTF Training Command 2010c). Evidence of a derailment was noted during the Pre-assessment Tour conducted in January and February 2010 (MAGTF Training Command 2010c).

Utility Lines

Three natural gas transmission pipelines are present: Southern California, All American, and an unnamed pipeline (MAGTF Training Command 2010c). Each of these pipelines has associated surface facilities. The All American pipeline facility includes an antenna tower with two microwave receivers. This pipeline parallels the Atchison Topeka and Santa Fe railroad right-of-way near the southeastern boundary of the east study area and was part of a former storage tank farm (MAGTF Training Command 2010c). The southern California pipeline is an interstate liquid petroleum pipeline that has a series of surface cathodic protection stations supported by above-ground diesel tanks inside concrete containment berms. Southern California has an EA on record with BLM to convert this pipeline to high pressure natural gas transmission and replace the cathodic protection system (MAGTF Training Command 2010c).

3.5 VISUAL RESOURCES

3.5.1 Definition of Resource

Aesthetics, or visual resources, are the natural and man-made (cultural) features of the landscape that can be seen and that contribute to the public's appreciative enjoyment of the environment. Aesthetics are generally defined in terms of a project's physical characteristics and potential visibility and the extent to which the project's presence would change the perceived visual character and quality of the environment in which it would be located. Scenic resources can be designated by state and local agencies and include designated and/or eligible scenic highways by the California Transportation Scenic Highways Program and locally designated roadways and resources.

A description of the methodology used for the visual resources analysis is presented in Section 4.5.1.1. The discussion of *Existing Conditions* (Section 3.5.4) begins with a discussion of the aesthetics for the project area as a whole, while noting any unique features, and is followed by a discussion of key viewpoints (KVPs) for each acquisition study area.

3.5.2 Regulatory Framework

In general, the technical approach to visual resources is dependent on land ownership. Visual resources for public lands (i.e., BLM-administered) are analyzed using the BLM's Visual Resource Management (VRM) system. This approach cannot be applied to non-BLM land because the designations of visual character of land areas do not exist and the BLM has no visual resource management authority over non-BLM lands. The technical approach for lands that are subject to administration by the USFS is based on the USFS's Scenery Management System. This method is required for all lands under the USFS's jurisdiction (Forest lands) but cannot be applied to non-Forest lands because the USFS has no authority over non-USFS lands. The Visual Sensitivity – Visual Change system is used for all non-BLM/non-USFS lands.

The proposed action involves acquiring land area currently administered by the BLM. VRM classifications for the lands in the proposed acquisition study areas were recently completed (BLM 2010). *The Johnson Valley OHV Area Management Plan* (BLM 1992) identifies that the Johnson Valley area (west study area) would be managed as VRM class II, III, or IV, if and when such management classes are established (BLM 2010). Under the proposed action, acquired lands would become Combat Center property managed by the Marine Corps, no longer administered by the BLM. Therefore, the Visual Sensitivity – Visual Change Methodology was employed to analyze the existing landscape's visual characteristics and impacts from implementation of the proposed action.

3.5.3 Visual Sensitivity – Visual Change Methodology

To assess possible visual changes resulting from the proposed action, the analysis considered the contrasts of the project in relation to the existing landscape (see Section 4.5). Key viewpoints were selected to represent the visual character of the project area, and to support an evaluation of the landscape's existing visual resources. Key viewpoints are often located in an effort to evaluate the existing landscape and potential impacts on visual resources with various levels of sensitivity, in different landscape types and terrain, and from various vantage points. Typical KVP locations for the present project include: 1) along travel corridors or points of visual access; 2) at scenic vista points; 3) at recreation areas; and 4) at locations that provide good examples of the existing visual context. The following factors are considered

in the evaluation of the existing landscape under the Visual Sensitivity – Visual Change Methodology. These factors are typically expressed as low, low to moderate, moderate, moderate to high, or high.

Visual Quality is a measure of the overall impression or appeal of an area as determined by the particular landscape characteristics such as landforms, rockforms, water features, and vegetation patterns, as well as associated public values. The attributes of variety, vividness, coherence, uniqueness, harmony, and pattern contribute to visual quality classifications of indistinctive (low), common (moderate), and distinctive (high). Visual quality is studied as a point of reference to assess whether a given project would appear compatible with the established features of the setting or would contrast noticeably and unfavorably with them.

Viewer Concern addresses the level of interest or concern of viewers regarding an area's visual resources and is closely associated with viewers' expectations for the area. Viewer concern reflects the importance placed on a given landscape based on the human perceptions of the intrinsic beauty of the existing landforms, rockforms, water features, vegetation patterns, and even cultural features.

Viewer Exposure describes the degree to which viewers are exposed to views of the landscape. Viewer exposure considers landscape visibility (the ability to see the landscape), distance zones (proximity of viewers to the subject landscape), number of viewers, and the duration of view. Landscape visibility can be a function of several interconnected considerations including proximity to viewing point, degree of discernible detail, seasonal variations (snow, fog, and haze can obscure landscapes), time of day, and presence or absence of screening features such as landforms, vegetation, and/or built structures. Even though a landscape may have highly scenic qualities, it may be remote, receiving relatively few visitors and, thus, have a low degree of viewer exposure. Conversely, a subject landscape or project may be situated in relatively close proximity to a major road or highway utilized by a substantial number of motorists and yet still result in relatively low viewer exposure if the rate of travel speed on the roadway is high and viewing times are brief, or if the landscape is partially screened by vegetation or other features. Frequently, it is the subject area's proximity to viewers or *distance zone* that is of particular importance in determining viewer exposure. Landscapes are generally subdivided into three or four distance zones based on relative visibility from travel routes or observation points. Distance zones typically include foreground, middleground, and background. The actual number of zones and distance assigned to each zone is dependent on the existing terrain characteristics and public policy and is often determined on a project by project basis.

Overall Visual Sensitivity is a concluding assessment as to an existing landscape's susceptibility to an adverse visual outcome. A landscape with a low degree of visual sensitivity is able to accommodate a higher degree of adverse visual change without resulting in a significant visual impact. A landscape with a high degree of visual sensitivity is able to accommodate a lower degree of adverse visual change without resulting in a significant visual impact. Overall visual sensitivity is derived from a comparison of existing visual quality, viewer concern, and viewer exposure.

3.5.4 Existing Conditions

The proposed acquisition study areas are located adjacent to the existing Combat Center boundary in a sparsely developed area of the Mojave Desert. This area is located within the Mojave Desert Geomorphic and Tectonic province, commonly referred to as the Mojave Block. As described in Section 3.12, *Geological Resources*, this area is characterized by rocky uplands and low valleys containing broad alluvial (i.e., deposits pertaining to flowing water) plains or bajadas, washes, and playas (i.e., dry lake beds). The visual environment is characteristic of the Mojave Desert, with some sweeping vistas from

certain vantage points. Valleys, sporadic low hills, boulder and volcanic rock formations are the predominant landforms. Vegetation in the proposed action area is sparse and is comprised of Mojave creosote bush scrub occurring on rocky to sandy substrates. This vegetative type is of similar form and low in profile over the landscape, with few trees or upright structure. Wash drainages are few, shallow, and relatively indistinguishable from the surrounding landscape. Mojave wash scrub tends to occur in these washes. Several large and small dry lakebeds occur, which are barren of vegetation. Colors of the landscape range from dark grays and brown to light tans and light green. Textures are medium to coarse for hill areas, and smooth to fine for valley and drainage areas.

Views from travel routes running along portions of each of the proposed acquisition study areas tend to encompass broad, sweeping desert expanses bordered by rugged mountain ranges, consisting of both developed land and open natural areas. Therefore, within this regional setting, the project area for the visual resources analysis was defined by the numerous viewpoints from which the signs of activities associated with the proposed land acquisition would be seen.

The predominant cultural features in the west study area include extensive motorized vehicle use staging areas, dirt roads, camping areas, and a few small mining operations. Within the east study area, cultural features include Amboy Road, a few dirt roads, and a large chloride mine on Bristol Lake, while infrequent dirt roads are the predominant cultural landscape features in the south study area. Aside from the electrical poles associated with a transmission corridor on the northwestern edge of the west study area, no known architectural structures of scenic significance exist in the acquisition study areas.

There are no officially designated state scenic highways within the viewshed of the proposed project. However, SR 247 (Old Woman Springs Road/Camp Rock Road) is an eligible state scenic highway (not officially designated) that is within the viewshed for a portion of the proposed action (California Department of Transportation [CalTrans] 2010).

A total of 10 areas of potential visual sensitivity were selected for detailed analysis among the three acquisition study areas. The 10 KVPs were selected to represent the visual setting for the proposed action by including locations along travel corridors, at scenic vista points, and in recreation areas. Although there are wilderness areas located adjacent to the south and east study areas (e.g., Cleghorn Lakes Wilderness, Sheephole Valley Wilderness, Cadiz Dunes Wilderness, and Old Woman Mountains Wilderness), no KVPs were selected in these wilderness areas due to low number of viewers, limited viewer exposure, and limited access to potential vista points. At each KVP, the existing landscape was characterized and photographed. In addition, a GPS location and direction of each photograph taken were recorded for each KVP. Key viewpoints are organized by acquisition study area in the subsequent sections and the viewshed from the selected KVPs are described, taking into consideration the Visual Sensitivity – Visual Change Methodology factors. Table 3.5-1 summarizes the visual sensitivity for each KVP.

Table 3.5-1. Summary of KVP Sensitivity

KVP	Visual Quality	Viewer Concern	Viewer Exposure	Overall Visual Sensitivity	Acquisition Study Area
KVP 1: North Anderson Dry Lake	Low	Low	Low	Low	West
KVP 2: The Rock Pile	Low	Low	Low to Moderate	Low to Moderate	West
KVP 3: Soggy Dry Lake	Low	Low	Low	Low	West
KVP 4: SR 247/Bessemer Mine Road	Low	Low	Low	Low	West
KVP 5: SR 247/Boone Road	Low	Low	Low	Low	West
KVP 6: Means Dry Lake	Low	Low to Moderate	Low to Moderate	Low to Moderate	West
KVP 7: Valle Vista Road	Low	Low	Low	Low	South
KVP 8: Amboy Road/Bristol Dry Lake	Low	Low	Moderate	Low to Moderate	East
KVP 9: Amboy Road	Low	Low	Low	Low	East
KVP 10: National Trails Highway	Low	Low	Low	Low	East

Note: KVP = key viewpoint

3.5.4.1 Combat Center

As described in Section 1.4.5, some type of training occurs each day of the year at the Combat Center, with major exercises conducted on approximately 250 days per year (70%). The remaining 30% of the year is devoted to smaller types of activities and exercises.

Dust clouds are visible from some of the daytime ground operations and exercises occurring in the east and west/southwest portions of the Combat Center from Amboy Road and the Johnson Valley area, respectively. Aircraft participating in daytime air operations occurring in the eastern and western/southwestern portions of the Combat Center are visible on occasion from the surrounding region (Combat Center 2009a).

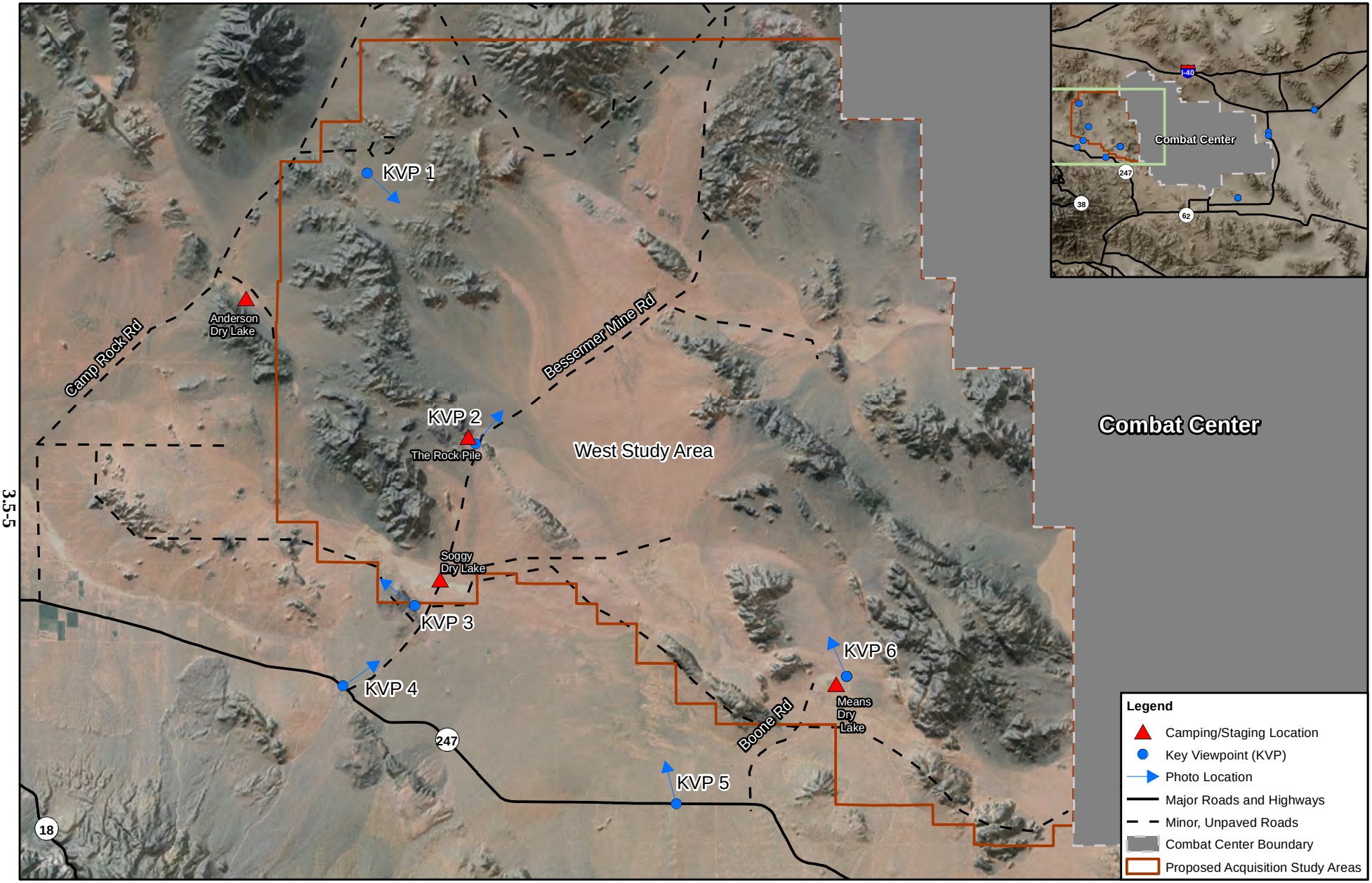
Artillery and aerial-delivered illumination is visible in the areas adjacent to the Combat Center from night ground and air operations and exercises occurring in the west, southwest, southeast, and east portions of the Combat Center. Between 25-30% of all current training exercises occur during periods of darkness. Training is usually concluded before midnight, but there is no restriction on training after that time. Although there has been public mention of seeing illumination at night, there have been no complaints recorded to date (Combat Center 2009a).

3.5.4.2 West Study Area

Six KVPs were selected for the west study area, as identified in Figure 3.5-1. Key viewpoints photographs are depicted below in Figures 3.5-2 through 3.5-7.

<u>Key Viewpoint 1: North Anderson Dry Lake Camping/Staging Area</u>

Key viewpoint 1 was established at the North Anderson Dry Lake camping/staging area. Viewing east-southeast towards the location of proposed training activities in the west study area (Figure 3.5-2), this location was selected to generally characterize the existing landscape in an area where a number of individuals may congregate while recreating in the Johnson Valley area and where there may be visible signs of the proposed training activities.



Kilometers
0 1.5 3 6
0 1.5 3
Miles

Source: MAGTF Training Command 2009

Figure 3.5-1
Key Viewpoints and Photo Locations in West Study Area

Figure 3.5-2. Key Viewpoint 1, Viewing East-southeast

- **Visual Quality.** Low. The visual quality of the area around KVP 1 is low. The area has typical desert topography and vegetation that is common to the region. An existing electrical line runs along the access road to the camping/staging area (not visible in Figure 3.5-2). The electrical line is within view of all areas of the camping/staging area and is a prominent visual feature in the immediate area. The immediate area is a highly disturbed, flat dry lake bed, which is characteristic of the region. Distant mountain ranges with undulating forms and irregular lines appear low on the horizon and add only slightly to the landscape's visual interest. There are no water features and there is very little vegetation in the immediate area. The vegetation in the region is typical muted desert scrub.
- **Viewer Concern.** Low. The nearest proposed action activities would occur approximately 4 to 7.2 miles (6.5 to 11.6 km) away. Therefore, proposed action activities would not be visible from KVP 1 and any signs of activities would be in the middleground, occurring low on the horizon. Located on BLM land and within a designated OHV area, human activities and land disturbance are expected in the vicinity of KVP 1. The Johnson Valley OHV area is adjacent to the Combat Center; therefore, signs of military activities are not uncommon or different from what a viewer may expect.
- **Viewer Exposure.** Low. The users of the North Anderson Dry Lake Camping/Staging Area would have no direct view of the training activities occurring on the lands proposed for acquisition. The camping/staging area is approximately 4 to 7.2 miles (6.5 to 11.6 km) away from the area where training activities are expected to occur. Training activities would not affect the landscape visibility. Any visible signs of training activities would be in the middleground for users of the North Anderson Dry Lake area.
- **Overall Visual Sensitivity**. Low. For visual receptors in the vicinity of KVP 1 at the North Anderson Dry Lake camping/staging area, the low visual quality, low viewer concern, and low viewer exposure leads to a low overall visual sensitivity of the visual setting and viewing characteristics.

<u>Key Viewpoint 2: The Rock Pile Camping/Staging Area</u>

Key viewpoint 2 was established at the Rock Pile camping/staging area. Viewing northeast towards the location of proposed training activities in the west study area (Figure 3.5-3), this location was selected to generally characterize the existing landscape in an area where a number of individuals may congregate

while recreating in the Johnson Valley area and where there may be visible signs of the proposed training activities.

Figure 3.5-3. Key Viewpoint 2, Viewing Northeast

- **Visual Quality.** Low. The visual quality of the area around KVP 2 is low. The area has typical desert topography and vegetation that is common to the region. Distant mountain ranges with undulating forms and irregular lines appear low on the horizon and add only slightly to the landscape's visual interest. Rock formations are present in the immediate area. The area affords views of distant expanses and a flat plain area. There are no water features and the vegetation is typical muted desert scrub.
- **Viewer Concern.** Low. Proposed action activities would occur approximately 3.9 miles (6.4 km) away. Therefore, proposed action activities would not be visible from KVP 2 and any signs of activities would be in the middleground, occurring low on the horizon. Located on BLM land and within a designated OHV area, human activities and land disturbance are expected in the vicinity of KVP 2. The Johnson Valley OHV area is adjacent to the Combat Center; therefore, signs of military activities are not uncommon or different from what a viewer may expect.
- **Viewer Exposure.** Low to Moderate. The users of the Rock Pile Camping/Staging Area would have no direct view of the training activities occurring on the lands proposed for acquisition. The camping/staging area is approximately 3.9 miles (6.4 km) from the area where training activities are expected to occur. However, signs of training activities would be visible since the camping/staging area is located at a higher elevation than the immediate surrounding area. Training activities would have little effect on the landscape visibility and any visible signs of training activities would be in the middleground for users of the camping/staging area.
- **Overall Visual Sensitivity**. Low to Moderate. For visual receptors in the vicinity of KVP 2 at the Rock Pile camping/staging area, the low visual quality, low viewer concern, and low to moderate viewer exposure leads to a low to moderate overall visual sensitivity of the visual setting and viewing characteristics.

<u>Key Viewpoint 3: Soggy Dry Lake Camping/Staging Area</u>

Key viewpoint 3 was established towards the western half of the Soggy Dry Lake camping/staging area. Viewing northeast towards the location of proposed training activities in the west study area (Figure 3.5-4), this location was selected to generally characterize the existing landscape in an area where a

number of individuals may congregate while recreating in the Johnson Valley area and where there may be visible signs of the proposed training activities.

Figure 3.5-4. Key Viewpoint 3, Viewing Northeast

- **Visual Quality** Low. The visual quality of the area around KVP 3 is low. The area has typical desert topography and vegetation that is common to the region. The immediate area is a flat dry lake bed, which is characteristic of the region. There are several restroom facilities constructed in the Soggy Dry Lake Bed area indicating development and usage of the area. Distant mountain ranges with undulating forms and irregular lines appear very low on the horizon and add only slightly to the landscape's visual interest. There are no water features and there is very little vegetation in the immediate area. The vegetation in the region is typical muted desert scrub.
- **Viewer Concern.** Low. The nearest proposed action activities would occur approximately 6.0 miles (9.7 km) away. Therefore, proposed action activities would not be visible from KVP 3 and any signs of activities would be in the middleground, occurring low on the horizon. Located on BLM land and within a designated OHV area, human activities and signs of land usage and disturbance (e.g., vehicles, dust clouds, etc.) are expected in the vicinity of KVP 3. The Johnson Valley OHV area is adjacent to the Combat Center; therefore, signs of military activities are not uncommon or different from what a viewer may expect.
- **Viewer Exposure.** Low. The users of the Soggy Dry Lake camping/staging area would have no direct view of the training activities occurring on the lands proposed for acquisition. The camping/staging area is approximately 6.0 miles (9.7 km) from the area where training activities are expected to occur. Training activities would not affect the landscape visibility. Any visible signs of training activities would be in the distant background for users of the camping/staging area.
- **Overall Visual Sensitivity**. Low. For visual receptors in the vicinity of KVP 3 at the western part of the Soggy Dry Lake camping/staging area, the low visual quality, low viewer concern, and low viewer exposure leads to a low overall visual sensitivity of the visual setting and viewing characteristics.

Key Viewpoint 4: SR 247/Bessemer Mine Road

Key viewpoint 4 was established on SR 247 near Bessemer Mine Road. Viewing northeast towards the location of proposed training activities in the west study area (Figure 3.5-5), this location was selected to

generally characterize the existing landscape where the proposed training activities may have viewer exposure from those traveling on SR 247.

Figure 3.5-5. Key Viewpoint 4, Viewing Northeast

- **Visual Quality.** Low. The visual quality of the area around KVP 4 is low. The area has typical desert topography and vegetation that is common to the region. Distant mountain ranges with undulating forms and irregular lines appear low on the horizon and add only slightly to the landscape's visual interest. There are no water features and the vegetation is typical muted desert scrub. In addition, existing electrical lines crisscross the desert landscape in the area.
- **Viewer Concern.** Low. The nearest proposed action activities would occur approximately 9.7 miles (15.7 km) away. Therefore, proposed action activities would not be visible from KVP 4 and any signs of activities would be in the background, occurring low on the horizon. State Route 247 runs along the boundary of the Johnson Valley OHV area; therefore, signs of human activities and land disturbance in the visual landscape are expected in the vicinity of KVP 4. The Johnson Valley OHV area is adjacent to the Combat Center; therefore, signs of military activities are not uncommon or different from what a viewer may expect.
- **Viewer Exposure.** Low. The proposed action training activities would have low visibility in the background view for travelers on SR 247. The terrain consists of rolling hills and undulating mountain ranges; therefore, the proposed activities would not be visible from all areas on SR 247. The area is sparsely populated; therefore, the number of viewers would be low and would consist only of those traveling on SR 247. The duration of view would be short since the rolling topography would result in a limited view of the activities remaining within the primary cone of vision (45 degrees either side of the primary direction of view) while traveling on SR 247.
- **Overall Visual Sensitivity**. Low. For travelers on SR 247 near Bessemer Mine Road, the low visual quality, low viewer concern, and low viewer exposure leads to a low overall visual sensitivity of the visual setting and viewing characteristics.

Key Viewpoint 5: SR 247 near Boone Road

Key viewpoint 5 was established on SR 247 near Boone Road. Viewing northwest towards the location of proposed training activities in the west study area (Figure 3.5-6), this location was selected to generally characterize the existing landscape where the proposed training activities may have viewer exposure from those traveling on SR 247.

Figure 3.5-6. Key Viewpoint 5, Viewing Northwest

- **Visual Quality.** Low. The visual quality of the area around KVP 5 is low. The area has typical desert topography and vegetation that is common to the region. Distant mountain ranges with undulating forms and irregular lines appear low on the horizon and add only slightly to the landscape's visual interest. There are no water features and the vegetation is typical muted desert scrub.
- **Viewer Concern.** Low. The nearest proposed action activities would occur approximately 5.4 miles (8.7 km) away. Therefore, proposed action activities would not be visible from KVP 5 and any signs of activities would be in the middleground, occurring low on the horizon. SR 247 runs along the boundary of the Johnson Valley OHV area; therefore, signs of human activities and land disturbance in the visual landscape are expected in the vicinity of KVP 5. The Johnson Valley OHV area is adjacent to the Combat Center; therefore, signs of military activities are not uncommon or different from what a viewer may expect.
- **Viewer Exposure.** Low. The proposed action training activities would have low visibility in the background view for travelers on SR 247. The terrain consists of rolling hills and undulating mountain ranges; therefore, the proposed activities would not be visible from all areas on SR 247. The area is sparsely populated; therefore, the number of viewers would be low and would consist only of those traveling on SR 247. The duration of view would be short since the rolling topography would result in a limited view of the activities remaining within the primary cone of vision (45 degrees either side of the primary direction of view) while traveling on SR 247.
- **Overall Visual Sensitivity**. Low. For users of Means Dry Lake, the low visual quality, low viewer concern, and low viewer exposure leads to a low overall visual sensitivity of the visual setting and viewing characteristics.

Key Viewpoint 6: Means Dry Lake Camping/Staging Area

Key viewpoint 6 was established at the Means Dry Lake camping/staging area. Viewing northwest towards the location of proposed training activities in the west study area (Figure 3.5-7), this location was selected to generally characterize the existing landscape in an area where a number of individuals may congregate while recreating in the Johnson Valley area and where there may be visible signs of the proposed training activities. The location was also selected to represent a location where one of the

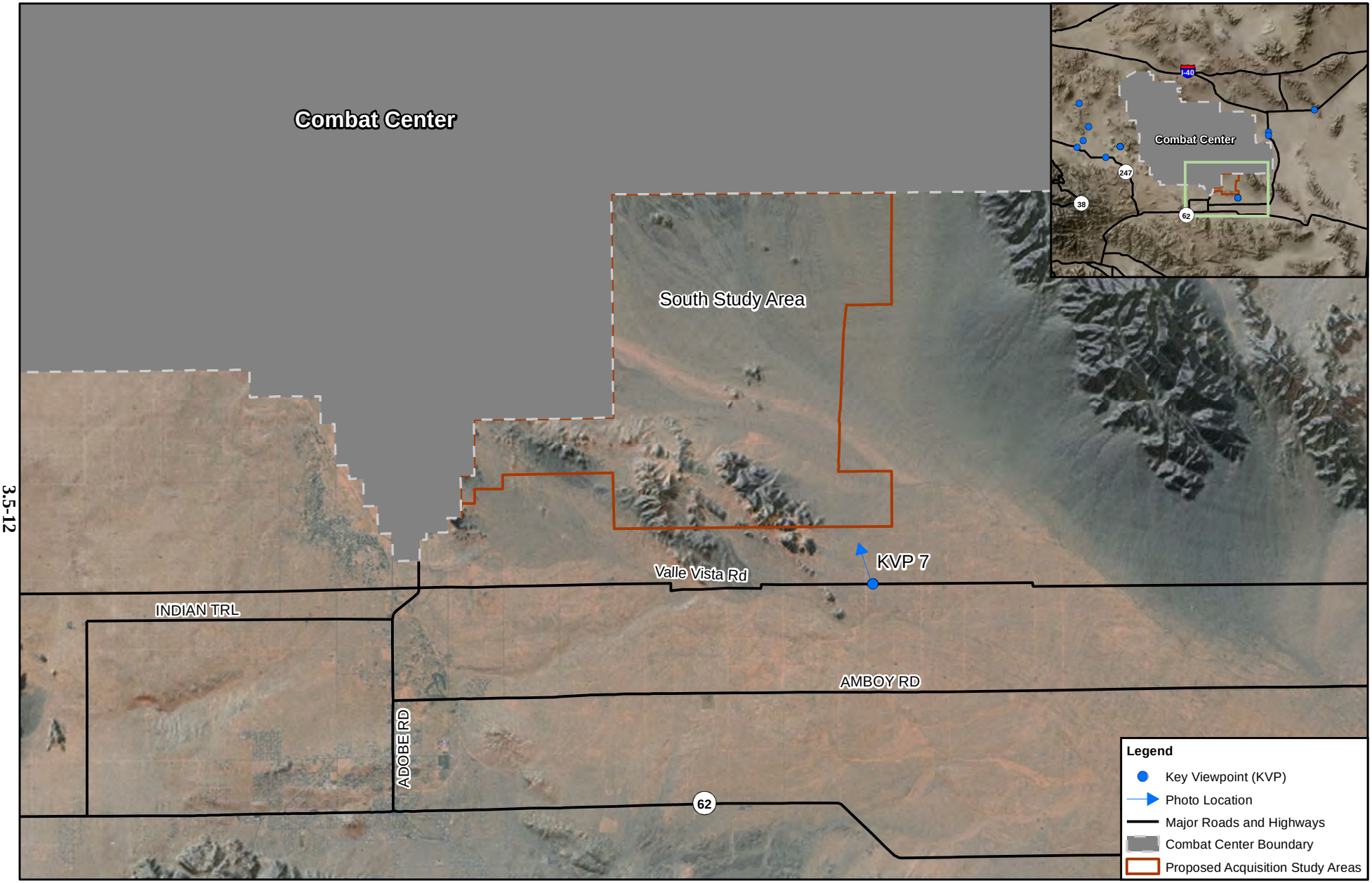
proposed communication towers and proposed company objective target area in the west study area would be visible to those recreating in the area.

Figure 3.5-7. Key Viewpoint 6, Viewing Northwest

- **Visual Quality.** Low. The visual quality of the area around KVP 6 is low. The area has typical desert topography and vegetation that is common to the region. The immediate area is a flat dry lake bed, which is characteristic of the region. Distant mountain ranges with undulating forms and irregular lines appear low on the horizon and add only slightly to the landscape's visual interest. There are no water features and there is very little vegetation in the immediate area. The vegetation in the region is typical muted desert scrub.
- **Viewer Concern.** Low to Moderate. Proposed action activities would not be visible from KVP 6 and any signs of activities would be in the distant background, occurring low on the horizon. The proposed communication towers and company training objectives would be visible in the middleground, construction of which would cause a permanent visual change in the immediate area. Located on BLM land and within a designated OHV area, human activities and land disturbance are expected in the vicinity of KVP 6. The Johnson Valley OHV area is adjacent to the Combat Center; therefore, signs of military activities are not uncommon or different from what a viewer may expect.
- **Viewer Exposure.** Low to Moderate. The users of the Means Dry Lake camping/staging area would have no direct view of the training activities occurring on the lands proposed for acquisition. Training activities would not affect the landscape visibility. The proposed communication towers and company training objectives would be visible in the middleground as a permanent visual fixture.
- **Overall Visual Sensitivity**. Low to Moderate. For users of the Means Dry Lake camping/staging area, the low visual quality, low to moderate viewer concern, and low to moderate viewer exposure leads to a low to moderate overall visual sensitivity of the visual setting and viewing characteristics.

3.5.4.3 South Study Area

One KVP was selected for the south study area, as identified in Figure 3.5-8. The KVP photograph is depicted below in Figure 3.5-9.



Kilometers
0 1.5 3 6
0 1.5 3
Miles

Source: MAGTF Training Command 2009

Figure 3.5-8
Key Viewpoints and Photo Location in South Study Area

N

Key Viewpoint 7: Valle Vista Road

Key viewpoint 7 was established on Valle Vista Road south of the south study area. Viewing northwest towards the location of proposed training activities in the south study area (Figure 3.5-9), this location was selected to generally characterize the existing landscape where the proposed training activities may have viewer exposure from those traveling on Valle Vista Road and for residences in the area.

Figure 3.5-9. Key Viewpoint 7, Viewing Northwest

- **Visual Quality.** Low. The visual quality of the area around KVP 7 is low. The area has typical desert topography and vegetation that is common to the region. Distant mountain ranges with undulating forms and irregular lines appear low on the horizon and add only slightly to the landscape's visual interest. There are no water features and the vegetation is typical muted desert scrub. Scattered housing is visible in the area and existing electrical lines crisscross the desert landscape.
- **Viewer Concern.** Low. Proposed action activities would occur approximately 6.0 miles (9.7 km) away. Therefore, proposed action activities would not be visible from KVP 7 and any signs of activities would be in the middleground, occurring low on the horizon. Key viewpoint 7 is nearby the Combat Center; therefore, signs of military activities are not uncommon or different from what a viewer may expect.
- **Viewer Exposure.** Low. The proposed action training activities would have low visibility in the middleground to background view for travelers on local roadways and residences in the area. Terrain in the area consists of rolling hills and undulating mountain ranges; therefore, the proposed activities would not be visible from all areas. The area is sparsely populated; therefore, the number of viewers would be low and would consist only of those traveling on local roadways and residences in the immediate area. The duration of view for residences in the area would be limited to the limited timeframe there would be training activities occurring in the south study area. The duration of view for those traveling on local roadways would be low since the rolling topography would result in a limited view of the activities remaining within the primary cone of vision (45 degrees either side of the primary direction of view).

- **Overall Visual Sensitivity**. Low. For travelers on local roadways near KVP 7, the low visual quality, low viewer concern, and low viewer exposure leads to a low overall visual sensitivity of the visual setting and viewing characteristics.

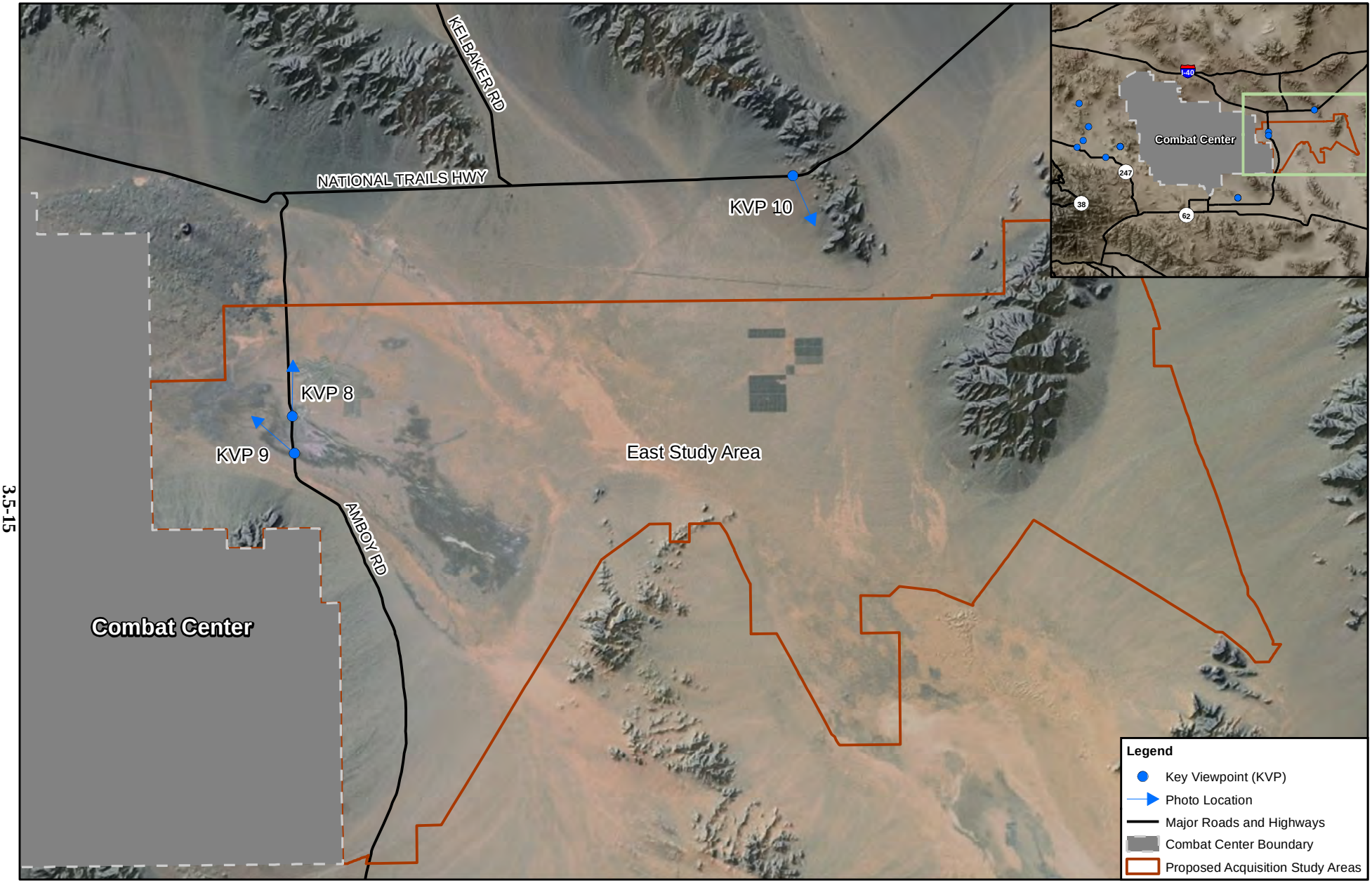
3.5.4.4 East Study Area

Three KVPs were selected for the east study area, as identified in Figure 3.5-10. Key viewpoint photographs are depicted below in Figures 3.5-11 through 3.5-13.

Key Viewpoint 8: Amboy Road 1

Key viewpoint 8 was established on Amboy Road near Bristol Dry Lake. Viewing north along the roadway, this location was selected to generally characterize the existing landscape where one of the four proposed tank crossings would be visible to those traveling on Amboy Road (Figure 3.5-11).

- **Visual Quality.** Low. The visual quality of the area around KVP 8 is low. The area has typical desert topography and vegetation that is common to the region. Distant mountain ranges with undulating forms and irregular lines appear low on the horizon and add only slightly to the landscape's visual interest. There are no water features and the vegetation is typical muted desert scrub. Amboy Road is characteristic of roadways in the area; it is a wide straight road with few curves, and there is a wide shoulder on either side of the road.
- **Viewer Concern.** Low. Amboy Road runs parallel to the eastern boundary of the Combat Center; therefore, road improvements associated with military exercises are not uncommon or unexpected in the areas surrounding the installation. Proposed road upgrades are not uncommon or unexpected; therefore, the upgrades would result in lower viewer concern.
- **Viewer Exposure.** Moderate. The proposed tank crossing on Amboy Road would have a moderate to high visibility for travelers on Amboy Road. The tank crossing would be visible as vehicles approach the location of the tank crossing. The area is sparsely populated and would be limited to those traveling on Amboy Road. The rate of travel speed on the roadway is high; therefore, viewing times would be brief.
- **Overall Visual Sensitivity**. Low. For travelers on Amboy Road near KVP 8, the low visual quality, low viewer concern, and moderate viewer exposure leads to a low overall visual sensitivity of the visual setting and viewing characteristics.



Kilometers
0 1.5 3 6
0 1.5 3
Miles

Source: MAGTF Training Command 2009

Figure 3.5-10
Key Viewpoints and Photo Locations in East Study Area

N

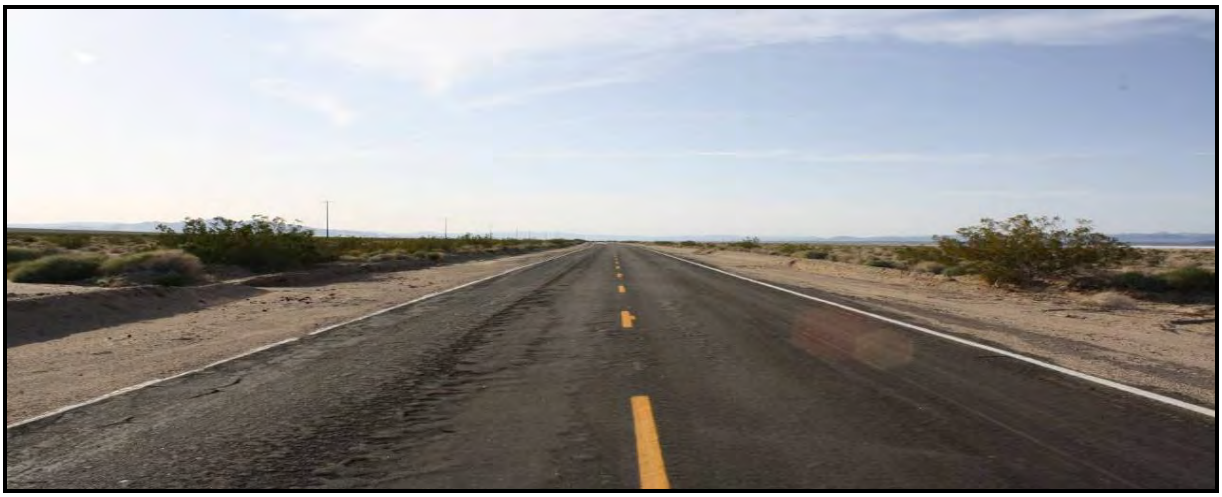


Figure 3.5-11. Key Viewpoint 8, Viewing North

Key Viewpoint 9: Amboy Road 2

Key viewpoint 9 was established on Amboy Road near Bristol Dry Lake. Viewing northwest towards the location of proposed training activities on the Combat Center (Figure 3.5-12), this location was selected to generally characterize the existing landscape where the proposed training activities on the east side of the Combat Center may have viewer exposure from those traveling on Amboy Road.

Figure 3.5-12. Key Viewpoint 9, Viewing Northwest

- **Visual Quality.** Low. The visual quality of the area around KVP 9 is low. The area has typical desert topography and vegetation that is common to the region. Distant mountain ranges with undulating forms and irregular lines appear low on the horizon and add only slightly to the landscape's visual interest. There are no water features and the vegetation is typical muted desert scrub. In addition, existing electrical lines crisscross the desert landscape in the area.
- **Viewer Concern.** Low. Proposed action activities would occur approximately 4.7 miles (7.5 km) away. Therefore, proposed action activities would not be visible from KVP 9 and any signs of activities would be in the middleground, occurring low on the horizon. Amboy Road runs parallel to the Combat Center; therefore, signs of military activities are not uncommon or different than what a viewer may expect.

- **Viewer Exposure.** Low. The proposed action training activities would have moderate to low visibility in the middleground view for travelers on Amboy Road. The terrain consists of rolling hills and undulating mountain ranges; therefore, the proposed activities would not be visible from all areas on Amboy Road. The area is sparsely populated; therefore, the number of viewers would be low and would consist only of those traveling on Amboy Road. The duration of view would be short since the rolling topography would result in a limited view of the activities remaining within the primary cone of vision (45 degrees either side of the primary direction of view) while traveling on Amboy Road.
- **Overall Visual Sensitivity**. Low. For travelers on Amboy Road near KVP 9, the low visual quality, low viewer concern, and low viewer exposure leads to a low overall visual sensitivity of the visual setting and viewing characteristics.

Key Viewpoint 10: National Trails Highway

Key viewpoint 10 was established on National Trails Highway. Viewing south-southeast towards the location of proposed training activities in the east study area (Figure 3.5-13), this location was selected to generally characterize the existing landscape where the proposed training activities may have viewer exposure from those traveling on National Trails Highway. The location was also selected to represent a location where the proposed communication tower in the east study area would be visible to those traveling in an easterly direction on National Trails Highway.

Figure 3.5-13. Key Viewpoint 10, Viewing South-southeast

- **Visual Quality.** Low. The visual quality of the area around KVP 10 is low. The area has typical desert topography and vegetation that is common to the region. Distant mountain ranges with undulating forms and irregular lines appear low on the horizon and add only slightly to the landscape's visual interest. There are no water features and the vegetation is typical muted desert scrub. A railroad line is visible in the middleground.
- **Viewer Concern.** Low. Proposed action activities would occur approximately 6.0 miles (9.7 km) away. Therefore, proposed action activities would not be visible from KVP 10 and any signs of activities would be in the middleground, occurring low on the horizon. The proposed communication tower would be located approximately 8.1 miles (13.1 km) away, visible in the middleground to background.

- **Viewer Exposure.** Low. The proposed action training activities would have moderate to low visibility in the middleground view for travelers on National Trails Highway. The terrain consists of rolling hills and undulating mountain ranges; therefore, the proposed activities would not be visible from all areas on National Trails Highway. The area is sparsely populated; therefore, the number of viewers would be low and would consist only of those traveling on the roadway. The duration of view would be short since the rolling topography would result in a limited view of the activities remaining within the primary cone of vision (45 degrees either side of the primary direction of view) while traveling on National Trails Highway. The proposed communication tower would be visible in the middleground as a permanent visual fixture.
- **Overall Visual Sensitivity**. Low. For travelers on National Trails Highway near KVP 10, the low visual quality, low viewer concern, and low viewer exposure leads to a low overall visual sensitivity of the visual setting and viewing characteristics.

3.5.4.5 Action Alternatives

Alternative 1

Under Alternative 1, the west and south study areas would be acquired for exclusive military use. In addition, three communication towers would be constructed on mountain formations within the west study area. Under Alternative 1, KVPs 4 and 5 were selected as viewpoints from which proposed action activities in the west study area may be visible by travelers on SR 247. Key viewpoint 7 was selected as a viewpoint from which proposed action activities in the south study area may be visible to residences in the immediate area.

Alternative 2

Under Alternative 2, the south study area and a smaller land area in the west study area would be acquired for exclusive military use. In addition, two communication towers would be constructed on mountain formations within the west study area. Under Alternative 2, KVP 2 was selected as a viewpoint from which training exercises may be visible to users of the Rock Pile camping/staging area and others recreating in the immediate area. Key viewpoint 7 was selected as a viewpoint from which proposed action activities in the south study area may be visible to residences in the immediate area.

Alternative 3

Under Alternative 3, the east and south study areas would be acquired for exclusive military use. In addition, a communication tower would be constructed on a mountain formation on the western side of the east study area and up to four tank crossings would be constructed along Amboy Road. Under Alternative 3, KVP 7 was selected as a viewpoint from which proposed action activities in the south study area may be visible to residences in the immediate area. Key viewpoint 8 was selected as a viewpoint to represent one of the proposed tank crossing road improvements that would be visible to travelers on Amboy Road. Key viewpoint 9 was selected as a viewpoint from which training activities on the eastern portion of the Combat Center may be visible to travelers on Amboy Road, and KVP 10 was selected as a viewpoint from which proposed action activities in the east study area may be visible from the roadways and from which the proposed communication tower would be visible.

Alternative 4

Under Alternative 4, the south study area would be acquired for exclusive military use. The west study area would be acquired and would have restricted public access during training exercises. Under Alternative 4, three communication towers would be constructed on mountain formations within the west

study area. In addition, two area company objectives would be constructed within the west study area for use during training exercises. The company objective areas would be exclusive military use, with one located north of Means Dry Lake and the other located northwest of Galway Dry Lake. Under Alternative 4, KVP 6 was selected as a viewpoint from which training targets remaining from the company objective may be visible to users of the Means Dry Lake area and as a viewpoint from which the communication tower that would be located west of Means Dry Lake would be visible to users in the area. Key viewpoint 7 was selected as a viewpoint from which proposed action activities in the south study area may be visible to residences in the immediate area. Key viewpoint 9 was selected as a viewpoint from which training activities on the eastern portion of the Combat Center may be visible to travelers on Amboy Road.

Alternative 5

Under Alternative 5, the west study area would be acquired and would have restricted public access during training exercises. No other land areas would be acquired. Under Alternative 5, three communication towers would be constructed on mountain formations within the west study area. In addition, two area company objectives would be constructed for use during training exercises. These areas would be exclusive military use, with one located north of Means Dry Lake and the other located northwest of Galway Dry Lake. Under Alternative 5, KVP 6 was selected as a viewpoint from which training targets remaining from the company objective may be visible to users of the Means Dry Lake area and as a viewpoint from which the communication tower that would be located west of Means Dry Lake would be visible to users in the area. Key viewpoint 9 was selected as a viewpoint from which training activities on the eastern portion of the Combat Center may be visible to travelers on Amboy Road.

Alternative 6

Under Alternative 6, the south study area would be acquired for exclusive military use. The west study area would be acquired, with the northern majority becoming exclusive military use and a portion of the southern part having restricted public access during training exercises. Under Alternative 6, three communication towers would be constructed on mountain formations within the west study area; two would be within the exclusive military use area and one would be within the Restricted Public Access Area (RPAA). In addition, two area company objectives would be constructed for use during training exercises; both would be located within the RPAA. These areas would be exclusive military use, with one located north of Means Dry Lake and the other located within the Hammers. Under Alternative 6, KVP 1 and 3 were selected as viewpoints from which training exercises may be visible to users of the North Anderson Dry Lake and Soggy Dry Lake camping/staging areas, respectively, and others recreating in the immediate area. Key viewpoint 5 was selected as a viewpoint from which proposed training activities in the west study area may be visible by travelers on SR 247. Key viewpoint 6 was selected as a viewpoint from which training targets remaining from the company objective may be visible to users of the Means Dry Lake area, as a viewpoint from which ongoing training activities on the newly acquired exclusive military use land area may be visible, and as a viewpoint from which one of the proposed communication towers would be visible. Key viewpoint 7 was selected as a viewpoint from which proposed action activities in the south study area may be visible to residences in the immediate area.

3.6 TRANSPORTATION AND CIRCULATION

3.6.1 Definition of Resource

Transportation and circulation refers to roadway and street systems and the movement of vehicles on roadway networks. The ROI for this analysis includes roadway networks both within and in the immediate vicinity of the Combat Center and the adjacent acquisition study areas. For this analysis, roadway operating conditions and the adequacy of existing roadway systems to accommodate vehicle use are described in terms of average daily traffic (ADT) volumes and level of service (LOS) ratings. Level of service is a qualitative measure describing operational conditions within a traffic stream and their perception by motorists. Specifically, the levels are meant to measure driver discomfort, frustration, fuel consumption, and lost travel time. Level of service ratings range from a rating of A for free-flowing traffic conditions to a rating of F for congested conditions. For the purpose of the analysis presented in this EIS, LOS was evaluated using traffic volume-to-capacity ratios where applicable, and is further described in Section 4.6.1.2. Substantial increases in ADT can cause degradation of LOS ratings on roadways without proper traffic control measures.

3.6.2 Regulatory Framework

Traffic analysis is guided by standards set at the federal level by the Federal Highway Administration, at the state level by Caltrans, and at the local level by local jurisdictions. Interstates fall under the jurisdiction of the Federal Highway Administration and state highways fall under the jurisdiction of Caltrans. Other roadways are under county or city jurisdictions which, for the purposes of this analysis, are San Bernardino County and the City of Twentynine Palms. The roadway network within the Combat Center is under the control of the DoN. Table 3.6-1 contains the jurisdictions of roadways within the ROI that would potentially be affected by the proposed alternative actions and their respective ADT volumes.

3.6.3 Existing Conditions

3.6.3.1 Combat Center

<u>Mainside Access and Circulation</u>

Mainside is the primary operations and housing sector of the Combat Center and is located at the southern boundary of the installation, within the city limits of Twentynine Palms, approximately 6.0 miles (9.7 km) north of SR 62. In 2000, the City of Twentynine Palms annexed the Mainside portion of the installation (City of Twentynine Palms 2009). As part of the annexation process, the City of Twentynine Palms and MAGTF Training Command entered into a Pre-Annexation Agreement in which the city agreed not to exercise its police power over the Marine Corps property. As a result of that agreement, street construction and maintenance on the installation, including that portion within Twentynine Palms, is the responsibility of the Combat Center (City of Twentynine Palms 2009). Figure 3.6-1 illustrates the existing road network and major intersections in Mainside.

Table 3.6-1. Roadways and ADT Volumes Within ROI

Road/Highway	Traffic Count Intersection	Jurisdiction Within ROI*	ADT
On-base			
Adobe Road	Del Valle Road	Combat Center	13,500[1]
Del Valle Road	Adobe Road	Combat Center	14,425[1]
Off-base			
Adobe Road	Amboy Road	City of Twentynine Palms	just under 15,000[2]
Amboy Road	Bullion Mountain Road	County of San Bernardino	1,019[3]
North Amboy Road	Amboy Road	County of San Bernardino	672[3]
Bullion Mountain Road	Amboy Road	City of Twentynine Palms	< 100[3]
Indian Trail	Morongo Road	County of San Bernardino/City of Twentynine Palms	4,345[3]
Camp Rock Road	SR 247	County of San Bernardino	355[3]
Lear Avenue	Indian Trail	County of San Bernardino/City of Twentynine Palms	3,461[3]
Valle Vista Road	Lear Avenue	City of Twentynine Palms	< 100[3]
National Trails Highway	N Amboy Road	County of San Bernardino	749[3]
SR 62	Adobe Road	State of California	just under 15,000[2]
SR 247	SR 62	State of California	12,000[4]

Notes: *Jurisdictions pertain to portions of roads affected by military personnel/convoy use.
ADT = average daily traffic; ROI = region of influence; SR = State Route
Sources: [1]NAVFAC Southwest 2005; [2]City of Twentynine Palms 2009; [3]County of San Bernardino 2010; [4]Caltrans 2008

The primary transportation route to and from the installation is Adobe Road, a north-south, four lane roadway that links Mainside to the City of Twentynine Palms and SR 62. All visitors and vehicles with two or more axles must enter and exit via Adobe Road, where the installation's Main Gate is located. Adobe Road also serves as the principal arterial for military convoys moving off of the installation to access peripheral training areas. As such, Adobe Road has a fairly high ADT of approximately 13,500 within the Combat Center (Naval Facilities Engineering Command [NAVFAC] Southwest 2005). Limited access to the installation is available to two-axle vehicles and buses via two secondary (auxiliary) gates. These gates are located at Condor Road and Morongo Road.

The circulation system of Mainside consists of a small urban grid network of roadways. The grid consists of 1st through 13th Streets and from two to five cross streets. Del Valle Road is the primary road servicing the Mainside grid. The intersection of Adobe Road and Del Valle Road is the key intersection within Mainside, with an ADT volume of approximately 14,500 (MAGTF Training Command 2008). As recommended in a 2005 traffic study (Darnell and Associates 2005), Del Valle Road has since been widened, but still provides for only one lane of traffic in either direction (DoN 2009). Before the widening of Del Valle Road, the Adobe Road/Del Valle Road intersection had an LOS of C. It is likely that the widening of Del Valle Road has since improved the LOS at this key intersection.

Kilometers
0 0.25 0.5 1
0 0.125 0.25 0.5
Miles

Figure 3.6-1
Mainside Road Network

Access to Training Areas

The majority of vehicle circulation for access to training areas occurs via on-base roads. There are two types of roads that traverse the Combat Center's training areas: main supply routes (MSRs) and secondary roads. Main supply routes are primary unpaved thoroughfares that cover approximately 354 miles (570 km) and an area of 1,400 acres (567 hectares). Most vehicular circulation throughout the training areas occurs on MSRs. Secondary roads are narrower and more numerous than the MSRs, and cover approximately 665 miles (1,070 km) and an area of 1,300 acres (526 hectares) (DoN 2003). The width of MSRs and secondary roads depends on terrain and proposed use. However, the average width for MSRs is 32 feet (10 meters) wide, while secondary roads are approximately 16 feet (5 meters) wide (DoN 2003).

On occasion, military personnel use public roadways to access training areas along the eastern and western boundaries. Use of public roads to access peripheral training areas is primarily for maintenance personnel and training instructors. Exact off-base routes used by military personnel are discussed below.

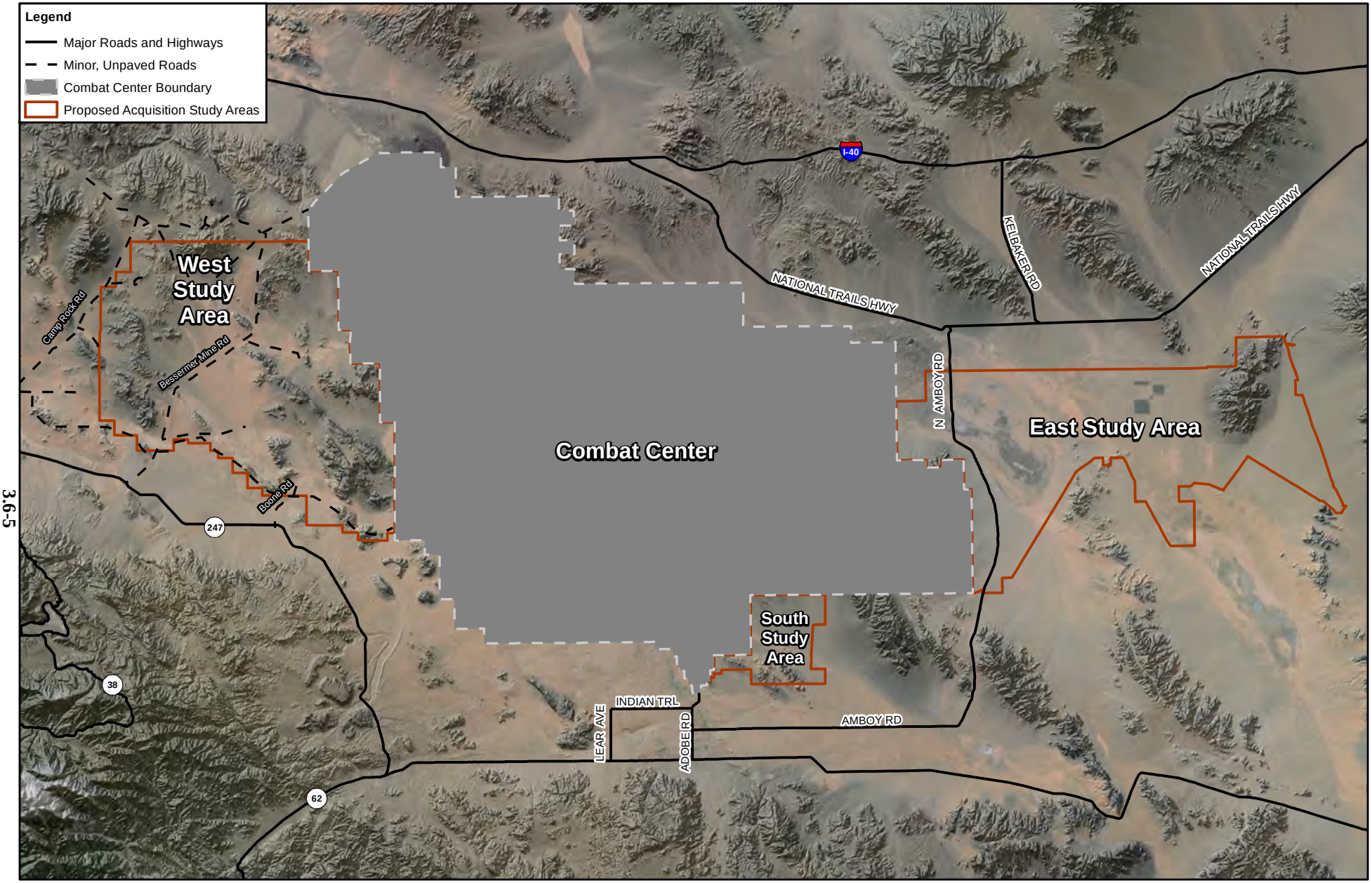
Surrounding Areas

Land to the immediate north and east of the Combat Center is predominantly undeveloped desert under the control of the BLM. The western border of the installation is adjacent to the Johnson Valley OHV Area, which is also administered by the BLM. Incorporated areas to the south of the Combat Center include the cities of Twentynine Palms, Joshua Tree, and Yucca Valley. Figure 3.6-2 provides a detailed map of major roads and highways surrounding the Combat Center.

The northern boundary of the installation is located south of I-40. U.S. Historic Route 66 (herein referred to as "National Trails Highway") runs adjacent to the northeast boundary of the Combat Center. Since access to the Combat Center is primarily via the Main Gate at the southern end of the installation, I-40 and National Trails Highway are not directly affected by traffic to and from the installation.

Along the eastern boundary, North Amboy Road runs nearly parallel to the Combat Center, and is used on occasion by military personnel to access eastern training areas. Western portions of the installation are accessed by military personnel primarily via SR 247. High utilization of the western training areas requires frequent use of public roadways by maintenance personnel to access these areas for target resets, range specific maintenance, and route maintenance. On average, only two maintenance vehicles use public roadways for access to the western training areas on any given day (MAGTF Training Command 2010).

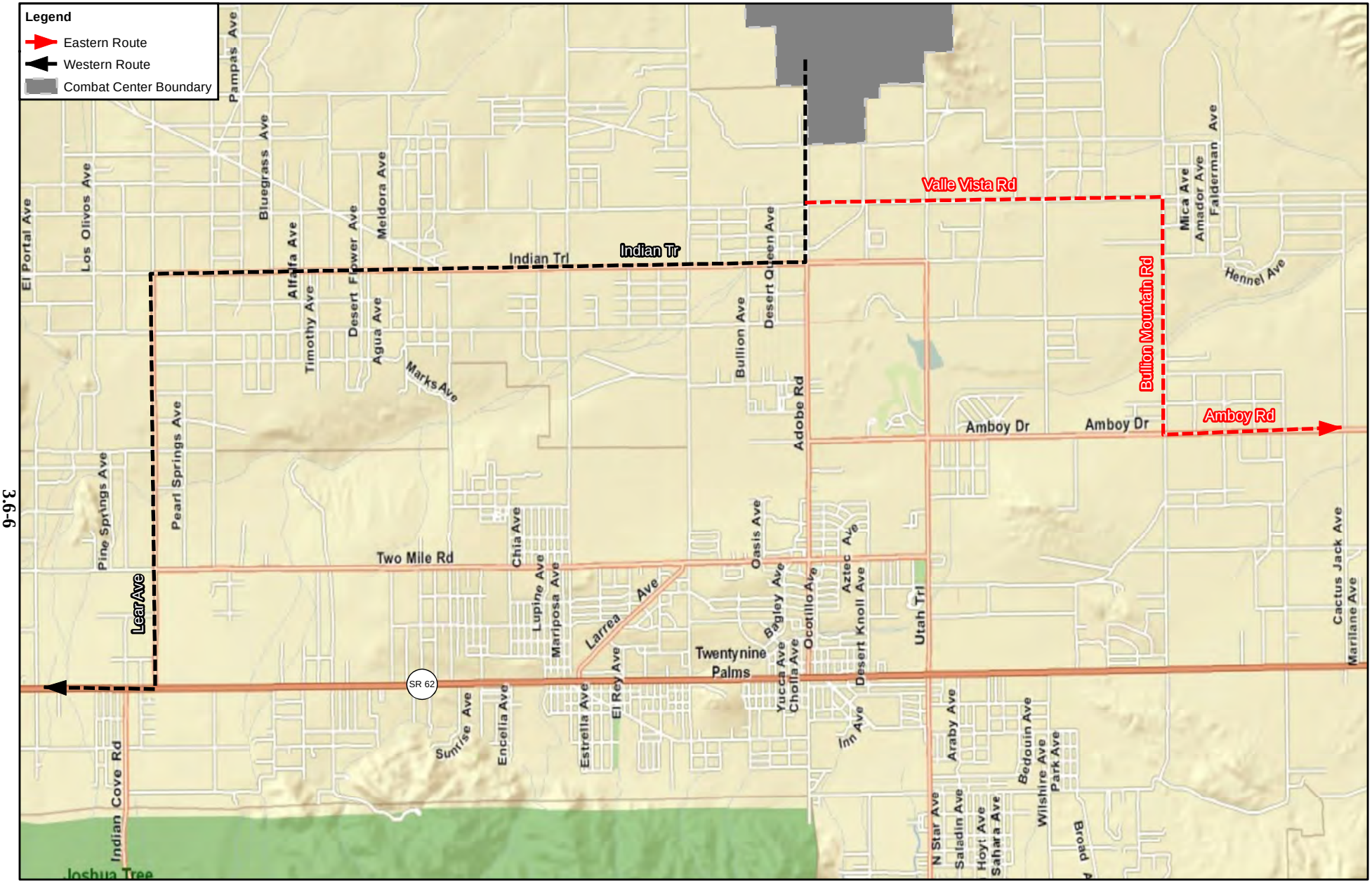
The southern boundary of the Combat Center shares its border with the City of Twentynine Palms. The ADT volumes within the city and in the immediate vicinity range from very low to just under 15,000 vehicles per day, with the majority of vehicle circulation on Adobe Road and SR 62 (City of Twentynine Palms 2009, Caltrans 2008). Military personnel and convoys must, on occasion, pass through Twentynine Palms to access peripheral training areas. Current military personnel routes through Twentynine Palms are shown in Figure 3.6-3. The *City of Twentynine Palms General Plan Update* (2009) reports only three key intersections within city limits that operate under a LOS of C. One of these intersections is Lear Avenue at SR 62, which operates at an LOS of D and is within the path of current military convoy routes. The city has determined that this intersection warrants a traffic signal and is working with Caltrans to implement the action (City of Twentynine Palms 2009).



Kilometers
0 5 10 20
0 5 10
Miles
Source: MAGTF Training Command 2009

Figure 3.6-2
Major Roads and Highways Surrounding the Combat Center

N



Kilometers
0 1.5 3
0 0.5 1
Miles
Source: City of Twentynine Palms 2009

Figure 3.6-3
Military Convoy Routes Through Twentynine Palms

N

3.6.3.2 West Study Area

The west study area encompasses 180,353 acres (72,987 hectares) on the west side of the Combat Center. State Route 247 runs nearly parallel to the southern border of the west study area. At its junction with SR 62, SR 247 has an ADT volume of 12,000 (Caltrans 2008). The ADT volume for SR 247 quickly declines to 3,000 as the highway extends to the north and west towards Camp Rock Road (Caltrans 2008). All roads within the west study area are unpaved and primarily used for OHV recreation. Two unpaved roads that are commonly used to access Johnson Valley OHV Area from SR 247 are Boone Road and Bessemer Mine Road. Traffic data for these roads does not exist as they are primarily used for access to and from the Johnson Valley OHV Area, not as thoroughfares for regular vehicle traffic.

3.6.3.3 South Study Area

The south study area encompasses 21,304 acres (8,621 hectares) on the south side of the Combat Center and is located just east of Mainside. There are no major roadways that run through the south study area.

3.6.3.4 East Study Area

The east study area encompasses 177,276 acres (71,741 hectares) on the east side of the Combat Center and is primarily federal land with a number of private, unclassified land parcels. The east study area contains a large portion of North Amboy Road which runs north to south through the acquisition study area. Twentynine Palms' existing Circulation Plan classifies Amboy Road as a 6-lane expressway (City of Twentynine Palms 2009), although it has a relatively low ADT volume of approximately 1,000 (County of San Bernardino 2010). As Amboy Road extends to the eastern side of the Combat Center it transitions into the north-south, two-lane North Amboy Road, which has an ADT volume of 672 (County of San Bernardino 2010). This road connects the City of Twentynine Palms to National Trails Highway and serves as a route for access to Amboy Crater (Desert USA 2010).

3.7 AIRSPACE MANAGEMENT

3.7.1 Definition of Resource

Appendix D provides detailed descriptions of airspace types and classifications along with a graphic that illustrates each type/classification and their relationship to each other.

The nation's airspace is designed and managed by the FAA and is intended to meet both the individual and common needs of all military, commercial, and general aviation interests. In general, all navigable airspace is categorized as either regulatory or non-regulatory. Within those two categories are four types of airspace: Controlled, Special Use, Uncontrolled, and Other. All airspace is classified according to the operating and flight rules that apply to the use of each area. Classification of each airspace area is dependent on (1) the complexity or density of aircraft operations, (2) the nature of those operations, (3) the level of safety required, and (4) national and public interest. Airspace management discussions reference these types/classifications, where appropriate, as they relate to the Combat Center ROI (FAA 2008).

The ROI for Airspace Management includes the existing Combat Center SUA, the airspace areas identified for the proposed acquisition study areas, and the surrounding airspace that supports all other civil and military aviation activities

3.7.2 Regulatory Framework

Processes for establishing or modifying regulatory airspace, such as Restricted Areas, are considered rulemaking and require public notification and participation, as outlined in FAA Order JO 7400.2h, *Procedures for Handling Airspace Matters* (FAA 2011). Processes for establishing or modifying non-regulatory airspace, such as MOAs, are non-rulemaking but may still require public awareness and involvement, as appropriate.

The FAA recognizes that air traffic, aviation, and technology are constantly evolving and continues to seek ways to improve safety, efficiency, and flexibility, while also working with the public on quality of life concerns. For that reason, airspace use is frequently reviewed by the FAA, DoD, airport operators, and other affected stakeholders to ensure operational efficiency, user compatibility, and flight safety are maintained to the greatest extent possible. In that regard, DoD agencies responsible for managing the scheduled use of each SUA area submit annual SUA utilization reports to the FAA that describe the types of activities conducted in the airspace, the times and altitudes used, and other details that characterize airspace use. This information is considered in the FAA's overall management of the National Airspace System and SUA program (FAA 2008).

New or proposed changes to land or airspace uses may result in a need to modify the existing airspace structure to better serve the needs of all concerned. Such changes can have regional and possibly national implications for ATC and flow management, and for the user community. Therefore, full consideration is given to national defense, security, and aviation stakeholder interests while seeking solutions that are equitable to all airspace users. It is important to identify and examine the current baseline use of all airspace within the Combat Center ROI to determine what potential effects the proposed SUA configurations may have on airspace and air traffic management in this region.

Table 3.7-1 provides definitions of the more common aeronautical terms used throughout the airspace management sections in Chapters 3 and 4, and in Chapter 9, *Acronyms and Abbreviations*. Definitions for additional terms are located in Appendix D.

Table 3.7-1. Aviation and Airspace Use Terminology

Term	Definition
Visual Flight Rules (VFR)	A standard set of rules that all pilots, both civilian and military, must follow when not operating under IFR and in visual meteorological conditions. These rules require that pilots remain clear of clouds and avoid other aircraft.
Instrument Flight Rules (IFR)	A standard set of rules that all pilots, civilian and military, must follow when operating under flight conditions that are more stringent than VFR. These conditions include operating an aircraft in clouds, operating above certain altitudes prescribed by FAA regulations, and operating in some locations such as major civilian airports. ATC agencies ensure separation of all aircraft operating under IFR.
Above Ground Level (AGL)	Altitude expressed in feet measured above the ground surface. Descriptions of aircraft activities conducted at lower altitudes above the ground surface (typically below 5,000 feet) are normally expressed in terms of altitudes AGL (e.g., 500 feet AGL).
Mean Sea Level (MSL)	Altitude expressed in feet measured above average (mean) sea level. Descriptions of aircraft flight activities at higher altitudes above the ground level up to, but not including, 18,000 feet are normally expressed in altitudes above MSL such as 10,000 feet MSL. Altitudes below 18,000 feet MSL are based on specific altimeter settings for the barometric pressure in the area aircraft are operating. Note: Aircraft elevations are displayed on cockpit instrumentation that senses and measures the altitudes at which aircraft are operating.
Flight Level (FL)	Altitudes at 18,000 feet MSL and above are expressed in terms of FLs such that 24,000 feet MSL is FL 240. Unlike aircraft altitudes below 18,000 feet MSL, FLs are based on a standard altimeter setting of 29.92 inches of mercury.
Sortie/Sortie-Operation	Sortie refers to an operational mission conducted by a single aircraft. Sortie-operation refers to a flight activity conducted by that single aircraft within a designated airspace area during the sortie mission. Airspace use tracking typically accounts for an aircraft sortie-operation within each area it operates throughout the course of the overall training mission

Notes: AGL = above ground level; ATC = Air Traffic Control; FAA = Federal Aviation Administration; FL = Flight Level; IFR = Instrument Flight Rules; MSL = mean sea level; VFR = Visual Flight Rules
Source: FAA 2011.

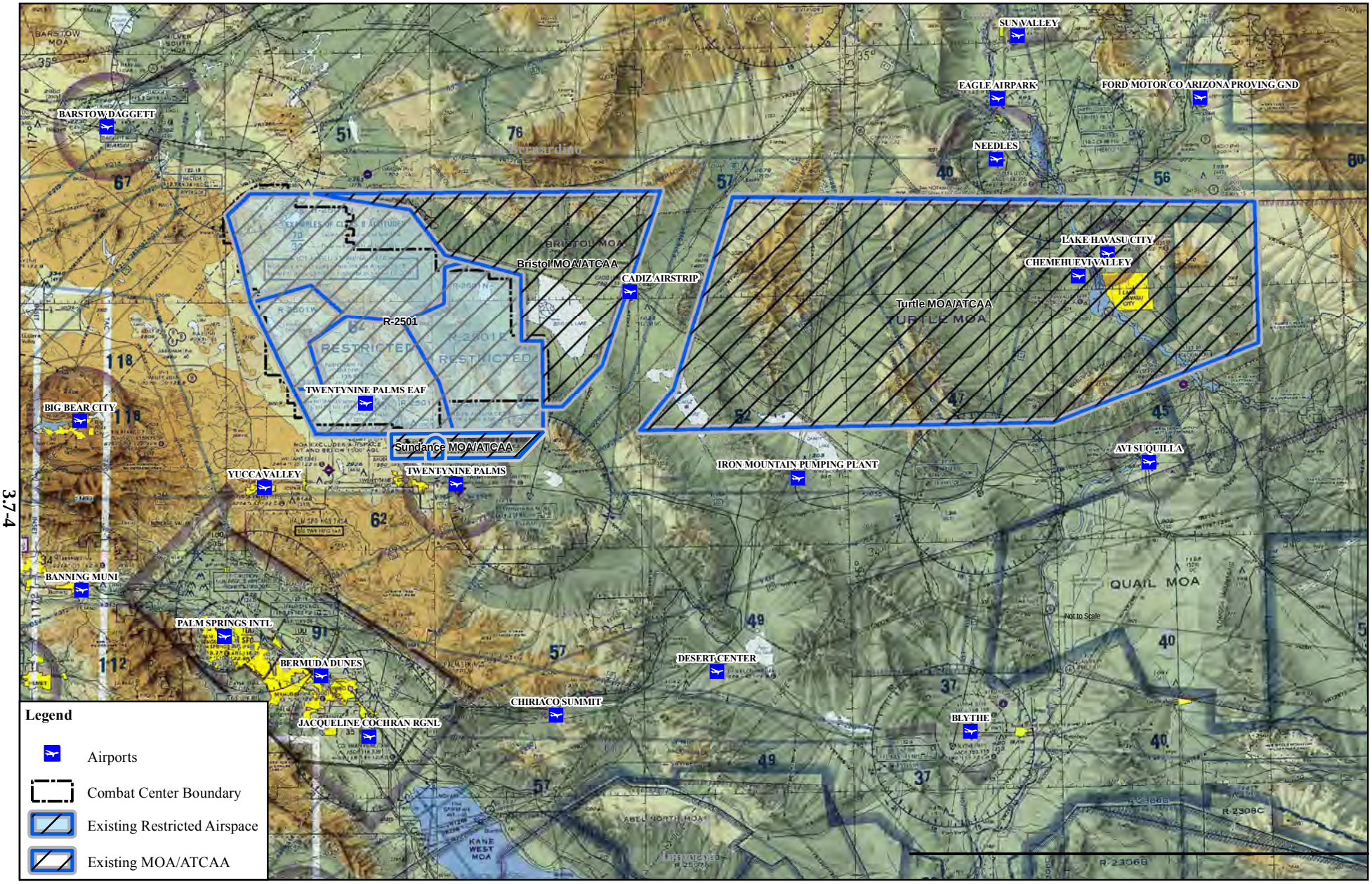
3.7.3 Existing Conditions

The following sections describe representative baseline uses of all military and civilian airspace within the Combat Center ROI to include those areas where new or modified SUA is proposed for the different alternatives described in Chapter 2. Table 3.7-2 compares the existing SUA with the proposed SUA configurations for each alternative. Figure 3.7-1 depicts the existing Combat Center SUA and Turtle MOA. Figures 3.7-2 through 3.7-4 depict the proposed SUA configurations for each alternative, overlaid on Sectional Aeronautical Charts published by the FAA National Aeronautical Charting Office, showing other airspace designations in the ROI. Jet routes are also included on these figures.

Table 3.7-2. Comparison of Existing and Proposed Alternative SUA

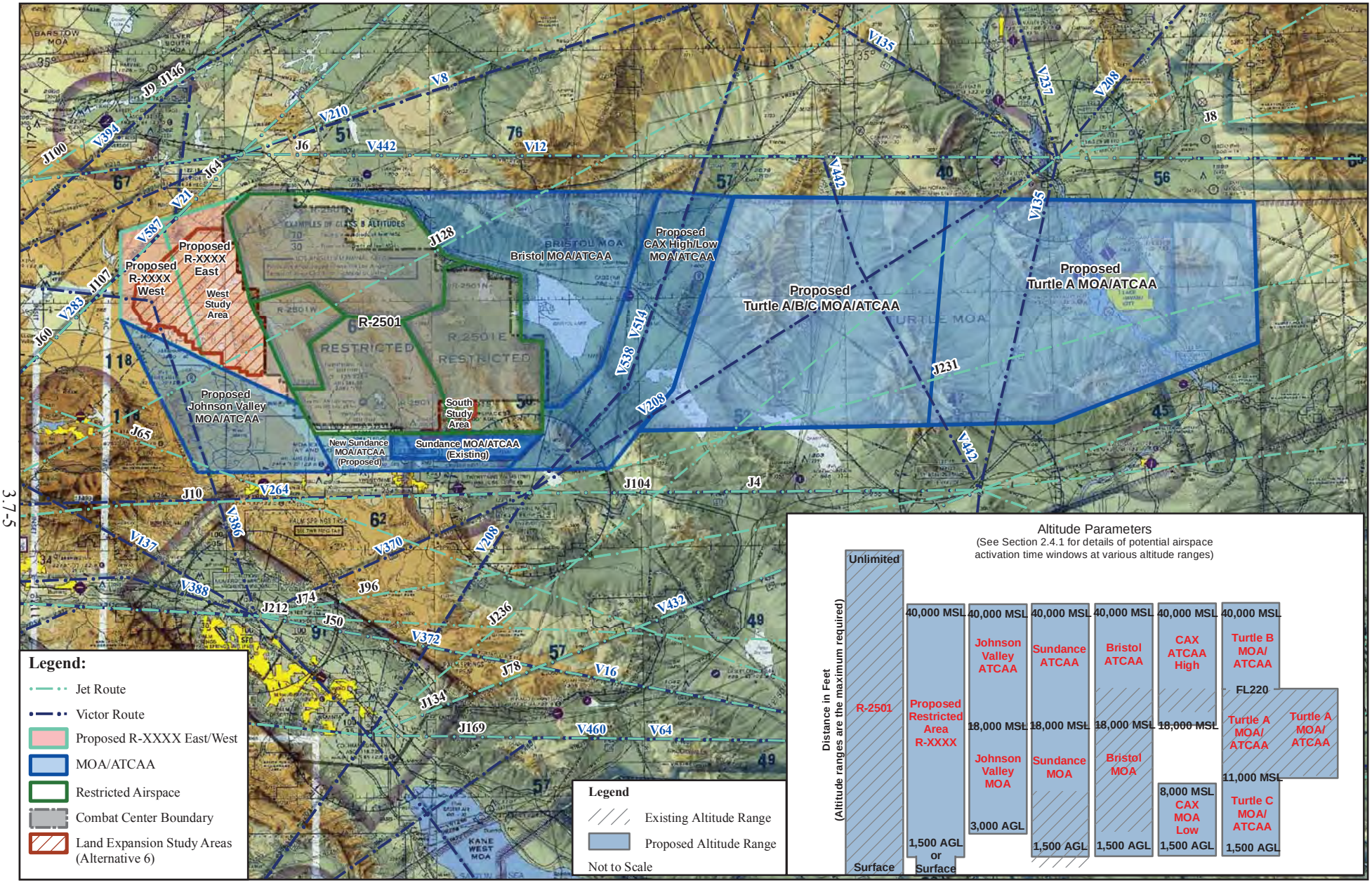
Airspace	Existing	Alternative 1, 4, 5, and 6 Proposed	Alternative 2 Proposed	Alternative 3 Proposed
R-2501 N/S/E/W	• Surface to unlimited	• No Change	• No Change	• No Change
Proposed Restricted Area R-XXXX	• Non-existent	• Surface (over controlled lands) to FL400 • Subdivided into East and West sectors	• Same as Alternative 1 with reduced boundaries	• Not proposed
Proposed Johnson Valley MOA/ATCAA	• Non-existent	• 3,000 feet AGL up to, but not including, FL180 • ATCAA from FL180 to FL400	• Same as Alternative 1 with reduced boundaries	• Not proposed
Sundance MOA	• 500 feet AGL up to and including 10,000 feet MSL • No overlying ATCAA	• Extend existing lateral boundaries • Raise floor to 1,500 feet AGL • Raise ceiling up to, but not including, FL180 • Establish ATCAA from FL180 to FL400	• Same as Alternative 1	• Same as Alternative 1
Bristol MOA/ATCAA	• 5,000 feet MSL up to, but not including, FL180 • ATCAA from FL180 to FL220	• Lower floor to 1,500 feet AGL • Raise ATCAA ceiling to FL400	• Same as Alternative 1	• Reclassify MOA/ATCAA as Restricted Area R-XXXXA • 5,000 feet MSL to FL400
Proposed CAX MOA/ATCAA	• Not designated – occasional use between FL190 and FL220 per LOA with FAA	• Establish Low MOA from 1,500 feet up to 8,000 feet MSL • Establish ATCAA from FL180 to FL400	• Same as Alternative 1	• Establish as Restricted Area R-XXXXB • 5,000 feet MSL to FL400
Turtle MOA/ATCAA	• MOA 11,000 feet MSL up to, but not including, FL180 • ATCAA from FL180 to FL220	• Turtle A MOA/ATCAA from 11,000 feet MSL to FL220 • Turtle B ATCAA from FL220 to FL400 • Turtle C MOA from 1,500 AGL to 11,000 feet MSL	• Same as Alternative 1	• Lower floor to 1,500 feet AGL • Raise ATCAA ceiling to FL400

Notes: AGL = above ground level; ATCAA = Air Traffic Control Assigned Airspace; FL = Flight Level; LOA = Letter of Agreement; MOA = Military Operations Area; MSL = mean sea level



Source: MAGTF Training Command 2009

Figure 3.7-1
Existing Special Use Airspace



Kilometers
0 5 10 20
0 5 10 20
Miles

Source: MAGTF Training Command 2009

Figure 3.7-2
Alternative 1,4,5,6: Airspace Establishment and Modification

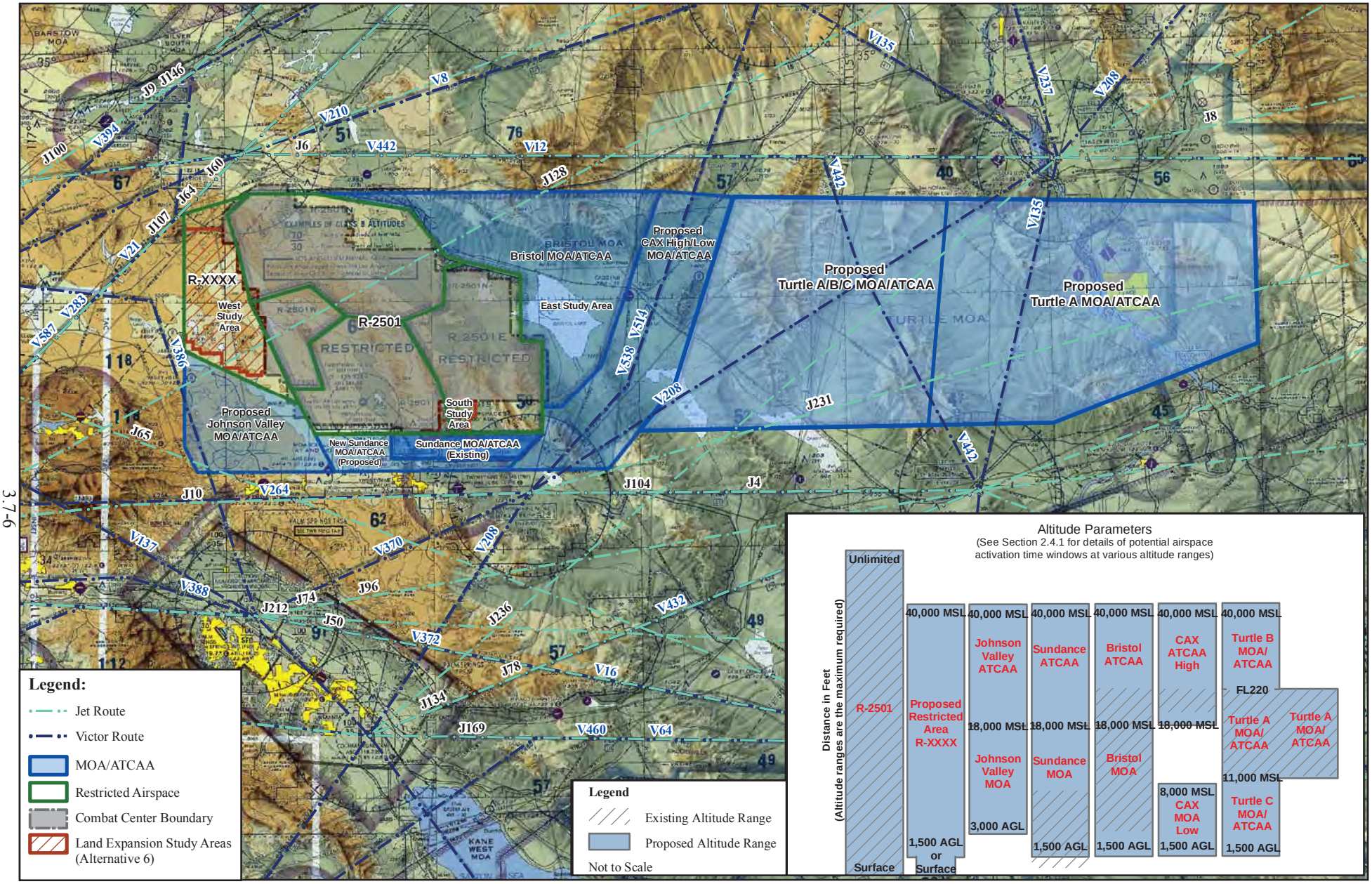
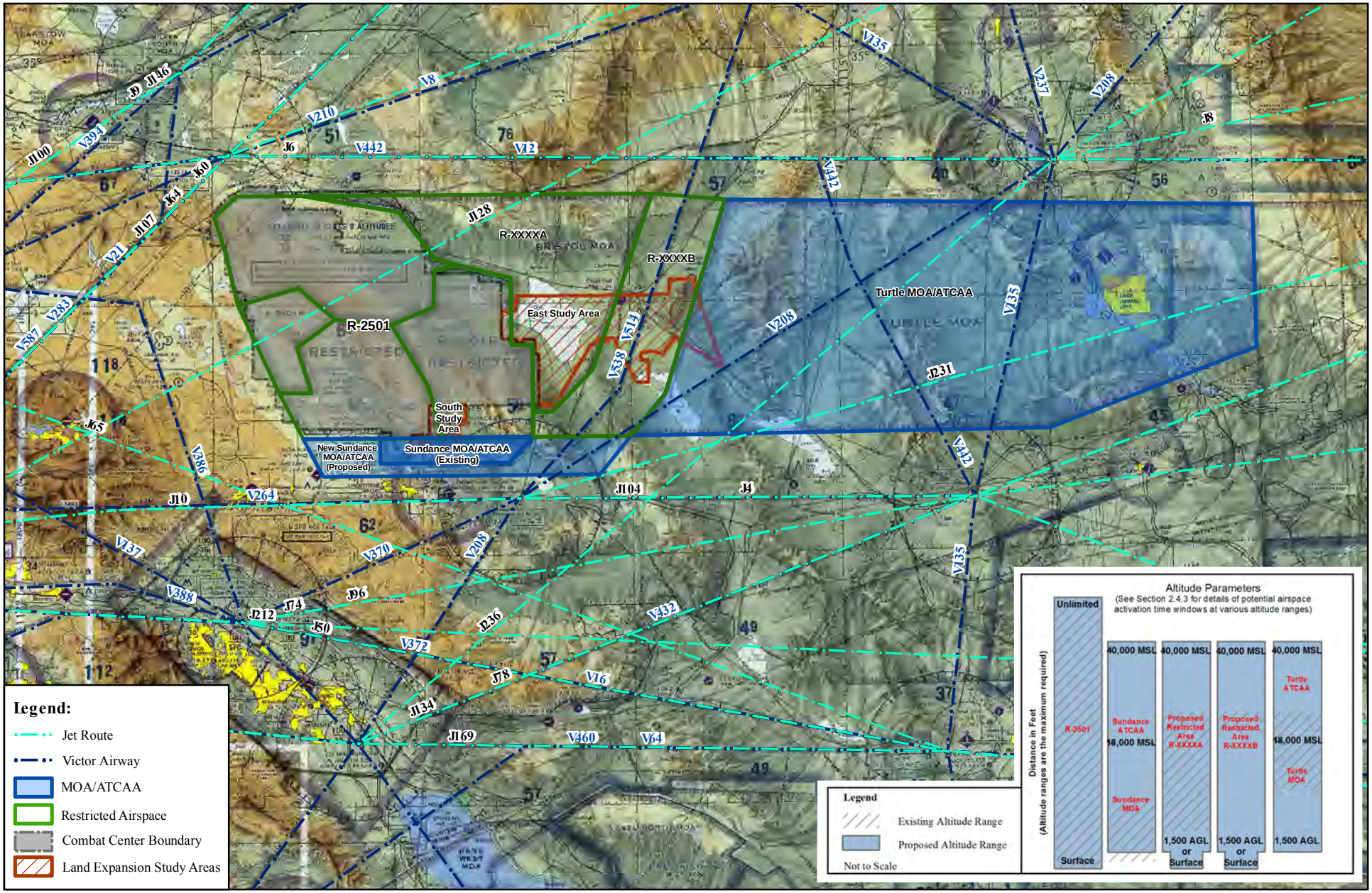


Figure 3.7-3
Alternative 2: Airspace Establishment and Modification



Kilometers
0 5 10 20
0 5 10 20
Miles

Source: MAGTF Training Command 2009

Figure 3.7-4
Alternative 3 : Airspace Establishment and Modification

N

3.7.3.1 Military Airspace Use

The following describes the types of SUA areas within the Combat Center complex and discusses the baseline use of each area.

Restricted Areas

Restricted Areas are established to contain air and ground-based hazardous activities such as artillery firing, aerial gunnery, or guided missile use within an airspace environment, thereby avoiding, to the extent possible, any potential risks to the public. As such, they provide a versatile and valuable training asset where different military service components can individually or jointly accomplish essential training mission requirements. Federal Aviation Regulations stipulate that flights by non-participating aircraft within these areas, while not wholly prohibited, are subject to restrictions. Most Restricted Areas are designated as joint use to optimize use of this airspace by Instrument Flight Rules (IFR)/Visual Flight Rules (VFR) aircraft when not scheduled for use and as authorized by the controlling ATC facility.

Restricted Areas typically extend from the ground surface to the higher altitudes (sometimes designated as "unlimited") required to contain the hazardous activities being conducted within this airspace. To establish a Restricted Area at the surface, the using agency must own, lease, or by agreement, control that surface area. Provisions must also be made to permit aerial access to any private and public use land beneath or bordering this airspace, such as establishing an exclusionary area around airfields.

Restricted Area R-2501, as shown in Figure 3.7-1, extends from the surface up to Flight Level (FL) 600, as needed. Per range operating procedures, this area is available for scheduling from the surface to FL260, 24 hours a day, 7 days a week. Altitudes above FL260 are not available between 9:00 a.m. - 12:00 p.m. and 5:00 - 9:00 p.m. local time daily, but may be scheduled during other hours with prior coordination through the Range Scheduling Office. When not in use, R-2501 is released to the LA ARTCC for transiting commercial air traffic through this airspace. Typically, R-2501 is scheduled an average of 300 days per year, 10-12 hours daily, with approximately 70% of the aircraft operations occurring during daytime hours (7:00 a.m. - 7:00 p.m. local time).

R-2501 is subdivided into North, South, East, and West sectors, as shown in Figure 3.7-1, to segregate flight activities supporting the individual air-to-ground, ground-to-air, and ground-to-ground training events within the range training areas described in Section 3.1. Table 3.7-3 lists the representative number of sortie-operations each aircraft conducts within each sector during the course of a single sortie mission. For example, an F/A-18 conducting flight maneuvers throughout all four sectors within R-2501 is counted as one sortie-operation for each sector.

Military Operations Areas/Air Traffic Control Assigned Airspace

Military Operations Areas are a non-regulatory type of SUA of defined vertical and lateral limits that are established and charted for the purpose of separating certain non-hazardous military flight activities from IFR traffic. They also identify for VFR aircraft pilots where concentrated military aircraft operations may occur. Flight activities within MOAs generally include air combat tactics, air intercepts, formation training, and high- and low-altitude tactics. The altitudes and flight profiles flown within a MOA can vary considerably, depending on the performance capabilities and mission requirements of the individual aircraft types.

Table 3.7-3. Representative Annual Baseline Airspace Use (Aircraft Sortie-Operations)

Aircraft Type	R-2501 North	R-2501 South	R-2501 East	R-2501 West	Sundance MOA	Bristol MOA/ ATCAA	Turtle MOA/ ATCAA	Total Operations
F/A-18	1093	1,394	1,079	1,033	102	237	See Note[1]	4938
F-5E	36	44	35	3	3	7	"	158
KC-130	358	456	352	339	34	80	"	1,619
AV-8B	895	1,140	883	848	83	194	"	4,043
AH-1	1,144	1,463	1,132	1,083	108	251	"	5,181
UH-1	359	458	354	339	34	79	"	1,623
CH-53E	555	707	547	525	52	121	"	2,507
MV-22[2]	64	8	69	126	12	12	"	8
UAS	286	366	282	270	27	63	"	1,294
Total	**4,790**	**6,036**	**4,733**	**4,596**	**455**	**1,044**	**"**	**21,670**

Notes: [1] Data not available because sortie-operations are not reported for Turtle MOA. Turtle MOA was active in 2009 for 1,129 hours over 232 days.
[2]MV-22s transit the airspace via perimeter routes to operate at Drop Zones (DZs) and other locations beneath the SUA shown in this table.
ATCAA = Air Traffic Control Assigned Airspace; MOA = Military Operations Area
Source: DoN 2009.

By definition, MOAs can only be established at altitudes up to, but not including, 18,000 feet above mean sea level (MSL) (FL180). Military Operations Area floors generally begin at 1,200 to 1,500 feet above ground level (AGL), but may be lower if mission requirements dictate and there is minimal adverse effect on any private or public land uses beneath or adjacent to this airspace. Because flight training maneuvers often require altitudes above FL180, ATCAAs are often established above MOAs with the same lateral boundaries to extend this training airspace to higher altitudes. Air Traffic Control Assigned Airspaces are not depicted on aeronautical charts, but are formalized in an LOA between the using agency and the controlling FAA ATC facility. Air Traffic Control Assigned Airspaces are above the altitudes used by VFR aircraft.

When a MOA/ATCAA is active, ATC either routes nonparticipating IFR traffic around this airspace or provides vertical or lateral separation from military operations while directing air traffic through this airspace. Visual Flight Rules aircraft may transit an active MOA but must do so using see-and-avoid procedures. Accordingly, military pilots must maintain situational awareness during their flight maneuvers to remain clear of any VFR aircraft observed transiting through this airspace. Visual Flight Rules pilots can check on the active status of a MOA by contacting the regional Flight Service Station or by requesting this status and traffic advisories through the controlling ATC agency.

The Combat Center airspace includes the Bristol MOA/ATCAA and the Sundance MOA, both of which border R-2501, as shown in Figure 3.7-1. The Bristol MOA/ATCAA extends from 5,000 feet MSL to FL220 and is used for air combat maneuvers, tactical air exercises, and aerial refueling, as well as a staging area for conducting flight activities in R-2501.

The Sundance MOA extends from 500 feet AGL to 10,000 feet MSL excluding a 1-mile radius of the Dale Airpark from the surface to 1,500 feet AGL, and a 1-mile wide corridor extending from the center of this airfield on a straight line south to the edge of the MOA. Because of the relatively narrow width of this MOA, it is used primarily during Enhanced Mojave Viper (EMV) exercises while transiting to and from range training areas R-2501. Table 3.7-3 indicates the representative annual number of sorties conducted in the Bristol MOA/ATCAA and Sundance MOA.

The Turtle MOA/ATCAA, located east of the Bristol MOA/ATCAA, extends from 11,000 feet MSL to FL220. This MOA/ATCAA is scheduled by the Yuma Marine Corps Air Station and frequently used in conjunction with Combat Center flight training activities.

Military Training Routes

Military Training Routes are used to conduct low-altitude tactical navigation training in both IFR and VFR weather conditions below 10,000 feet AGL at airspeeds in excess of 250 knots. These routes have both vertical and lateral defined limits within which flight operations are contained. Visual Flight Rules Routes (VRs) are only used under VFR conditions while IFR Routes (IRs) may be flown under both VFR and IFR conditions. Non-participating aircraft are not prohibited from flying within an MTR; however, see-and-avoid procedures must be exercised when operating through or near these routes. Military Training Route centerlines are depicted on Sectional Aeronautical Charts.

The MTRs in the vicinity of the Combat Center were introduced in Section 1.4.4. Instrument Flight Rules Routes IR-212, IR-213, IR-217, IR-250, and IR-252 are used primarily by C-17 and F/A-18 aircraft on an average of one to two times per month. VR-289 is used by C-17 and fighter type aircraft on an average of six times per month. It is not anticipated that the proposed Combat Center flight activities would significantly affect the current average use of these routes; therefore, they are not included in the EIS analyses.

Other Military Use Areas

Combined Arms Exercise Corridor

The airspace gap between the Bristol and Turtle MOA/ATCAAs, referred to as the CAX Corridor, is used to transition joint forces aircraft through this airspace during training exercises. This corridor is defined in an LOA with the FAA, which limits corridor use to altitudes between FL190 to FL220. This corridor is scheduled with the FAA on a limited basis when an ATC detachment is operational during training exercises.

Expeditionary Airfield, DZs, and ALZs

The EAF is located about 6 miles (9.6 km) northwest of Combat Center Mainside and is used by a variety of fixed-wing and rotary-wing aircraft conducting flight activities in the Combat Center range and airspace areas. This airfield has one runway (Runway 10/28), 8,000 feet long and 150 feet wide (2,438 meters long and 46 meters wide), made of aluminum-matting that can support all aircraft in the U.S. military inventory. Most operations occur on Runway 28 such that aircraft arrivals and departures are oriented in a westerly direction. The only instrument approach capability for the EAF is provided by a Tactical Air Navigation system located on the airfield.

The EAF airport traffic area extends from the airfield surface up to and including 4,600 feet MSL within a 4.3 nautical mile (NM) radius. This airport traffic area is under control of the EAF tower during those times when the airfield is operational. An LOA and range operating procedures outline requirements that promote safety of flight and define the coordination required to control live-fire of weapons and other projectile hazards to aircraft flights arriving and departing the EAF. This is accomplished through real-time coordination between the EAF control tower and Range Control.

As noted in Chapter 1, the Combat Center also includes the Camp Wilson Exercise Support Base, DZs, and ALZs for use in supporting tactical operations and exercises. Table 3.7-4 indicates the representative annual number of operations conducted at the EAF, Camp Wilson, and DZ Sandhill. The total numbers consider that a takeoff and landing or DZ approach/departure count as two operations for each aircraft

type. Operations at the EAF have been reduced considerably by deployment commitments since 2001 when operations at this airfield exceeded 16,000.

Table 3.7-4. Representative Annual Baseline Airfield Operations

Aircraft	EAF[1]	Camp Wilson	DZ Sandhill	Total
FA-18 A/C	16	0	0	16
F-18 E/F	16	0	0	16
AV-8B	35	0	0	35
UC-35	43	0	0	43
C-20	43	0	0	43
C-17	12	0	0	12
C-12	341	0	0	341
UAV	0	0	220	220
E-2/C-2	10	0	0	10
C-130	10	0	0	10
CH-53E	432	17	20	469
MV-22B	1742	0	98	1840
AH-1	392	0	0	392
UH-1	392	0	0	392
SAR	262	0	0	262
H-60	44	0	0	44
Total	3790	17	338	4145

Note: [1]Includes aircraft arrival, departure, and touch and go operations.
DZ = Drop Zone; EAF = Expeditionary Airfield
Source: DoN 2009

3.7.3.2 Civil Aviation Airspace Use

Civil aviation airspace use consists primarily of commercial air carriers such as air passenger and cargo jet aircraft and general aviation aircraft typically consisting of smaller single- and twin-engine aircraft. Commercial air traffic operates under IFR procedures at higher altitudes and is under the control of the ATC system. General aviation aircraft typically operate at lower altitudes (below 10,000 feet MSL) using VFR procedures that require pilots to visually maintain a safe distance from terrain, obstructions, and other aircraft. This section describes those Victor airways, jet routes, public airports, private airfields, and other areas in the ROI used by commercial and general aviation aircraft. Section 3.7.3.3 identifies the LA ARTCC sector flight operations and radar tracking data within the specific regions of the existing and proposed Combat Center SUA.

Figure 3.7-5 depicts the radar flight tracks for all IFR air traffic operating along the Victor airways, jet routes, and other transit routes within the southern California area over a typical busy 10-hour period. This provides a general illustration of where this route traffic flows on a daily basis relative to the Combat Center complex and other SUA within this region. As shown in this figure, the Combat Center SUA is located in the midst of the higher density routes. Instrument Flight Rules air traffic within the Combat Center ROI is under the control of the LA ARTCC, which provides radar services above 8,000 feet MSL as the Center's radar coverage permits. Federal Aviation Administration Terminal Radar Approach Control facilities provide radar services at the lower altitudes for airport arriving and departing aircraft. The following sections describe those routes shown in Figures 3.7-1 through 3.7-4 that transit within or near the existing and proposed Combat Center SUA. Much of the air traffic arriving and departing the Los Angeles airports are climbing or descending along these routes when transiting the Combat Center ROI.

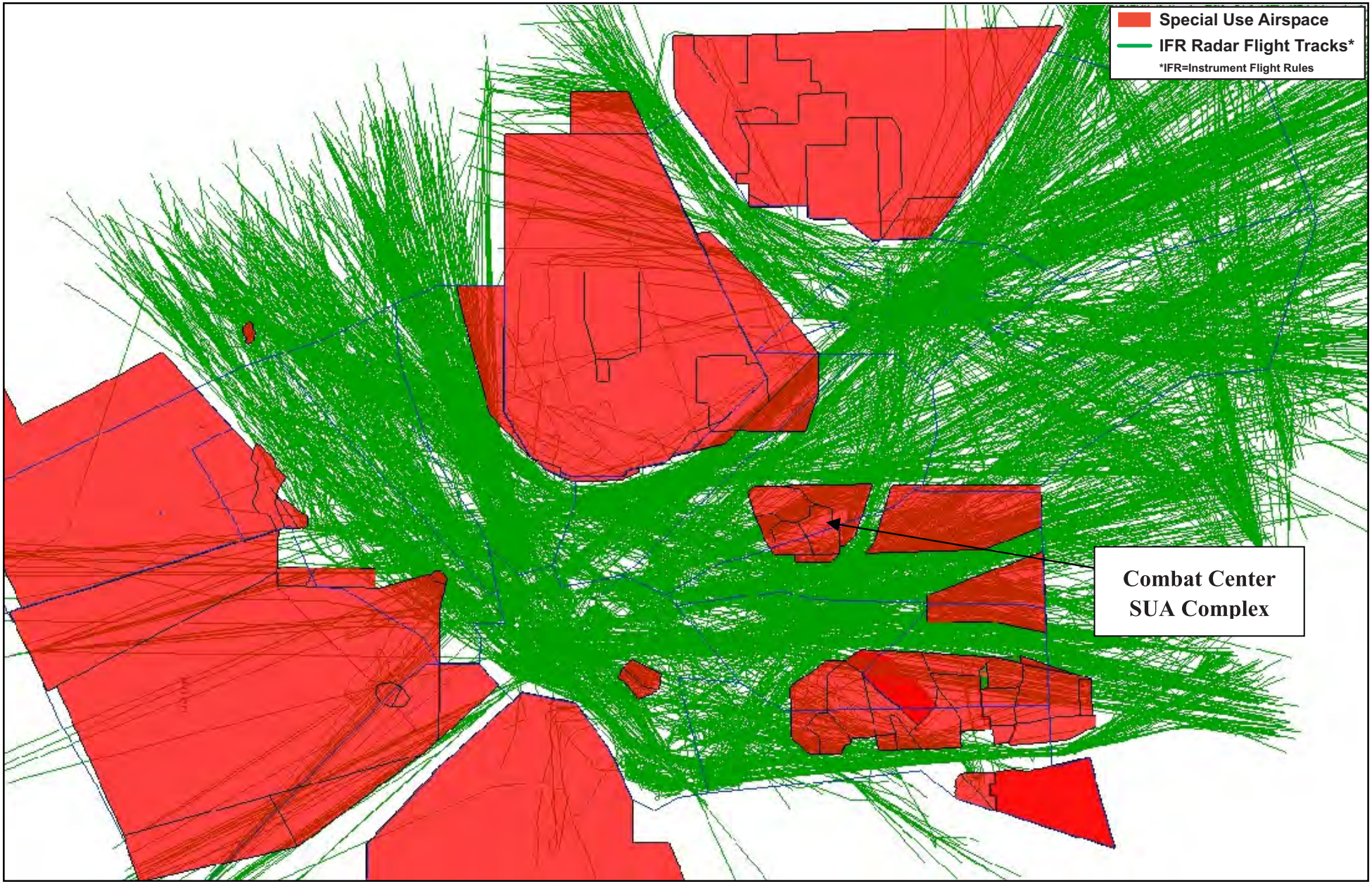


Figure 3.7-5
IFR Air Traffic Flows within Southern California and the Combat Center ROI

Victor Airways

Several Victor airways transit through or adjacent to the Combat Center airspace complex, as shown in Figures 3.7-1 through 3.7-4. Victor airways are designated on aeronautical charts with the letter "V" preceding the numbered route. Unless otherwise specified, these airways extend from 1,200 feet AGL up to, but not including, 18,000 feet MSL with lateral boundaries of 4 NM on each side of the centerline. Instrument Flight Rules aircraft using these airways operate at altitudes of odd and even thousands of feet below FL180, as assigned by ATC, for the direction of flight. General aviation VFR aircraft navigating along a Victor airway fly at 500-foot increments between the IFR altitudes to maintain adequate vertical and visual separation from the IFR traffic. Victor airways are within Class E airspace and are within the same altitude range as MOAs and Restricted Area altitudes below FL180.

The following describes the Victor airways relative to their proximity to the existing and proposed Combat Center SUA. The minimum altitudes flown by IFR air traffic along these routes in this region is generally 8,000 feet MSL which assures navigational aid reception, Air Route Traffic Control Center (ARTCC) radar coverage, and obstacle clearance. Section 3.7.3.3 includes flight operations data and radar tracks for air traffic operating within the altitude strata of the Victor airways transiting the Combat Center ROI.

- V 8-21 V 283-587 is a consolidated route between the Los Angeles area and Las Vegas and would transit the northwest portion of the proposed Restricted Area R-XXXX East/West.
- V 386 transits between the Palmdale/Victorville area and Palm Springs and would cross both the proposed Restricted Area R-XXXX West and Johnson Valley MOA.
- V 12 V 422 is a consolidated route transiting between the Los Angeles area and Needles and runs parallel to the northern boundary of the existing Combat Center SUA. This route would run parallel to the northern boundary of the proposed Restricted Area R-XXXX East/West and CAX MOA.
- VR 264 transits between the Los Angeles area, Twentynine Palms, and Parker, south of and parallel to the existing Combat Center complex. This route would transit south of the modified Sundance MOA boundary.
- V 208 transits between the San Diego and Needles areas while crossing through the western portion of the Turtle MOA. This route would transit the southern portion of the proposed CAX MOA.
- V 370 transits between Palm Springs and Twentynine Palms areas and would be clear of any of the proposed airspace.
- V 514-538 is a consolidated route transiting between Twentynine Palms and Las Vegas through the airspace proposed as the CAX MOA.
- V 422 and V 135 transit between the Parker and Needles areas, crossing through the Turtle MOA.

Jet Routes

Jet routes extend from FL180 up to FL450 in Class A airspace and have no defined widths. Only IFR aircraft operate on the jet routes at altitudes assigned by ATC to provide required vertical and horizontal separation from other IFR aircraft on these routes. Jet routes are generally within the same altitude range as the ATCAAs and the upper altitudes of Restricted Areas (FL180 and above).

As indicated previously, the jet routes in the ROI are used extensively by IFR air traffic transiting between Los Angeles basin airports and eastern destinations. Real time coordination between LA ARTCC, terminal ATC facilities, and the range scheduling agencies ensure the smooth flow of air traffic through this region with little effect on either civil or military flight activities. Most IFR air traffic operates above the altitudes normally used in the Combat Center airspace when transiting those jet routes through or near the Combat Center complex. When higher altitudes are needed for military operations (i.e., above FL260), this is coordinated in advance with LA ARTCC and ATC provides required separation from those operations or may "cap" military aircraft to achieve this separation.

The following describes the jet routes relative to their proximity to the existing and proposed SUA. Section 3.7.3.3 includes flight operations data and radar tracks for air traffic operating within the altitude strata of the jet routes transiting the Combat Center ROI. The minimum enroute altitude (MEA) for these routes is FL180 unless otherwise indicated. These published minimum altitudes provide obstacle clearance, and navigational aid and radio communications reception.

- J60-64-107 is a consolidated route between the Los Angeles basin area and Las Vegas and would transit the northwest portion of the proposed Restricted Area R-XXXX.
- J6 transits between Palmdale and Needles, running parallel to the northern boundary of R-2501 and the Bristol and Turtle MOA/ATCAAs. This route would run parallel to the northern boundary of the proposed Restricted Area R-XXXX and CAX ATCAA.
- J128 transits between Ontario and Peach Springs crossing through R-2501 and the Bristol ATCAA. This route would also transit the proposed Restricted Area R-XXXX East sector and Johnson Valley MOA/ATCAA. The MEA for this route segment is FL250; therefore, air traffic is above those altitudes normally used by military aircraft in the SUA.
- J65 transits between Palmdale and Blythe and would cross through the Johnson Valley ATCAA.
- J4-10-104 transits between the Los Angeles basin area and Parker, south of and parallel to the existing Combat Center SUA. The southern boundary of the modified Sundance MOA/ATCAA would be in closer proximity to this jet route.
- J236 transits between Thermal and Needles through the Turtle ATCAA. The proposed CAX ATCAA is west of this jet route. The MEA for this route segment is FL180.
- J10-231 transits between Ferdo and Prescott through the Turtle ATCAA. This route would transit the southern portion of the CAX ATCAA. The MEA for this route segment is FL230.

Area Navigation and GPS Routes

Several Area Navigation (RNAV) or GPS routes are established within the ROI for enroute navigation and airport instrument procedures. These routes do not depend on ground-based navigational aids, thereby allowing appropriately equipped aircraft to fly more direct routing with minimal conflicts with jet routes. Area Navigation routes, designated as "Q" routes on aeronautical charts, are established between FL180 and FL450. Flight safety along Q routes is ensured through a combination of aircraft navigation accuracy, route separation, and ATC radar monitoring and communications. Area Navigation Route Q2-4 transits between Palmdale and Blythe with an MEA of FL240, crossing near the southwest boundary of the modified Sundance MOA/ATCAA. Several of the larger public airports in the region have RNAV or GPS instrument approach procedures established for navigating to the airport runway environment when

weather conditions dictate and for pilot training and proficiency. Section 3.7.3.3 includes flight operations data and radar tracks for air traffic operating within the altitude strata of this RNAV route.

Visual Flight Rules Air Traffic Routes

General aviation pilots operating under VFR procedures commonly use visual flight routes that minimize travel distances and provide safe clearance from obstacles and congested areas. To enhance their flight safety, many pilots use VFR flight following a radar traffic information service provided by ATC as radio and radar coverage and controller workload permit. This requires the aircraft be equipped with a radio and transponder and pilots be familiar with the ATC radio frequencies and basic communication protocols needed for flight following service. Pilots using this service establish radio and radar contact with the controlling ATC radar facility to receive traffic advisories, safety alerts, general navigation guidance, or emergency assistance, as necessary. Such assistance helps VFR pilots be more alert to other air traffic in the area and take avoidance actions, as needed, to remain clear of this traffic. This service may also enable them to transit Class B or C airspace once ATC provides a clearance or authorization to do so. Controllers may also clear VFR aircraft through joint use Restricted Areas on occasion when not scheduled for military use. Pilots using the flight following service are not relieved of their responsibility to continue exercising see-and-avoid, remain in visual flight weather conditions, and comply with Federal Aviation Regulations.

Although not required, pilots are encouraged to file VFR flight plans through a Flight Service Station or a control tower, if available. The purpose of a VFR flight plan is to provide the FAA system with such information as pilot and passenger names, destination, route of flight, estimated arrival time, etc., in the event a search and rescue may be required. Filing a VFR flight plan does not require contact with ATC.

General aviation operations in the Combat Center region include those IFR and VFR aircraft operating from the different public airports and private airfields in the region. Some of the more commonly flown VFR routes are those providing the most direct routing between the higher use airports in the local area such as Lake Havasu, Palm Springs, Barstow-Dagget, Hemet, Apple Valley, and Big Bear. Those areas where VFR flights are most prevalent are generally north, west, and south of R-2501, within the "CAX corridor" between the Bristol and Turtle MOAs, and beneath the eastern portion of the Turtle MOA. As the enroute controlling ATC agency for this region, the LA ARTCC may provide VFR flight following for VFR aircraft as requested and radio and radar coverage permits. Pilots can also learn the active status of the Combat Center SUA through Flight Service Station advisories, NOTAMs, and direct contact with the controlling ATC facility.

Public Airports

Table 3.7-5 lists the public airports located within the ROI and shown in Figure 3.7-1 with their operations data and an indication of any instrument approach procedures published for each airport. An instrument approach is a flight path navigated by a pilot to a runway environment without visual reference to the ground using aircraft instruments and ground-based electronic or communications systems or devices. None of these airports are located directly beneath the existing Combat Center SUA; however, some may be within, or in close proximity to, the proposed new or modified airspace. Those airports noted as having RNAV, GPS, or other published instrument approach capabilities are not currently affected by Combat Center flight activities. See Appendix D for an explanation of the different airspace classifications established around airports with and without an operating control tower.

The Lake Havasu (Class E airspace) and Chemehuevi airports are located beneath the Turtle MOA. The higher floor of this MOA (11,000 feet MSL) provides airspace for VFR aircraft to operate below the

active MOA. The Needles airport (Class E airspace) is located about 5 miles (8 km) north of the Turtle MOA/ATCAA.

The Twentynine Palms (Class E airspace), Williams, and Yucca Valley airports are located within 10 miles of the R-2501 and Sundance MOA southern boundaries. They would be in closer proximity to the modified Sundance MOA southern boundary.

All other public airports listed in Table 3.7-5 are located at least 15 miles from the existing or proposed SUA boundaries. Class D airspace is established for the Palm Springs, Victorville, and Riverside airports having control towers for the higher density operations conducted at those airports. The Barstow-Daggett, Avi Suquilla, Big Bear, Hemet-Ryan, and Apple Valley airports are located within Class E airspace beginning at 700 feet above the surface. The Eagle Airpark and Hesperia airports are located in uncontrolled airspace.

Table 3.7-5. Public Airport Annual Operations in the ROI

Airport (Identifier)	Instrument Approach Capabilities	General Aviation (local and itinerant)	Air Carrier	Air Taxi	Military	Total	Daily Average
Palm Springs (PSP)	Yes	38,398	11,319	19,753	1,341	70,811	194
Jacqueline Cochran (TRM)	Yes	75,000	0	500	1,000	76,500	209
Bermuda Dunes (UDD)	Yes	32,000	0	8,000	20	40,020	109
Barstow-Daggett (KDAG)	Yes	18,500	0	0	18,000	36,500	100
Roy Williams (L80)	No	6,188	0	0	0	6,188	17
Yucca Valley (L22)	No	14,500	0	0	0	14,500	40
Twentynine Palms (TNP)	Yes	17,500	0	0	500	18,000	49
Chiriaco Summit (L77)	No	6,000	0	0	0	6,000	16
Lake Havasu City (HII)	Yes	31,664	0	1700	126	33,490	92
Chemehuevi Valley (49X)	No	4,000	0	0	0	4000	11
Needles ((EED)	Yes	10,500	0	0	0	10,500	29
Eagle Airpark (A-09)	No	6000	0	0	0	6,000	16
Avi Suquilla (P20)	No	10,200	0	0	0	10,200	28
Big Bear City (L35)	Yes	28,000	0	0	2000	30,000	82
Hemet-Ryan	Yes	75,444	0	0	0	75,444	207
Victorville Logistics	Yes	40,599	1314	1686	15,349	58,948	162
Apple Valley	Yes	37,500	0	0	0	37,500	103
Riverside Municipal	Yes	78,424	0	268	186	78,878	216
Hesperia	No	6,000	0	0	0	6,000	16
Banning Municipal (BNG)	No	9,450	0	0	0	9,450	26

Source: FAA 2010.

Private Airfields

There are several charted private airfields located beneath, or within close proximity to, the existing and proposed SUA as shown in Figures 3.7-1 through 3.7-4. These airfields are all unattended and are not for public use. No operations data are available for these airfields but they generally have limited based aircraft and operations. However, they are considered in the overall review of potential effects of the proposed airspace SUA on civil airspace use in the ROI.

The Dale airfield is located inside the Sundance MOA boundary where an exclusion area has been established from the surface up to 1,500 feet AGL with a 1 NM corridor from the airport center south to the MOA boundary. The Bauer, Crosswinds, and Hi Desert airfields are within a few miles of the existing Sundance MOA boundary and would be within, or in close proximity of, the modified Sundance southern boundary. The Kelly, B&E, and Abraham airfields are located within the southern boundary of the proposed Restricted Area R-XXXX West sector and the Valley Vista airfield would be beneath the proposed Johnson Valley MOA. The Cadiz airfield is located along the eastern Bristol MOA boundary. The proposed CAX MOA would overlie both the Cadiz and Danby airfields.

Other airfields within 2 to 10 miles (3 to 16 km) of the existing SUA and not beneath any of the proposed SUA include Ludlow, located north of R-2501, Camino, Massey, and Sergio located north of the Turtle MOA, and Iron Mountain and Gene Wash Reservoir located south of the Turtle MOA.

Other public and private airports/airfields are also located in the general region that may have aircraft operations transiting near or within this proposed airspace. Sectional Aeronautical Charts show that the modified Sundance MOA would include areas where glider operations and parachute jumping occur.

3.7.3.3 Federal Aviation Administration Airspace Usage Data

Flight operations and radar tracking data were provided by the FAA for the LA ARTCC ATC low (below FL180) and high (FL180 and above) sectors potentially affected by the proposed SUA configurations and projected aircraft operations. This data covers a 24-hour period with much of the flights occurring within peak traffic periods throughout the day. This 2010 data was derived from the Performance Data Analysis and Reporting System, which provides a means for tracking and monitoring day-to-day air traffic operations, identifying situations requiring change or improvement, and assessing the potential consequences of an airspace modification. This data will serve as a basis for further FAA analysis of any specific impacts the SUA proposals may have on IFR air traffic flows and ATC operations and what measures would be considered to mitigate such impacts.

The FAA selected a random date for each day of the week between April 2009 and March 2010 to capture representative IFR flight operations during each season of the year. The total flight operations for each of those dates are shown in Table 3.7-6. December 8, 2009 was selected by the FAA for a detailed airspace analysis of all IFR jet, turboprop, and propeller aircraft that transited the Combat Center ROI within specified altitude strata. Table 3.7-7 indicates the total number of IFR flights that operated on that date within a 3 NM buffer of the SUA proposals as they differed for the six alternatives. As noted for this table, the total number of flights accounts for those aircraft climbing and descending through multiple altitude strata while transiting through this airspace.

Figures 3.7-6 through 3.7-11 depict the cumulative radar flight tracks for all IFR flights/altitudes noted in Table 3.7-7 relative to the SUA configurations proposed for all alternatives.

Table 3.7-6. IFR Flights within LA ARTCC Low/High Sectors for Random Seasonal Dates

Date*	Day	Total IFR Flights
June 14, 2009	Sunday	1705
October 19, 2009	Monday	1669
December 8, 2009	Tuesday	1602
April 15, 2009	Wednesday	1734
January 28, 2010	Thursday	1874
March 19, 2010	Friday	2030
August 1, 2009	Saturday	1571
Average		1741

Note: *Date selected by FAA for flight track analysis shown in Figures 3.7-6 through 3.7-11.
IFR = Instrument Flight Rules

Table 3.7-7. Total IFR Flights by Altitude Strata Within Proposed/Modified SUA

Airspace	Base Altitude - 5,000 MSL	5,000-13,000 MSL	13,000 MSL–FL180	FL180-270	FL270-400	Total Flights[1]
Proposed Restricted Area R-XXXX and Johnson Valley MOA/ATCAA for Alternatives 1, 4, 5, and 6						
R-XXXX and Johnson Valley MOA	0	20	35	250	299	604
Proposed Restricted Area R-XXXX and Johnson Valley MOA/ATCAA for Alternative 2						
R-XXXX and Johnson Valley MOA	0	16	25	195	296	532
Other Airspace Modifications for Alternatives 1-6						
Modified Sundance MOA/ATCAA	0	39	59	149	321	568
Modified Bristol SUA	-	6	0	44	185	235
Proposed CAX Low/ High SUA	-	12	11	53	109	185
Modified Turtle A/B/C MOA/ATCAA	-	26	9	65	237	337

Notes: [1]Total number of flights through individual shelf altitudes adds up to more than daily flight total due to aircraft climbing or descending through multiple shelves.
ATCAA = Air Traffic Control Assigned Airspace; FL = Flight Level; MOA = Military Operations Area; MSL = mean sea level; SUA = Special Use Airspace

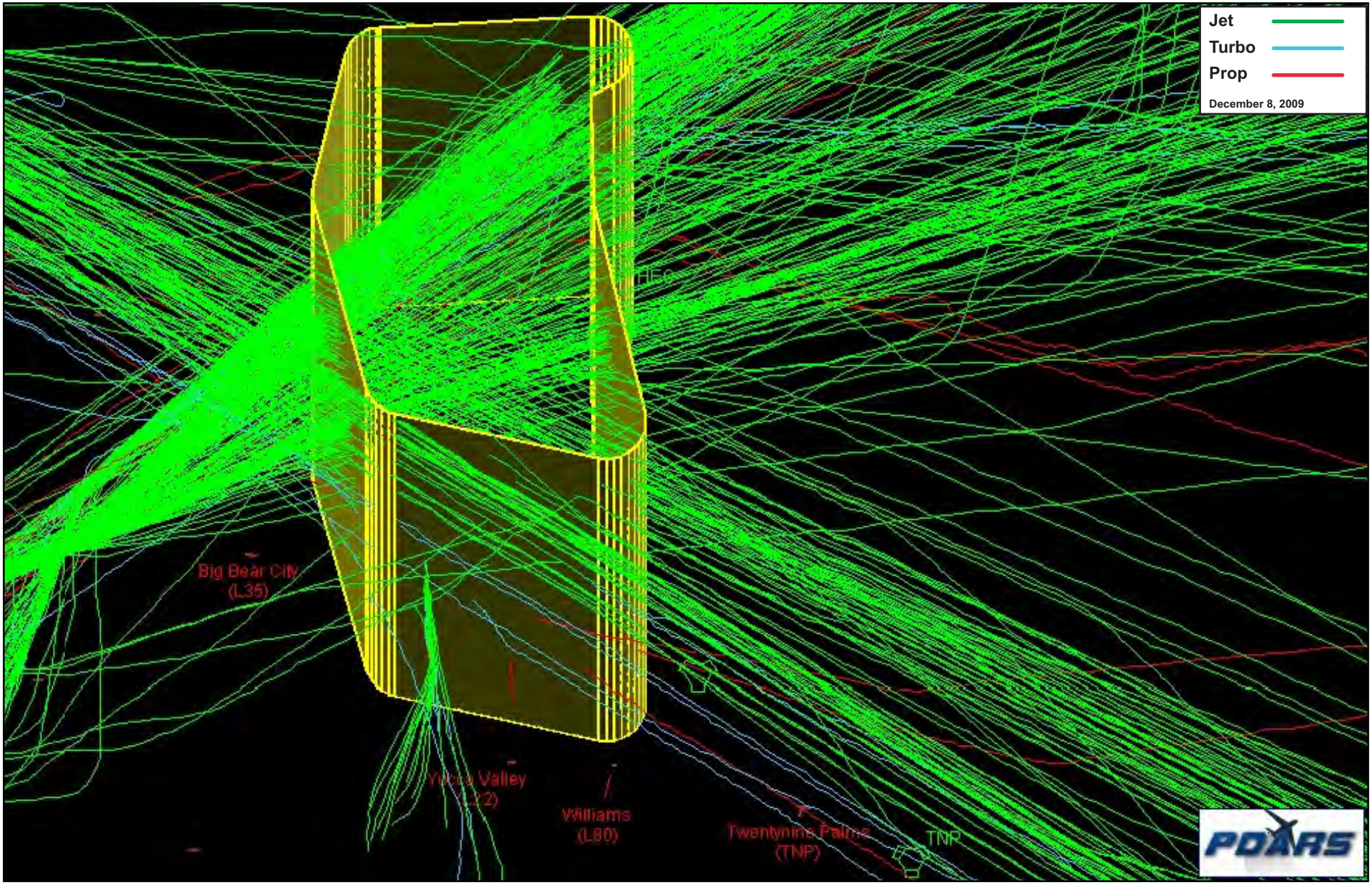


Figure 3.7-6
Flight Tracks through Proposed Johnson Valley Restricted Area/MOA for Alternatives 1, 4, 5, and 6

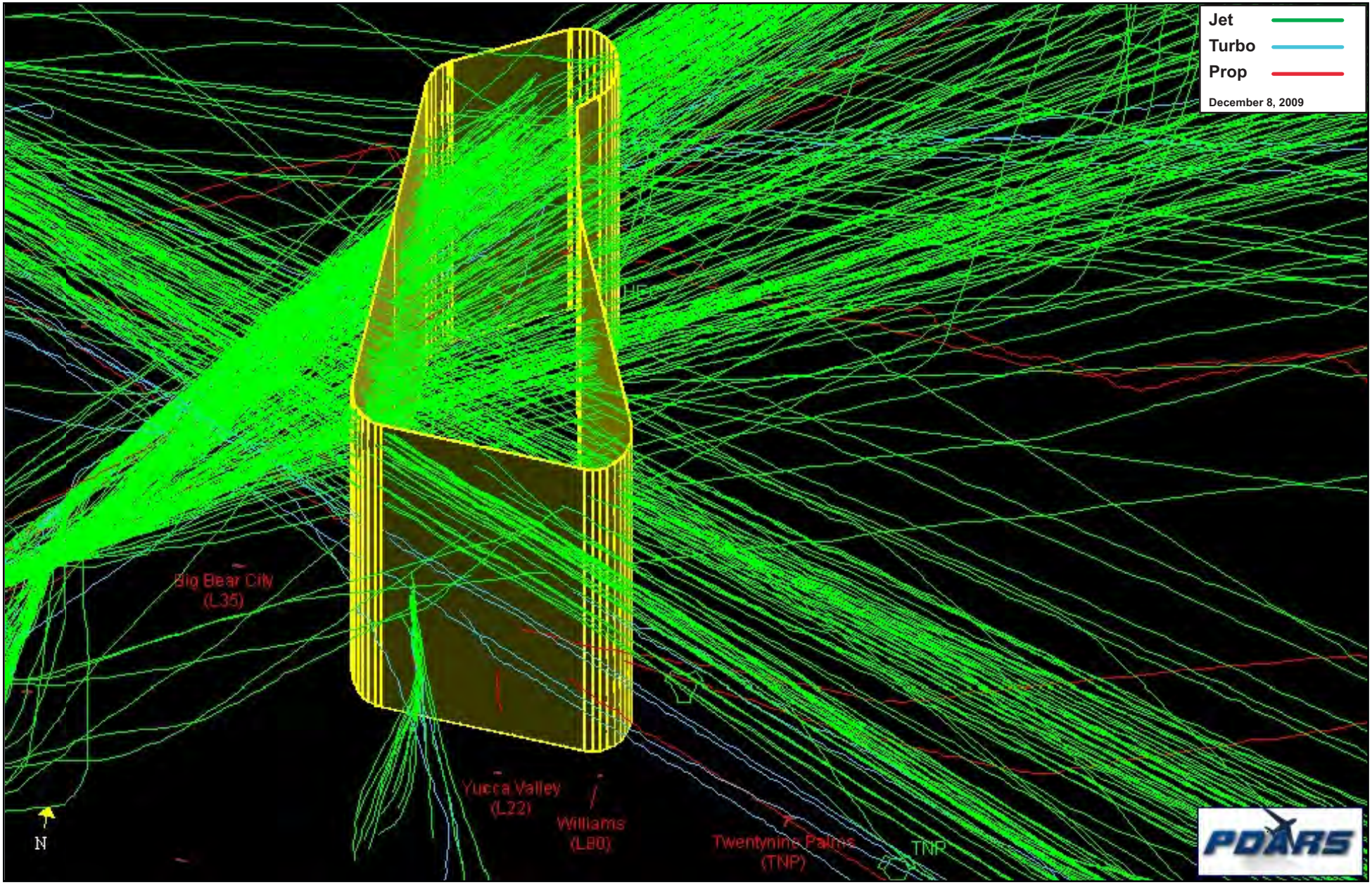


Figure 3.7-7
Flight Tracks through Proposed Johnson Valley Restricted Area/MOA for Alternative 2

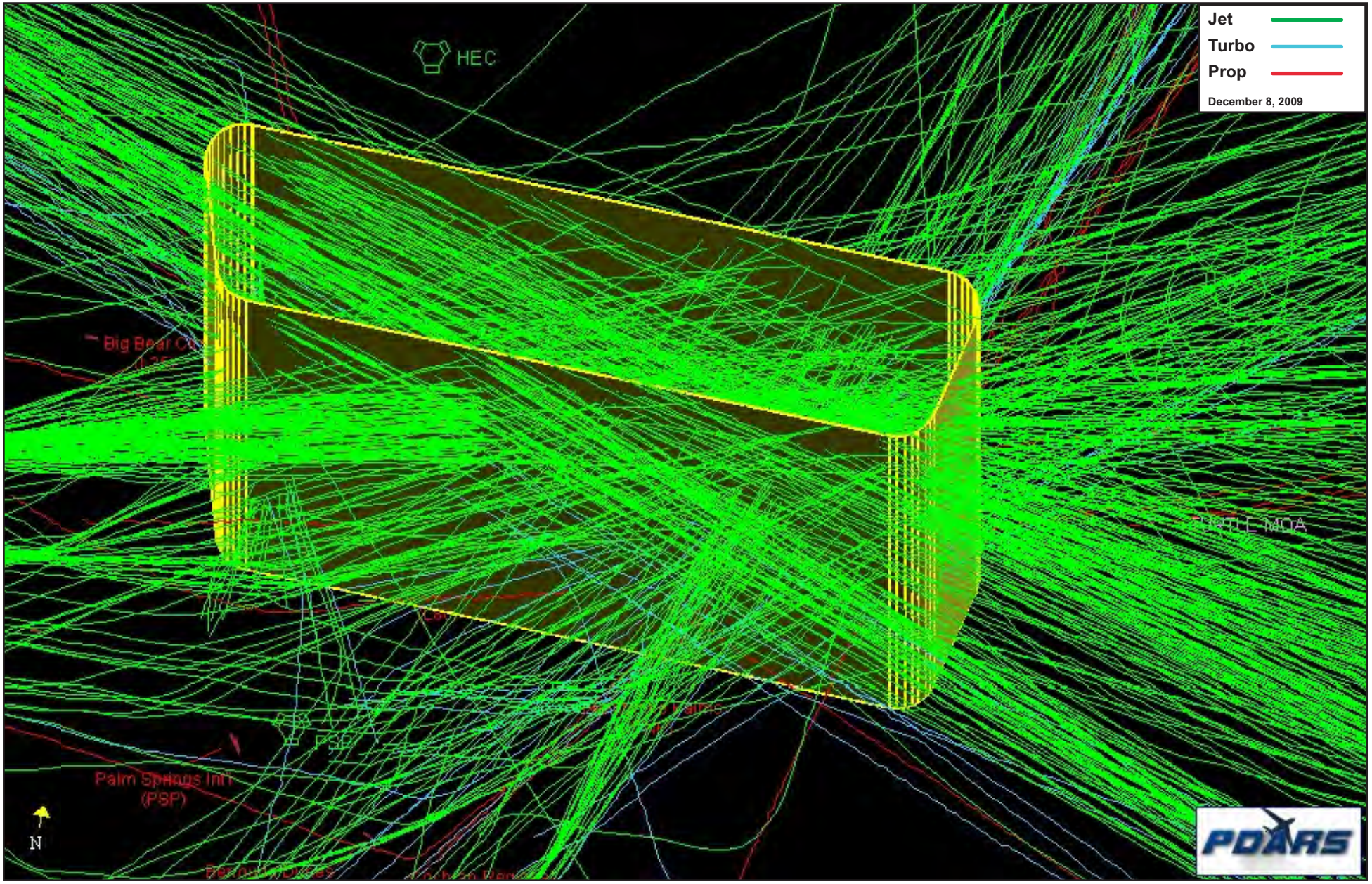


Figure 3.7-8
Flight Tracks through Proposed Sundance MOA/ATCAA Modification for all Alternatives

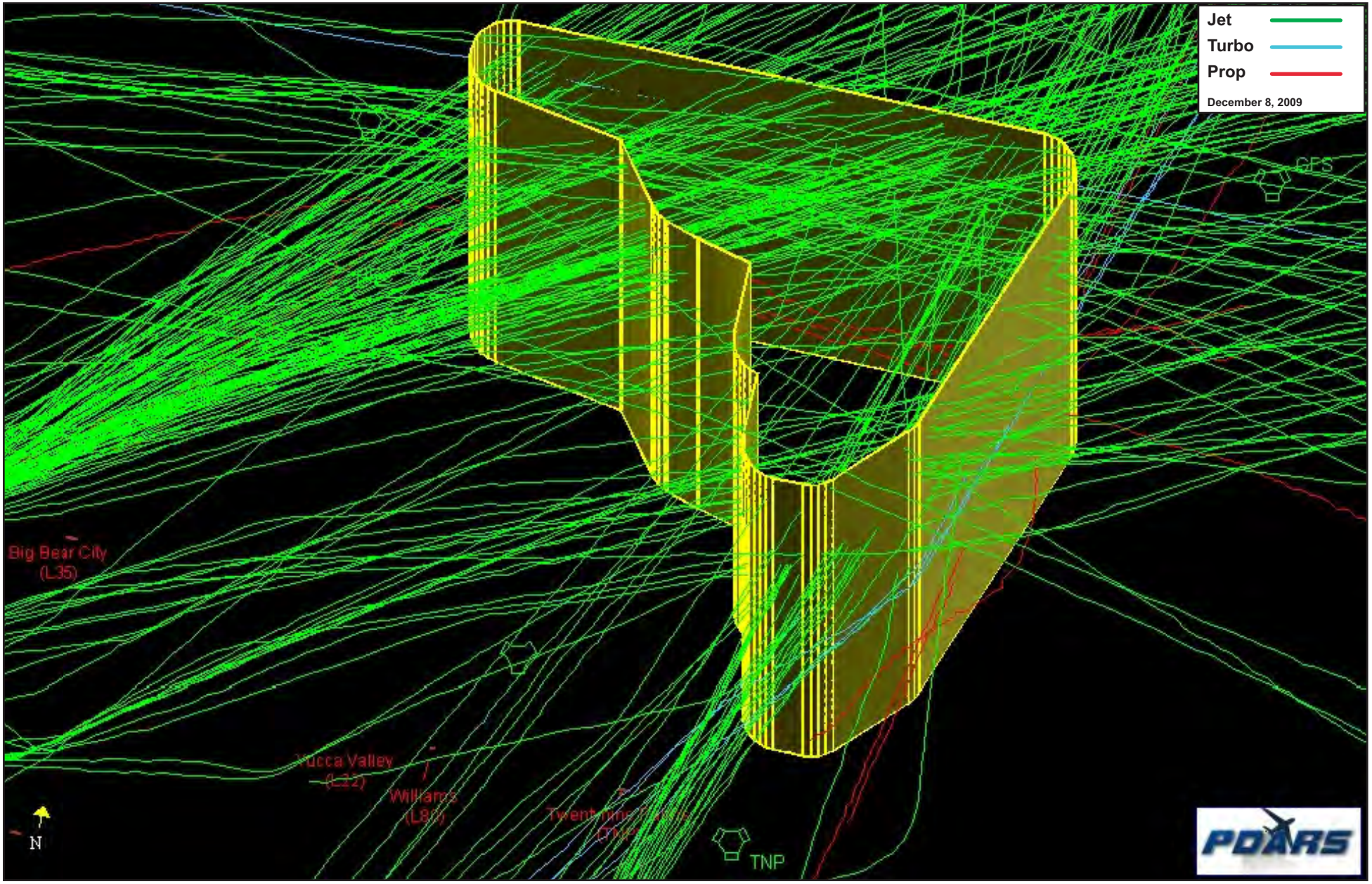


Figure 3.7-9
Flight Tracks through Proposed Bristol SUA Modification for All Alternatives

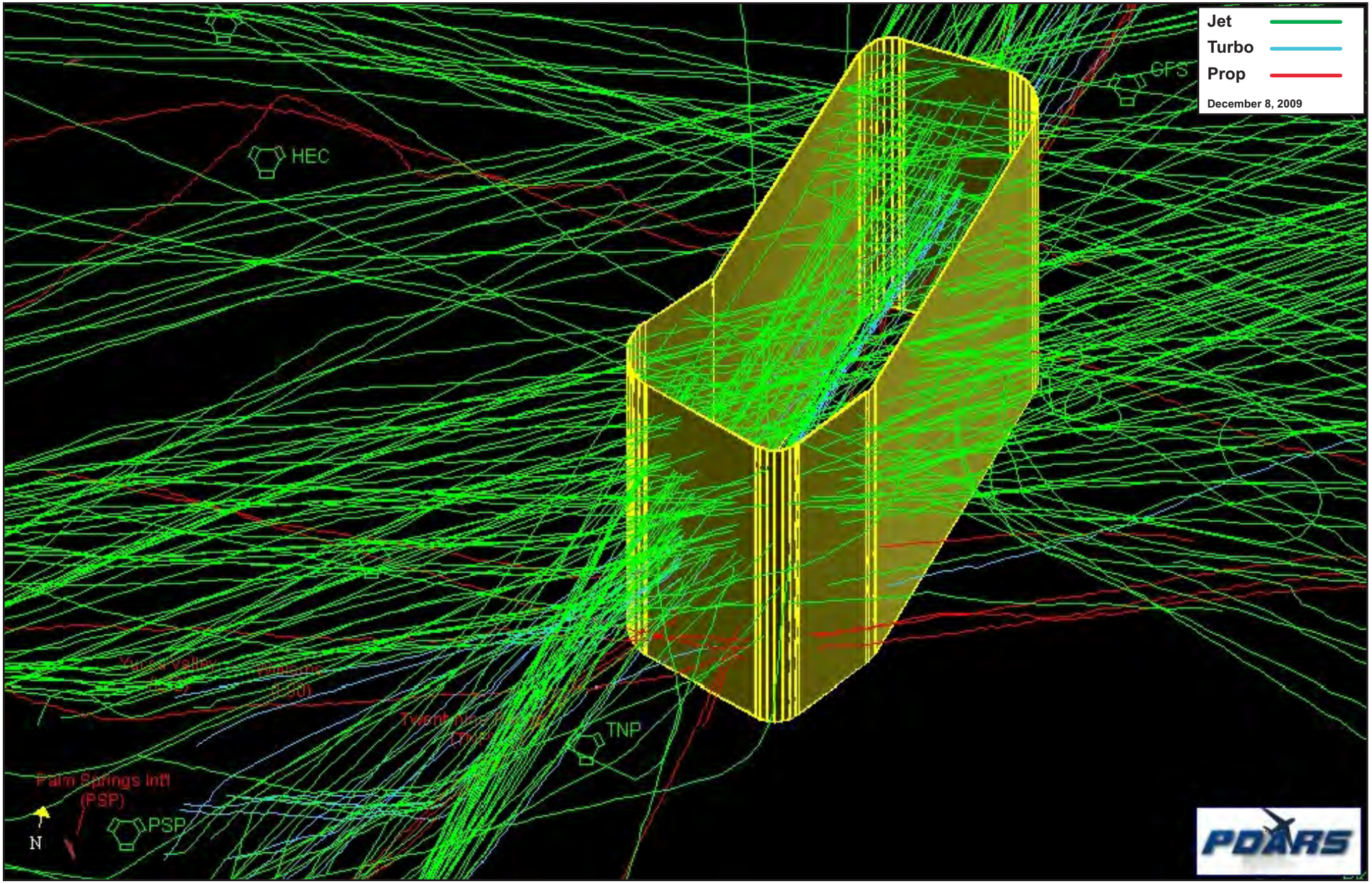


Figure 3.7-10
Flight Tracks through Proposed CAX SUA for All Alternatives

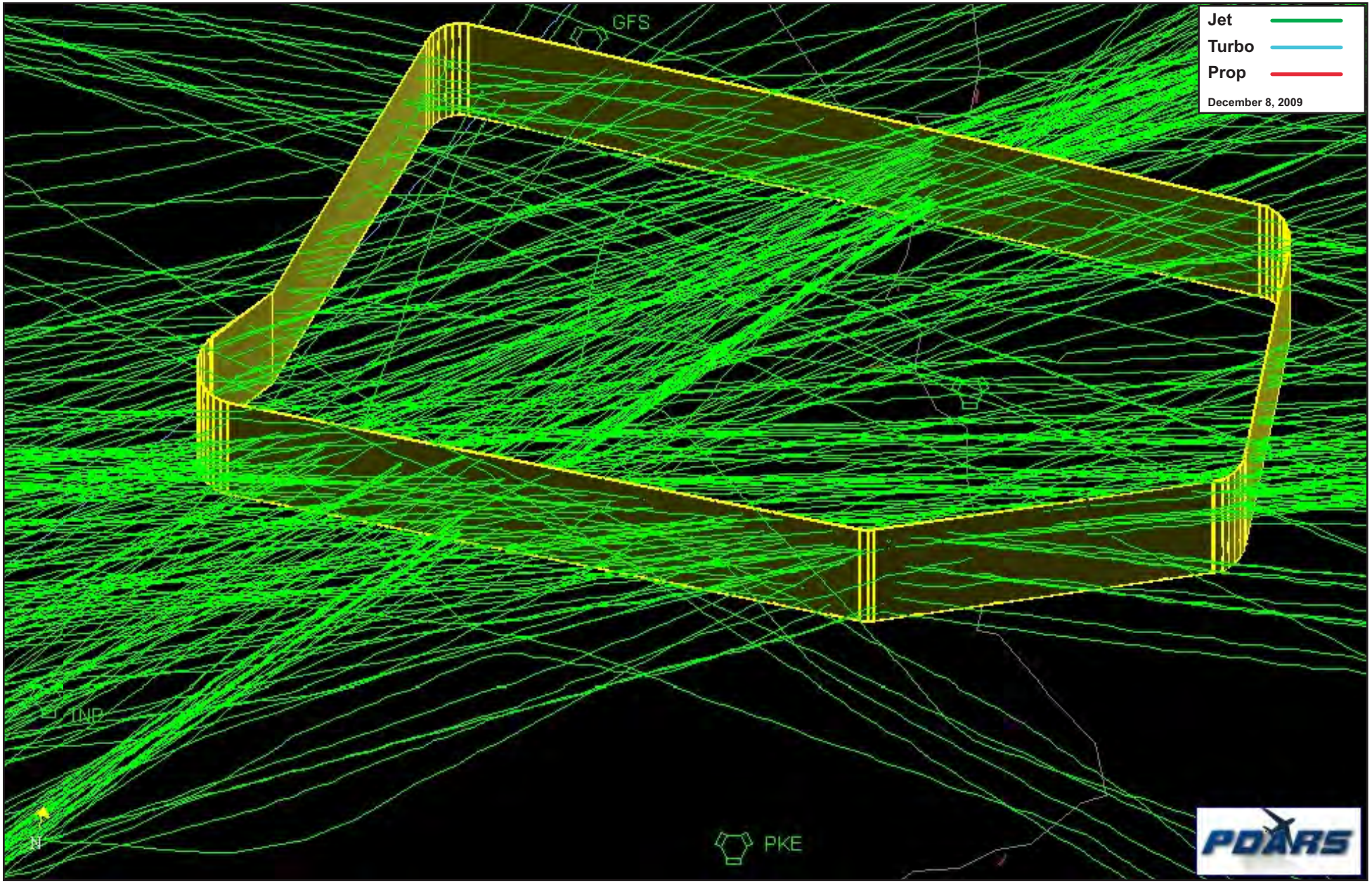


Figure 3.7-11
Flight Tracks through Proposed Turtle MOA/ATCAA Modification for All Alternatives

In response to public comments on the Draft EIS, additional data were requested from the FAA on the hourly flights typically transiting the Combat Center SUA on a daily basis. The FAA provided daily flight data for those LA ARTCC sectors where R-XXXX East/West and the Johnson Valley MOA/ATCAA are proposed and average weekly data for all sectors encompassing the Combat Center ROI.

The FAA selected Monday, April 25, 2011 as a random date representing the average daily arrival, departure, and overflight air traffic along those routes crossing the Johnson Valley region. Table 3.7-8 reflects flight totals for the times shown over a 24-hour period. While Tables 3.7-7 and 3.7-8 are based on different 2010 and 2011 data, the flight totals shown for the indicated altitudes and timeframes in both tables are generally representative of LA ARTCC's daily air traffic flows through this region. The combined information in these tables indicates the highest air traffic levels transiting the Johnson Valley area occurs between 8:00 a.m. and noon with high levels continuing through mid-evening while flying at altitudes above FL180.

Table 3.7-8. Total Hourly IFR Flights Within the Proposed SUA

Time Period	Total Flights Transiting Area Proposed for R-XXXX and Johnson Valley MOA/ATCAA[1]
Midnight - 6:00 a.m.	9
6:00-8:00 a.m.	60
8:00-10:00 a.m.	109
10:00 p.m.-noon	119
Noon-2:00 p.m.	83
2:00-4:00 p.m.	89
4:00-6:00 p.m.	87
6:00-8:00 p.m.	86
8:00-10:00 p.m.	95
10:00 p.m.-midnight	57
Total Flights	794

Note: [1]Flight totals for the individual time periods could add up to more than the daily total due to the same aircraft flying within the airspace across multiple time periods.
ATCAA = Air Traffic Control Assigned Airspace; MOA = Military Operations Area

The FAA weekly flight data reflects the average hourly flights across the Combat Center ROI from April 15 to May 12, 2011. The flight totals shown in this data generally reflect the same trend in air traffic densities as shown in Tables 3.7-7 and 3.7-8. This data indicates the highest concentration occurs along routes crossing the proposed Johnson Valley SUA (R-XXXX and MOA/ATCAA) with slightly lower numbers transiting R-2501 and the Bristol and Turtle MOA/ATCAAs. Fewer average hourly flights occur within the Sundance and proposed CAX MOAs and ATCAAs.

3.8 AIR QUALITY

3.8.1 Definition of Resource

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 National Ambient Air Quality Standards (NAAQS), while the California Air Resources Board (ARB) 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 state maximum acceptable pollutant concentrations that are not to be equaled or exceeded. The national and state ambient air quality standards are shown in Table 3.8-1. In California, the ARB is responsible for enforcing both the federal and state air pollution standards. The MDAQMD has been delegated the authority to enforce the federal and state standards in the project area.

Table 3.8-1. California and National Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	NATIONAL STANDARDS[a]	
			Primary[b,c]	Secondary[b,d]
O_3	1-hour	0.09 ppm (180 µg/m^3)	—	—
	8-hour	0.070 ppm (137 µg/m^3)	0.075 ppm (147 µg/m^3)	Same as primary
CO	8-hour	9 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)	—
NO_2	Annual	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)	Same as primary
	1-hour	0.18 ppm (339 µg/m^3)	0.10 ppm (188 µg/m^3)	—
SO_2	3-hour	—	—	0.5 ppm (1,300 µg/m^3)
	1-hour	0.25 ppm (655 µg/m^3)	0.075 ppm (105 µg/m^3)	—
PM_{10}	Annual	20 µg/m^3	—	—
	24-hour	50 µg/m^3	150 µg/m^3	Same as primary
$PM_{2.5}$	Annual	12 µg/m^3	15 µg/m^3	
	24-hour	—	35 µg/m^3	
Lead	Rolling 3-month average	—	0.15 µg/m^3	Same as primary
	Quarterly Average	—	1.5 µg/m^3	Same as primary
	30-day average	1.5 µg/m^3	—	—

Notes: [a] Standards other than the 1-hour O_3, 24-hour PM_{10}, 24-hour $PM_{2.5}$, and those based on annual averages are not to be exceeded more than once a year.
[b] Concentrations are expressed first in units in which they were promulgated. Equivalent units given in parenthesis.
[c] Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. Each state must attain the primary standards no later than 3 years after that state's implementation plan is approved by the USEPA.
[d] Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
µg/m^3 = micrograms per cubic meter; CO = carbon monoxide; mg/m^3 = milligrams per cubic meter; NO_2 = nitrogen dioxide; O_3 = ozone; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_2 = sulfur dioxide
Source: ARB 2010a.

Toxic compounds are toxic air pollutants that have been determined to represent some level of acute or chronic health risk (cancer or non-cancer) to the general public. Units of concentration for both types of pollutants are generally expressed in parts per million (ppm) or micrograms per cubic meter (µg/m^3).

The main pollutants of concern considered in this air quality analysis include volatile organic compounds (VOCs), ozone (O_3), carbon monoxide (CO), nitrogen oxides (NO_x), particulate matter less than 10 microns in diameter (PM_{10}), and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). Although VOCs or NO_x (other than nitrogen dioxide [NO_2]) have no established ambient standards, they are important as precursors to O_3 formation.

Identifying the ROI for air quality requires knowledge of the pollutant type, source emission rates, the proximity of project emission sources to other emission sources, and local and regional meteorology. Air emissions produced from minor construction (e.g., grading for roads) and from operations for the proposed action would mainly affect air quality within the Combat Center and the eastern portion of San Bernardino County. This region lies within the Mojave Desert Air Basin (MDAB), which includes all but the southwest corner of San Bernardino County and the eastern portions of Riverside, Los Angeles, and Kern Counties. For inert pollutants (such as CO and particulates in the form of dust), the ROI is generally limited to a few miles downwind from a source. The ROI for reactive pollutants such as O_3 may extend much farther downwind than for inert pollutants. Ozone is formed in the atmosphere by photochemical reactions of previously emitted pollutants called precursors. Ozone precursors are mainly NO_x and photochemically reactive VOCs. 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 their source.

The analysis of aircraft emissions associated with the proposed action is limited to operations that occur within the lowest 3,000 feet (914 meters) of the atmosphere, as this is the typical depth of the atmospheric mixing layer where emissions released into this layer could affect ground-level pollutant concentrations. Emissions released above the mixing layer generally would not appreciably affect ground-level air quality.

3.8.2 Regulatory Framework

The Federal Clean Air Act of 1970 (the CAA) and its subsequent amendments establish air quality regulations and the NAAQS and delegate the enforcement of these standards to the states. In California, the ARB is responsible for enforcing air pollution regulations. The CAA establishes air quality planning processes and requires areas in nonattainment of a NAAQS to develop a State Implementation Plan (SIP) that details how the state will attain the standard within mandated time frames. The requirements and compliance dates for attainment are based on the severity of the nonattainment classification of the area. The following summarizes the air quality rules and regulations that apply to the proposed project.

3.8.2.1 Federal Regulations

Section 176(c) of the CAA, as articulated in the USEPA General Conformity Rule, states that a federal agency cannot issue a permit or support an activity unless the agency determines that it will conform to the most recent USEPA-approved SIP. This means that projects using federal funds or requiring federal approval in nonattainment or maintenance areas must not 1) cause or contribute to any new violation of a NAAQS; 2) increase the frequency or severity of any existing violation; or 3) delay the timely attainment of any standard, interim emission reduction, or other milestone. Mojave Desert Air Quality Management District Rule 2002 implements the USEPA General Conformity Rule. Within the MDAB project region, if net annual emissions from a proposed project action remain below 25 tons of VOCs and NO_x and 100 tons of PM_{10}, a CAA conformity determination is not required. If emissions of one or more of these compounds exceed a *de minimis* threshold, the DoD must demonstrate conformity under one of the methods prescribed by MDAQMD Rule 2002. The conformity analysis for the project alternatives is summarized in Section 4.8.2 and presented in complete form in Appendix G of this EIS.

As part of the Prevention of Significant Deterioration (PSD) Regulation, the CAA provides special protection for air quality and air quality related values (including visibility and pollutant deposition) in selected areas of the U.S. (National Parks greater than 6,000 acres or National Wilderness Areas greater than 5,000 acres). These Class I areas are areas where any appreciable deterioration of air quality is considered significant. In 1999, the USEPA promulgated a regional haze regulation that requires states to establish goals and emission reduction strategies to make initial improvements in visibility within their respective Class I areas. The nearest area to the project site is the Joshua Tree National Park, whose nearest border to proposed activities within the Combat Center is about 12 miles (19 km) to the south. Due to the proximity of this Class I area to the Combat Center, this EIS provides an analysis of the potential for proposed emissions to impact visibility within this pristine area. Criteria to determine significant impacts on visibility within Class I areas usually pertain to stationary emission sources, as mobile sources are generally exempt from permit review by regulatory agencies. However, Section 169A of the CAA states the national goal of prevention of any further impairment of visibility within Class I areas from man-made sources of air pollution.

3.8.2.2 State Regulations

The ARB is responsible for the coordination and administration of both federal and state air pollution control programs within California and for implementing the California Clean Air Act (CCAA). The CCAA required the ARB to establish the CAAQS (see Table 3.8-1). In general, the CAAQS are at least as stringent as the NAAQS. The CCAA requires local air districts in the state to achieve and maintain the CAAQS by the earliest practical date. The CCAA specifies that local air districts should focus particular attention on reducing emissions from transportation and area-wide emission sources and it gives districts the authority to regulate indirect sources of emissions.

On January 22, 2009, the ARB adopted the California Regional Haze Plan (California Plan) as one that meets the requirements of the CAA, and approved it as a revision to the California SIP. On March 16, 2009, the ARB transmitted this Plan to the USEPA for approval (ARB 2009a). The California Plan demonstrates reasonable progress in reducing haze by 2018, the first benchmark year on the path to natural visibility by 2064. Each state is required to submit a 5-year progress report, as well as a revised Plan every 10 years.

Due to the regional nature of haze, multi-state planning organizations were established to coordinate technical planning and consultation for regional haze plans. The Western Regional Air Partnership serves this function in the west and it includes 15 western states, federal land management agencies, tribes, and the USEPA. Technical tool development, emission inventories, and air quality modeling have been conducted on a regional basis by the Western Regional Air Partnership to support the efforts of all of the western states. The technical analysis conducted by the Western Regional Air Partnership has shown that by 2018, visibility will improve in all areas of the west and the greatest improvements will occur in California. This enhanced rate of progress in California is due to the state's current emission control programs for O_3 and PM, and specifically, due to substantial reductions in VOC, NO_x, and sulfur oxides (SO_x) emissions from mobile sources.

The California Plan analysis shows that the overwhelming majority of pollutants that degrade visibility in the Joshua Tree National Park are ammonia (whose primary pollutant source is NO_x) and organic compounds, or VOCs (ARB 2009b). The analysis also shows that sources outside of the western region, such as international shipping and emissions from Mexico and Asia, also provide substantial contributions to visibility impairment in the Western U.S.

3.8.2.3 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 (MDAQMD 2009a). 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 2010a). For example, the requirements of MDAQMD Rule 403, *Fugitive Dust*, would apply to the proposed construction of dirt roads within the Combat Center.

The Combat Center is within the Western Mojave Desert O_3 nonattainment area of the MDAB. The USEPA designated this area as nonattainment for the O_3 NAAQS on April 15, 2004. This ruling required that this nonattainment area meet the 1997 8-hour O_3 NAAQS (0.084 ppm) by 2021. To satisfy this requirement, the MDAQMD submitted the *MDAQMD Federal 8-Hour Ozone Attainment Plan - (Western Mojave Desert Non-attainment Area)* to the USEPA in June 2008 (MDAQMD 2008). The USEPA is in the process of evaluating this plan for inclusion in the SIP. On May 27, 2008, the USEPA revised the eight-hour O_3 NAAQS down to 0.075 ppm.

The MDAQMD submitted the *Mojave Desert Planning Area PM_{10} Attainment Plan* to the USEPA on July 15, 1997 (MDAQMD 1995). However, the USEPA has yet to approve this plan.

3.8.3 Existing Conditions

3.8.3.1 Climate and Meteorology

The climate of the project area 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 issues in the region. Climate and meteorological data collected for the City of Twentynine Palms are used to describe the climatic conditions of the project area (Western Region Climate Center 2009).

The project area 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) 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 (10 centimeters). Monsoon rains, which generally occur between the months of July through September, produce about 40% of the annual rainfall at Twentynine Palms. The average high and low temperatures at Twentynine Palms during the summer months range from about 105 degrees Fahrenheit (°F) to 63°F (40.6 degrees Celsius [°C] to 17.2°C). The average high and low temperatures during the winter months range from 72°F to 36°F (22.2°C to 2.2°C). The low humidity in the region is responsible for the large diurnal variations in temperature.

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. This wind pattern is reflected in Figure 1 of Appendix G, which summarizes 5 years of wind data collected at the Combat Center Mainside monitoring station in the form of a wind rose (Naval Facilities Engineering Service Center 2009).

3.8.3.2 Baseline Air Quality

The USEPA designates all areas of the U.S. as having air quality better than or worse than the NAAQS, termed as attainment and nonattainment, respectively. An area generally is in nonattainment for a pollutant if its NAAQS has been exceeded more than once per year. Former nonattainment areas that have attained the NAAQS are designated as maintenance areas. Presently, the MDAB attains the NAAQS for all criteria pollutants except O_3 and PM_{10}. The portions of the MDAB that encompass the project area are rated as severe-17 O_3 and moderate PM_{10} nonattainment areas (MDAQMD 2009b). The severe-17 O_3 rating means that a region has 17 years to attain this standard, or in the case of the MDAB, until 2021.

The ARB also designates areas of the state that are in attainment or nonattainment of the CAAQS. An area is in nonattainment for a pollutant if its CAAQS have been exceeded more than once in 3 years. Presently, the MDAB attains the CAAQS for all criteria pollutants except O_3, PM_{10}, and $PM_{2.5}$ (MDAQMD 2009b).

Ozone concentrations are highest during warmer months of the year and coincide with the period of maximum insolation. Maximum O_3 concentrations tend to be homogeneously spread throughout a region, since it often takes several hours to convert precursor emissions to O_3 in the atmosphere. Ozone precursor emissions transported from the South Coast Air Basin are the main contributors to high O_3 levels in the MDAB. 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. Maximum inert pollutant concentrations are usually found near an emission source.

Ambient PM_{10} concentrations within the project region occur from emissions of fugitive dust and the combustion of fuel in vehicles. Maximum PM_{10} impacts occur in combination with fugitive dust generated by ground-disturbing activities (such as the operation of vehicles on unpaved surfaces) and high wind events.

The NREA at the Combat Center has operated an air monitoring program at the Combat Center since 1996. Currently, the NREA operates two stations that sample for PM_{10} within the southern region of the Combat Center. The Mainside area of the Combat Center also samples for gaseous pollutants (Naval Facilities Engineering Service Center 2009). The purpose of the program is to characterize air quality trends and to address state and regional air monitoring initiatives. The program occurs in partnership with the MDAQMD. Table 3.8-2 summarizes the maximum ambient pollutant data monitored at the Mainside monitoring station for the last 5 years. These data show that other than O_3 and PM_{10}, the ambient air quality concentrations at this location are well below CAAQS and NAAQS values. Ambient air quality levels at locations distant from Mainside that are within the existing Combat Center or proposed acquired lands boundaries have air quality readings that are similar to or lower than those experienced at Mainside. This is the case, as the Mainside monitoring site is in proximity to 1) mobile and stationary sources of combustive emissions, and 2) areas of disturbed lands and bare soils that emit fugitive dust.

Table 3.8-2. Maximum Pollutant Concentrations Measured at the Mainside Monitoring Station – Twentynine Palms, California

Pollutant	Averaging Period	National Standard	State Standard	Highest Monitored Concentration				
				2003	2004	2005	2008	2009
Ozone (ppm)	1-hour	n/a	0.09	0.111	0.095	0.106	0.093	0.087
	8-hour	0.075	0.07	**0.076**	**0.080**	**0.081**	**0.077**	**0.073**
CO (ppm)	1-hour	35	20	1.0	0.7	0.7	1.2	3.6
	8-hour	9	9	0.8	0.3	0.6	1.0	2.4
NO_2 (ppm)	1-hour	0.10	0.18	0.028	0.058	0.025	0.025	0.03
	Annual	0.053	0.03	0.005	0.004	0.004	0.003	0.004
SO_2 (ppm)	1-hour	0.075	0.25	0.020	0.005	0.006	0.010	0.011
	24-hour	n/a	0.04	0.003	0.002	0.002	0.009	0.007
	Annual	n/a	n/a	0.001	0.000	0.001	0.002	0.002
PM_{10} ($\mu g/m^3$)	24-hour	150	50				118	TBD
	Annual	n/a	20	22	18	17	25	TBD
$PM_{2.5}$ ($\mu g/m^3$)	24-hour	35	n/a	28	34	27	17	20
	Annual	15	12		11	10		9

Notes: Exceedances of the standards are bolded.
a. Pollutant data for calendar year 2008 inclusive to 9/30/2008.
$\mu g/m^3$ = micrograms per cubic meter; ppm = parts per million

Source: Naval Facilities Engineering Service Center 2009, except $PM_{2.5}$ data collected by the MDAQMD at the Victorville station.

Combat Center and Acquired Lands Existing Emissions

Combat Center Emissions

Table 3.8-3 summarizes the annual air emissions estimated for current operations at the Combat Center for 2008. All of these data, except those estimated for aircraft range operations, were compiled for purposes of meeting requirements of the MDAQMD (NAVFAC Southwest and Combat Center 2010). This inventory does not include emissions that occurred from retail and non-retail gasoline stations, as these sources are part of a separate industry-wide inventory for the MDAQMD. Emissions for aircraft range operations were estimated from baseline data that is consistent with the project noise analyses, as presented in Section 3.9 of this EIS. Aircraft emissions pertain to landing and take-off, touch-and-go, and cruising operations that occurred below 3,000 feet (914 meters) AGL within the Combat Center.

The data in Table 3.8-3 show that the main sources of combustive emissions at the Combat Center include tactical vehicles/support equipment and ordnance usage. In addition, the main sources of fugitive dust (PM_{10}/$PM_{2.5}$) occur from the use of tactical vehicles/support equipment on unpaved surfaces. Table 3.8-3 also shows the MDAB existing emissions for use in comparison to the Combat Center existing emissions.

Table 3.8-3. Annual Emissions from Current Operations at the Combat Center

Activity Type	Air Pollutant Emissions (Tons per Year)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Aircraft - Fugitive Dust	---	---	---	---	0.67	0.27
Aircraft – Landing and Take-off	52.46	189.83	45.80	3.69	30.91	30.62
Aircraft - Range Operations	6.59	77.58	107.08	3.11	29.49	29.49
Aluminum Sweat Furnace	---	0.01	0.04	---	0.03	0.03
Boilers	0.30	0.32	3.38	0.03	0.38	0.38
Coatings and Solvents	0.36	---	---	---	---	---
Fire Fighting Training	---	0.02	---	---	---	---
Internal Combustion Engines - Stationary	8.19	77.72	60.38	3.31	4.84	4.78
Landfill Gas	0.55	0.11	---	---	---	---
Ordnance Usage - Combustive	3.33	165.16	2.25	---	0.89	0.05
Ordnance Usage - Fugitive Dust	---	---	---	---	22.00	22.00
Tactical Vehicles/Support Equipment	30.37	141.69	370.02	42.68	14.11	13.98
Paint Spray Booth	0.01	---	---	---	---	---
Road Dust - Paved	---	---	---	---	61.28	7.32
Road Dust - Unpaved	---	---	---	---	6,468.63	646.86
Smoke Training	---	0.11	---	---	0.01	0.01
Storage Tanks – Fuels	0.09	---	---	---	---	---
Total Existing Emissions	**102.3**	**652.6**	**589.0**	**52.8**	**6,633.2**	**755.8**
Total Existing Emissions – MDAB[1]	**33,909**	**157,534**	**99,426**	**3,249**	**72,854**	**19,637**

Notes: The above data, excluding emissions from aircraft – range operations, were obtained from *Calendar Year 2009 Comprehensive Emissions Inventory Report for Marine Corps Air Ground Combat Center Twentynine Palms* (NAVFAC Southwest and Combat Center 2010). Emissions for aircraft range operations were estimated from baseline data used in the project noise analyses (see Section 3.9 of this EIS).
[1]For year 2008 (ARB 2010b).
CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_x = sulfur oxides; VOC = volatile organic compound

Acquired Lands Existing Emissions

Air emissions within the lands proposed for acquisition under the proposed action mainly occur from recreational activities and the use of OHVs. The types of current air emissions include 1) combustive emissions due to vehicular usage, camp fires, propane stoves, and portable diesel- and gasoline-powered generators, and 2) fugitive dust emissions due to the use of vehicles on unpaved surfaces. The Johnson Valley OHV Area within the west study area has the highest recreational usage and, therefore, the highest emissions that are generated within any of the lands proposed for acquisition. Recreational activities and resulting emissions generated within the south and east study areas are substantially lower than those that are generated in the west study area. Activity data used to estimate emissions from these activities were developed from visitor usage obtained from the BLM, as presented in EIS Section 3.2 (BLM and TEC Inc. 2010). Table 3.8-4 presents a summary of the existing emissions that are generated within the west, south, and east study areas.

Table 3.8-4. Existing Emissions – Acquisition Study Areas

Location/Activity Type	Air Pollutant Emissions (Tons per Year)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
West Study Area						
Vehicles - Combustive	5.83	57.33	3.79	0.02	0.20	0.18
Vehicles - Dust	---	---	---	---	957.26	95.73
Gasoline-powered Generator	3.02	0.97	1.54	0.08	0.10	0.09
Propane Stoves	0.01	0.05	0.08	0.00	0.00	0.00
Camp Fires	2.14	32.01	---	---	4.66	4.04
Total – West Area	**11.00**	**90.36**	**5.40**	**0.10**	**962.23**	**100.05**
South Study Area						
Vehicles - Combustive	0.02	0.22	0.01	0.00	0.00	0.00
Vehicles - Dust	---	---	---	---	3.62	0.36
Total - South Area	**0.02**	**0.22**	**0.01**	**0.00**	**3.62**	**0.36**
East Study Area						
Vehicles - Combustive	0.01	0.13	0.01	0.00	0.00	0.00
Vehicles - Dust	---	---	---	---	2.33	0.23
Gasoline-powered Generator	0.00	0.00	0.00	0.00	0.00	0.00
Propane Stoves	0.00	0.00	0.00	0.00	0.00	0.00
Camp Fires	0.00	0.01	---	---	0.00	0.00
Total - East Area	**0.01**	**0.14**	**0.01**	**0.00**	**2.33**	**0.23**

Notes: Developed from visitor usage data source (BLM and TEC Inc. 2010).
CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_x = sulfur oxides; VOC = volatile organic compound

In the mid-1990s, the MDAQMD defined baseline conditions for the MDAB that included activities on public lands managed by the BLM and developed strategies for implementing emissions reductions in the air basin (the SIP). Activities permitted by the BLM in the MDAB undergo federal conformity analysis to assure conformity with the SIP and consistency with the MDAQMD Rule 403.2 *Fugitive Dust Control for the Mojave Desert Planning Area*, adopted July 22, 1996. Ongoing activities, including casual use of OHVs in the acquisition study areas, are part of the original emissions budget in the SIP and covered in this Control Strategy.

Sensitive Receptors

In response to public comments and in accordance with EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, the impact of air emissions on sensitive members of the population, such as children, is evaluated in Section 4.8. Other sensitive receptor groups include pregnant women, the elderly, and the acutely and chronically ill. Sensitive receptor locations include residences, schools, playgrounds, hospitals, convalescent homes, daycare centers, and other locations where children, chronically ill individuals, or other sensitive persons could be exposed to air pollution. Residences in the Johnson Valley community are the nearest sensitive receptors to the proposed training areas and they occur as close as 1 mile from the boundary of the west study area. In addition, residences and daycare centers occur within the Mainside community on the Combat Center, or about 3 miles away from the proposed training areas within the south study area.

3.8.3.3 Greenhouse Gas Emissions

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere by absorbing infrared radiation. Without this natural greenhouse effect, the average surface temperature of the Earth would be about 60°F (15.5°C) colder (U.S. Global Change Research Program 2009). Scientific evidence indicates a trend of increasing global temperature over the past century due to an increase in GHG emissions from human

activities. The climate change associated with this global warming is predicted to produce environmental, economic, and social consequences across the globe.

Greenhouse gas emissions occur from natural processes and human activities. Water vapor is the most important and abundant GHG in the atmosphere. However, human activities produce only a very small amount of the total atmospheric water vapor. The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). The main source of GHGs from human activities is the combustion of fossil fuels, including crude oil and coal. Examples of GHGs created and emitted primarily through human activities include fluorinated gases (hydrofluorocarbons and perfluorocarbons) and sulfur hexafluoride. The six GHGs mentioned above are regulated by the State of California.

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 (Intergovernmental Panel on Climate Change 2007). To simplify GHG analyses, total GHG emissions from a source are often expressed as a CO_2 equivalent (CO_2e). The CO_2e is calculated by multiplying the emissions of each GHG by its GWP and adding the results together to produce a single, combined emission rate representing all GHGs. While CH_4 and N_2O have much higher GWPs than CO_2, CO_2 is emitted in such higher quantities that it is the overwhelming contributor to CO_2e from both natural processes and human activities.

Recent observed changes due to global warming include rising temperatures, shrinking glaciers and sea ice, thawing permafrost, a lengthened growing season, and shifts in plant and animal ranges. International, national, and state organizations independently confirm these findings (Intergovernmental Panel on Climate Change 2007, U.S. Global Change Research Program 2009, and California Energy Commission 2009).

The most recent *California Climate Change Scenarios Assessment* predicts that temperatures in California will increase between 3°F to 10.5°F (1.7°C to 5.8°C) by 2100, based upon low and high GHG emission scenarios (California Energy Commission 2009). Predictions of long-term negative environmental impacts due to global warming include sea level rise, changing weather patterns with increases in the severity of storms and droughts, changes to local and regional ecosystems including the potential loss of species, and a substantial reduction in winter snow pack. In California, predictions of these effects include exacerbation of air quality problems, a reduction in municipal water supply from the Sierra snowpack, a rise in sea level that would displace coastal businesses and residences, an increase in wild fires, damage to marine and terrestrial ecosystems, and an increase in the incidence of infectious diseases, asthma, and other human health problems (California Energy Commission 2009).

Federal agencies on a national scale address emissions of GHGs by reporting and meeting reductions mandated in federal laws, EOs, and agency policies. The most recent of these are EOs 13423 and 13514 and the *USEPA Final Mandatory Reporting of Greenhouse Gases Rule* (74 *Federal Register* 5620, 40 CFR Part 98 *Greenhouse Gas Reporting Program, 2009*). Several states have promulgated laws as a means of reducing statewide levels of GHG emissions. In particular, the California Global Warming Solutions Act of 2006 (AB32) directs the State of California to reduce statewide GHG emissions to 1990 levels by the year 2020. As part of the AB32 requirements, the Combat Center is a reporting facility under the ARB *Regulation for the Mandatory Reporting of Greenhouse Gas Emissions* (January 2009). Groups of states also have formed regionally-based collectives (such as the Western Climate Initiative) to jointly address GHG pollutants.

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 EOs and the Energy Policy Act of 2005, the Marine Corps and DoD have implemented a number of renewable energy projects (e.g., NAVFAC Southwest 2006). The types of projects currently in operation within the 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 and continues to promote and install new renewable energy projects within the southwest region. Consistent with these initiatives, the Combat Center has developed approximately 1.5 megawatts of photovoltaic power generation and an additional megawatt of capacity is currently under construction (Combat Center 2010). The Combat Center also is evaluating the feasibility of operating electrical wind generation, geothermal energy, and solar thermal water heating systems on-site.

On February 18, 2010, the CEQ proposed for the first time draft guidance on how federal agencies should evaluate the effects of climate change and GHG emissions for NEPA documentation (CEQ 2010). The CEQ does not propose a reference point as an indicator of a level of GHG emissions that may significantly affect the quality of the human environment. In the analysis of the direct effects of a proposed action, the CEQ proposes that it would be appropriate to 1) quantify cumulative emissions over the life of the project; 2) discuss measures to reduce GHG emissions, including consideration of reasonable alternatives; and 3) qualitatively discuss the link between such GHG emissions and climate change. The CEQ accepted public comments on the draft guidance through May 24, 2010 and it is expected to issue final guidance in the near future.

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 project-induced GHG emissions to global climate change is discussed in the context of cumulative impacts in Chapter 5 of this EIS. Appendix G presents estimates of GHG emissions generated by each project alternative.

3.9 NOISE

3.9.1 Definition of Resource

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. Sound is all around us. 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 (see Appendix H). 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.

Noise and sound are expressed in logarithmic units called decibels (dB). A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above 120 dB begin to be felt inside the human ear as discomfort. Sound levels between 130 to 140 dB are felt as 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. On average, a person perceives a doubling (or halving) of the sound's loudness when there is a 10 dB change 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 characterized by 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 EIS, the dB unit refers to A-weighted sound levels. A "C-weighted" scale is typically applied to impulsive sounds such as a sonic boom or ordnance detonation and is denoted by the units "dBC."

In accordance with DoD guidelines and standard practice for environmental impact analysis documents, the noise analyses in this EIS utilize the following (A-weighted) noise descriptors or metrics: Maximum Sound Level (L_{max}), Sound Exposure Level (SEL), and Community Noise Equivalent Level (CNEL). Maximum Sound Level and SEL describe single noise events, whereas CNEL describes the time-averaged noise environment of individual noise events over longer periods, usually up to 24 hours. For this EIS, the time-averaging is 24 hours. CNEL accounts for single-event noise levels and is weighted or penalized by up to 10 dB depending on the time period in which they occur: evening (7:00 p.m. to 10:00 p.m.) sounds by 5 dB and nighttime (10:00 p.m. to 7:00 a.m.) sounds by 10 dB. The CNEL is specific to California (State of California 1990).

The Onset-Rate Adjusted Monthly variant of CNEL, denoted $CNEL_{mr}$, is specifically utilized for describing the time-averaged aircraft noise exposure from airspace and range operations. C-weighted CNEL, denoted CCNEL or dBC CNEL, is specifically utilized for describing the time-averaged noise exposure from ordnance activity.

In calculating time-averaged sound levels for airspace activity, the reliability of the results decreases at lower levels (i.e., less than or equal to 45 dB). This arises from the increasing variability of individual aircraft sound levels at longer distances due to atmospheric effects on sound propagation and the presence of other sources of noise. Also, when flight activity is infrequent, the time-averaged sound levels are

generated by only a few individual aircraft noise events that may not be statistically representative of the given aircraft modeled. Time-averaged outdoor sound levels less than 45 dB are well below any currently accepted guidelines for aircraft noise compatibility. Most of the guidelines for the incompatibility of aircraft noise with residential land use are on the order of 65 dB CNEL or greater. Therefore, all calculated CNEL or $CNEL_{mr}$ less than 45 dB are stated in this analysis as "<45 dB."

High-amplitude noise resulting from annual average daily artillery or demolition firings is described in terms of the CCNEL. The definition of CCNEL is identical to CNEL except the sound levels contributing to the CCNEL are weighted by the C scale. Consistent with A-weighted CNEL, C-weighted CNEL bases its value on a 24-hour period of events. Annual events are divided by 365, resulting in annual average daily events.

Noise from individual ordnance events can be characterized by the (unweighted) Peak Sound Level (L_{pk}). The instantaneous L_{pk} exceeded by 15 percent of ordnance events while accounting for variable meteorological conditions and their effect on sound propagation is abbreviated as PK 15(met). The PK 15(met) is a metric utilized by the DoD for correlation with the potential for receiving noise complaints about large caliber impulsive noise from armor, artillery, mortars and demolition activities, and noise from small arms ranges.

Each descriptor, along with other noise metrics, is described in more detail in Appendix H (Section H.1).

All of these noise metrics and the models used to estimate noise exposure draw from databases of actual noise measurements from relevant sources (e.g., from aircraft, ordnance detonations, etc.). The noise models are most accurate and useful for comparing "before-and-after" noise levels resulting from alternative scenarios with calculations made in a consistent manner. Such models allow predictions of noise exposure that would result from proposed actions without actual implementation and/or noise monitoring of those actions. Section 4.9.1.1 describes the models and methodology used in this EIS to estimate noise from aircraft activity and ordnance use associated with baseline operations (existing conditions projected to occur at the time of project implementation) as well as proposed operations under each action alternative.

Many components of the proposed action would generate noise and thereby warrant analysis in this EIS. The predominant noise sources would be aircraft operations at the EAF and in other parts of the range airspace. Ordnance use from both aircraft and ground operations would also be a major noise source. Other components such as construction and vehicle traffic would produce noise, but such noise would represent a transitory and negligible contribution to the overall noise environment. Response to noise varies, depending on the type and characteristics of the noise, the distance between the noise source and whoever hears it (the receptor), receptor sensitivity, and time of day. The ROI for analysis of noise from the proposed action consists of the areas of the existing Combat Center where training activities would occur, the proposed acquisition study areas, and adjacent areas where noise impacts may occur.

3.9.2 Regulatory Framework

The passage of the Noise Pollution and Abatement Act (more commonly called the Noise Control Act) of 1972 directed the USEPA to promulgate regulations for a host of noise emissions. Federal legislation is the foundation for all regulation of aircraft noise and the foundation for all aircraft noise abatement is the Federal Aviation Administration Aviation Noise Abatement Policy, issued in 1976 which has guided aircraft noise policy for almost 30 years. All General Plans created for towns or cities have a Noise Element that sets forth existing sound levels and states goals for each land use class and numerical planning standards to evaluate future development proposals with regard to noise pollution. In the case of

construction of new (or remodeled) apartments, condominiums, hospitals and hotels many U.S. states and cities have stringent building codes with requirements of acoustical analysis, to protect building occupants from exterior noise sources and sound generated within the building itself. Additional guidance is provided in DoD Instruction 4715.13, *DoD Noise Program* and MCO P5090.2A, Chapter 13, *Noise Management.*

Table 3.9-1 presents an overview of the 24-hour and single-event noise metrics, the models from which they are derived, and their scope of applicability in evaluating the potential for noise effects. The 24-hour metrics such as CNEL are used to evaluate land use compatibility while the single-event metrics provide supplemental information and a basis for analyzing aircraft noise comparisons and the potential for generating noise complaints. All of the metrics in the table are applicable to the proposed action and have been used in the analysis in this EIS.

The Noise Zones mentioned in the table are from the Navy's AICUZ and Range AICUZ instructions and are primarily used for evaluating the noise exposure associated with each project alternative (see section 4.9.1.2). For airfields and airspace, Noise Zones have a lower bound of 65 dBA CNEL/$CNEL_{mr}$ for Noise Zone I, incrementing 10 dB for each zone up to Noise Zone III for CNEL/$CNEL_{mr}$ greater than or equal to 75 dBA (DoN 2008a; DoN 2008b).

The Navy Range AICUZ Instruction is expressed in terms of A-weighted noise levels. To compare blast noise in terms of C-weighted noise levels to A-weighted noise levels, the criterion level is adjusted on the principle of equal annoyance. The 62 and 70 dBC CNEL correspond to the 65 and 75 dBA $CNEL_{mr}$ criterion, respectively (DoN 2008b; Wyle 2003b). Therefore ordnance noise levels below 62, 62 to 70, and above 70 dBC CNEL correspond to Noise Zones I, II, and III, respectively.

SEL and L_{max} are primarily used to compare the noise levels of a single "fly-by" of differing aircraft. SEL is most useful for widely varying aircraft types such as a helicopter versus a fixed-wing aircraft because it contains the total sound exposure of the entire fly-by event. L_{max} is useful for describing how loud[8] the flight event may get. For flight events, the L_{max} occurs only for an instant in time. There are no regulations governing the magnitudes of SEL and L_{max}.

Regarding the potential for noise complaints, the Marine Corps has not established guidance for damage assessment or noise complaint potential from large caliber weapons. For the purposes of this EIS, guidance from Army Regulation 200-1 (Environmental Protection and Enhancement) is used (U.S. Department of the Army 2007). According to Army Regulation 200-1, a PK 15(met) noise level less than 115 dB corresponds to areas of low potential for noise complaints from large caliber weapons. A PK 15(met) level between 115 and 130 dB corresponds to areas with medium potential for noise complaints and noise-sensitive land uses are discouraged in such areas. Noise-sensitive land uses are strongly discouraged in areas where PK 15(met) is equal to or greater than 130 dB due to a high potential for noise complaints. For large caliber weapons, a PK 15(met) level exceeding 140 dB corresponds to a potential for physiological damage to unprotected human ears and structural damage claims.

[8] The term 'loud' is used here in the layman vernacular to mean overall sound pressure level, not the literal acoustic "loudness" which is a much more complex term.

Table 3.9-1. Summary of Applicable Noise Metrics

Noise Source	Applicable Noise Model	24-hour Noise Metrics			Single-Event Noise Metrics (decibel)		
		Noise (decibel)	Events	DoD Land Use Compatibility Guideline	Sound Exposure Level (SEL)	Maximum Sound Level (L_{max})	PK 15(met)
Aircraft (airfield)	NOISEMAP suite, including Rotorcraft Noise Model (RNM)	CNEL (A-weighted)	Annual Average Daily Events	65 - 70 dBA = Noise Zone I 70 - 75 dBA = Noise Zone II 75+ dBA = Noise Zone III	A-weighted		n/a
Aircraft (airspace)	Military Operating Area and Range Noise Model (MR_NMAP)	$CNEL_{mr}$ (A- weighted)	Average Daily Events during the Busiest Month		A-weighted and Rise-time Corrected	A-weighted	n/a
Blast/ Ordnance	Blast Noise Prediction (BNOISE2)	CNEL (C-weighted)	Annual Average Daily Events	<62 dBC = Noise Zone I 62 - 70 dBC = Noise Zone II 70+ dBC = Noise Zone III	C-weighted	Unweighted (L_{pk})	
Noise Effect Applicability:		Land Use Compatibility			Comparing events from differing aircraft types (e.g., helicopter vs. fixed-wing)		Potential for Noise Complaints

Notes: CNEL = Community Noise Equivalent Level; $CNEL_{mr}$ = Onset-Rate Adjusted Monthly Community Noise Equivalent Level; dBA = A-weighted decibel; dBC = C-weighted decibel; DoD = Department of Defense; Lpk = Peak Sound Pressure Level; PK 15(met) = Peak Sound Pressure Level exceeded by 15% of ordnance/blast events based on variable meteorological conditions

3.9.3 Existing Conditions

3.9.3.1 Aircraft Noise at the Expeditionary Airfield

The projected baseline noise environment at the EAF is expected to be similar to conditions evaluated in a 2003 aircraft noise study referred to herein as WR 02-13 (Wyle 2003a). WR 02-13 reflected calendar year 2001 EAF flight activity, which approximates the level of flight operations projected to occur in the timeframe when the proposed action would be implemented. The primary update to the 2003 analysis for this EIS was the addition of 59% of the MV-22 flight operations to the EAF from the recent *MV-22 West Coast Basing EIS* (DoN 2009; Ruffini 2010). The resulting condition serves as the baseline for the EAF for this EIS.

Flight Operations

The baseline condition for the EAF considered approximately 16,000 flight operations annually. All but 11 of these operations were modeled for the affected environment. The 11 annual operations not modeled are by Unmanned Aerial Systems (UAS) aircraft whose contribution to the overall aircraft noise environment is negligible relative to the contribution of the modeled aircraft. Approximately one-third of the modeled flight operations are by jet fighter/attack aircraft such as the F/A-18 Hornet and AV-8B Harrier. Approximately 63% of the modeled flight operations are by helicopters such as the CH-46E Sea Knight (twin engine, twin rotor, medium lift helicopter) and CH-53E Super Stallion (three-engine, single rotor heavy lift helicopter). The CNEL evening (7:00 p.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) flight operations account for 26% and 2% of the total modeled flight operations, respectively.

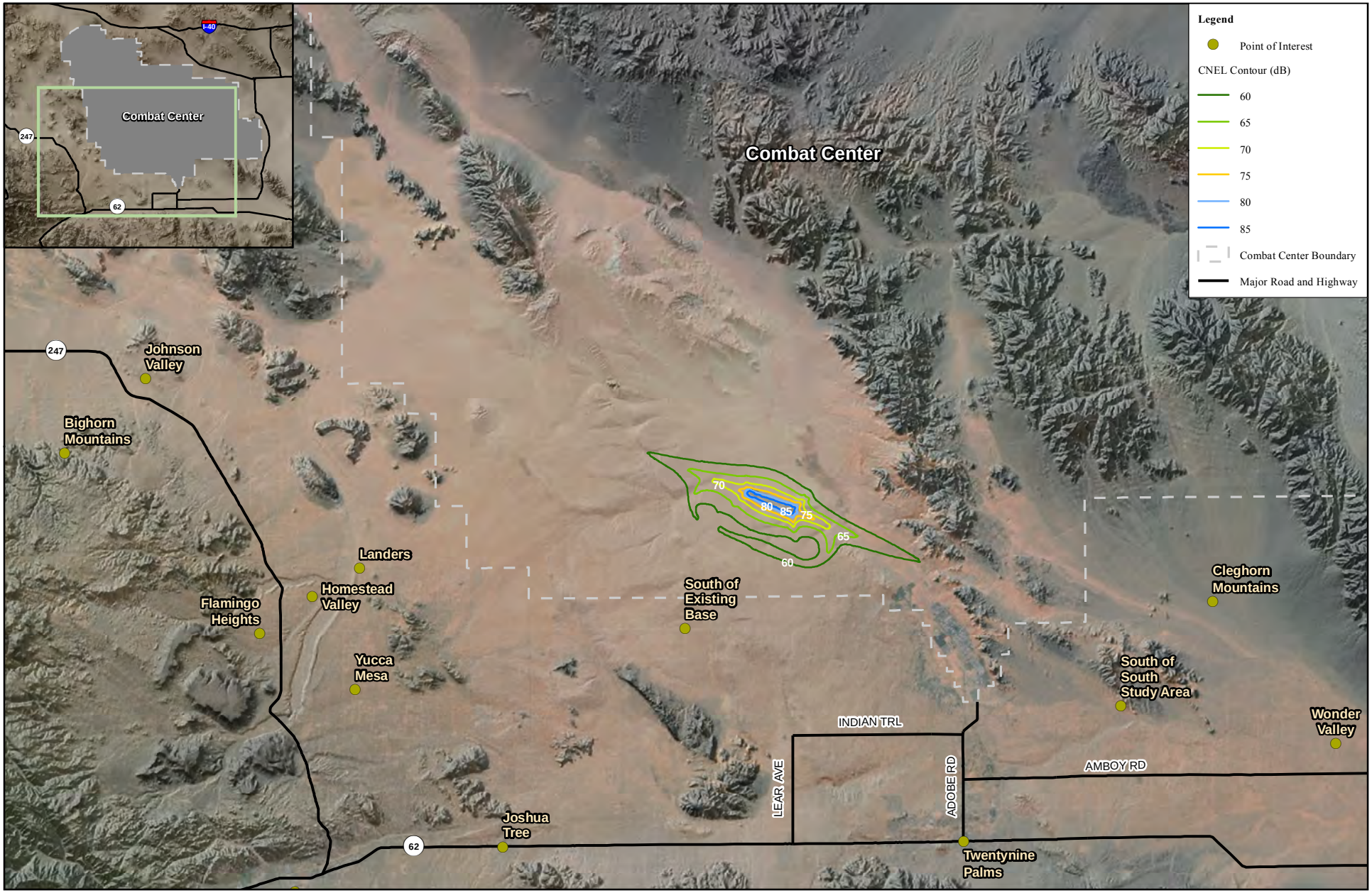
Other updates to WR 02-13 consistent with the MV-22 EIS include (a) conversion of the CH-46E and CH-53E modeling from NOISEMAP to Rotorcraft Noise Model (RNM) (see Section 4.9.1.1); (b) modeling of annual average daily operations instead of annual average busy day operations and; (c) 5% of F/A-18 operations converted to F/A-18E/F Super Hornet (Ruffini 2010). The aircraft noise sources and flight profiles were converted to RNM to take advantage of more accurate modeling technology not available for WR 02-13. Annual average daily operations were modeled for the EAF per the latest AICUZ Instruction (DoN 2008a).

Maintenance run-up operations were not modeled because maintenance run-ups are not typically conducted at the EAF.

Noise Exposure

Figure 3.9-1 shows the 65 to 85 dB CNEL contours, in 5 dB increments, for the projected baseline condition at the EAF. The contours primarily follow the path of departures and arrivals on Runway 10L/28R. The northwest lobe of the 65 dB contour extends approximately 2 miles (3.2 km) past the arrival end of Runway 10 and the southeast lobe extends 2.3 miles (3.7 km) past the arrival end of Runway 28. The main part of the 65 dB contour is 1.4 miles (2.25 km) wide and the lobes at the runway ends are up to 0.6 miles (0.97 km) wide. The contours do not extend beyond the boundary of the Combat Center.

Because the CNEL contours are wholly contained within the Combat Center boundary, there are no people or housing units off-base within the CNEL contours.



Kilometers
0 1.5 3 6
0 1.5 3 6
Miles
Source: MAGTF Training Command 2009

Figure 3.9-1
Baseline Noise Exposure from Airfield Operations at the Combat Center

N

3.9.3.2 Noise from Airspace and Range Flight Activity

The existing aircraft noise environment at the Combat Center range complex is based on the baseline scenario from the recent *MV-22 West Coast Basing EIS* (DoN 2009) but with (a) the addition of 59% of the proposed MV-22 flight operations; (b) most modeled areas modified to reflect areas typically flown instead of the political boundaries of the airspaces; and (c) 5% of F/A-18 operations converted to F/A-18E/F Super Hornet (Ruffini 2010). The baseline scenario from the recent *MV-22 West Coast Basing EIS* was primarily based upon a 2003 noise study herein referred to as WR 03-11 (Wyle 2003b), which in turn reflected calendar year 2001 airspace activity. The resultant modified data serves as the baseline for the Combat Center for this EIS.

Flight Operations

The baseline condition for the Combat Center modeled approximately 1,500 route-type operations annually. Route modeling consists of two aerial refueling tracks in the Bristol MOA, one flown at an altitude of 19,000 feet MSL and the other flown at 22,000 feet MSL, and one route outlining the perimeter of the existing Combat Center airspace flown by the MV-22 aircraft.

The baseline condition for the Combat Center also modeled approximately 26,000 area-type sorties annually. Modeled areas consist of the following:

- Bristol MOA/ATCAA
- Sundance MOA
- Restricted Area R-2501 (four components – North, South, East, and West)

Most of the existing route operations are by fixed-wing aircraft (e.g., KC-130, F/A-18C/D, AV-8B), with the modeled activity evenly split between the aerial refueling track at 19,000 feet (5,791 meters) above mean sea level and the aerial refueling track at 22,000 feet (6,706 meters). Most of the existing area-type sorties are by rotary-wing aircraft, primarily by H-1 and CH-46E helicopters and about 30% of these operations are to R-2501S. The remaining operations are approximately equally divided to R-2501N, R-2501E, and R-2501W. Of the total modeled area-type and route-type operations, $CNEL_{mr}$ evening (7:00 p.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) flight operations account for 12% and 3%, respectively.

The $CNEL_{mr}$ is a daily noise metric based on operations flown in the busiest month, so daily operations are calculated by dividing the number of annual operations by 12, then by the number of flying days in the busiest month. Updated data from the *MV-22 West Coast Basing EIS* was used to model area- and route-type operations at the Combat Center with 20 flying days per busiest month for area-type operations and 10 flying days per busiest month for route-type operations (Ruffini 2010).

Noise Exposure

Figure 3.9-2 shows the baseline $CNEL_{mr}$ contours (in 5 dB increments) for flight operations in range airspace. The 65 dB $CNEL_{mr}$ contour encompasses 327 acres (132 hectares) beyond the boundaries of the Combat Center on the west side of the installation. (Figure 3.9-2 and Table 3.9-2). The maximum $CNEL_{mr}$ of any of the modeled ranges/routes is R-2501W with approximately 65 dB $CNEL_{mr}$. Most of the existing noise exposure is due to F/A-18 activity. There are no people or housing units outside the installation exposed to $CNEL_{mr}$ greater than or equal to 65 dB.

The Points of Interest (POIs) addressed in Section 3.1, *Land Use*, are shown in Figure 3.9-2. None of the 52 POIs are exposed to CNEL greater than or equal to 65 dB.

Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009

Figure 3.9-2
Baseline Noise Exposure from Airspace Operations at the Combat Center

N

Table 3.9-2. Acreage and Population Within Noise Contours: Baseline Conditions

Noise Source (metric)	Noise Contour Band	Affected Acres Outside Combat Center Boundary	Affected Population Outside Combat Center Boundary
Airspace ($CNEL_{mr}$)	65-70 dBA	327	0
	70-75 dBA	---	---
	75+ dBA	---	---
Ordnance (CNEL)	62-70 dBC	2,514	0
	70-75 dBC	---	---
	75+ dBC	---	---
Single-Event Ordnance: Potential for Complaints (PK 15[met])	Medium	324,774	2,293
	High	3,511	0

Notes: $CNEL_{mr}$ = Onset-Rate adjusted Monthly Community Noise Equivalent Level; CNEL = Community Noise Equivalent Level; PK 15(met) = Peak Sound Level exceeded by 15% of ordnance events, accounting for variable meteorological conditions; dBA = A-weighted decibel; dBC = C-weighted decibel; --- = Not Applicable

3.9.3.3 Noise from Ordnance Use

The projected baseline level of ordnance activity within the Combat Center range complex at the time the proposed action would be implemented is assumed to be approximately double (2x) the baseline ordnance use modeled in the 2003 noise study, WR 03-11 (Wyle 2003b). Live ordnance expenditures were categorized as ground-to-ground within the fixed (also called "numbered") ranges, ground-to-ground within all Combat Center training areas, and air-to-ground within nine of the training areas. WR 03-11 reflected calendar year 2001 ground-to-ground live ordnance expenditures while reflecting fiscal year 2002 air-to-ground training range live ordnance expenditures. An assumed doubling of the ordnance use since 2002 represents the estimated change that has occurred due to higher wartime training requirements and deployments in recent years, and that is expected to continue. Other modifications in this EIS baseline noise analysis compared to the modeling approach from WR 03-11 included the use of the updated BNOISE2 noise model, inclusion of inert practice rounds, and inclusion of noise attenuation effects due to terrain (see also Section 4.9.1).

Ordnance Operations

As detailed in Appendix H, the 2003 noise study condition for the Combat Center considered approximately 3 million ground-to-ground firings on the fixed ranges, 1 million ground-to-ground firings within the training areas, and 1.1 million air-to-ground annual firings. With the estimated doubling of baseline ordnance activity, the projected baseline annual ordnance is approximately 6 million ground-to-ground firings on the fixed ranges, 2 million ground-to-ground firings within the training areas, and 2.2 million air-to-ground firings. Of these, approximately 5%, 6%, and 11% of the ground-to-ground fixed range, ground-to-ground training area, and air-to-ground firings, respectively, were considered to be high explosives and were modeled as such. The inert ordnance events were included. The No-Action Alternative is considered the same as the projected baseline ordnance activity.

Of the total annual ground-to-ground firings on the fixed ranges, 5% occur during the CCNEL evening (7:00 p.m. to 10:00 p.m.) period with less than 0.5% during the CCNEL nighttime (10:00 p.m. to 7:00 a.m.) period. Twenty percent of the total annual ground-to-ground firings and 20% of the total annual air-to-ground firings in the training areas occur during the CCNEL evening (7:00 p.m. to 10:00 p.m.) period and 20% of the total firings in these categories occur during the CCNEL nighttime (10:00 p.m. to 7:00 a.m.) period.

Firing and target locations and utilization for the fixed and training areas were modeled identically to those in WR 03-11. There were 43, 151, and 120 firing and target areas for the fixed range ground-to-ground, training area ground-to-ground, and training area air-to-ground, respectively.

Annual *average daily* ordnance operations were modeled for the Combat Center per the most recent Range AICUZ Instruction (DoN 2008b).

Noise Exposure

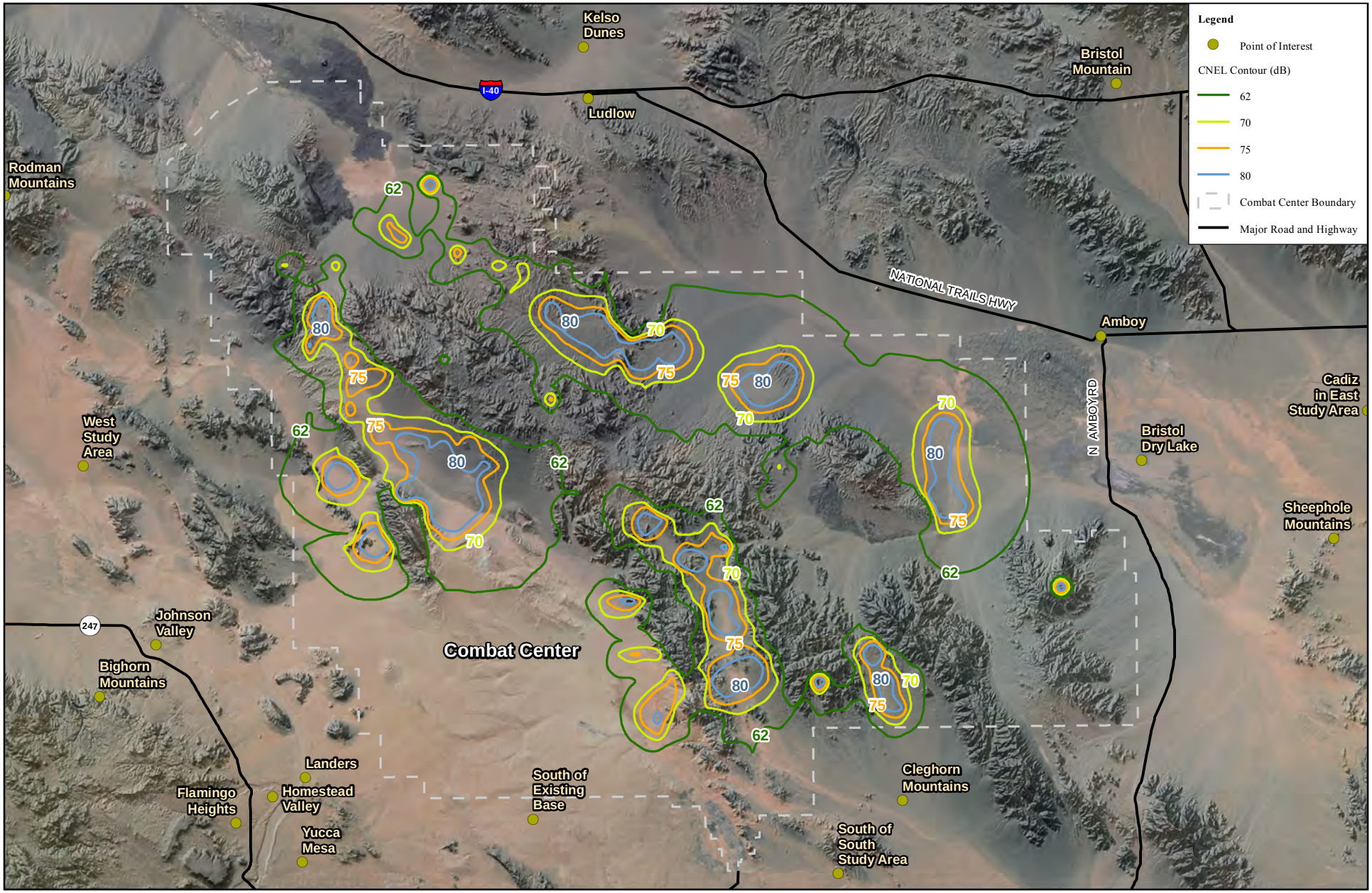
The baseline condition (No-Action Alternative) CNEL 62, 70, 75, and 80 dBC noise contours for all modeled ordnance are shown in Figure 3.9-3. As shown in the figure and in Table 3.9-2, the CNEL 62 dBC noise contour extends outside the boundaries of the Combat Center complex by 2,514 acres (1,017 hectares), primarily along the northeast boundary. The CNEL 70 dBC noise contour does not extend outside the Combat Center complex.

None of the 52 POIs have an exposure greater than or equal to 62 dBC CNEL.

Figure 3.9-4 shows the areas of medium and high potential for noise complaints associated with existing (modeled) ordnance activity. Noise complaints from ordnance can be a function of noise-induced vibration (e.g., rattling of windows), audible noise or both. Medium and high risk areas would extend beyond the northern boundary of the Combat Center by up to 8 miles and 1 mile, respectively. Medium risk areas would extend beyond the southern boundary of the Combat Center by up to 5 miles. High risk areas would not extend beyond the southern boundary of the Combat Center. As shown in Table 3.9-2, the area subject to medium potential for noise complaints from single-event ordnance noise encompasses a total of 324,774 acres (131,432 hectares) outside the Combat Center boundaries, an area populated by an estimated 2,293 people. The area in Figure 3.9-4 representing a high potential for noise complaints encompasses 3,511 acres outside the Combat Center boundary, all of which are unpopulated.

As shown in Figure 3.9-4, four of the 52 POIs (#3 Amboy, #13 Landers, #48 South of Existing Base, and #52 Bristol Dry Lake) have a medium potential for noise complaints from ordnance events.

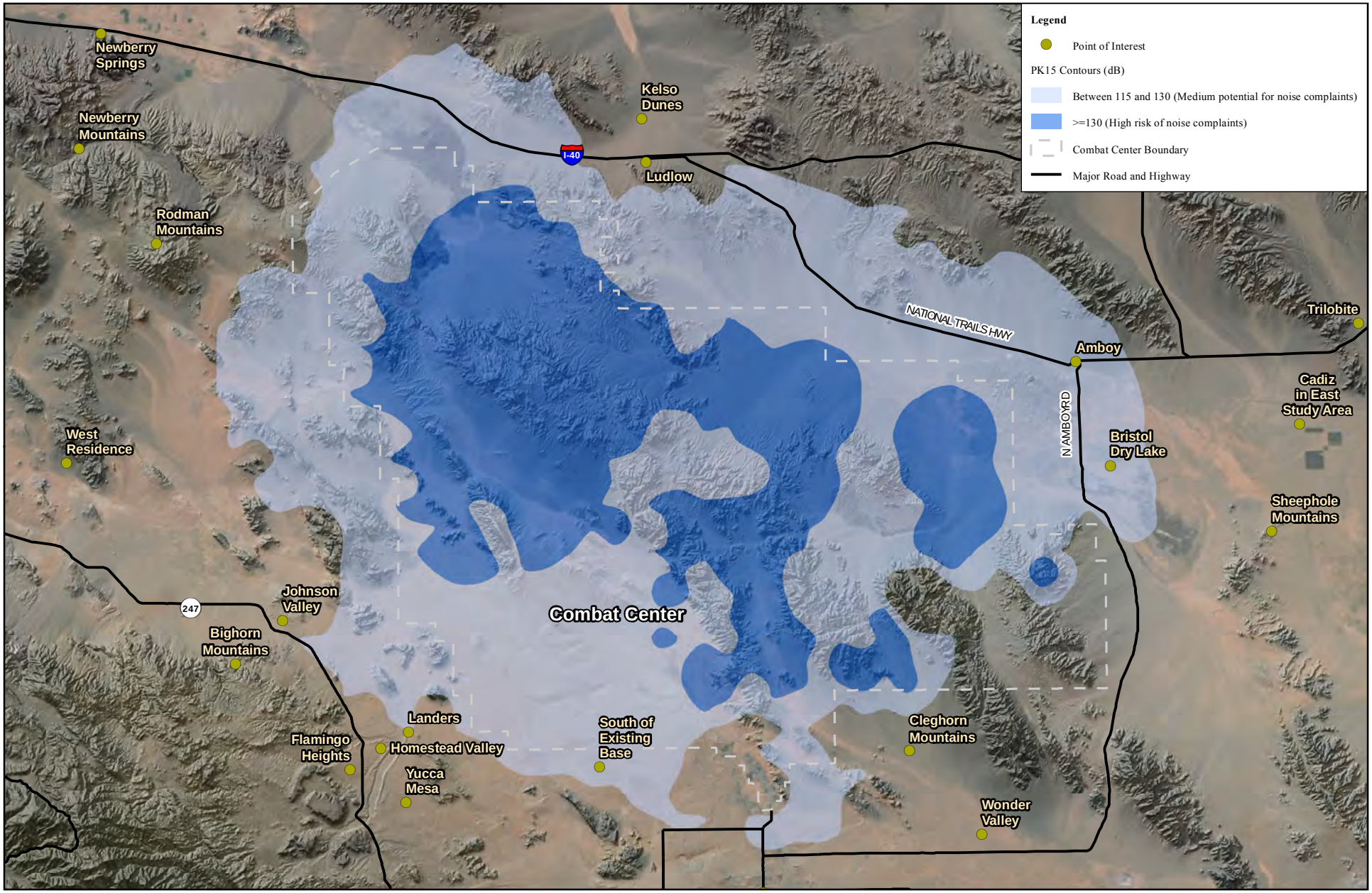
Under baseline conditions, the probability of damage to any structures with brick walls at POIs #14, #22 and #48 is less than 0.002% (refer to Section 4.9.1 for a description of the methodology used to estimate the probability of damage to structures). Other hard structure types and windows at these POIs have an even lower probability of damage from blasts. These values indicate extremely low probability of structural damage associated with baseline levels of ordnance activity at the Combat Center. Although the probability of damage is relatively low, noise complaints may arise from noise-induced vibration as stated above.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009

Figure 3.9-3
Baseline Noise Exposure from Ordnance Activity at the Combat Center



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles
Source: MAGTF Training Command 2009

Figure 3.9-4
Baseline Noise Complaint Risk from Ordnance Activity at the Combat Center

N

3.10 BIOLOGICAL RESOURCES

3.10.1 Definition of Resource

Biological resources include plant and animal species and the habitats in which they occur. Biological resources are important because they 1) influence ecosystem functions and values; 2) have intrinsic value and contribute to the human environment; and 3) are the subject of a variety of statutory and regulatory requirements. This analysis focuses on species that are important to the function of the ecosystem, are of special societal importance, and/or are protected under federal or state law. For purposes of this EIS, these resources are divided into five main categories as follows:

- *Vegetation* includes terrestrial plant communities and their individual component species, as well as non-native vegetation, landscaped, and disturbed areas. Special status plant species are discussed in more detail in a separate section (see below).
- *Ecosystems* comprise the interrelated vegetation and wildlife communities and natural processes that are associated with particular landforms or locations, and other unique features such as seeps and springs, dry lakes (i.e., playas), caves and mines, and cryptobiotic soils.
- *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*. Protected species and special status animal species are discussed in more detail in separate sections (see below).
- *Protected species* are those species afforded protection under the federal ESA of 1973. The only resident species discussed in this EIS with this protected status is the desert tortoise (*Gopherus agassizii*).
- *Special status species* include plant and animal species that occupy limited or unique habitats and those species that various state and federal agencies are interested in tracking. These taxa often require specific survey methods, monitoring, and/or management consideration and fall into one or more of the following categories:
    - Species that are proposed for listing, or are active candidates for listing under the federal ESA (USFWS 2010a, b).
    - Species that are listed, proposed for listing, or are active candidates for listing under the California ESA (CESA) (CDFG 2009a).
    - Species listed by the BLM as Sensitive (BLM 2004a, 2006a).
- Plant species listed by the California Native Plant Society (CNPS) (CNPS 2009a).
- Species listed by the California Department of Fish and Game (CDFG) as California Species of Special Concern (CSSC) or Fully Protected (FP) (CDFG 2009a).
- Bird species listed by the USFWS as Birds of Conservation Concern (BCC) (CDFG 2009a).

  The following criteria were used to determine the list of special status species covered in the analysis:

    - Special status species identified in the *California Desert Conservation Area Plan* (1980, as amended) and *West Mojave Plan Final EIS* (BLM 2005) that occur, or are likely to occur, on

the Combat Center, the proposed land acquisition study areas, or the lands that underlie proposed airspace establishment.

- Special status species observed on the Combat Center, the proposed land acquisition study areas, or the lands that underlie proposed airspace establishment, as recorded during surveys or as listed in the California Natural Diversity Data Base (CDFG 2009b).

The ROI for biological resources includes the Combat Center, the three proposed acquisition study areas, and the lands that would underlie the airspace proposed for establishment. This region is within the south central Mojave Desert, which is topographically and climactically transitional between the southwestern and eastern Mojave Desert. The boundaries of the south central Mojave Desert are formed by the Mojave River to the west, the Pinto Mountains to the east, the San Bernardino and Little San Bernardino mountains to the south, and the Newberry-Bullion Mountains to the north. These mountain ranges are oriented northwest to southeast. For regional planning purposes, the south central Mojave is considered a portion of the West Mojave Planning Area (BLM 2006b).

Additional areas have been identified in southern California beyond the ROI (see Appendix M of this EIS) as alternative recreational sites that attract OHV and other activities similar to those occurring in the acquisition study areas. Section 4.10 of this EIS discusses potential indirect impacts from potential displacement of OHV use on special status species at these alternative recreational sites.

The description of the affected environment in Section 3.10.3 focuses on the five geographic areas that compose the ROI, as described above. Information pertaining to the biological resources of the ROI varies considerably. Extensive biological resource survey information, both recent and historic, is available for the Combat Center (refer to Table 3.10-1 in Section 3.10.3, *Existing Conditions*). Recent data pertaining to vegetation and certain sensitive species found on the proposed acquisition study areas are also available, but historic information is limited (e.g., BLM 1992; Berry 1990, 2003). Little biological information is available for the lands that underlie the proposed airspace establishment outside the Combat Center and acquisition study areas.

For the Combat Center and proposed acquisition study areas, descriptions are provided of vegetation, ecosystems, wildlife, and protected or special status species that occur or possibly occur. Information pertaining to airspace establishment is limited to only those resources that could potentially be affected by aircraft activity. All scientific names used in this EIS are consistent with valid and accepted names in the Integrated Taxonomic Information System (www.itis.gov). Potential adverse effects to the federally threatened desert tortoise under the Preferred Alternative (Alternative 6) are described in more detail in a separate Biological Assessment (available at http://www.marines.mil/unit/29palms/las/pages/default.aspx).

Although there is a potential for some federally threatened or endangered migratory bird species to occur at the permanent water sources at Mainside (Cutler *et al.* 1999), these species are not addressed in this EIS due to their uncertain occurrence (they were not identified to the threatened subspecies or population) and, if present, their limitation to Mainside where impacts from the proposed action would be negligible.

3.10.2 Regulatory Framework

3.10.2.1 Federal Statutes and Regulations

The primary federal statutes and regulations that pertain to biological resources are the ESA and the MBTA. These and other relevant federal statutes and regulations are described below.

Endangered Species Act

The ESA of 1973, as amended (16 USC §§ 1531, *et seq*.), provides for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend. This act:

- authorizes the determination and listing of species as endangered or threatened;
- prohibits unauthorized taking, possession, sale, and transport of endangered species;
- provides authority to acquire land for the conservation of listed species, using land and water conservation funds;
- authorizes establishment of cooperative agreements and grants-in-aid to states that maintain adequate programs for listed species; and
- authorizes the assessment of civil and criminal penalties for violating the Act or its regulations.

Endangered species are those plant or wildlife taxa that are in danger of extinction throughout all or a significant portion of their range. Threatened species are those taxa that are likely to become endangered in the foreseeable future. Candidate species are those taxa for which the USFWS has sufficient information to propose an endangered or threatened listing under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. Proposed species are those taxa for which a *Federal Register* Notice has been issued proposing listing under the ESA.

Section 7 of the ESA requires federal agencies to ensure that any action authorized, funded, or carried out by them is not likely to jeopardize the continued existence of listed species or adversely modify designated critical habitat.

Migratory Bird Treaty Act/EO 13186

The MBTA of 1918 (16 USC §§ 703-712) prohibits the taking, killing, possession, transportation, sale, and importation of migratory birds, any of their parts, their eggs, or nests, except when specifically authorized by the Department of Interior, or unless permitted by regulations. All special status bird species listed in this EIS, and a large number of the non-special status bird species, are covered and protected by the MBTA. In addition to the MBTA, EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, provides specific direction to federal agencies to achieve the objectives of the MBTA. The DoD and the USFWS signed an MOU in 2007 with regard to implementing this EO. This MOU specifically pertains to the following categories of DoD activities:

1. Natural resource management activities including, but not limited to, habitat management, erosion control, forestry activities, agricultural outleasing, conservation law enforcement, invasive weed management, and prescribed burning;
2. Installation support functions including, but not limited to, the maintenance, construction or operation of administrative offices, military exchanges, road construction, commissaries, water treatment facilities, storage facilities, schools, housing, motor pools, non-tactical equipment, laundries, morale, welfare, and recreation activities, shops, landscaping, and mess halls;
3. Operation of industrial activities;
4. Construction or demolition of facilities relating to these routine operations; and
5. Hazardous waste cleanup.

This MOU does not address incidental take during military readiness activities, which was addressed in a rulemaking in accordance with Section 315 of the National Defense Authorization Act for FY 2003. The

final rule, *Migratory Bird Permits: Take of Migratory Birds by the Armed Forces*, was published as 50 CFR Part 21 in the February 28, 2007 *Federal Register*, pages 8931-8950. This final rule exempts the DoD from the MBTA prohibition on "take" of migratory bird species, provided that such "take" is a result of military readiness activities. However, if it is determined during the NEPA process that a proposed or an ongoing military readiness activity may result in a significant adverse effect on a population of a migratory bird species, then the DoD must confer and cooperate with the USFWS to develop appropriate and reasonable conservation measures to minimize or mitigate identified significant adverse effects.

National Environmental Policy Act

Section 102(2)(H) of the NEPA contains a requirement that agencies use ecological information in planning and development. An important aspect of the NEPA process is that it can serve to coordinate consideration of substantive requirements of other environmental statutes, including laws designed to protect special species or areas (such as the ESA, Marine Mammal Protection Act, and Wilderness Act).

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act of 1940, as amended (16 USC §§ 668 – 668d) prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald or golden eagles, including their parts, nests, or eggs. The act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."

For purposes of these guidelines, "disturb" means: "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death, or nest abandonment.

Noxious Weed Act/EO 13112

The Noxious Weed Act (7 USC § 28014) established a federal program to control the spread of noxious weeds through establishment of land management programs, cooperative agreements with state and local agencies, and official designation of species that should be considered "noxious weeds." In addition, EO 13112, *Invasive Species*, directs agencies to identify how their actions could contribute to spread of invasive species, prevent such spread through research and program implementation, conduct public education efforts, and provide for restoration of native species.

3.10.3 Existing Conditions

3.10.3.1 Overview

Characteristics of the South Central Mojave

Characterized by the low, widely spaced shrubs common to the Mojave Desert, the ROI includes wide basin valleys and plains, alluvial fans dissected by washes, rolling hills, and peripheral mountain ranges. The Mojave Desert is a transition zone between the Great Basin Desert to the north and the Colorado Desert to the south and east (USGS 2004).

Average annual precipitation in the City of Twentynine Palms is low, averaging 4.26 inches (10.82 centimeters) of rainfall spread widely over the months of July through March (Desert Research Institute 2010). Temperature extremes range from an average daily high of 105.4°F (40.8°C) in July to an average daily low of 35.4°F (1.9°C) in December (Desert Research Institute 2010). The highest and lowest recorded temperatures at Twentynine Palms were 118°F and 10°F (48°C and -12°C), respectively (Lato *et al.* 1999). Day to night fluctuations in temperature can be extreme. Spring and fall months are known for frequently windy conditions. Freezing weather and snowfall in winter months is also known to occur on occasion (Rowlands 1993).

Regional wildlife habitats are defined by distinct landscape features such as alluvial fans and basins, braided washes, rock outcrops, cliffs, caves and mineshafts, sand dunes and fields, springs, and seeps. All contribute to the diversity and abundance of wildlife, as they provide microhabitats for species uniquely adapted to, or dependent on, these features. Most wildlife species known from the region are adapted to extremely arid conditions and variable weather patterns, including sparse vegetative cover and intermittent sources of water.

Seeps, springs, and natural water catchments (i.e., "tanks," "tinajas," and rock catchments) provide intermittent sources of water that attract wildlife. These areas often support greater wildlife diversity in comparison to the surrounding communities (reviewed by Shepard 1993).

Natural Resource Management Plans in the West Mojave

The CDCA Plan (BLM 1980) included early efforts to stabilize declining desert tortoise (*Gopherus agassizii*) populations, and called for the development of Habitat Management Plans and identification of ACECs. The CDCA Plan also called for vehicle route designation and development of OHV area management plans.

In 1992, the BLM and CDFG released the Statewide Desert Tortoise Management Policy (BLM and CDFG 1992) that contained the first recommendations for definitive actions that should be taken to improve protection and enhancement to desert tortoise populations and habitat. An updated CDCA Plan (BLM 1998) was released that further emphasized recovery efforts for desert tortoise populations.

In 1994, USFWS issued a Desert Tortoise Recovery Plan delineating six evolutionarily significant Recovery Units supporting the desert tortoise within the Mojave population (USFWS 1994). The six units were determined through analysis of data from various sources, and are based on populations or groups of populations that show significant differentiation in genetics, morphology, ecology, or behavior. In turn, these six units were given the status of recovery units. Preserving viable populations of tortoises within each of these recovery units is essential to the long-term recovery, viability, and genetic diversity of the species (USFWS 2011).

The Western Mojave Recovery Unit, situated completely within California, is considered exceptionally large and heterogeneous. It is subdivided into the Western Mojave, Southern Mojave, and Central Mojave regions, with each subdivision having distinct climate and vegetation characteristics. The Combat Center is located within the Western Mojave Region.

Within each Recovery Unit, Desert Wildlife Management Areas (DWMAs) are identified in which recovery actions are implemented to provide for the long-term persistence of viable desert tortoise populations and the ecosystem upon which they depend (USFWS 2011). The Ord-Rodman DWMA, immediately northwest of the Combat Center, covers about 300,000 acres (121,406 hectares). Estimated tortoise densities within this DWMA range from 5 to 150 tortoises per mi^2 (2 to 58 per km^2), with most of the area in the lower range of that scale (reviewed by Snover and Kellogg 1999). It is likely that some portions of the Ord-Rodman DWMA would not have a high tortoise density, based on the presence of many steep slopes and areas of higher elevation.

As required by federal regulation, BLM policy, and the BLM's CDCA Plan, Vehicle Route Designations are established in the West Mojave Plan (BLM 2003, 2005, 2006b) and Northern and Eastern Mojave Plan (BLM 2002a, 2002b, 2004b). These plans designate routes on BLM land as open or closed to motorized vehicle access, or as open on a limited basis. These routes and their designations are incorporated as a component in the CDCA Plan, and take into account landscape, presence of critical habitat, and many other factors in an effort to protect desert tortoise populations and other sensitive species while allowing public access.

Rangeland Health Standards were established in the Northern and Eastern Mojave Plan (BLM 2002a, 2002b) and West Mojave Plan (BLM 2005, 2006b). These standards were intended to maintain suitable habitat for tortoises and other native species while allowing livestock grazing. Guidelines emphasize maintenance of stream function, wetland and riparian habitat quality, soil quality, and maintenance of healthy populations of native species.

The West Mojave Plan, Northern and Eastern Mojave Plan, and Desert Tortoise Recovery Plan also contain recommendations to conduct additional studies regarding tortoise population densities in various areas and into the use of habitat by tortoises. These bioregional plans recommend studies on the use of hatchling-rearing nurseries to increase survival of desert tortoises.

The USFWS released a Revised Recovery Plan for the Mojave population of the desert tortoise in 2011 (USFWS 2011) to update the 1994 Recovery Plan (USFWS 1994). Recovery criteria are specified that include the management or elimination of threats, addressing the five statutory de-listing factors. Even though a wide range of threats affect desert tortoises and their habitat, very little is known about the demographic impacts of these threats on tortoise populations or the relative contributions each threat makes to tortoise mortality. Accordingly, the Revised Recovery Plan does not establish specific threats-based recovery criteria. Specific recovery actions, including research, must be implemented to identify sets of threats that contribute to a greater number of mortality mechanisms or affect size structure or fecundity. As additional quantitative information regarding threats to desert tortoise populations and tortoise mortality is obtained, more specific recovery criteria may be defined.

Surveys and Mapping in the ROI

Several survey and mapping efforts have been conducted in the last 20 years on the Combat Center, and, more recently, on the areas proposed for acquisition (Table 3.10-1). Typically, the more recent surveys and mapping described below form the basis for the description of the existing biological resources presented in this section.

Table 3.10-1. Surveys and Mapping Conducted in the ROI

Survey/Map Subject	Survey/Map Area	Date	Reference
Vegetation and Plants			
Vegetation mapping	Combat Center	1993	University of California, Riverside 1993
Vegetation mapping	Combat Center	2008	Agri-chemical and Supply 2008
Vegetation mapping	South Central Mojave Desert	1999-2000	USGS 2004
Non-native plants	Combat Center	2005	Agri-chemical and Supply 2005
Non-native plants	Combat Center	2001	Anteon Corporation 2001

Continued on next page

Table 3.10-1. Surveys and Mapping Conducted in the ROI

Survey/Map Subject	Survey/Map Area	Date	Reference
Special status plant species	Combat Center	1997-2005	MAGTF Training Command 2006
Special status plant species	West study area, South study area	2008	MAGTF Training Command 2009a
Special status plant species	East study area	2009	MAGTF Training Command 2009b
Plant inventory	Combat Center	1996-1999	Tierra Data Systems 2000
Special status plant species (draft)	Combat Center	2006	Agri-chemical and Supply 2006
Land Condition and Trend Analysis 1997-1999	Combat Center	2000	Tierra Data Systems 2000
Rare Plant Survey and Floristic Inventory 1997, 1998, and 1999	Combat Center	1999 to 2000	Tierra Data Systems 1998, 1999, 2000
Vegetation Survey	Combat Center	1982	Scheidlinger and Zedler 1982
Land Condition Trend Analysis	Combat Center	2003	USACE 2003
Special Status Wildlife Surveys			
Desert tortoise, Mojave fringe-toed lizard, burrowing owl, chuckwalla[1]	South study area, West study area	2008	Karl 2009a
Desert tortoise, Mojave fringe-toed lizard, burrowing owl, chuckwalla[1]	East study area	2008	Karl 2010
Desert tortoise	Combat Center and Adjacent	2001, 2002, 2003,	Woodman 2004a, 2004b, 2004c
Desert tortoise	Combat Center	1997	Woodman (Jones and Stokes) 1998
Desert tortoise	Combat Center	1997, 1999	Woodman *et al.* 2001
Desert tortoise	Combat Center	2001	Woodman 2001
Desert tortoise	Combat Center	1991	Wood 1991
Desert tortoise	Combat Center	2001	Woodman 2001
Desert tortoise	Combat Center	2001	Bjurlin 2001, Bjurlin and Bissonette 2004
Desert tortoise	Combat Center – America Mine	1998	Woodward-Clyde 1998
Desert tortoise	Combat Center – Range Development Areas P-506, -507, -508	1993-1994	Sweetwater Environmental Biologists 1993, 1994
Desert tortoise	Combat Center	1993	Wood 1993
Desert tortoise (density analysis)	Combat Center	1993	Wood 1993
Desert tortoise	Combat Center	1986	Baxter 1986
Desert tortoise	Combat Center – Sand Hill	1984	Burge *et al.* 1984
Desert tortoise	Combat Center (Sand Hill and West training areas)	1984	Kirtland 1984

Continued on next page

Table 3.10-1. Surveys and Mapping Conducted in the ROI

Survey/Map Subject	Survey/Map Area	Date	Reference
Desert tortoise	Combat Center and Joshua Tree National Park	1995 and 1996	Duda 1998
Desert tortoise	Combat Center	1984	Kirtland 1984
Desert tortoise	Combat Center	1995	Krzysik *et al.* 1995a, b & c
Mojave fringe-toed lizard	Combat Center, small portion of west study area near Acorn training area, part of south study area, other areas north and south of Combat Center but not in acquisition study areas	2001	Cablk and Heaton 2002
Mojave fringe-toed lizard	Combat Center	1983	Fromer, Dodero and Patterson 1983
Burrowing owl	Mostly Combat Center, but some survey transects in west and south study areas	2004-2005	USGS 2007
Special status bat species	Combat Center	2005	USGS 2006
Aquatic invertebrates (e.g., fairy shrimp)	Combat Center	2006	Simovich 2006
Mojave ground squirrel	Combat Center (only Sand Hill, Emerson Lake, Acorn, and Maumee Mine training areas)	2008	Jones and Stokes 2008a
Mojave ground squirrel	West study area	2008	Jones and Stokes 2008b
Wildlife Inventories			
General wildlife inventory	Combat Center	1996-1998	Cutler *et al.* 1999
Reptile, amphibian and small mammal Inventory	Combat Center (only Sand Hill training area)	1999-2001	Hirsch *et al.* 2002
Bat species	Combat Center	1998	Brown and Berry 1998
Reptile inventory	Combat Center	1982	Fromer and Dodero 1982
Bird inventory	Combat Center	1983	Fromer and Edward 1983
Neotropical birds	Combat Center (Mainside, Quackenbush training area) and south of Combat Center	1994-1995	McKernan 1998
Terrestrial arthropods (e.g., insects, spiders, etc.)	Combat Center	2001-2005	Pratt 2005
Crustaceans	Combat Center	2003	Simovich 2003

Notes: [1]Not a special status species. Refer to Appendix I for detailed citations for these surveys.
MAGTF = Marine Air Ground Task Force; USACE = U.S. Army Corps of Engineers; USGS = U.S. Geological Survey

3.10.3.2 Combat Center

Vegetation

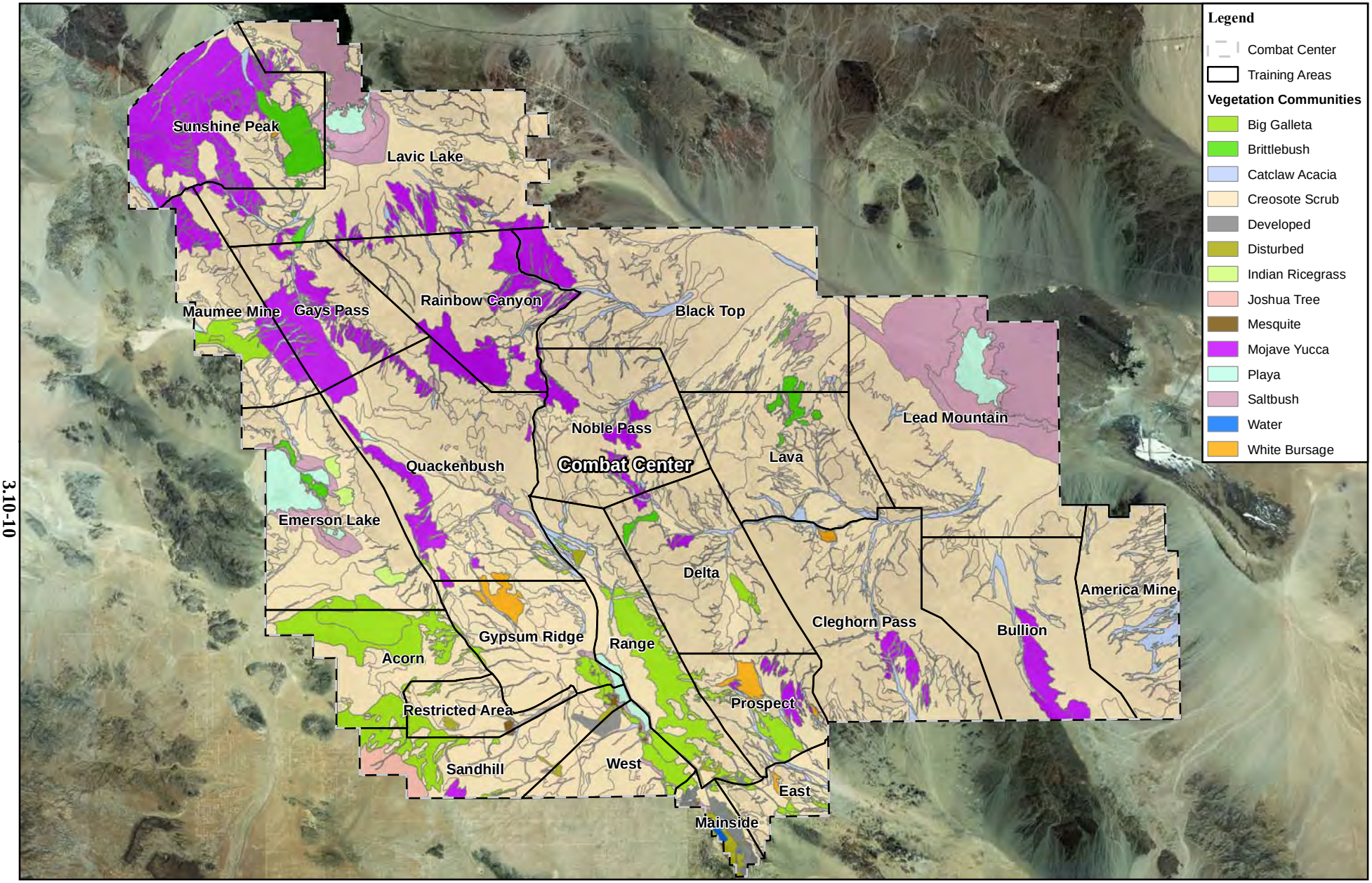
Plant Communities

The primary vegetation type within the ROI is desert scrub or shrubland, which can be subdivided into specific shrub-dominated plant communities that occur on the Combat Center (Table 3.10-2). Table 3.10-2 also presents communities that are dominated by trees rather than shrubs and land classifications that are not defined by dominant vegetation. The locations of these plant communities and land classifications on the Combat Center are shown in Figure 3.10-1.

Table 3.10-2. Plant Communities and Land Classifications[1] on the Combat Center

Plant Community or Land Classification	Area (Percent of Total)	Dominant Species	Subdominant Species (If Applicable)
Shrub-Dominated Communities			
Creosote bush scrub	439,989 acres (73.4%)	Creosote bush (*Larrea tridentata*) White bursage (*Ambrosia dumosa*) Brittlebush (*Encelia farinosa*) Cheesebush (*Hymenoclea salsola*)	Sweetbush (*Bebbia juncea*) Spiny senna (*Senna armata*) Desert lavender (*Hyptis emoryi*)
Mojave yucca	52,299 acres (8.7%)	Creosote bush White bursage	Mojave yucca (*Yucca schidigera*) Spiny senna Cheesebush Black brush (*Coleogyne ramosissima)*
Saltbush scrub	34,408 acres (5.7%)	Creosote bush All-scale *(Atriplex polycarpa)* Bush seepweed (*Suaeda moquinii*) Fourwing saltbush *(Atriplex canescens)*	Desert holly (*Atriplex hymenelytra*) Spiny senna (*Senna armata*) Brittlebush Bush encelia
Big galleta	28,812 acres (4.8%)	Big galleta *(Pleuraphis rigida)* Creosote bush	White bursage
Brittlebrush	5,640 acres (0.9%)	Brittlebush	Creosote bush White bursage
White bursage	2,886 acres (0.5%)	White bursage Bush encelia (*Encelia frutescens*)	Creosote bush Sweetbush
Indian ricegrass	1,036 acres (0.2%)	Indian ricegrass *(Achnatherum hymenoides)* Creosote bush	None
Tree-Dominated Communities			
Catclaw acacia	20,471 acres (3.4%)	Catclaw acacia (*Acacia greggii*) Cheesebush Smoke tree *(Psorothamnus spinosus*)	Creosote bush Cheesebush Sweetbush Desert willow (*Chilopsis linearis*)
Joshua tree	1,919 acres (0.3%)	Creosote bush White bursage	Joshua tree (*Yucca brevifolia*)
Mesquite	323 acres (0.05%)	Honey mesquite *(Prosopis glandulosa* var. *torreyana)*	All-scale Bush seepweed Fourwing saltbush
Other Land Classifications			
Playa	7,750 acres (1.3%)	N/A	N/A
Developed	2,407 acres (0.4%)	N/A	N/A
Disturbed	1,662 acres (0.3%)	N/A	N/A
Water	188 acres (0.03%)	N/A	N/A

Notes: [1]As defined by CNPS (2009a).
Source: Agri-Chemical and Supply 2008



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009c, Agri-chemical and Supply 2008

Figure 3.10-1
Plant Communities on the Combat Center (modified from Agri-chemical and Supply 2008)

N

Non-Native Vegetation

Introduced non-native vegetation is often fast-growing and can thrive in disturbed soils (D'Antonio and Vitousek 1992). Once established, associated non-native plant seed can be spread by livestock, wildlife, vehicles, wind, and water (e.g., Gelbard and Belnap 2003, Radosevich *et al.* 2003, Constible *et al.* 2005). Some non-native plants can effectively compete with native vegetation for water, sunlight, and space, occasionally replacing valuable wildlife forage and/or cover (e.g., D'Antonio and Vitousek 1992, Davis *et al.* 2000). Non-native species in the Mojave Desert can form a significant amount of the annual spring biomass, depending on the timing and amount of rainfall (DeFalco *et al.* 2007). The most widespread non-native annual plants in the ROI include storksbill (*Erodium cicutarium*), split grass (*Schismus barbatus*, *S. arabicus*), red brome (*Bromus rubens*), cheat grass (*Bromus tectorum*), biennial mustard (*Hirschfeldia incana*), and tumbleweed (*Salsola tragus*) (Agri-Chemical and Supply 2005).

Other non-native plants have become locally common on the Combat Center as a result of supplemental irrigation, such as burgrass (*Cenchrus tribuloides*), crabgrass (*Digitaria* spp.), lambsquarter (*Chenopodium album*), plantain (*Plantago lanceolata*), tansy mustard (*Descurainia pinnata*), tumble mustard (*Sisymbrium altissimum*), puncture vine (*Tribulus terrestris*), and saltcedar (*Tamarix ramosissima*) (Agri-Chemical and Supply 2005). However, these species rarely spread beyond artificially irrigated or otherwise highly disturbed landscapes and are not commonly encountered throughout the ROI. Non-native annual plants can become established along the disturbed soil shoulders of roadsides and areas of regular vehicle use, occasionally radiating outwards from these introduction sites. One relatively recent non-native weed to enter the area is the Sahara mustard (*Brassica tournefortii*), which has become established along many roadsides and utility corridors in the Mojave Desert. The structure and growth pattern of some non-native plants (e.g., split grass, red brome, cheat grass, and Sahara mustard), often in combination with native plant growth, can influence the spread and severity of fire effects upon native shrubs when wildfire occurs (Brooks 1999).

Split grass in particular is pervasive across the Combat Center (Agri-Chemical and Supply 2005). This non-native species increases wildfire risks, and its pervasiveness makes management strategies very difficult. At present, Sahara mustard and tumbleweed are removed by hand from the Tortoise Research and Captive Rearing Site (TRACRS), where removal is viable on a small scale (MAGTF Training Command 2010a). The removal of saltcedar from the Combat Center is an ongoing land restoration action. Most saltcedar trees have been removed from Mainside and in the range training areas, most notably Lead Mountain. These trees have limited wildlife value, displace native species, and are water inefficient. More than 40,000 saltcedar trees were removed between 1996 and 2007 (MAGTF Training Command 2007).

Landscaped Areas

The area within and immediately surrounding Mainside is lightly landscaped with drought-tolerant or cultivated desert plants, which is referred to as xeriscaping. All new buildings at the Combat Center are incorporating xeriscaping principles and many buildings around Mainside are being converted from traditional landscaping. The Headquarters building was re-landscaped using xeriscaping principles in 2005 and 2006.

Ecosystems

Plant communities, caves, mines, seeps, springs, and man-made water sources support several diverse ecosystems within the ROI. Krzysik and Trumbull (1996) described 13 ecosystems on the Combat Center with species-ecosystem associations and management options for each ecosystem. The Creosote/Bursage Scrub Ecosystem currently covers approximately 90% of the Combat Center's training

areas. Yucca Woodlands, Desert Riparian, and Wet Areas/Ponds/Riparian: perennial ecosystems, by far the richest in terms of wildlife biodiversity, occupy less than 1% of existing training land.

Below is a brief summary of the ecosystems found on the Combat Center, as described by Krzysik and Trumbull (1996). Where data are available, species richness for each ecosystem is also provided.

Creosote/Bursage Scrub Ecosystems

- ***Creosote/Bursage Scrub: Valleys, Gentle Bajadas*** – This ecosystem occurs on 50% of the Combat Center in valleys, rolling plains, flats, gentle bajadas, and alluvial fans. In undisturbed valleys, creosote bush forms elliptical mosaics of clones. Cutler *et al.* (1999) surveyed the flats in Acorn Training Area and identified 18 bird species, 8 reptile species, and 6 mammal species occurring in this ecosystem.
- ***Creosote/Bursage Scrub: Disturbed*** – This ecosystem was originally the Valleys, Gentle Bajadas Ecosystem, but it has been subjected to extensive military training activities with moderate to high disturbance. This disturbed ecosystem occurs on 10% of the Combat Center. No species inventories are available for this ecosystem on the Combat Center.
- ***Creosote/Bursage Scrub: Mountains*** – This ecosystem typically possesses moderate to high diversity of woody perennials. Creosote bush is predominantly found as small individuals, never clones. This ecosystem is found on steep slopes, alluvial fans, or bajadas; boulder fields, talus slopes, or rocky outcrops; steep broken ridges or hills; and canyons or arroyos. This ecosystem occurs on 24% of the Combat Center, primarily in the Bullion Mountains. Cutler *et al.* (1999) surveyed the Bullion Mountains in Rainbow Canyon Training Area and Lava Bed Mountains in Sunshine Peak Training Area and identified 41 bird species, 8 reptile species, and 11 mammal species occurring in this ecosystem.
- ***Creosote/Bursage Scrub: Sand Dunes*** – The sand dune ecosystem is dominated by creosote bush, white bursage, galleta grass, Indian ricegrass, and sand dune annuals. It occurs on 3% of the Combat Center, predominantly in the southwestern and northern portions. Cutler *et al.* (1999) surveyed the sand dunes in Lead Mountain and Quackenbush Training Areas and identified 26 bird species, 10 reptile species, and 11 mammal species occurring in this ecosystem.
- ***Creosote/Bursage Scrub: Lava Flows*** – Lava flows, existing as solid basalt pavements, boulders, and rocky and coarse-gravel substrates, are the primary characteristics of this ecosystem. This ecosystem occurs on 5.4% of the Combat Center on the northern boundaries. Cutler *et al.* (1999) surveyed the Petroglyph and Pisgah flows and identified 37 bird species, 7 reptile species, and 9 mammal species occurring in this ecosystem.

Other Vegetation Series Ecosystems

In addition to Creosote/Bursage Scrub ecosystems, a few of the other plant communities described above also provide habitat and sustenance for key ecosystems in the Western Mojave and on the Combat Center.

- ***Yucca woodlands: Joshua Trees and/or Mojave Yucca*** – This Joshua tree-dominated ecosystem is confined to the southwestern and northwestern corners of the Combat Center, covering only 0.4% of total land. Cutler *et al.* (1999) surveyed the Joshua tree woodlands in Sand Hill Training Area and identified 21 bird species, 8 reptile species, and 7 mammal species occurring in this ecosystem.

- ***Saltbush Scrub: Playa and Uplands*** – This low-biodiversity ecosystem is characterized by one or more species of saltbush (*Atriplex* spp.) in combination with other halophytes, and is often prevalent around margins of playas or other poorly drained soil types. About 6% of the Combat Center includes the saltbush scrub ecosystem. No species inventories are available for this ecosystem on the Combat Center.
- ***Black Brush Scrub*** – Black brush ecosystems are widespread on upper bajadas and rocky alluvial mountain slopes in the Mojave Desert, but they only compose 0.7% of the Combat Center, primarily in the northwestern corner of the installation. No species inventories are available for this ecosystem on the Combat Center.

Riparian, Wet Areas, and Aquatic Ecosystems

Seeps, springs, and man-made bodies of water provide perennial sources of water and often have high concentrations of vegetation and cover that contribute to increased wildlife diversity in these areas. Large mammals use these water sources and return to them regularly. Bats typically feed and drink at these areas because of increased abundance of invertebrate prey. Migrant bird species often rest in these habitats, and birds of prey often feed on the variety of animals that visit these sites.

- ***Desert Riparian (Xeroriparian)*** – These tree-dominated, desert wash ecosystems, supported by ephemeral surface flows, are known from small localities on the Combat Center and cover less than 0.5% of its area. Mammalian species often use desert riparian habitats as movement corridors, and migrant birds often rest and nest in these habitats. Cutler *et al.* (1999) surveyed the Petroglyph wash and identified 39 bird species, 6 reptile species, and 7 mammal species occurring in this ecosystem.
- ***Desert Wash with Ephemeral Flows*** – Supported by ephemeral water flow, shrub-dominated desert washes are known to occur on approximately 2 to 4% of the Combat Center. Mammals use such habitats as movement corridors. Migrant bird species often rest in these habitats. Birds of prey often feed on animals that travel in washes. Cutler *et al.* (1999) surveyed the Lavic Lake wash and identified 23 bird species, 11 reptile species, and 7 mammal species occurring in this ecosystem.
- ***Springs and Seeps*** – This ecosystem is poorly represented at the Combat Center. There are no permanent springs known to occur; only one intermittent spring with hydrophytic vegetation (Sunshine Peak) and one ephemeral spring without hydrophytic vegetation (north of Lead Mountain) occur on the Combat Center. A seep-fed surface water source is located approximately 100 feet (30.5 meters) inside the gated entrance of the Pat Maloy mine in the Sunshine Peak Training Area. At least three "tinajas" (highly ephemeral water pockets) occur throughout the training areas (MAGTF Training Command 2007). Cutler *et al.* (1999) surveyed the Sunshine Peak spring and identified 13 bird species, 2 reptile species, and 5 mammal species occurring in this ecosystem.
- ***Dry Lake Beds (Playas)*** – Eleven playas occur on the Combat Center (DoN 2003). Playas are supported by episodic periods of heavy rainfall. Following rainfall events, ephemeral surface waters form. Upon drying, saline deposits cover surface soils in playas. Surface water in playas is ephemeral and highly episodic. Five species of fairy, clam, and tadpole shrimp have been found in some of the playas when water is present (reviewed by Krzysik and Trumbull 1996). No comprehensive species inventories are available for this ecosystem on the Combat Center.

- ***Wet Areas/Ponds/Riparian: Perennial*** – This man-made habitat type covers less than 0.1% of the Combat Center, all within and near Mainside. The area is heavily used by migratory birds, and is used by a number of resident and breeding birds as well as other animals (MAGTF Training Command 2007). Cutler *et al.* (1999) surveyed the golf course and sewage treatment ponds at Mainside and identified 183 bird species, 2 reptile species, and 6 mammal species occurring in this ecosystem.

Artificial Water Sources

A common artificial water source installed at numerous locations within the ROI is referred to as a wildlife water "guzzler." These relatively low-maintenance water improvements are commonly constructed to benefit upland gamebirds such as California quail (*Callipepla californica*), Gambel's quail (*C. gambelli*), and the introduced chukar (*Alectoris chukar*).

Two guzzlers are installed in the Bullion Mountains in Cleghorn Pass and Bullion Training Areas to support an experimental population of Nelson's bighorn sheep (*Ovis canadensis nelsoni)*, and are maintained by NREA. Cutler *et al.* (1999) surveyed one of the Bullion guzzlers and identified 11 bird species, 3 reptile species, and 1 mammal species occurring in this ecosystem.

Mines and Rock Crevices

In addition to the ecosystems described on the Combat Center by Krzysik and Trumbull (1996), natural and man-made topographic features also support unique ecosystems. Caves, rock crevices, and mines occur in several locations within the Combat Center and are used by a variety of wildlife species for water, shelter, and protection from the heat. Abandoned mines have become important roosts in the southwestern U.S. for a variety of bats, including obligate cave-roosting species such as Townsend's big-eared bat (*Plecotus townsendii*) and California leaf-nosed bat (*Macrotus californicus*), as well as generalist-roosting species such as California myotis (*Myotis californicus*) and pallid bat (*Antrozous pallidus*) (USGS 2006).

Cryptobiotic Soils

In many locations within the ROI, vegetation cover is often sparse or absent. Nevertheless, in open spaces between the higher plants (e.g., creosote bush, white bursage), the soil surface is generally not bare of autotrophic life, but covered by a community of minute or microscopic organisms that form "cryptobiotic" soil crusts. Cryptobiotic soil crusts are a complex mosaic of cyanobacteria, green algae, lichens, mosses, microfungi, and other bacteria. Cyanobacterial and microfungal filaments weave through the top few millimeters of soil, gluing loose particles together and forming a matrix that stabilizes and protects soil surfaces from erosion. Cryptobiotic soils have only recently been recognized as having a major influence on terrestrial ecosystems, affecting nutrients available to vascular plants, infiltration of water into the soil, and lowering the temperature of the soils (USGS 2001).

Cryptobiotic soils are present throughout the ROI in varying levels of intactness. Intact cryptobiotic soils are most likely to be present in areas that have not been disturbed for many years by military personnel and vehicle movement or ordnance explosion. In areas where disturbance has resulted in damage or destruction to cryptobiotic soils, recovery is a slow to very slow process, ranging from approximately 15 years to more than 100 years depending on soil types, exposure, and other factors (Belnap 1993).

Wildlife

Cutler *et al.* (1999) observed 256 species of vertebrates within the Combat Center. Of these, 56% were observed only at the golf course or sewage ponds at Mainside. These species are generally described below, and those that are special status species are described fully in *Special Status Species* below.

Many wildlife populations depend on large areas of continuous habitat for reproduction, resting, foraging, and dispersal. Development (e.g., structures and roads) and disturbance (e.g., OHV activity and wildfires) can fragment suitable habitats or create barriers to animal movement, resulting in areas too small or isolated from dispersal to support viable populations. When this occurs, the maintenance of remaining natural "linkages," or undeveloped areas that allow for transit between habitat patches, is critical to avoiding losses of biodiversity. The non-profit organization, South Coast Wildlands, has identified several potential linkages between the Combat Center and Joshua Tree National Park, as these two areas represent large expanses of relatively undeveloped land (Penrod *et al.* 2008). It should be noted that these potential linkages are solely based on modeling; field investigations to determine whether these "potential" linkages are actually in use or would be suitable for use as linkages, have not been conducted.

Invertebrates

Although wildlife surveys typically do not focus on invertebrate species, invertebrates (especially insects) are an essential component of desert ecosystems, providing food for numerous vertebrate species and acting as pollinators for a large number of plant species. The seasonal reproductive cycle of some insect species results in an "explosion" of the population in a relatively short period of time. These insect swarms provide an important prey base for insectivores, such as smaller birds, reptiles, amphibians, and bats. The University of California, Riverside conducted a terrestrial invertebrate survey from 2001-2005 that identified more than 1,600 species, though no special status species were detected (Pratt 2005).

Simovich (2006) investigated nine of the Combat Center dry lakes for presence of aquatic invertebrates. Six species of fairy shrimp, clam shrimp, and tadpole shrimp were detected. Nearly all expected species were detected in either their live or desiccated forms, and none of the species detected were considered rare or otherwise sensitive.

Fish

There are no perennial springs located on the Combat Center and there is no documentation of native fish species occurring anywhere on the installation. The introduced mosquito fish (*Gambusia affinis*) occurs in some of the man-made treatment ponds at Mainside (MAGTF Training Command 2007).

Amphibians

Two amphibian species, the Western toad (*Anaxyrus boreas halophilus*) and the red-spotted toad (*Anaxyrus punctatus*) were identified on the Combat Center by Fromer and Dodero (1982) and Cutler *et al.* (1999) during wildlife inventories. Western toads were observed only at the golf course near Mainside, while the red-spotted toads were observed at two water holes in America Mine Training Area. No other amphibian species are known to occur on the Combat Center.

Reptiles

An inventory of reptile species on the Combat Center was conducted by Fromer and Dodero (1982), and a vertebrate inventory conducted by Cutler *et al.* (1999) also inventoried reptiles on the Combat Center (see Appendix I for a complete list of reptile species observed on the Combat Center). One intensive 1999-2001 reptile survey was also conducted in the Sand Hill Training Area (Hirsch *et al.* 2002). The reptile diversity observed on the Combat Center represents a typical community structure for lower elevation

Mojave desert scrub habitats. Twenty-three reptile species were identified during the Fromer and Dodero inventory (13 lizards, 9 snakes, and 1 tortoise), and 21 were identified by Cutler *et al.* (13 lizards, 7 snakes, and 1 tortoise). Habitat diversity and, as a consequence, reptile species diversity on the Combat Center are somewhat limited by the lack of high elevations (the highest elevation is just over 4,600 feet [1,400 meters]) and the absence of natural water sources.

Western whiptails (*Cnemidophorus tigris*) were the most commonly captured lizard in the Sand Hill Training Area survey (Hirsch *et al.* 2002), accounting for 72.5% of all lizards caught. Other lizards caught in order of decreasing abundance were side-blotched lizards (*Uta stansburiana*), desert horned lizards (*Phrynosoma platyrhinos*), western banded geckos (*Coleonyx variegatus*), desert iguanas (*Dipsosaurus dorsalis dorsalis*), desert spiny lizards (*Sceloporus magister*), zebra-tailed lizards (*Callisaurus draconoides*), and long-nosed leopard lizards (*Gambelia wislizenii*).

Among the 46 snakes caught in the 1999-2001 herpetofaunal survey (Hirsch *et al.* 2002), the most common were western shovel-nosed snakes (*Chionactis occipitalis*), followed by coachwhips (*Masticophis flagellum*), spotted leaf-nosed snakes (*Phyllorhynchus decurtatus*), glossy snakes (*Arizona elegans*), Mojave rattlesnakes (*Crotalus scutulatus*), gopher snakes (*Pituophis catenifer*), sidewinder (*Crotalus cerastes*), and kingsnake (*Lampropeltis getula*).

In comparing the Combat Center to BLM lands located south of the installation and north of the City of Twentynine Palms, Hirsch *et al.* (2002) found a lower abundance of desert horned lizards, western banded geckos, and snake species on the public lands, yet there were more desert iguanas on those public lands. They theorized that slower moving reptiles may be more susceptible to human activities, collection, and feral-domestic animal predation; and that species like desert iguanas may benefit from the additional food associated with greater human presence.

Birds

The diversity and density of resident bird species in the Mojave Desert is relatively low compared to coastal habitats, especially at the lower elevations vegetated by saltbush scrub. The low numbers and lack of bird diversity is due to the absence of permanent water sources and lack of a tree overstory that is used by birds for cover and foraging. The most commonly observed resident birds in the western Mojave area include black-throated sparrow (*Amphispiza bilineata*), house finch (*Carpodacus mexicanus*), Gambel's quail (*Callipepla gambelii*), ground doves (*Columbina passerina*) and mourning doves (*Zenaida macroura*), and other sparrows such as the white-crowned sparrow (*Zonotrichia leucophrys*) and fox sparrow (*Passerella iliaca*) (BLM 2005). In contrast to low diversity of resident bird species, many migrant bird species utilize the Mojave Desert and specifically the Combat Center, likely due to the permanent water sources at Mainside.

Bird species inventories at the Combat Center have been conducted in the early 1980s (Fromer and Edwards 1982) and late 1990s (Cutler *et al.* 1999). Cutler *et al.* recorded 87 resident bird species at the Combat Center and another 122 migrant, vagrant, or other transient species of bird (a complete list of birds known to occur on the Combat Center is included in Appendix I). These authors suspected, but did not prove, greater bird species richness in washes and canyons than at other sites. Bird species richness and overall abundance were greater in 1998 following higher winter/spring precipitation than in 1997.

In addition to causing increased predation pressure on desert tortoises (Chamblin and Boarman 2005), common ravens (*Corvus corax*) are a concern at the Combat Center because they have formed a large nocturnal roost on power lines near the Exercise Support Base at Camp Wilson. This roost represents a potential BASH because it is less than 2 miles (approximately 3 km) from the EAF used for Marine training exercises. Ravens and other members of the corvid family (crows and jays) often form large

communal roosts in trees, abandoned buildings, cliffs, power lines, and even on the ground amidst dense vegetation. Communal roosting behavior is thought to be an adaptation either for predator avoidance or to increase the chances of finding food (Caccamise *et al.* 1997). Roost site selection by ravens is not well understood, although it has been suggested that shelter from the elements, especially wind, and proximity to human development and resources may be important factors (Boarman 2002). Based on guidance from USFWS, MAGTF Training Command ensures that any new utility poles not be compatible for raven nesting (existing poles will be modified by MAGTF Training Command and Southern California Edison on a conditional basis). Educational outreach activities at the Combat Center also direct Marines to not feed ravens. Finally, a Special Purpose Permit from USFWS allows the limited removal of nests of common ravens, as well as several other species, "when nests are built on or near tactical vehicles, pose a health or safety threat, or the nests are in a location where birds are in danger."

Mammals

Numerous mammal species occur on the Combat Center. According to the University of California, Riverside (1993), Brown and Berry (1998), and Cutler *et al.* (1999), there are 34 mammal species confirmed on the Combat Center, and an additional 16 mammals that could potentially occur. A complete list of mammals observed on the Combat Center is included in Appendix I.

The most common large mammal on the Combat Center, and most likely throughout the ROI, is the coyote (*Canis latrans*). Other highly mobile large mammals include the kit fox (*Vulpes macrotis*), bobcat (*Lynx rufus*), and badger (*Taxidea taxus*). Mountain lions (*Puma concolor*) are known from the Mojave River corridor and the San Bernardino Mountains (MAGTF Training Command 2007).

Small mammals found on the Combat Center include the black-tailed jackrabbit (*Lepus californicus*) and desert cottontail (*Sylvilagus audubonii*), which are among the most commonly observed herbivores on valley floors and alluvial fans throughout the Mojave Desert. Jackrabbits are active at twilight and are commonly seen resting in the shade of shrubs during the heat of the day. White-tailed antelope ground squirrel (*Ammospermophilus leucurus*) and round-tailed ground squirrel (*Spermophilus tereticaudus*) have been observed on the Combat Center and are active during the day in summer. The most numerous nocturnal rodents that are found in the area include several species of kangaroo rats (*Dipodomys* spp.), deer mouse (*Peromyscus maniculatus*), and long-tailed and desert pocket mice (*Chaetodipus formosus* and *C. penicillatus*, respectively) (MAGTF Training Command 2007).

Small mammal captures in a 1999-2001 trapping survey of Sand Hill Training Area (Hirsch *et al.* 2002) were dominated by little pocket mice (*Perognathus longimembris*), comprising 81% of the total captures. Southern grasshopper mice (*Onychomys torridus*) were the next most common, followed by Merriam's kangaroo rats, pocket mice, and white-tailed antelope ground squirrels. Cutler *et al.* (1999) found small mammal species richness to be greater at high elevation sites than all other types of sites except washes.

Protected and Special Status Species

Table 3.10-3 lists the protected and special status wildlife and plant species known to occur, or potentially occur, on the Combat Center. Special status plant species which have the potential to occur on the Combat Center, but have not been observed to date, are listed in Table 3.10-4.

Table 3.10-3. Protected, Special Status, and Other Status Species Known to Occur/Potentially Occur on the Combat Center

Name		Status			Potential to Occur or Occurrence
Common Name	**Scientific Name**	**Federal**	**State**	**CNPS**	
Protected -- Federally Threatened or Endangered					
Reptiles					
Desert tortoise – Mojave population	*Gopherus agassizii*	Threatened	Threatened	N/A	Occurs in suitable habitat throughout the Combat Center (MAGTF Training Command 2001).
State Endangered or Threatened					
Birds					
Bald eagle	*Haliaeetus leucocephalus*	Bald/Golden Eagle Protection Act	Endangered	N/A	Potential to occur as migrants in the ROI (Cutler *et al.* 1999).
Gilded flicker	*Colaptes chrysoides*	BCC	Endangered	N/A	Known to occur as a migrant at the Combat Center (Cutler *et al.* 1999).
Bank swallow	*Riparia riparia*	None	Threatened	N/A	Known to occur as a migrant at the Combat Center (Cutler *et al.* 1999).
Other Federal Status					
Reptiles					
Mojave fringe-toed lizard	*Uma scoparia*	BLM-S	CSSC	N/A	Occurs in southwest, northeast, and north portions of Combat Center (Cablk and Heaton 2002).
Rosy boa	*Charina trivirgata gracia*	BLM-S	N/A	N/A	Fromer and Dodero (1982) found a shed skin in Lavic Lake Training Area, and Minnich *et al.* (1993, as reviewed in Cutler *et al.* 1999) reported this species in Sunshine Peak Training Area.
Mammals					
Townsend's western big-eared bat	*Plecotus townsendii*	BLM-S	CSSC	N/A	Known to occur at the Pat Maloy and Imperial Lode mines on the Combat Center (USGS 2006).
Pallid bat	*Antrozous pallidus*	BLM-S	CSSC	N/A	Known to occur at the Pat Maloy and Imperial Lode mines on the Combat Center (USGS 2006).
Nelson's bighorn sheep	*Ovis canadensis nelsoni*	BLM-S	None	N/A	Re-introduced to the Combat Center in 1992, population considered stable (MAGTF Training Command 2007).
Birds					
Golden eagle	*Aquila chrysaetos*	Bald/Golden Eagle Protection Act, BLM-S, BCC	CSSC FP (3511)	N/A	Known to occur at a few locations within the Combat Center (Cutler *et al.* 1999).
Peregrine falcon	*Falco peregrinus anatum*	BCC	FP (3511)	N/A	Known to occur as a migrant at the Combat Center (Cutler *et al.* 1999).
LeConte's thrasher	*Toxostoma lecontei*	BLM-S, BCC	CSSC	N/A	Known to occur at several locations within the Combat Center (Cutler *et al.* 1999).
Loggerhead shrike	*Lanius ludovicianus*	BCC	CSSC	N/A	Known to occur at several locations within the Combat Center (Cutler et al. 1999).

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Table 3.10-3. Protected, Special Status, and Other Status Species Known to Occur/Potentially Occur on the Combat Center

Name		Status			Potential to Occur or Occurrence
Common Name	**Scientific Name**	**Federal**	**State**	**CNPS**	
Prairie falcon	*Falco mexicanus*	BCC	WL	N/A	Known to occur at several locations within the Combat Center (Cutler *et al.* 1999).
Burrowing owl	*Athene cunicularia*	BLM-S, BCC	CSSC	N/A	Known to occur at a few locations on the Combat Center (Cutler *et al* 1999, USGS 2007).
Ferruginous hawk	*Buteo regalis*	BLM-S, BCC	WL	N/A	Known to occur as a migrant at the Combat Center (Cutler *et al.* 1999).
Yellow warbler	*Dendroica petechia brewsteri*	None	CSSC	N/A	Known to occur as a migrant at the Combat Center (Cutler *et al.* 1999).
Plants					
Whitemargin beardtongue	*Penstemon albomarginatus*	BLM-S	None	1B.1	Known to occur on the Combat Center (MAGTF Training Command 2006).
Other State Status (No Federal Status)					
Mammals					
Pallid San Diego pocket mouse	*Chaetodipus fallax pallidus*	None	CSSC	N/A	One observation on the Combat Center (Cutler *et al.* 1999).
American badger	*Taxidea taxus*	None	CSSC	N/A	Three observed on the Combat Center in 1997-1998 surveys, but thought to sparsely occur on the Combat Center (Cutler *et al.* 1999, B.T. Henen unpublished data).
Birds					
Northern harrier	*Circus cyaneus*	None	CSSC	N/A	Known to occur at several locations within the Combat Center (Cutler *et al.* 1999).
Long-eared owl	*Asio otus*	None	CSSC	N/A	Known to occur at several locations within the Combat Center (Cutler *et al.* 1999).
Sharp-shinned hawk	*Accipiter striatus*	None	WL	N/A	Known to occur at several locations within the Combat Center (Cutler *et al.* 1999).
Cooper's hawk	*Accipiter cooperi*	None	WL	N/A	Known to winter at a few locations within the Combat Center (Cutler *et al.* 1999).
Black tern	*Chlidonias niger*	None	CSSC	N/A	Known to occur as a migrant at the Combat Center (Cutler *et al.* 1999).
Double-crested cormorant	*Phalacrocorax auritus*	None	WL	N/A	Known to occur as a migrant at the Combat Center (Cutler *et al.* 1999).
White-faced ibis	*Plegadis chihi*	None	WL	N/A	Known to occur as a migrant at the Combat Center (Cutler *et al.* 1999).
Osprey	*Pandion haliaetus*	None	WL	N/A	Known to occur as a migrant at the Combat Center (Cutler *et al.* 1999).
Merlin	*Falco columbarius*	None	WL	N/A	Known to occur as a migrant at the Combat Center (Cutler *et al.* 1999).
Short-eared owl	*Asio flammeus*	None	CSSC	N/A	Known to occur as a migrant at the Combat Center (Cutler *et al.* 1999).
Vaux's swift	*Chaetura vauxi*	None	CSSC	N/A	Known to occur as a migrant at the Combat Center (Cutler *et al.* 1999).
Brown-crested flycatcher	*Myiarchus tyrannulus*	None	WL	N/A	Known to occur as a migrant at the Combat Center (Cutler *et al.* 1999).
All raptors		None	FP (3503)	N/A	Various species known to occur at the Combat Center (CDFG 2009b, Cutler *et al.* 1999).

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Table 3.10-3. Protected, Special Status, and Other Status Species Known to Occur/Potentially Occur on the Combat Center

Name		Status			Potential to Occur or Occurrence
Common Name	**Scientific Name**	**Federal**	**State**	**CNPS**	
Other Status Species					
Plants					
Parish's onion	*Allium parishii*	None	None	4.3	Known to occur on the Combat Center; however, some questions as to accuracy of identifications (MAGTF Training Command 2006, 2007).
Crucifixion thorn	*Castela emoryi*	None	None	2.3	Four known populations on the Combat Center, largest on the border of Lavic Lake and Sunshine Peak (MAGTF Training Command 2007).
Winged cryptantha	*Cryptantha holoptera*	None	None	4.3	Two populations found in 2005 (MAGTF Training Command 2006), known to occur elsewhere on the Combat Center (MAGTF Training Command 2007).
Utah swallow-wort	*Cynanchum utahense*	None	None	4.2	Fairly common on the western portion of the Combat Center (MAGTF Training Command 2006).
Foxtail cactus	*Escobaria alversonii*	None	None	4.3	Known to occur on the Combat Center (MAGTF Training Command 2007).
Slender bedstraw	*Galium angustifolium* ssp. *gracillimum*	None	None	4.2	Recorded on the Combat Center (MAGTF Training Command 2000); however, there are questions regarding the identification (MAGTF Training Command 2006).
Crowned muilla	*Muilla coronata*	None	None	4.2	Recorded on the Combat Center (MAGTF Training Command 2000); however, there are questions regarding the identification (MAGTF Training Command 2006).
Spectacle fruit	*Wislizenia refracta* ssp. *refracta*	None	None	2.2	Large population on the Combat Center mostly within the restricted use area in Sunshine Spring (MAGTF Training Command 2006).

Notes: Federal Species of Concern lists are not consistently maintained for southern California. The mammalian CSSC list is outdated (not officially revised since 1986) and is projected to be updated by 2011.
BCC = Bird Species of Conservation Concern; BLM-S = BLM-Sensitive; CSSC = California Species of Special Concern; FP (#) = Fully Protected Under CDFG Code (#); MAGTF = Marine Air Ground Training Facility; ROI = region of influence; WL = Watch List
CNPS List Definitions
List 1B = Rare, threatened, or endangered in California and elsewhere
List 2 = Rare, threatened, or endangered in California, but more common elsewhere
List 4 = Limited distribution (watch list)
.1 indicates seriously endangered in California
.2 indicates 20-80% occurrences threatened
.3 indicates <20% of occurrences threatened

Table 3.10-4. Special Status and Other Status Plant Species with Potential to Occur on the Combat Center

Name		Status			Potential to Occur
Common Name	**Scientific Name**	**Federal**	**State**	**CNPS**	
Booth's evening primrose	*Camissonia boothii* spp. *boothii*	None	None	2.3	Moderate-high potential to occur on the Combat Center (MAGTF Training Command 2000).
Mojave spineflower	*Chorizanthe spinosus*	None	None	4.2	Moderate-high potential to occur on the Combat Center (MAGTF Training Command 2000).
Riverside spineflower	*Chorizanthe xanti* var. *leucotheca*	None	None	1B.2	Formerly considered moderate-high potential to occur on the Combat Center (MAGTF Training Command 2000). Now considered unlikely to occur (MAGTF Training Command 2006).
Ribbed cryptantha	*Cryptantha costata*	None	None	4.3	Moderate-high potential to occur on the Combat Center (MAGTF Training Command 2000).
Panamint live-forever	*Dudleya saxosa* ssp. *saxosa*	BLM-S	None	1B.3	Formerly considered moderate-high potential to occur on the Combat Center (MAGTF Training Command 2000). Now considered unlikely to occur (MAGTF Training Command 2006).
Coulter's goldfields	*Lasthenia glabrata* ssp. *coulteri*	BLM-S	None	1B.1	None observed, but moderate-high potential to occur on the Combat Center (MAGTF Training Command 2000).
Spearleaf	*Matelea parvifolia*	None	None	2.3	None observed, but moderate-high potential to occur on the Combat Center (MAGTF Training Command 2000).
Robison's monardella	*Monardella robisonii*	BLM-S	None	1B.3	None observed, but moderate-high potential to occur on the Combat Center (MAGTF Training Command 2000).
Thurber's penstemon	*Penstemon thurberi*	None	None	4.2	None observed, but moderate-high potential to occur on the Combat Center (MAGTF Training Command 2000).
Chinese lantern	*Physalis lobata*	None	None	2.3	None observed, but moderate-high potential to occur on the Combat Center (MAGTF Training Command 2000).
Silkcotton purslane	*Portulaca halimoides*	None	None	4.2	None observed, but moderate-high potential to occur on the Combat Center (MAGTF Training Command 2000).
Redspined fishhook cactus	*Sclerocactus polyancistrus*	None	None	4.2	None observed, but moderate-high potential to occur on the Combat Center (MAGTF Training Command 2000).
Salt spring checkerbloom	*Sidalcea neomexicana*	None	None	2.2	Formerly considered moderate-high potential to occur on the Combat Center (MAGTF Training Command 2000). Now considered unlikely to occur (MAGTF Training Command 2006).

Notes: CNPS = California Native Plant Society; MAGTF = Marine Air Ground Task Force
CNPS List Definitions
List 1B = Rare, threatened, or endangered in California and elsewhere
List 2 = Rare, threatened, or endangered in California, but more common elsewhere
List 4 = Limited distribution (watch list)
.1 indicates seriously endangered in California
.2 indicates 20-80% occurrences threatened
.3 indicates <20% of occurrences threatened

Protected - Federally Threatened or Endangered Species

Desert Tortoise: The desert tortoise is a large, herbivorous reptile that occurs in the Mojave and Sonoran deserts in southern California, southern Nevada, Arizona, and the southwestern tip of Utah in the U.S., as well as Sonora and northern Sinaloa in Mexico (BLM 2007). The designated Mojave population of the desert tortoise includes those animals living north and west of the Colorado River in the Mojave Desert of California, Nevada, Arizona, and southwestern Utah, and in the Sonoran (Colorado) Desert in California (USFWS 1990, 2008).

Tortoises are adapted to living in a highly variable and often harsh desert environment. They spend much of their lives in burrows, even during seasons of activity. In early spring, they emerge from over-wintering burrows and are typically active through fall. Activity levels decrease in summer, but tortoises often emerge after summer rain storms. Mating occurs primarily during spring, but can occur in the fall (Black 1976; BLM 2007). During activity periods, tortoises eat a wide variety of herbaceous vegetation, particularly grasses and the flowers of annual plants. During periods of inactivity, tortoises reduce their metabolism and consume very little food. Adult tortoises can survive for more than a year without access to free water of any kind and can tolerate large imbalances in their water and energy budgets (Nagy and Medica 1986; Henen *et al.* 1998; Henen 2002).

Desert tortoises are long-lived and grow slowly, requiring 13 to 20 years to reach sexual maturity (Turner *et al.* 1984; Germano *et al.* 1994; Mueller *et al*. 1998). They have low reproductive rates during a long period of reproductive potential (Turner *et al.* 1984; Germano *et. al.* 1994). The number of eggs as well as the number of clutches (set of eggs laid at a single time) that a female tortoise can produce in a season is dependent on a variety of factors including environment, habitat, availability of forage and drinking water, and physiological condition (Turner *et al.* 1986; Henen 1997).

The size of tortoise home ranges varies with respect to location and year (Berry 1986). Home range size can also serve as an indicator of resource availability, opportunity for reproduction, and social interactions (BLM 2007). Females have long-term home ranges that are approximately half that of the average male, whose home range varies from 25 to 200 acres (10 to 80 hectares) (Berry 1986). Over its lifetime, each tortoise may use more than 1,000 acres (400 hectares) of habitat and may make periodic forays of more than 7 miles (11 km) at a time (Berry 1986).

Desert tortoises in the Mojave Desert occupy a variety of habitats from valleys, alluvial fans, and bajadas dominated by creosote bush and saltbush scrub at lower elevations to rocky slopes supporting mixed Mojave scrub and Joshua tree woodlands (Germano *et al.* 1994). The lower slopes of suitable mountain habitats are utilized on occasion (USFWS 2006). In general though, tortoises occur on gently sloping terrain with sandy to gravel soils supporting low-growing shrubs and herbaceous plants (Germano *et al.* 1994). Soils must be friable enough for digging of burrows, but firm enough so that burrows do not collapse (USFWS 1994). Typical habitat for the desert tortoise in the Mojave Desert has been characterized as creosote bush scrub in which precipitation ranges from 2 to 8 inches (5 to 20 centimeters), where a diversity of perennial plants is relatively high, and production of ephemerals is high (Luckenbach 1982; Turner 1982; Turner and Brown 1982; Germano *et al.* 1994).

Threats: Tortoise predators include: coyote, kit fox, badger, feral or free-ranging dogs, common raven, and on occasion, golden eagle (reviewed by Boarman 2002). The dominant predator varies temporally, spatially, and with size of the tortoise (Berry 1990 as amended, as reviewed in Boarman 2002). However, few studies have attempted to quantify or estimate the relative proportion of mortality attributable to the various predators at specific sites, or to characterize it regionally (e.g., Berry 1990, as amended, Bjurlin and Bissonette 2001).

Ravens have experienced a tremendous population explosion in the deserts of California, with regional increases of up to tenfold over a recent 25-year period (Boarman 2003). As human communities have grown, raven populations appear to have increased, taking advantage of resources that human developments inadvertently provide. Raven population growth is a concern to natural resource managers at the Combat Center due to documented raven predation upon juvenile tortoises (USFWS 1990; Boarman 1993).

Predation by subsidized predators like the raven can drive rare native prey populations to endangerment and extinction. Anthropogenic resources often insulate a subsidized predator from fluctuations in prey populations, allowing predator populations to remain high even as prey become rare. Active management of ravens (e.g., lethal methods, trapping, and removal) and control of subsidies may be necessary to minimize the effects of ravens on reducing tortoise populations (Kristan and Boarman 2003).

Bjurlin and Bissonette (2004) reported that feral or free-ranging dogs cause a significant amount of mortality among adult tortoises on the Combat Center, but presented evidence for only one such death. They did report a high incidence of canid-like shell damage to live tortoises and the presence of feral or free-ranging dogs and dog packs within their study site. More recent surveys and observations near the southern border of the Sand Hill and West Training Areas indicate a high incidence of adult tortoises having canid-based shell damage (MAGTF Training Command 2010b). Similar tortoise shell damage has been reported in reports prepared for the Johnson Valley tortoise trend plot (USGS 2010).

Two diseases have been identified as possibly affecting the stability of some desert tortoise populations: Upper Respiratory Tract Disease and cutaneous dyskeratosis affecting the shell. A third disease, a herpesvirus, was more recently identified and may have population-level consequences, but very little is known about it. Upper Respiratory Tract Disease has been found in several populations that have experienced high mortality rates, including some in the west Mojave. The first case of this disease at the Combat Center was documented in May 2000 (USFWS 2002). It is still unclear whether Upper Respiratory Tract Disease is responsible for the high rates of mortality seen in some populations of desert tortoise, and further study is needed.

The greatest threats to desert tortoise populations are likely to be habitat loss, degradation, and fragmentation. Habitat loss in the western Mojave has resulted from agricultural conversion, energy and mineral development, fire, spread of non-native plants, livestock grazing, OHV recreation, road construction, and military operations (BLM 2007).

Habitat loss has most likely affected tortoise populations in the ROI. Approximately 30% of the Combat Center has experienced at least 25% shrub loss as a result of operations (USFWS 2002). Approximately 25% of the Combat Center is rocky and mountainous; desert tortoises may occur in low densities in portions of these mountainous areas. Some portions of the Combat Center are occupied by permanent facilities, while some areas within several of the training areas have been so heavily affected by exercises that they no longer support desert tortoises (USFWS 2002). Vegetation and soil surfaces in desert environments like the west Mojave take a long time to recover (Barbour 1968, Belnap 1993), so even in areas of the Combat Center that no longer experience disturbance, little recovery has occurred.

Desert Tortoise Management and Conservation: The natural resources of the Combat Center are managed in accordance with an INRMP (MAGTF Training Command 2007). Per the requirements of the Sikes Act Improvement Act of 1997, the INRMP was developed in cooperation with USFWS and CDFG to reflect the mutual agreement of these parties on regulatory requirements concerning the conservation, protection, and management of natural resources on the Combat Center. In addition to the INRMP,

complementary plans for specific resources (i.e., Desert Tortoise Management Plan, Wildfire Management Plan, and Invasive Species Management Plan) have also been prepared.

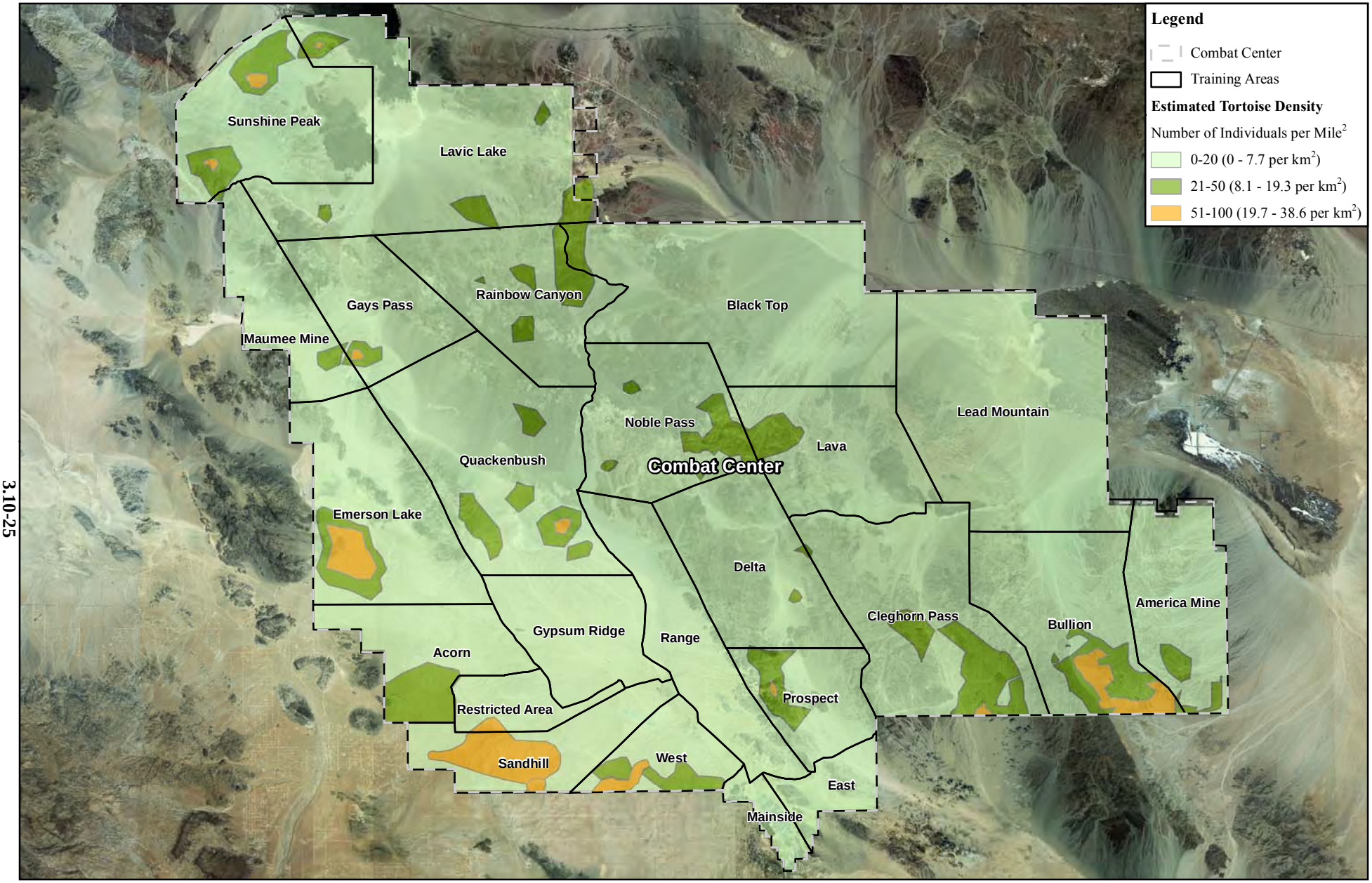
Tortoises within the Combat Center are protected during training activities per the Base-wide Biological Opinion (2002). The Biological Opinion outlines conservation measures for protecting the desert tortoise and is a requirement of Section 7 of the ESA. These measures are also outlined in the installation's INRMP (MAGTF Training Command 2007) per requirement of the Sike's Act, and include measures such as all personnel are briefed about the potential occurrence of tortoises on the installation.

Live-fire training does not occur within Acorn, Sand Hill, and West Training Areas, home to many tortoises on the Combat Center. Other areas, such as Sunshine Peak and the southern Bullion Training Areas, have historically received less training. Compared to tortoises far within the interior of the Combat Center, tortoises near Combat Center boundaries are less threatened by training due to restrictions against live-fire near the boundaries.

In May 2006, TRACRS opened on the Combat Center. Egg-bearing female tortoises from the installation have subsequently been brought to TRACRS to nest within individual, fenced enclosures. At TRACRS, the tortoise nests, eggs, and hatchlings are protected until the young can grow large enough, and their shells tough enough, to resist predation by ravens and many other predators, like coyotes, kit fox, and feral or free-ranging dogs (NREA 2007). The aim of this program is to perform research that contributes to recovery of the species, a conservation measure of the Base-wide Biological Opinion (USFWS 2002). The intent of the headstart program is to grow the young and release them in their mother's range, where she would have nested. Based upon growth rates at the Combat Center, and shell hardness data from Edwards Air Force Base and Fort Irwin, the headstart tortoises at the Combat Center should reach adequate shell hardness at an age of about seven years or a carapace length of about 110 mm (Nagy *et al.* 2010; MAGTF Training Command 2010b). From 2006 to 2010, roughly 400 hatchlings have been produced at TRACRS and the first release of hatchlings is expected in 2011 or 2012 (MAGTF Training Command 2010b).

Status on the Combat Center: Based on strip transect surveys in 1997 and 1999, Kiva Biological Consulting (MAGTF Training Command 2001) estimated the number of tortoises on the Combat Center at 9,593 individuals. These surveys inventoried 22 of the 23 training areas (excluding only Mainside), using 920 strip transects. This effort included coincidental collection of information on indications of relative disturbance levels, such as the number of vehicle tracks, expended ordnance, and other range residue. Previously established study plots in known high-density areas were also examined to provide estimates of desert tortoise numbers and trends. The results of the surveys indicated that desert tortoise density is generally low throughout the Combat Center (Table 3.10-5, Figure 3.10-2) (MAGTF Training Command 2001).

Densities ranging from 51 to 100 desert tortoises per square mile (8.1 to 19.3 per square kilometer) occur in the Sand Hill, south-central West, southern Bullion, southwestern Emerson Lake, Sunshine Peak, Quackenbush, Gays Pass, and Prospect Training Areas. These higher densities also occur in southern Cleghorn Pass near the south study area, and in the restricted area within Acorn Training Areas (MAGTF Training Command 2001). These higher density areas, most of which are located within Special Use Areas, cover approximately 2.8% of the Combat Center. This is unsurprising, as these areas were often designated as Special Use Areas because desert tortoise densities therein were higher than on other parts of the Combat Center. Almost all of the area supporting these higher densities of tortoises occurred at elevations between 2,300-2,950 feet (701-900 meters) MSL. Acreage supporting 21-50 desert tortoises per square mile (9.8% of the Combat Center) appeared to occur over a somewhat broader elevation range, with 97% of this acreage occurring at elevations of 1,970-3,610 feet (601-1,100 meters) MSL.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2001, MAGTF Training Command 2009c

Figure 3.10-2
Estimated Desert Tortoise Densities on the Combat Center
(modified from MAGTF Training Command 2001)

N

Table 3.10-5. Tortoise Abundance Classes on the Combat Center

Abundance Class (Tortoises/Square Mile)	Acres	Percent of Total Area
0 - 5	291,065	48.6%
6 - 20	135,892	22.7%
21 - 50	58,438	9.8%
51 - 100	15,274	2.6%
101 - 250	1,321	0.2%
Total	501,990	83.9%

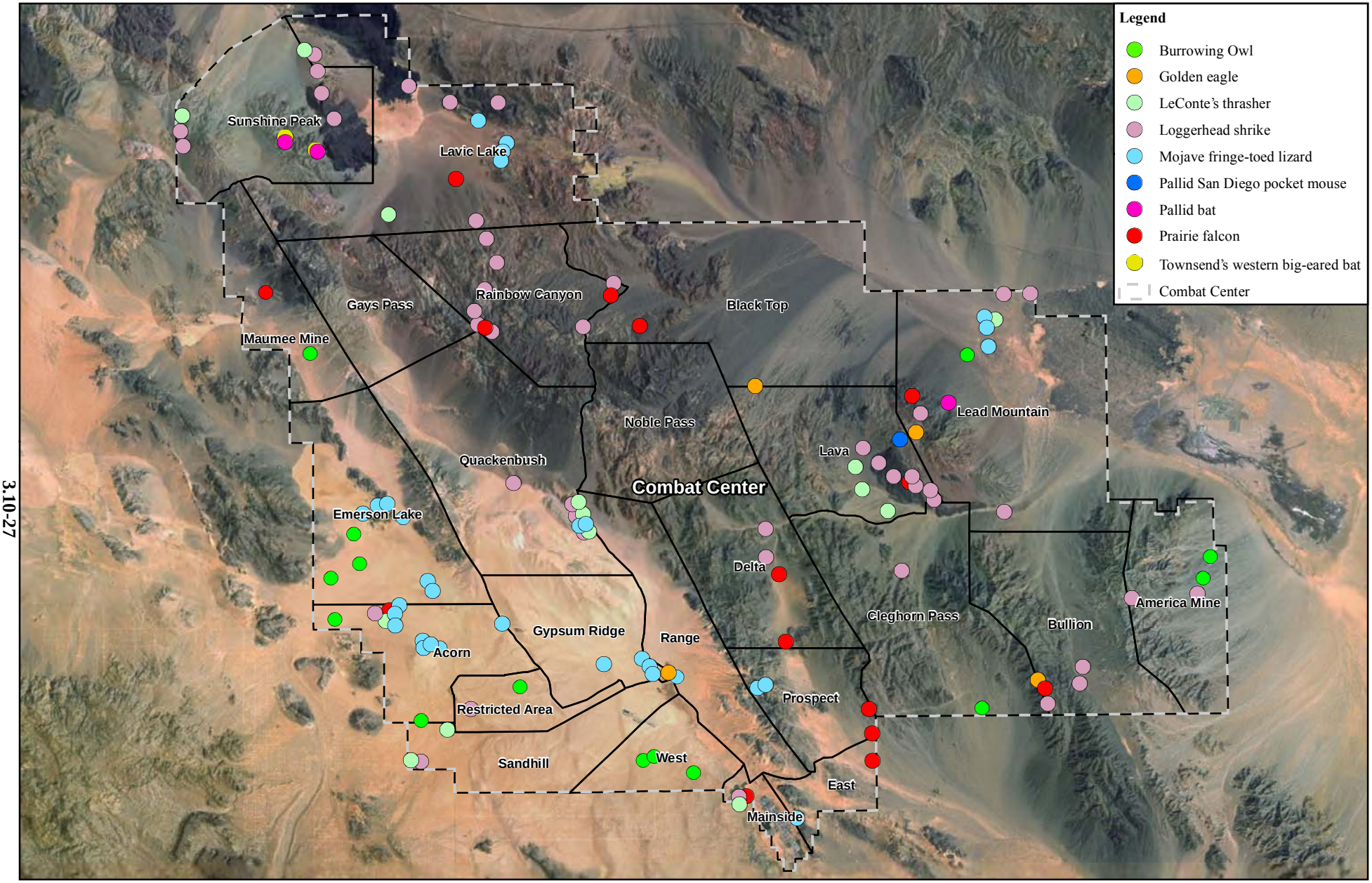
Notes: Tortoise surveys conducted in 1997 and 1999.
Source: MAGTF Training Command 2001.

The Marine Corps maintains three permanent tortoise study plots in Special Use Areas within Sand Hill, Emerson Lake, and Bullion Training Areas. The plot in the southern Bullion Training Area is remote and subject to little effect from training and maneuvers. Studies on the plots at the Emerson Lake and Sand Hill Training Areas indicate declines of approximately 50-70% since the 1980s (MAGTF Training Command 2010b), which is consistent with major declines observed at other permanent study plots in the west Mojave from 1979 to 1994 (data from K. Berry as compiled in BLM 2005).

Other Federal Special Status Species

Birds represent the largest number of special status species on the Combat Center. Twenty-eight special status bird species have been observed, mostly at the man-made water sources of the golf course, sewage treatment systems, and the evaporation ponds in the Mainside area. Special status migratory birds have also been observed throughout the training areas (Cutler *et al.* 1999; MAGTF Training Command 2007). Of these species, only the burrowing owl has had recent focused surveys conducted on the Combat Center (USGS 2007). Other special status species known to occur as residents on the Combat Center are also described, with distributional information provided as available (Figure 3.10-3).

Townsend's Western Big-Eared Bat: Townsend's western big-eared bat is a BLM sensitive species and a CSSC. It is found in desert scrub, desert mountains with oak and pinyon-juniper, and conifer forests, and roosts in caves, mine shafts, and often in abandoned buildings (Cutler *et al.* 1999). It breeds in the fall and winter. Brown and Berry (1998) and the USGS (2005) documented Townsend's western big-eared bats using a portion of the Pat Maloy Mine in Sunshine Peak Training Area as both a day and night roost during the summer. There is a small, seep-fed source of open water approximately 100 feet (30 meters) inside the mine that is attractive to bats for drinking and likely also attracts insects that bats can eat opportunistically. Evidence of summer and winter use of the Imperial Lode mine complex in the Sunshine Peak Training Area by Townsend's big-eared bats was also documented (USGS 2006). The most serious direct threats to bats are disturbances of hibernation and maternity roosts and destruction of roosting habitat, primarily old mines and natural caves. Potential recreation impacts include access to significant roosts and degradation of foraging habitat for Townsend's big-eared bat and California leaf-nosed bat. To minimize disturbance to the population at the Pat Maloy mine, the Marine Corps installed gates that allow bats to pass freely while barring human or large animal entry to the mine.



Kilometers
0 5 10
0 5 10
Miles

Figure 3.10-3
Observations of Special Status Wildlife Species on the Combat Center (Excludes Desert Tortoise)

Source: Cutler *et al.* 1999; Cablk and Heaton 2002; USGS 2005, 2007; CDFG 2009a; MAGTF Training Command 2009c

N

Pallid Bat: The pallid bat is a BLM sensitive species and a CSSC. It feeds on night-flying insects, flightless insects, water bugs, scorpions, and moths, and breeds in fall and early winter. The Benchmark 19 mine in Lead Mountain Training Area is used as a maternity site by a colony of approximately 50 pallid bats (USGS 2006). After observing a sharp decline in the pallid bat population at this mine, which was attributed to human disturbance, the Marine Corps installed gates at the entrance to this mine that allow bats to pass freely while barring human or large animal entry. Pallid bats have also been observed using Pat Maloy Mine and Imperial Lode Mine in Sunshine Peak Training Area (USGS 2006). Guano that was identified as belonging to pallid bats was also identified in America Mine, Sunshine Peak, and potentially Emerson Lake and Delta Lake Training Areas (Brown and Berry 1998).

Nelson's Bighorn Sheep: Nelson's bighorn sheep is a BLM sensitive species. They frequent creosote bush, catclaw acacia, and possibly blackbrush plant communities, in rugged mountainous, open areas with ample forage and escape cover (Cutler *et al.* 1999). In 1992, 20 bighorn sheep, including 5 rams and 15 ewes, were introduced onto the Combat Center near the shared border of the Bullion and Cleghorn Pass Training Areas (MAGTF Training Command 2007). This population is considered an experimental population. Population counts conducted after introduction indicated that the population had become stable. The Marine Corps installed two "guzzlers" at Cleghorn Pass and Bullion to provide a water source for sheep that utilize this habitat. To track the movements of the sheep, cameras were installed in locations surrounding these guzzlers.

Occurrences of Nelson's bighorn sheep have been noted at other locations within the Combat Center. In addition to the Cleghorn Pass and Bullion Training Areas, Cutler *et al.* (1999) observed sheep tracks and pellets from 2,200 feet to 3,500 feet (670 meters to 1,070 meters) elevation in Rainbow Canyon and America Mine Training Areas. Bighorn sheep were observed in America Mine and Rainbow Canyon Training Areas by a crew conducting plant surveys in 1997 (Tierra Data Systems, Escondido, California, personal communication referenced in Cutler *et al.* 1999). Nelson's bighorn sheep may occur within other mountainous areas on the Combat Center.

Burrowing Owl: The burrowing owl is a USFWS BCC, a BLM sensitive species, and a high-profile species, having been proposed and rejected for state listing (California Fish and Game Commission 2004). The CDFG rejected the species for listing because of a "lack of evidence that the owl is threatened with extinction over a significant portion of its range."

Burrowing owls breed from south-central Canada south through most of the western U.S. and Central America to the southern tip of South America, as well as in Florida and on most of the larger Caribbean islands (BLM 2004b). Burrowing owl habitat in California is typically open, dry, nearly or quite level, grassland, prairie, or desert floor. Burrowing owls do not possess good night vision, and thus are more successful at hunting in open areas. Overall, breeding bird numbers in the deserts of California are low and occupied habitats are widely scattered (Gervais *et al.* 2008), which may be typical for this species in desert habitats.

Burrowing owls in the western U.S. are only rarely known to construct their own burrows, in contrast to those in Florida. Many researchers and observers have noted a strong association between burrowing owls and burrowing mammals, especially ground squirrels (*Spermophilus* spp.). Soils suitable for burrows may limit distribution in natural areas, however the species will also occupy man-made niches such as banks and ditches, piles of broken concrete, and even abandoned structures (BLM 2004b).

In transect surveys of suitable habitat (< 25% slopes) on the Combat Center (USGS 2007), 7 owl territories and 24 active burrowing owl locations were found in surveys of 59 mi^2 (152 km^2) during the 2004 season, whereas 4 owl territories and 27 active burrowing owl locations (14 of which were

reoccupied locations from the 2004 season) were found in surveys of 37 mi^2 (95 km^2) during the 2005 season (Figure 3.10-3). Based on the survey results, the density (mean ± 1 standard error) of burrowing owls in suitable habitat on the Combat Center was estimated to be one owl territory per 4.28 ± 0.10 mi^2 (11.09 ± 0.25 km^2) for 2004, and one owl territory per 4.24 ± 0.18 mi^2 (10.98 ± 0.46 km^2) for 2005.

Prairie Falcon: The prairie falcon, a BCC and CDFG Watch-Listed (WL) species, breeds from Canada south through the western half of the U.S. into Mexico and winters throughout its breeding range. Prairie falcon habitat includes barren mountains, prairies, perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub (CDFG 2003). Prairie falcons nest on cliffs in rugged mountain ranges, usually within a half-mile of a water source. They are found throughout the western Mojave Desert (BLM 2003). Prairie falcons have been observed to be residents at the Lead Mountain Training Area on the Combat Center (Cutler *et al.* 1999), and have been observed in Maumee Mine Training Area (CDFG 2009b), and are expected to be residents as well as winter visitors elsewhere in the ROI. Prairie falcons may roost and nest in the mountain ranges of the ROI. Human disturbance at certain prairie falcon nest sites is a threat. Urbanization surrounding an area historically occupied by falcons gradually degrades the foraging habitat and increases disturbance at nest sites. New mining projects also occasionally threaten certain nest sites.

Golden Eagle: The golden eagle is a BLM sensitive species, a CSSC, and is fully protected under the federal Bald and Golden Eagle Protection Act. Golden eagles are found in open terrain habitats, including grasslands, deserts, savannahs, and early successional stages of forest and shrub habitats. They nest on cliffs and in large trees in open areas. Golden eagles breed from Alaska east across northern Canada and south to Mexico, and winter in the southern part of their breeding range (CDFG 2003). Golden eagles have been observed in at least four locations within the Combat Center, including Lead Mountain, Lavic Lake, and Sunshine Peak Training Areas, and may forage or roost throughout the ROI (Cutler *et al.* 1999; BLM 2005).

LeConte's Thrasher: LeConte's thrasher is a BLM sensitive species and a CSSC. This species inhabits desert flats, washes, and alluvial fans characterized by scant vegetation (usually cholla and creosote bush), and sandy or alkaline soils. If available, golden cholla (*Cylindropuntia echinocarpa*) is preferred for nest sites. However, in some areas, allscale (*Atriplex polycarpa*) is the only suitable host plant for nesting. LeConte's thrasher is a non-migratory bird that is endemic to southern California, southern Nevada, southwestern Utah, western and central Arizona, and northwestern Mexico. It is found in desert scrub across the Mojave Desert of California. It occurs in the Antelope Valley (Los Angeles County), north to Ridgecrest and Naval Air Weapons Station China Lake (Inyo County). It also occurs along the northern base of the San Bernardino and San Gabriel mountains, throughout Joshua Tree National Park, and into the Owens and Panamint valleys (BLM 2007). LeConte's thrashers occur on the Combat Center and elsewhere in the ROI and are potentially resident year-round (Cutler *et al.* 1999). The primary threat to the species is loss of habitat and fragmentation of habitat into segments too small to support viable populations in the long term. LeConte's thrashers are sensitive to vehicle traffic during the nesting season, especially off-road travel in washes.

Loggerhead Shrike: The loggerhead shrike is a BCC and a CSSC. It occupies arid and semi-arid habitat throughout lowlands with suitable hunting perches. Densely vegetated areas are avoided. The loggerhead shrike's range extends across North America, from Canada to southern Mexico. Breeding birds in California deserts probably remain as residents, while migrating loggerhead shrikes arrive in these areas in winter. Loggerhead shrikes are widely distributed throughout the Mojave Desert (BLM 2007). Loggerhead shrikes have been observed throughout the Combat Center, in nearly every training area (Cutler *et al.* 1999). The entire ROI lies within the species' range, and it is likely a permanent resident.

Mojave Fringe-toed Lizard: The Mojave fringe-toed lizard is a BLM sensitive species, as well as a CSSC. The Amargosa River population of this species (northeastern San Bernardino County) is also under consideration for listing under the ESA. The Mojave fringe-toed lizard is endemic to southern California and a small area of western Arizona, where it is restricted to wind-blown sand habitats in the deserts of Los Angeles, Riverside, and San Bernardino counties in California and La Paz County in Arizona (BLM 2004b). Nearly all localities are associated with present-day and historical drainages and associated sand dune complexes of the Mojave and Amargosa rivers. Mojave fringe-toed lizard habitat includes sand dunes, sand sheets, and wind dominated transitional sand-vegetation areas in the California Mojave Desert, although Cablk and Heaton (2002) found Mojave fringe-toed lizards will tolerate small percentages of gravel, cobble, or stones intermixed within a sand substrate. These researchers also noted that the presence of perennial vegetation does not affect species' presence or absence, but that the presence of annual plants, particularly non-native species, appeared to adversely affect habitat. The loose wind-blown sand habitat on which the Mojave fringe-toed lizard largely depends is a fragile ecosystem requiring protection against both direct (OHV, urban development, agriculture) and indirect (disruption of sand supply) disturbances (BLM 2005). Although there is no published data suggesting a decline in population sizes of the Mojave fringe-toed lizard, sufficient threats exist in the West Mojave Plan Area to cause concern that populations will be (or have already been) adversely affected (BLM 2005).

The most recent surveys for the Mojave fringe-toed lizard (Cablk and Heaton 2002) on the Combat Center found individuals in sand dunes within East, Prospect, Gypsum Ridge, Acorn, Lead Mountain, Emerson Lake, and Lavic Lake Training Areas (Figure 3.10-3). Older surveys also found Mojave fringe-toed lizard within the Quackenbush and Sand Hill Training Areas (Fromer and Dodero 1982; Cutler *et al.* 1999).

Rosy Boa: The rosy boa (BLM sensitive species) is found in brushy, rocky areas near washes, canyons, and springs in creosote bush and catclaw acacia plant communities. This species is coveted by collectors throughout its range due to its coloration, and declines throughout the south central Mojave are often attributed to illegal collecting (Cutler *et al.* 1999). At the Combat Center, this species is fairly well-protected from disturbance due to its choice of habitat; heavy vehicles do not often penetrate the steep, rocky areas where rosy boas occur. The rosy boa is also fairly well-protected from collecting at the Combat Center due to restricted access. Fromer and Dodero (1982) found a shed skin from this species in Lavic Lake Training Area, and Minnich *et al.* (1993, as reviewed in Cutler *et al.* 1999) reported this species in Sunshine Peak Training Area. However, this species was not observed during more recent surveys on the Combat Center (Cutler *et al.* 1999; Hirsch *et al.* 2002).

Whitemargin Beardtongue: Whitemargin beardtongue (CNPS List 1B.1, BLM sensitive species) is an herbaceous perennial in the Scrophulariaceae family. It ranges from 6 to 14 inches (15 to 35 centimeters) in height with the stem base buried in sand. Leaves are opposite with bottom ones mostly scale-like and upper leaves white-margined. The flower corolla is pink to purple. Flowering usually occurs from March to May. This plant is considered rare in California and is usually found in loose desert sand, often on stabilized sand dunes in the Mojave Desert from 2,300 to 2,950 feet (700 to 900 meters). One population is known from the Combat Center, located in the Lavic Lake Training Area (MAGTF Training Command 2006). Another population was identified north of the Lavic Lake Training Area on BLM-managed land outside the ROI (not part of the land proposed for acquisition).

State Special Status Species that have no Federal Status

Pallid San Diego Pocket Mouse: The pallid San Diego pocket mouse is a CSSC. Its diet consists primarily of plant seeds, but also includes green plants and insects. It does not hibernate, although time

spent above ground is limited during colder periods. It breeds in the fall and typically has two to four young. It is found in rocky canyons with compacted soils and also in open desert areas in creosote bush and catclaw acacia plant communities. At Joshua Tree National Park, Miller and Stebbins found the greatest numbers of this species in yucca woodlands and pinyon-juniper areas (reviewed in Cutler *et al.* 1999).

Cutler *et al.* (1999) observed the pallid San Diego pocket mouse only at the Lead Mountain Canyon site, and only in the lower reaches of the canyon where large boulders were more abundant. Krzysik and Trumbull (1996) suggested that the most likely location for the occurrence of this species was the Mojave yucca community in Sunshine Peak Training Area, although they have not been observed there.

American Badger: The American badger is a CSSC, and is known to occur at Range 500 on the Combat Center (Henen 2010) and near fixed ranges of the Range Training Area (MAGTF Training Command 2011). They are found in creosote bush, big galleta, and saltbush scrub plant communities generally in open, sandy areas. They also use washes where there are suitable banks for burrowing. During surveys conducted in 1997 and 1998 (Cutler *et al.* 1999), badgers were observed only three times, but due to their burrowing habits they were likely more present than were observed. Badgers were observed at the Petroglyph Lava Flow site in Lava Training Area, in the Acorn Training Area, and in Noble Pass Training Area at night. Badger tracks were found in Quackenbush Training Area and Lead Mountain Training Area. Badger numbers possibly fluctuate with numbers of ground squirrels and pocket gophers, their main prey.

Bank Swallow: The bank swallow is state listed as threatened, and occurs as a migrant in the ROI. It is the smallest swallow in North America, and is usually found near water. Bank swallows are closely associated with sandy, vertical banks along rivers and lakes or where a bank has been created by human excavation. Bank swallows forage over water or open fields. The bank swallow has been observed at five locations during its migration through the Combat Center, including Mainside, Lavic Lake, and Quackenbush Training Areas (Cutler *et al.* 1999).

Cooper's Hawk*:* The Cooper's hawk, a CDFG WL species, is a medium-sized North American accipiter. Nesting habitat for the bird includes deciduous, coniferous, and mixed woodlands. The Cooper's hawk breeding range extends throughout the contiguous U.S., southern Canada, and northern Mexico. Cooper's hawks primarily winter throughout the southern portion of their range and into northern Central America. Within the region, nesting sites have been documented at Mojave Narrows Regional Park and Morongo Valley (BLM 2007). Cooper's hawks were identified as a resident species in Cutler *et al.* (1999), who noted one occurrence near Mainside, and one on the border of Maumee Mine and Gays Pass Training Areas. The ROI does not contain a substantial amount of habitat to support Cooper's hawks, but they may also occur as migrants or winter visitors in the ROI.

Long-eared Owl: The long-eared owl, a CSSC, is a medium-sized owl and one of the most strictly nocturnal of all owls. Long-eared owls use habitats with tall willows and cottonwoods or belts of live oaks, adjacent to stream courses and open land. Within the desert, long-eared owls are generally found resting and/or roosting in willows, cottonwoods, junipers, native live oak, dense plantings of tamarisk, elms, and conifers. Within North America, the long-eared owl is found across central Canada, south across the northeastern U.S., and within most of the western U.S. The long-eared owl winters in the southern part of its breeding range. While there is some influx of wintering owls in California deserts, it is not clear if the majority of these birds are winter visitors. Long-eared owls have been observed in a tract of cottonwoods and willows along the Mojave River near Victorville (BLM 2007). Long eared owls were identified as a resident species on the Combat Center by Cutler *et al.* (1999), with occurrences noted in Acorn, Lava, Lead Mountain, and Rainbow Canyon Training Areas.

Sharp-shinned Hawk: The sharp-shinned hawk is a CDFG WL species and the smallest of the North American accipiters. The breeding range of the sharp-shinned hawk includes the boreal forests of Canada and Alaska, and both deciduous and evergreen forest habitats throughout much of the remaining U.S. There are no breeding records for the sharp-shinned hawk in the west Mojave Desert. Most sharp-shinned hawks migrate south in the winter to the southern U.S., northern Mexico, and as far south as Central America. They have been observed in winter at Naval Air Weapons Station China Lake, in Lancaster, in the Mojave River Valley, in Joshua Tree National Park, and in the Morongo Valley (BLM 2007). Sharp-shinned hawks were noted as a winter-resident species on the Combat Center by Cutler *et al.* (1999), with occurrences noted at Mainside, and at Acorn and Lead Mountain Training Areas. Individuals of this species may also occur as migrants or winter visitors elsewhere in the ROI.

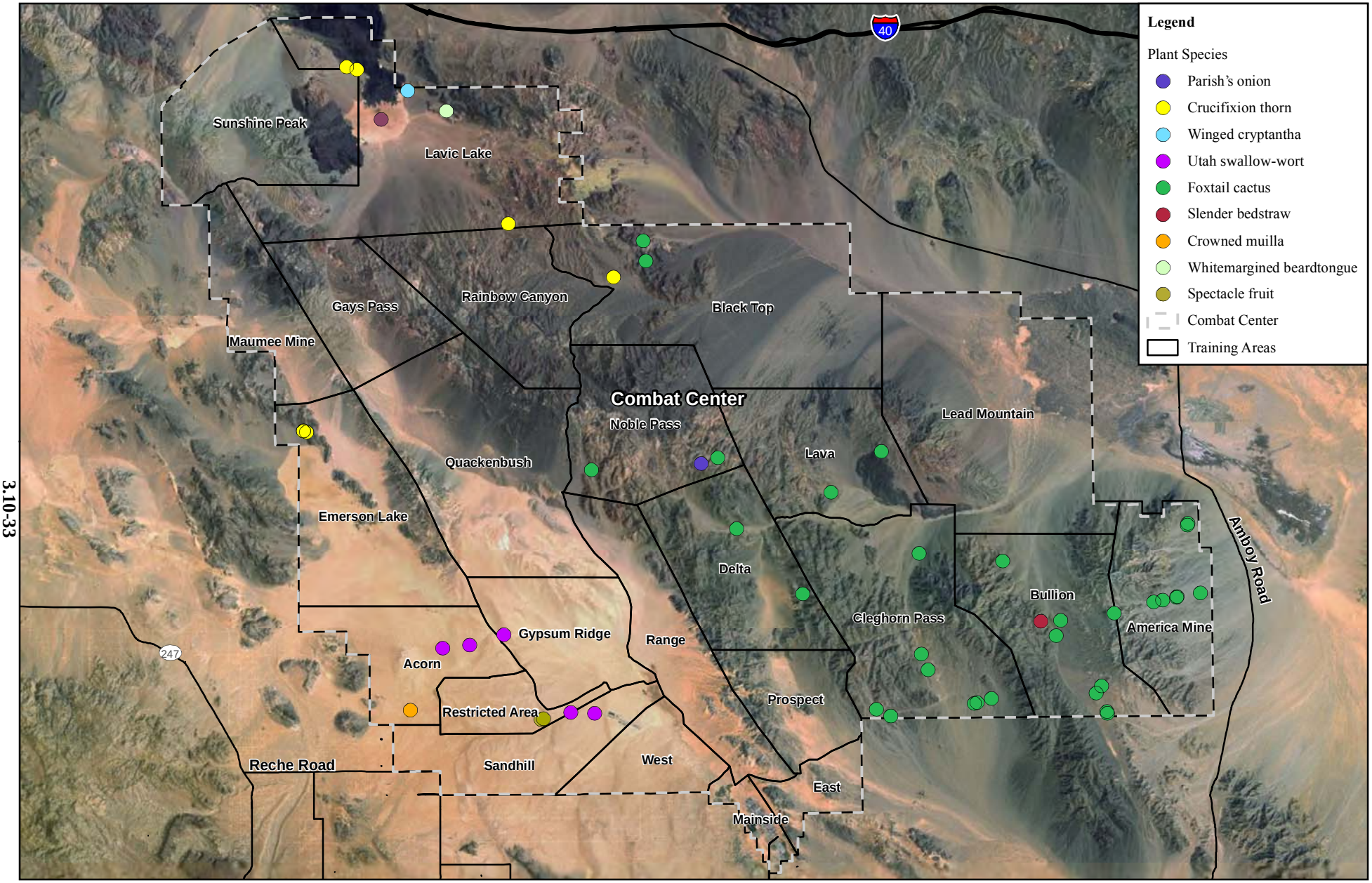
Northern Harrier: The northern harrier (marsh hawk) is a CSSC. Northern harriers breed in open wetlands, pastures, fallow fields, uplands, prairies, agricultural lands, and desert shrub-steppe habitats. Habitats occupied in their wintering range are slightly broader and include both wetland and a variety of upland habitats with low vegetation. The northern harrier's breeding range extends across North America and Eurasia, south into the U.S. to Baja California, the southern Great Plains, and the mid-Atlantic Coast. The northern populations are migratory, with a winter range extending south throughout the breeding range to Central America. It is a widespread migrant and winter visitor in California. Documented northern harrier breeding sites in the area include the Piute Ponds on Edwards Air Force Base, Fort Irwin, and Harper Lake. Wintering birds have been observed in Lancaster, Naval Air Weapons Station China Lake, and along the Mojave River near Victorville (BLM 2007). Cutler *et al.* (1999) observed the northern harrier as a winter-resident in America Mine, Cleghorn Pass, West, Acorn, and Rainbow Canyon Training Areas. It was also observed at Mainside, and is likely to occur as a migrant and winter visitor elsewhere in the ROI.

Other Status Species

Crucifixion Thorn: Crucifixion thorn (CNPS List 2.3) is a perennial shrub in the Simaroubaceae family. The plants are generally less than 6.6 feet (2 meters) in height, are intricately branched and thorny, and appear leafless. The leaves are scale-like and are rarely seen. This plant is considered rare in California and is found in dry, gravelly washes, slopes, and plains. There are four known populations on the Combat Center. Three populations consist of one to three individuals (Emerson Lake, Black Top, and southern Lavic Lake). One larger population is present in northwest Lavic Lake/Sunshine Peak consisting of more than 50 individuals (Figure 3.10-4) (MAGTF Training Command 2006).

Spectacle Fruit: Spectacle fruit (CNPS List 2.2) is a perennial in the Capparaceae family. The plant is profusely branched from the base, often becoming woody. Leaves of this plant are in leaflets of three and flowers are radial with yellow corollas. This plant is considered uncommon in California and is generally found in sandy washes, roadsides, and alkaline flats from 1,970 to 2,625 feet (600 to 800 meters) in the Mojave and northern Sonoran deserts. There is one large and well-established population on the Combat Center, at Surprise Spring (Figure 3.10-4) (MAGTF Training Command 2006).

Utah Swallow-wort: Utah swallow-wort (CNPS List 4.2) is a perennial twining plant in the Asclepiadaceae family. The stems are slender, highly branched, and less than 3.3 feet (1 meter). Leaves are 0.6 to 1.6 inches (1.5 to 4 centimeters) and linear. Flowers are yellow and hood-like, transitioning to orange. Flowering usually occurs from March to May. This plant is considered uncommon in California and is generally found in dry rocky areas from 2,300 to 3,280 feet (700 to 1,000 meters) in desert areas from Nevada to Baja California, and in Texas. This species is fairly common on the western portion of the Combat Center (Figure 3.10-4) (MAGTF Training Command 2006).



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2006, 2009c

Figure 3.10-4
Known Locations of Special Status and Other Status
Plant Species on the Combat Center (modified from MAGTF Training Command 2006)

N

Foxtail Cactus: Foxtail cactus (CNPS List 4.3) is a perennial succulent in the Cactaceae family. There is usually one cylindric stem up to 4 to 6 inches (10 to 15 centimeters) in height. Flowers are magenta to pink. It is found in sandy or rocky areas in creosote bush scrub from 245 to 1,970 feet (75 to 600 meters) in the Sonoran and Mojave Deserts. It is threatened due to human collection. Foxtail cactus are considered to be relatively abundant on the Combat Center (Figure 3.10-4) (MAGTF Training Command 2006).

3.10.3.3 West Study Area

The majority of the west study area is currently designated as the Johnson Valley OHV Area. This area, designated in 1980 through the CDCA Plan, offers outstanding recreational opportunities for both organized (e.g., that require a BLM permit) and unorganized OHV and other recreational activity in the western Mojave Desert of Southern California. The Johnson Valley OHV Area is located approximately 25 miles southeast of Barstow, California, and about 10 miles east of Lucerne Valley, California. The greater area contains nearly 300 mi^2 (777 km^2), and comprises approximately 73% of the OHV Open Area acreage in the Barstow BLM Resource Area. Unlike the BLM Limited Use areas, where, since the adoption of the CDCA Plan, OHVs are required to remain on designated routes, the Open Areas, including Johnson Valley, allow motorized access to any area. While many of the lower areas and lakebeds are heavily impacted by OHV use, many of the more remote areas are relatively pristine.

Vegetation

Plant Communities

Unlike the Combat Center and the other two acquisition study areas, plant communities have not been mapped to a high level of detail within the entirety of the west study area. High-quality mapping done by the USGS (2004) covered approximately 103,362 acres (41,829 hectares) (57%) of the west study area, and the remainder of the mapping for the west study area is taken from California Department of Forestry (CDF) mapping at lower quality (CDF 2003). In general, vegetation in the west study area is similar to that observed on the Combat Center, with creosote bush scrub as the dominant community (Table 3.10-6 and in Figure 3.10-5).

In addition to the plant communities shown in Table 3.10-6, two types of Unusual Plant Assemblages (UPAs) are known to occur in the west study area: creosote rings and yucca rings (San Diego State University 2002). These UPAs are analyzed in this EIS because of the great amount of time required for a damaged or destroyed ring to recover. These UPAs are formed when individual plants reproduce clonally. When creosote bush reaches an age between 30 and 90 years, the oldest branches gradually die and the stem crown splits into separate crowns (Vasek 1980). Eventually, the original stem and early branches die and rot away; the connections between adjoining segments of the stem crown thus disappear. The plant has then become a clone, composed of several independent stem crowns all descended from one seedling. The process continues until the clone spreads across the ground in a circular or elliptical shape. Usually, a mound of sand accumulates in the central area (Vasek 1980).

In a few areas of the Mojave Desert, clonal creosote rings have been found that are several yards in diameter. Outside the ROI near Lucerne Valley, “King Clone” has an average diameter of 45 feet (13.72 meters). Using radiocarbon dating and known growth rates of creosote, scientists have estimated the age of “King Clone” as 11,700 years (Vasek 1980). No BLM ACECs have been designated for creosote rings in the west study area (one – Soggy Dry Lake Creosote Rings ACEC - is located just south of the west study area). However, creosote ring UPAs are numerous and often extensive on valley floors in the west study area (San Diego State University 2002; Egan 2010).

Table 3.10-6. Plant Communities[1] and Land Classifications in the West Study Area

Plant Community or Land Classification	Area (Percent of Total)	Dominant Species	Subdominant Species (If Applicable)
Creosote Bush Scrub	166,570 acres (91.8%)	Creosote bush White bursage Brittlebush Cheesebush	Sweetbush Spiny senna Desert lavender
Mojave Yucca	8,247 acres (4.5%)	Creosote bush White bursage	Mojave yucca Spiny senna Cheesebush Black brush
Black Brush Scrub	2,376 acres (1.3%)	Black brush (*Coleogyne ramosissima*) Shadscale (*Atriplex confertifolia*) Creosote bush California buckwheat (*Eriogonum fasciculatum*)	None
Playa	1,547 acres (0.9%)	N/A	N/A
Mesquite	297 acres (0.2%)	Honey mesquite	All-scale Bush seepweed Fourwing saltbush
Smoketree Woodland	214 acres (0.1%)	Smoke tree Desert willow	Sweetbush Catclaw acacia Creosote bush
Catclaw Acacia	207 acres (0.1%)	Catclaw acacia Cheesebush Smoke tree	Creosote bush Cheesebush Sweetbush Desert willow
Joshua Tree	11.2 acres (>0.01%)	Creosote bush White bursage	Joshua tree

Notes: [1]As defined by CNPS (2009).
Source: CDF 2003; USGS 2004.

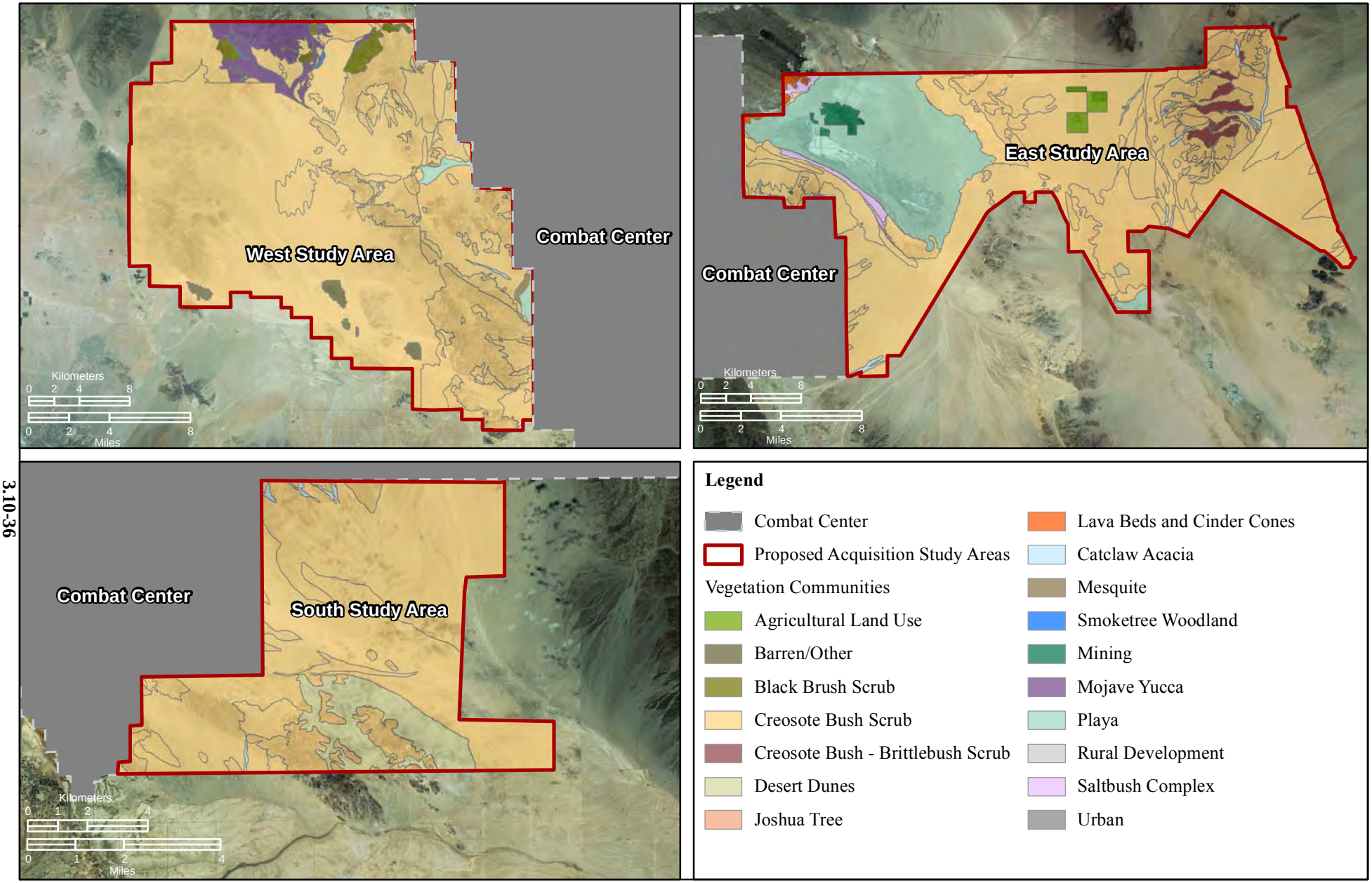


Figure 3.10-5
Vegetation Communities in the West, East, and South Study Areas

Source: CDF 2003, USGS 2004, MAGTF Training Command 2009c

Similar to the creosote rings, Mojave yuccas also form clonal rings. A particularly intact area of clonal yucca in the west study area was set aside for protection as a BLM ACEC. See Figure 3.1-6, *Grazing Allotments and Areas of Critical Environmental Concern*, for the location of the Upper Johnson Valley Yucca Ring ACEC within the west study area and the Soggy Dry Lake Creosote Rings ACEC just south of the west study area boundary.

Non-Native Vegetation

The amount of non-native vegetation in the west study area is not known. However, given the level of disturbance in Johnson Valley and the number of vehicles that travel to Johnson Valley from distant locations, it is expected that a substantial amount of non-native vegetation would occur in at least part of the west study area. As stated above for the Combat Center, non-native vegetation can thrive in disturbed conditions, and a variety of seeds could potentially be spread via travel from distant locations.

Landscaped Areas

No landscaped areas are known to occur in the west study area.

Ecosystems

Creosote/Bursage Scrub Ecosystem

As with the Combat Center, the vast majority of the ecosystems in the west study area include creosote bush and bursage scrub as the dominant vegetation (Figure 3.10-5). On the Combat Center, these ecosystems have been observed to support between 32 and 60 vertebrate species, though disturbance can reduce the vertebrate biodiversity substantially (Cutler *et al.* 1999).

Other Vegetation Series Ecosystems

Although vegetation mapping of the west study area is not as detailed as would be preferred, this area is known to contain yucca woodlands, saltbush scrub, and black brush scrub, similar to the Combat Center (CDF 2003, USGS 2004). The yucca woodland ecosystem has been observed to support 36 vertebrate species (Cutler *et al.* 1999).

Riparian, Wet Areas, and Aquatic Ecosystems

Playas in the west study area include Galway, Melville, Soggy, Emerson Lake, and Means Dry Lakes. Several of these playas have been degraded due to OHV activity, and have been disturbed as a result of their use as filming locations for television and film productions.

Guzzlers have been constructed by BLM in the west study area as low-maintenance water improvements to benefit upland gamebirds such as California quail (*Callipepla californica*), Gambel's quail (*C. gambelli*), and the introduced chukar (*Alectoris chukar*). As a replacement for the loss of certain guzzlers in the Cougar Buttes and Rockpile vicinity of the west study area, BLM (1992) prescribed the improvement of a guzzler located in the northern portion of the Johnson Valley OHV Area. The BLM also prescribed the reconditioning, maintenance, monitoring, and/or removal of 15 other guzzlers, as funding and personnel became available. The condition of these guzzlers at the present time is not known.

Based on USGS mapping, no seeps or springs are known from the west study area.

Caves and Mines

A total of 325 active mining claims are located in the west study area; however, none of these claims are currently being mined. Multiple non-operational mines were documented in the west study area from

available sources (see Table 3.12-4 in Section 3.12, *Geological Resources*), but potential ecosystem functions associated with them is not known. Due to the history of mining in the west study area, additional unknown or undocumented mines may be present, along with potential associated ecosystems.

Cryptobiotic Soils

Similar to the Combat Center, undisturbed or lightly disturbed ground surfaces between higher plants in bajadas and gentler slopes in the west study area would typically be composed of large expanses of cryptobiotic soils (USGS 2001). OHV activity in the Johnson Valley OHV Area is expected to have substantially affected cryptobiotic soils in the west study area (OHV impacts reviewed in Ouren *et al.* 2007); however, large areas of intact cryptobiotic soils should remain in the portions of the west study area that are not subject to heavy OHV use, mostly in the eastern and northern portions of the west study area.

Wildlife

A small portion of habitat linkage/corridor was identified in the southeast portion of the west study area by the group South Coast Wildlands (Penrod *et al.* 2008). The linkage was considered by the authors to potentially serve such species as mountain lion, bobcats, and badgers, as well as sensitive and listed species such as burrowing owl, loggerhead shrike, LeConte's thrasher, bighorn sheep, rosy boa, and desert tortoise. It should be noted that these potential linkages are solely based on modeling; field investigations to determine whether these "potential" linkages are actually in use or would be suitable for use as linkages, have not been conducted. No other wildlife habitat linkages or corridors have been formally identified in the west study area, but such features are almost certain to exist.

Invertebrates

The west study area would be expected to host a similar number of terrestrial invertebrate species (e.g., insects, arachnids, etc.) as the Combat Center, which has been estimated to have at least 1,600 resident invertebrate species (Pratt 2005).

The lakes located in the west study area have low enough salinities to contain branchiopods (i.e., tadpole shrimp, fairy shrimp, and cladocerans). During wet season surveys, the only large branchiopods found active were *Branchinecta* juveniles, most likely *B. lindahli* (Simovich 2010). Other species have been found in previous surveys, in soil samples and hydrations, and may occur in these lakes in greater abundance during warmer seasons.

Tadpole shrimp, fairy shrimp, and cladoceran propagules were found in Galway Dry Lake and these have hatched in hydration. Fairy shrimp cysts and cladoceran ephippia have been found in Soggy Dry Lake, and hydrations have produced clam shrimp. No cysts or branchiopods have been seen in Melville Dry Lake or Means Dry Lake. Only cladoceran ephippia were found in Emerson Dry Lake, which straddles the border between the west study area and the Combat Center (Simovich 2010).

Fish

Although there are perennial springs located in the vicinity of the west study area, there is no documentation of fish species occurring in any of these springs. Based on USGS mapping, the absence of perennial water sources in the west study area would preclude the occurrence of fish.

Amphibians

No amphibian species were observed in the west study area during surveys (Karl 2009a), but the red-spotted toad may occur in isolated tinajas, as they have been observed to do on the Combat Center (Cutler *et al.* 1999).

Reptiles

The non-special status reptiles observed on the Combat Center (see Section 3.10.3.2 and Appendix I) would be expected to occur in the west study area as well, but no wildlife inventories have been conducted. The only non-special status species for which surveys have been conducted is the chuckwalla, which was observed in suitable rocky habitat in several locations within the west study area (Karl 2009a).

The more uncommon reptile species reported from the west study area within Johnson Valley OHV Area (BLM 1992) include banded gecko, desert horned lizard, Mojave fringe-toed lizard, Mojave rattlesnake, and desert tortoise. The geomorphology-based habitat models described by Heaton *et al.* (2006) for western whiptail, zebra-tailed lizard, and side-blotched lizard on the Combat Center likely apply to the west study area, which is also known to support these more common lizard species.

Birds

Some of the non-special status migrant and resident birds described for the Combat Center (see Section 3.10.3.2 and Appendix I) would be expected to occur in the west study area. However, because a large number of the species observed on the Combat Center were dependent on the permanent water sources at Mainside, many would not be expected to occur. The migrant and resident non-special status bird species which have been observed on the Combat Center away from Mainside water sources (and which might reasonably be expected to occur in the west study area) include American avocet, red-tailed hawk, American kestrel, mourning dove, white-winged dove, greater roadrunner, barn owl, great horned owl, common poorwill, lesser nighthawk, white-throated swift, Costa's hummingbird, western kingbird, ash-throated flycatcher, Say's phoebe, horned lark, cliff swallows, and several others. The ephemeral water sources of the playa lakes in the west study area may provide stopover habitat and forage (e.g., insects or shrimp) for migratory birds, but no records were located describing such usage.

Mammals

Most or all of the non-special status mammal species known to occur on the Combat Center (see Section 3.10.3.2 and Appendix I) would be expected to occur in the west study area, but no wildlife inventories have been conducted.

Protected and Special Status Species

Table 3.10-7 lists the protected and special status wildlife species known to occur or potentially occur in the west study area.

Table 3.10-7. Protected, Special Status, and Other Status Species Known to Occur/Potentially Occur in the West Study Area

Name		Status			Potential to Occur or Occurrence
Common Name	**Scientific Name**	**Federal**	**State**	**CNPS**	
Note: The migrant federal and state special status species listed in Table 3.10-3 may potentially occur in the west study area, but because they are primarily associated with the permanent water sources at Mainside on the Combat Center, they are not listed here.					
Protected - Federally Threatened or Endangered					
Reptiles					
Desert tortoise - Mojave population	*Gopherus agassizii*	Threatened	Threatened	N/A	Occurs in suitable habitat throughout west study area (Karl 2009a).
Other Federal Status					
Reptiles					
Mojave fringe-toed lizard	*Uma scoparia*	BLM-S	CSSC	N/A	Occurs in the southern portion of west study area (Karl 2009a).
Mammals					
Townsend's western big-eared bat	*Corynorhinus townsendii*	BLM-S	CSSC	N/A	Based on the presence of mineshafts in the west study area and species presence on the Combat Center, this species is highly likely to occur in the west study area.
Pallid bat	*Antrozous pallidus*	BLM-S	CSSC	N/A	Based on the presence of mineshafts in the west study area and species presence on the Combat Center, this species is highly likely to occur in the west study area.
Birds					
Burrowing owl	*Athene cunicularia*	BLM-S, BCC	CSSC	N/A	Known to occur in low densities in the west study area (Karl 2009a)
Other State Status (No Federal Status)					
Birds					
All raptors		None	FP (3503)	N/A	Various species known to occur in the west study area (CDFG 2009b).
Mammals					
American badger	*Taxidea taxus*	None	CSSC	N/A	Because they occur sparsely on the Combat Center (Cutler *et al.* 1999, B.T. Henen unpublished data), it is expected that they are similarly distributed in the west study area.
Other Status Species					
Plants					
Utah swallow-wort	*Cynanchum utahense*	None	None	4.2	West study area in Johnson Valley, north and west of Means Dry Lake (MAGTF Training Command 2009a).

Notes: Federal Species of Concern lists are not consistently maintained for southern California. The mammalian CSSC list is outdated (not officially revised since 1986) and is projected to be updated by 2011.
BCC = Bird Species of Conservation Concern; BLM-S = BLM-Sensitive; FP (#) = Fully Protected Under California Department of Fish and Game Code (#);MAGTF = Marine Air Ground Task Force; ROI = region of influence; WL = Watch List
CNPS List Definitions
List 1B = Rare, threatened or endangered in California and elsewhere
List 2 = Rare, threatened or endangered in California, but more common elsewhere
List 4 = Limited distribution (watch list)
.1 indicates seriously endangered in California
.2 indicates 20-80% occurrences threatened
.3 indicates <20% of occurrences threatened

Protected - Federally Threatened or Endangered Species

Desert Tortoise: Tortoise surveys conducted in 2008 observed sign of this species throughout the west study area (Karl 2009a). Sign included live tortoises, burrows, scat, shells and shell parts, tracks, and drinking depressions. Both genders and all size classes of tortoise were observed. Sign was observed on nearly all topographic features sampled, from lower bajadas to mountains.

Of the surveyed portion of the west study area, approximately 9% was estimated to host no tortoises, in most cases as a result of unsuitable habitat or extreme disturbance. Estimated tortoise densities were greatest in the valleys, bajadas, and foothills of upper Johnson Valley, in the north-central portion of the acquisition study area, west of Emerson Dry Lake and west of the Fry Mountains (Table 3.10-8; Figure 3.10-6).

Table 3.10-8. Area in the West Study Area Covered by Different Categories of Desert Tortoise Density

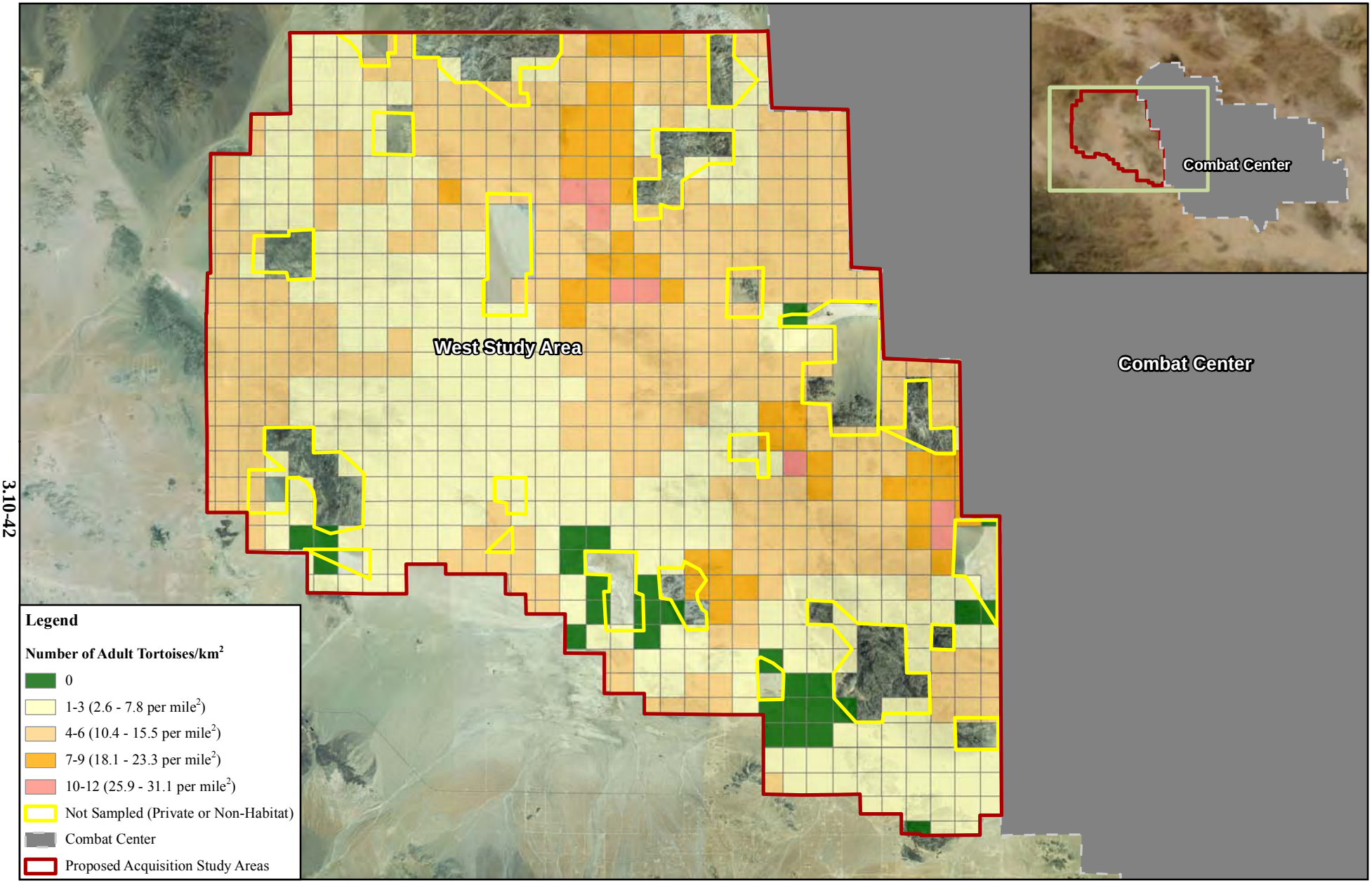
Density Category (Tortoises/Square Kilometer)	Area (acres)	Percent of Total
0	13,931	9.5%
1-3	60,458	41.2%
4-6	57,105	38.9%
7-9	11,104	7.6%
10-12	1,970	1.3%
13-15	0	0%
Total	*144,567*	*(98.6%)*

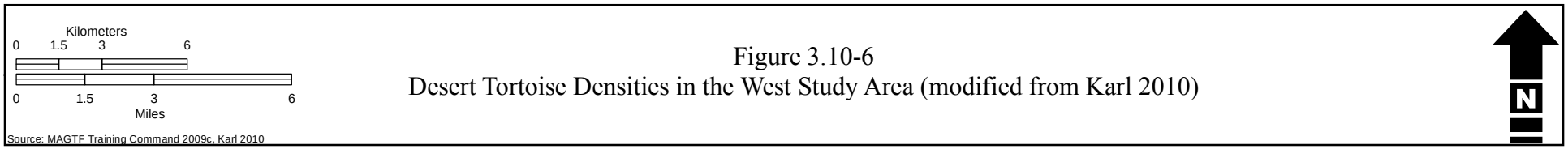
Notes: Tortoise surveys conducted in 2009. Based on the TRED survey method GIS data (Karl 2010a).
Source: Modified from Karl 2010.

Based on these density estimates, the number of desert tortoises in the west study area is estimated using the TRED survey method at 2,708 ± 780 adults (95% CI) (Karl 2010).

For comparison, two older surveys that included the west study area are described below. One of these efforts involved a mark and recapture demographic study that examined a 1-mi^2 (2.59-km^2) plot in Upper Johnson Valley from 1980 to 2008. The second involved a series of broad transects that were surveyed across the tortoise's entire range to estimate abundance.

The mark-recapture demographic study was conducted by the BLM and USGS on a 1-mi^2 (2.59-km^2) site in Upper Johnson Valley, referred to as a "Trend Plot." This plot was studied approximately every 4 to 6 years since 1980. Using a mark-single recapture technique, the density of adult tortoises in 1980 was 179 per mi^2 (69 per km^2) (BLM 2005). By 1990, densities had declined to 39 per mi^2 (15 per km^2), and densities in 1994 were nearly identical to those in 1990. The plot was surveyed in 2008, but the data are currently unavailable. However, tortoise densities may have decreased since 1994, since tortoise densities range-wide have declined since the 1980s (reviewed in Karl 2010).





Source: MAGTF Training Command 2009c, Karl 2010

Figure 3.10-6
Desert Tortoise Densities in the West Study Area (modified from Karl 2010)

Beginning in 1977, 32.8-feet (10-meter)-wide, 1.5 mile (2.4-km)-long belt transects were used to sample broad regions within the tortoise's range, including the west study area, to estimate abundance. Early transects were spaced at two per 36 mi^2 (93 km^2) (reviewed in Karl 2010). Later transects conducted for the West Mojave Plan (BLM 2005), which sampled the entire west study area between 1998 and 2002, were spaced at one or two per mi^2 (2.6 km^2). While these transects were poor estimators of tortoise density (Karl 2001), they were useful in suggesting extreme limits of tortoise abundance. Surveys conducted in the late 1970s identified relatively high tortoise abundance in a broad area of upper Johnson Valley, similar to the pattern of tortoise numbers identified in Karl's (2009a) study. However, the recent survey (Karl 2009a) did not identify the broad area of higher tortoise abundance formerly observed north of Means Dry Lake. The BLM's West Mojave Plan transects recorded above-average tortoise sign counts in northern Johnson Valley; to the north of the west study area; and west of Emerson Lake. This pattern of sign abundance is similar to that observed in the recent study (Karl 2009a). Other areas where above-average sign counts were observed by BLM included areas located west and northwest of the Fry Mountains and southern Johnson Valley. Neither of these areas was found to host high tortoise abundance in Karl's (2009a) study. This discrepancy may be due to actual differences in tortoise abundance between 2002 and 2008, differences in surveyor capability, or techniques employed.

Other Federal Special Status Species

Mojave Fringe-toed Lizard: Mojave fringe-toed lizards were observed only in the southern and southeastern portion of the west study area, in areas characterized by loose sand deposits and low dunes (Karl 2009a). These lizards were not observed in some scattered sandy patches and hummocky areas south and southeast of Melville Dry Lake and in the eastern-central west study area. Lack of observation of Mojave fringe-toed lizards at these locations might have resulted from the species being absent or at very low density, or because transects did not intersect small habitat patches. Records of Mojave fringe-toed lizards in the west study area are shown in Figure 3.10-7.

Burrowing Owl: Burrowing owls are present in very low densities in the west study area (Karl 2009a). Fifty incidences of burrowing owl sign were observed in the west study area, distributed throughout the area. Most sign consisted of burrows with whitewash or pellets, although two owls were also observed, both in association with burrows (Figure 3.10-7). There are no other published or available recent studies of burrowing owls in the west study area.

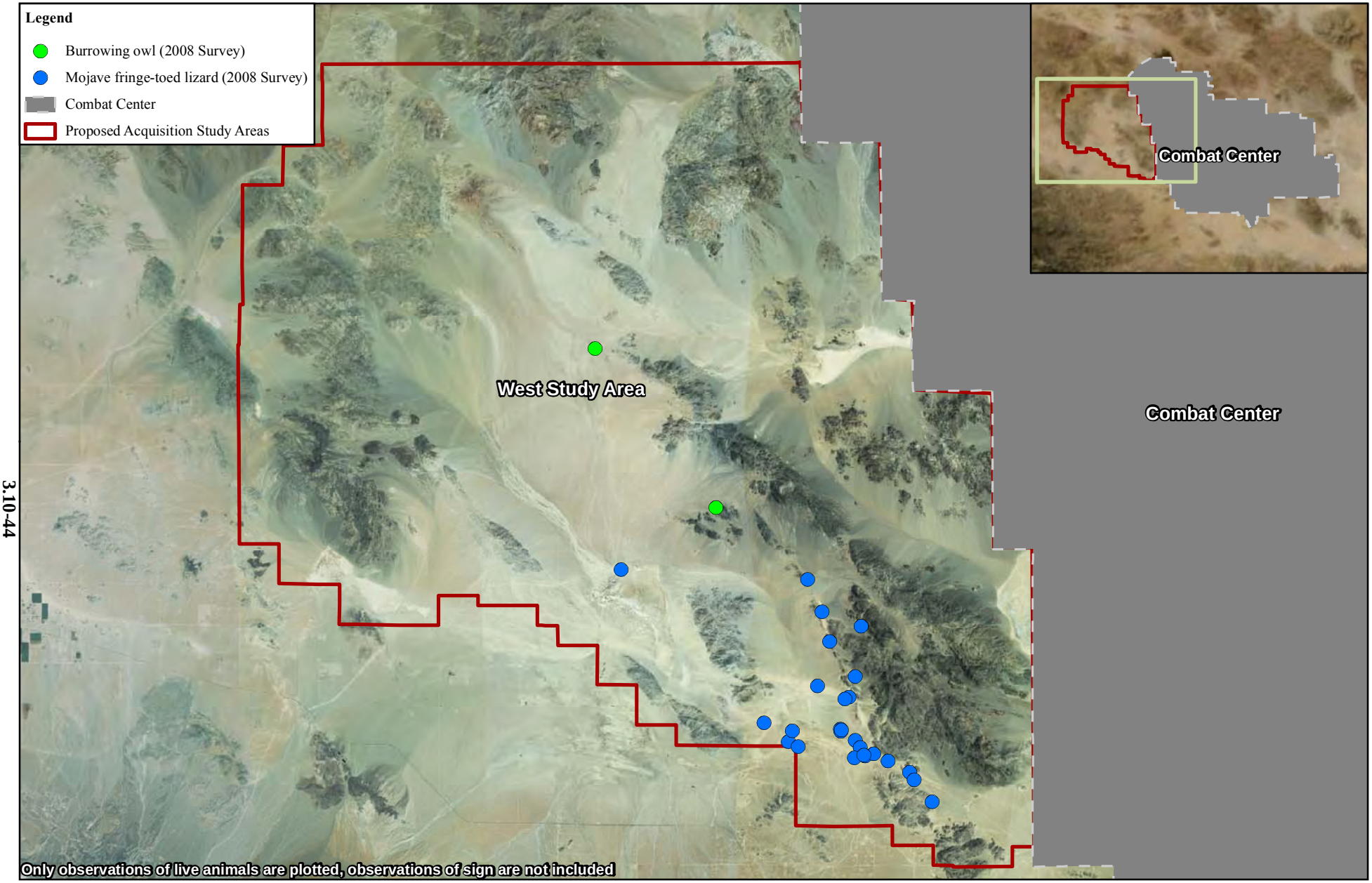
State Special Status Species That Have No Federal Status

Pallid San Diego Pocket Mouse: No surveys are known to have been conducted for this species in the west study area. Given its rarity on the Combat Center (Cutler *et al.* 1999), it may not occur in the west study area. If it does occur, it would likely be at low densities, similar to the Combat Center.

American Badger: No surveys are known to have been conducted for this species in the west study area. They occur sparsely on the Combat Center (Cutler et al. 1999, B.T. Henen unpublished data). Due to similar available habitat, they are probably similarly distributed in the west study area.

Other Status Species

Utah Swallow-wort: Two populations of Utah swallow-wort were found in the west study area near Means Dry Lake (Figure 3.10-8) (MAGTF Training Command 2009a). One large population was located on the north side of the dry lake, while a smaller population was located west of the lake. The preliminary surveys conducted were not all-inclusive, so other populations might be identified in the west study area.

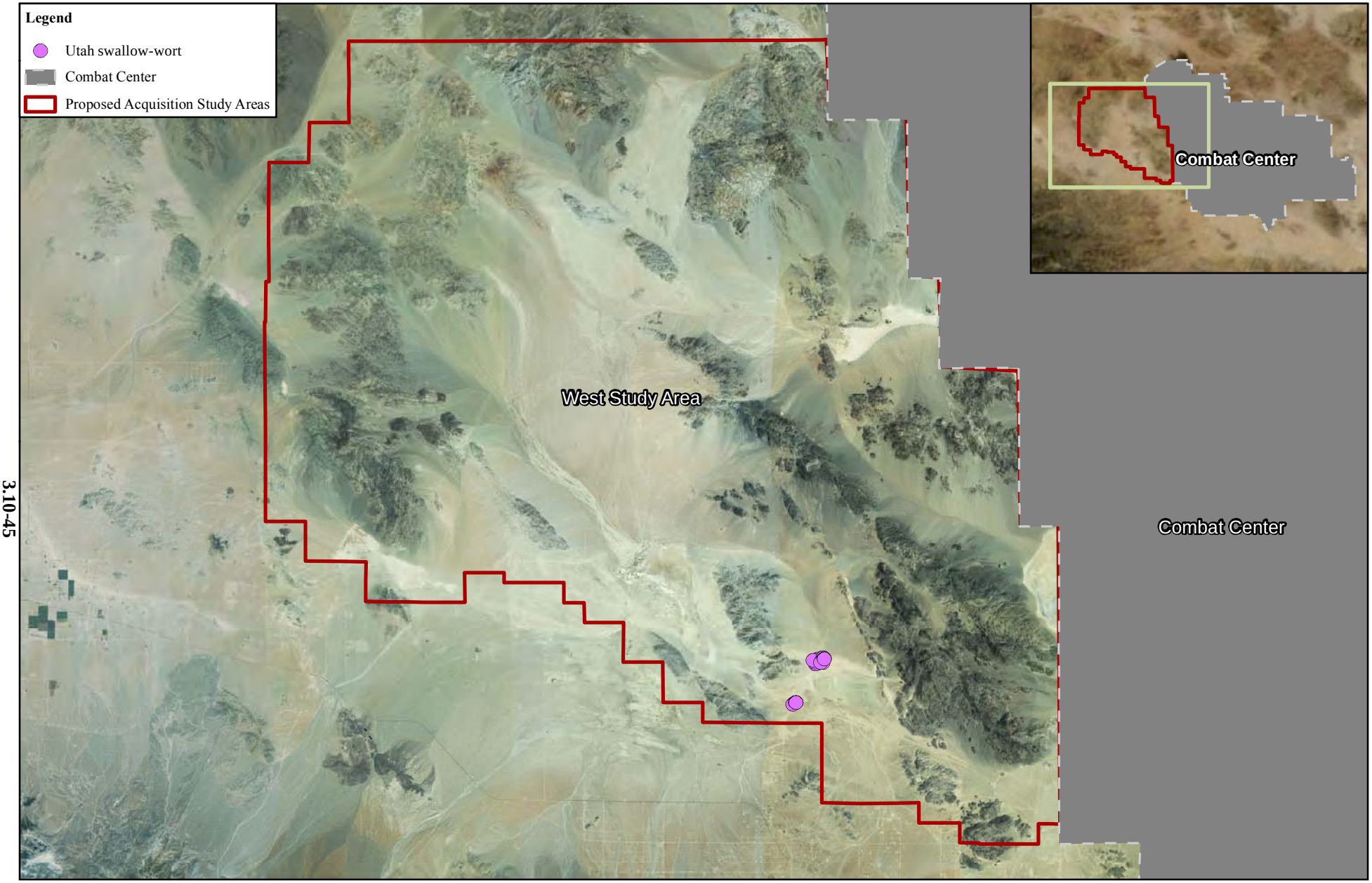


Kilometers
0 1.5 3 6
0 1.5 3 6
Miles

Source: MAGTF Training Command 2009c, Karl 2009a

Figure 3.10-7
Observations of Special Status Wildlife Species in the West Study Area
(Excludes Desert Tortoise, modified from Karl 2009a)

N



Kilometers
0 1.5 3 6
0 1.5 3 6
Miles

Source: MAGTF Training Command 2009a, 2009c

Figure 3.10-8
Locations of Special Status Plant Species in the West Study Area
(modified from MAGTF Training Command 2009a)

N

3.10.3.4 South Study Area

Vegetation

Plant Communities

Based on the vegetation mapping conducted by the USGS (2004), the south study area is dominated by creosote bush scrub, consistent with the Combat Center and the other acquisition study areas (Table 3.10-9, Figure 3.10-5). Substantial areas of the south study area are also composed of desert dunes with minimal vegetation, and a small portion is covered by the tree-dominated catclaw acacia community.

Table 3.10-9. Plant Communities[1] and Land Types on the South Study Area

Plant Community or Land Classification	Area (Percent)	Dominant Species	Subdominant Species (if applicable)
Creosote Bush Scrub	19,320 acres (88%)	Creosote bush White bursage Brittlebush Cheesebush	Sweetbush Spiny senna Desert lavender
Desert Dunes	2,364 acres (11%)	No dominant species	Desert twinbugs (*Dicoria canescens*) Desert sand verbena (*Abronia villosa*) Various buckwheat species (*Eriogonum* spp.) Indian ricegrass
Catclaw Acacia	115 acres (0.5%)	Catclaw acacia Smoke tree Desert willow	Burrobush (*Ambrosia salsola*) Sweetbush Brittlebush

Note: [1]As defined by CNPS (2009b).
Source: USGS 2004.

Non-Native Vegetation

The amount of non-native vegetation in the south study area is not known. However, because the south study area is near Mainside and has experienced some disturbance, it is expected that a substantial amount of non-native vegetation would occur in at least part of the south study area.

Landscaped Areas

No landscaped areas are known to occur in the south study area.

Ecosystems

Creosote/Bursage Scrub Ecosystem

The south study area is largely composed of the Creosote/Bursage Scrub ecosystem, and also includes 2,364 acres (957 hectares) of the Sand Dune ecosystem (Figure 3.10-5).

Other Vegetation Series Ecosystems

No other vegetation series ecosystems have been described for the south study area (USGS 2004).

Riparian, Wet Areas, and Aquatic Ecosystems

No playas, seeps, springs, or man-made water sources are known to occur in the south study area (USGS 2004).

Caves and Mines

No caves or mines are known to occur in the south study area (Karl 2009a).

Cryptobiotic Soils

Similar to the Combat Center, undisturbed or lightly disturbed ground surfaces between higher plants in bajadas and gentler slopes in the south study area would typically be composed of expanses of intact cryptobiotic soils.

Wildlife

A potential habitat linkage for desert tortoise between the Combat Center and Joshua Tree National Park was identified by the group South Coast Wildlands (Penrod *et al*. 2008). This potential linkage would overlap with the south study area under study in this EIS. This habitat linkage, if it exists, could also potentially serve other large vertebrates such as mountain lions, bobcats, badgers, and others, as well as rodent species. It should be noted that this potential linkage was solely based on modeling; field investigations to determine whether this "potential" linkage is actually in use or would be suitable for use, have not been conducted.

Invertebrates

No aquatic invertebrates occur in the south study area as this area does not possess the required habitat. The south study area would be expected to host somewhat fewer terrestrial invertebrate species (e.g., insects, arachnids) as compared to the Combat Center, which has been estimated to have at least 1,600 resident invertebrate species. This is due to the substantially smaller geographic area and lower habitat diversity (based on fewer vegetation and ecosystem types) present in the south study area.

Fish

No fish species are known to occur in the south study area, and based on USGS mapping the absence of known permanent water sources would preclude their occurrence.

Amphibians

No amphibian species were observed in the south study area during surveys (Karl 2009a). They are unlikely to occur there as tinajas or other water sources are not known for the south study area.

Reptiles

The common reptile species observed on the Combat Center (see Section 3.10.3.2 and Appendix I) would also be expected to occur in the south study area, but no wildlife inventories have been conducted. The chuckwalla was detected in vertebrate surveys conducted in 2008, particularly in the mountainous portion of the south study area (Karl 2009a). The south study area was identified by the group South Coast Wildlands (Penrod *et al.* 2008) to comprise a potential habitat linkage/corridor for desert tortoise between the Combat Center and Joshua Tree National Park, but no existing linkage has been identified.

Birds

Because a large number of the species observed on the Combat Center (see Section 3.10.3.2 and Appendix I) are dependent on the permanent water sources at Mainside, many of those species could potentially occur occasionally in the nearby south study area. Such occurrences would be expected to be relatively brief due to the absence of permanent water sources in the south study area. Species that may be residents in the south study area (rather than transient) include the red-tailed hawk, American kestrel, mourning dove, white-winged dove, greater roadrunner, barn owl, great horned owl, common poorwill, lesser nighthawk, white-throated swift, Costa's hummingbird, western kingbird, ash-throated flycatcher, Say's phoebe, horned lark, cliff swallow, and several others.

Mammals

Some of the non-special status mammal species known to occur on the Combat Center (see Section 3.10.3.2 and Appendix I) would be expected to occur in the south study area, but many would not due to the limited variety of habitat, smaller geographic area, and proximity to developed areas. No wildlife inventories have been conducted for this area. Mammalian species that might be expected to occur in the south study area include the coyote, raccoon, desert kit fox, desert cottontail, black-tailed jackrabbit, various rodents (e.g., California ground squirrel, little pocket mouse, desert kangaroo rat, etc.). Bats would not be expected to be abundant due to the absence of mines and caves, but could potentially shelter in rock crevices, as well as transit or forage in the area.

Protected and Special Status Species

Table 3.10-10 lists the protected and special status species known to occur within the south study area. Because the south study area is much smaller than the other geographic areas under consideration (e.g., the Combat Center, west study area, and east study area), there are fewer types of habitat available, limiting the number of species present or potentially present.

Table 3.10-10. Protected and Special Status Species Known to Occur in the South Study Area

Name		Status			Potential to Occur or Occurrence
Common Name	**Scientific Name**	**Federal**	**State**	**CNPS**	
Note: The migrant federal and state special status species listed in Table 3.10-3 may potentially occur in the south study area, but because they are primarily associated with the permanent water sources at Mainside on the Combat Center, they are not listed here.					
Protected - Federally Threatened or Endangered					
Reptiles					
Desert tortoise – Mojave population	*Gopherus agassizii*	Threatened	Threatened	N/A	Occurs throughout ROI, and in moderately high density in the northeast of the south study area (MAGTF Training Command 2001; Karl 2009a).
Other Federal Status					
Reptiles					
Mojave fringe-toed lizard	*Uma scoparia*	BLM-S	CSSC	N/A	Limited number occurs in south study area (Karl 2009a).
Birds					
Burrowing owl	*Athene cunicularia*	BLM-S, BCC	CSSC	N/A	Known to occur in the south study area (Karl 2009a).
Other State Status (No Federal Status)					
Birds					
All raptors		None	FP (3503)	N/A	Various species known to occur in the south study area (CDFG 2009b).
Mammals					
American badger	*Taxidea taxus*	None	CSSC	N/A	They occur sparsely on the Combat Center (Cutler et al. 1999, B.T. Henen unpublished data). Due to similar available habitat, they are probably similarly distributed in the west study area.

Notes: Federal Species of Concern lists are not consistently maintained for southern California. The mammalian CSSC list is outdated (not officially revised since 1986) and is projected to be updated by 2011.
BCC = Bird Species of Conservation Concern; BLM-S = BLM-Sensitive; CSSC = California Species of Concern; MAGTF = Marine Air Ground Task Force; ROI = region of influence; WL = Watch List; FP (#) = Fully Protected Under California Department of Fish and Game Code (#)

Protected - Federally Threatened or Endangered Species

Desert Tortoise: Tortoises within the south study area are protected to an extent per public land management direction specified in the amended CDCA Plan. Sign of tortoise occurrence was observed throughout most of the surveyed portion of the south study area during 2008 surveys, although sign counts were considered low (Karl 2009a). In general, most of the south study area contains low densities of desert tortoises (Table 3.10-11). Estimated tortoise densities were greatest in the northeast corner of the south study area, where it abuts the Combat Center, and in the southern portion of the south study area, especially on the bajadas and slopes associated with several small mountains (Figure 3.10-9).

Table 3.10-11. Acreage in the South Study Area Covered by Different Categories of Desert Tortoise Density

Density Category (Tortoises/Square Kilometer)	Area (acres)	Percent of Total
0	0	0%
1-3	4,328	20.3%
4-6	11,202	52.6%
7-9	3,335	15.6%
10-12	296	1.4%
13-15	249	1.2%
Total	*19,409*	*91.1%*

Notes: Tortoise surveys conducted in 2009. Based on the TRED survey method GIS data (Karl 2010).
Source: Modified from Karl 2010.

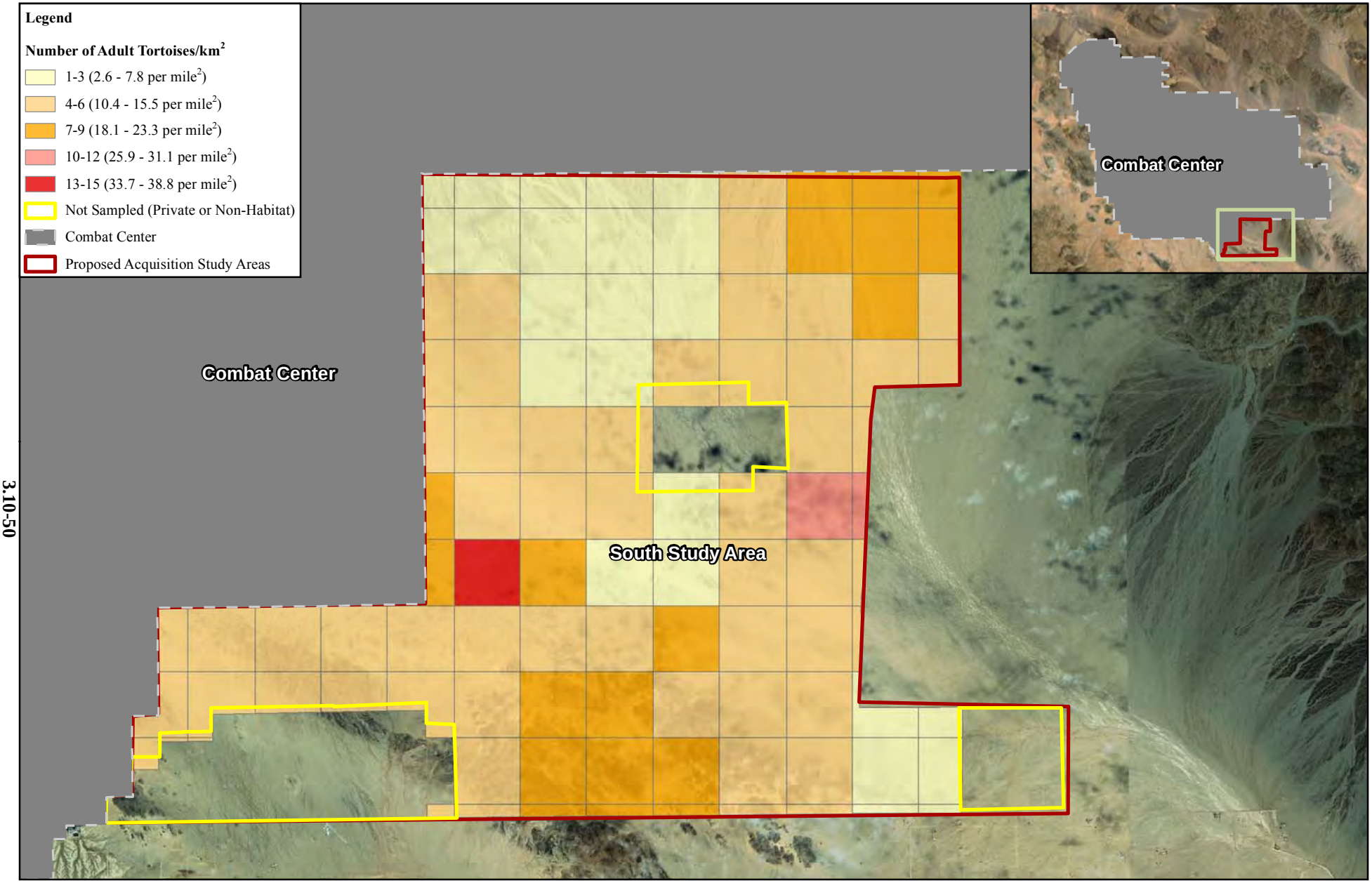
Even the highest density class identified in the south study area is considered relatively low, at the lower end of densities found in the Fort Irwin vicinity of 39 to 78 adult tortoises per mi^2 (15 to 30 per km^2) (Karl 2010). Based on these density estimates, the number of desert tortoises in the south study area is estimated using the TRED method at between 389 ± 115 (95% CI) adults (Karl 2010).

BLM (2005) previously conducted belt transect surveys in the western and southern portion of the south study area between 1998 and 2002, but did not describe any areas of high sign counts in the south study area. Tortoise densities on adjacent areas of the Combat Center, based primarily on belt transect surveys conducted in 1997-1999 (MAGTF Training Command 2001), indicate an area of relatively high tortoise abundance (21 to 100 tortoises per mi^2 [8 to 39 per km^2], size classes unidentified) abutting the northeastern portion of the south study area (MAGTF Training Command 2001). This is adjacent to the area Karl (2010) estimated as having moderate tortoise densities (7 to 9 adult tortoises per km^2 [18 to 23 tortoises per mi^2]).

Other Federal Special Status Species

Mojave Fringe-toed Lizard: Mojave fringe-toed lizards were observed in the loose sand deposits on southeastern Valley Mountain, often on small, isolated habitat patches of only a few acres, and in the northwestern portion of the south study area (Karl 2009a). Records of Mojave fringe-toed lizards in the south study area are shown in Figure 3.10-10.

Burrowing Owl: Only two incidences of burrowing owl sign (no individual owls) were observed in the south study area, which indicates that owl densities are very low (Karl 2009a). There are no published or available recent studies that have observed live burrowing owls in the south study area.

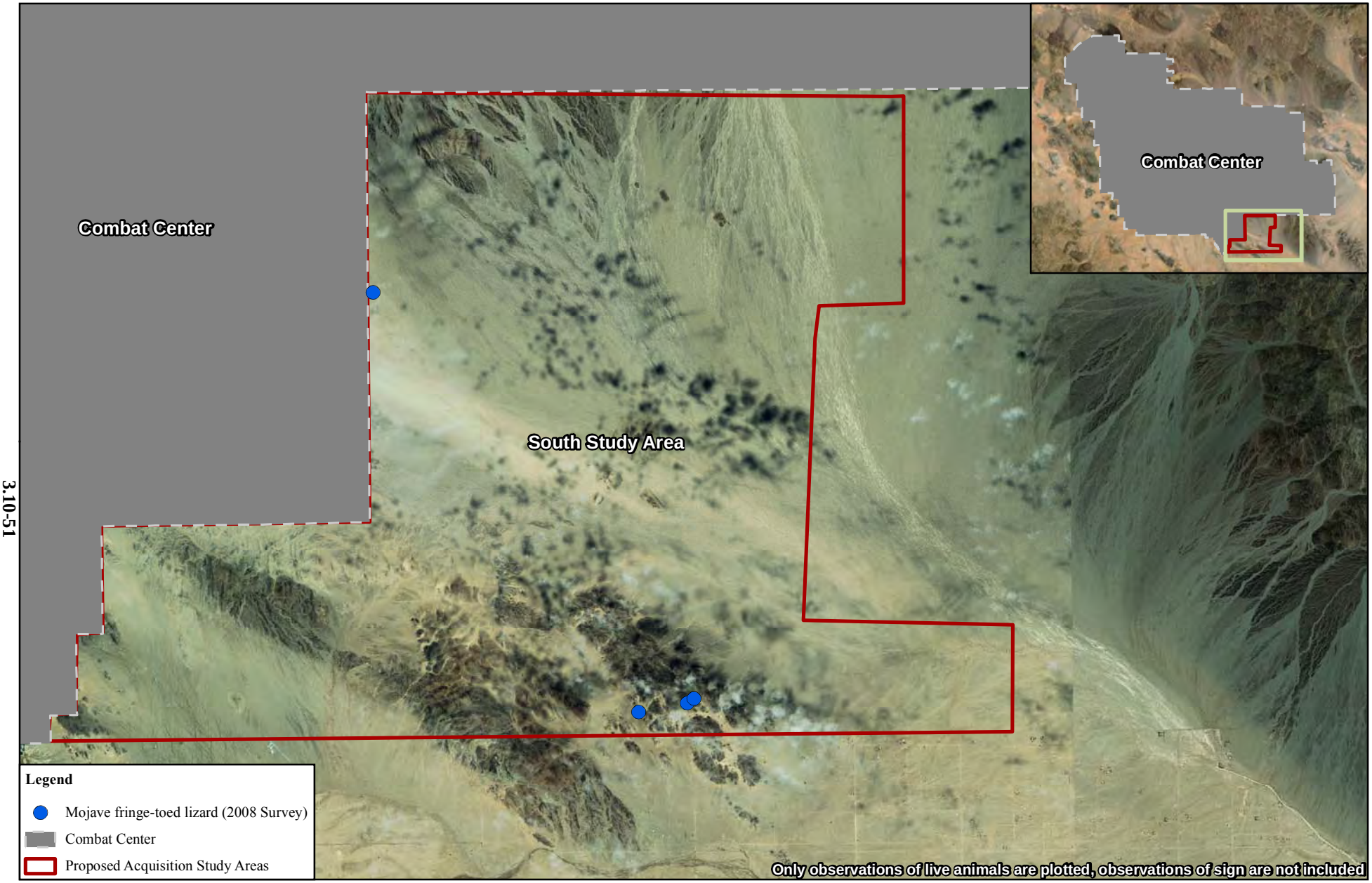


Kilometers
0 0.5 1 2
0 0.5 1 2
Miles

Source: MAGTF Training Command 2009c, Karl 2010

Figure 3.10-9
Desert Tortoise Densities in the South Study Area (modified from Karl 2010)

N



Kilometers
0 1 2
0 1 2
Miles

Source: MAGTF Training Command 2009c, Karl 2009a

Figure 3.10-10
Observations of Special Status Wildlife Species in the
South Study Area (Excludes Desert Tortoise, modified from Karl 2009a)

N

State Special Status Species That Have No Federal Status

Pallid San Diego Pocket Mouse: No surveys are known to have been conducted for this species in the south study area. Due to the rarity of these animals on the Combat Center, they are not expected to occur in the south study area. If this species does occur, it would likely be at low densities.

American Badger: No surveys are known to have been conducted for this species in the south study area. They occur sparsely on the Combat Center (Cutler et al. 1999, B.T. Henen unpublished data). Due to similar available habitat, they are probably similarly distributed in the west study area.

California Native Plant Society List Species

Foxtail cactus: One population of foxtail cactus was found north of Valley Mountain in the northwest corner of the south study area during surveys conducted in 2008 (Figure 3.10-11) (MAGTF Training Command 2009a). The preliminary surveys conducted for sensitive plant species were not all-inclusive, so other populations might be identified in the south study area.

3.10.3.5 East Study Area

Vegetation

Plant Communities

Based on the vegetation mapping conducted by the USGS (2004), the east study area is typical of the ROI in that it is primarily composed of various creosote bush scrub communities (Table 3.10-12, Figure 3.10-5). The east study area includes expanses of mostly barren playa and a few areas that have been highly disturbed by mining activities. There are two active calcium chloride production facilities on the Bristol playa lakebed. Abandoned historic mines outside the playa are widely separated by open space. There is also an agricultural site within the east study area.

Non-Native Vegetation

Non-native vegetation in the east study area would be expected to be similar to that found on the Combat Center and the west and south study areas. Disturbance due to mining, salt production, and agriculture, as well as highways, railroads, and pipelines, has likely facilitated spread of several non-native species; however, specifics are not known.

Landscaped Areas

An agricultural operation of approximately 1,600 acres (647 hectares) is operated in the northern central portion of the east study area by Cadiz Inc. and currently grows primarily citrus and grapes (see Section 3.1, *Land Use* for details). No other landscaped areas are known.

Ecosystems

Creosote/Bursage Scrub Ecosystem

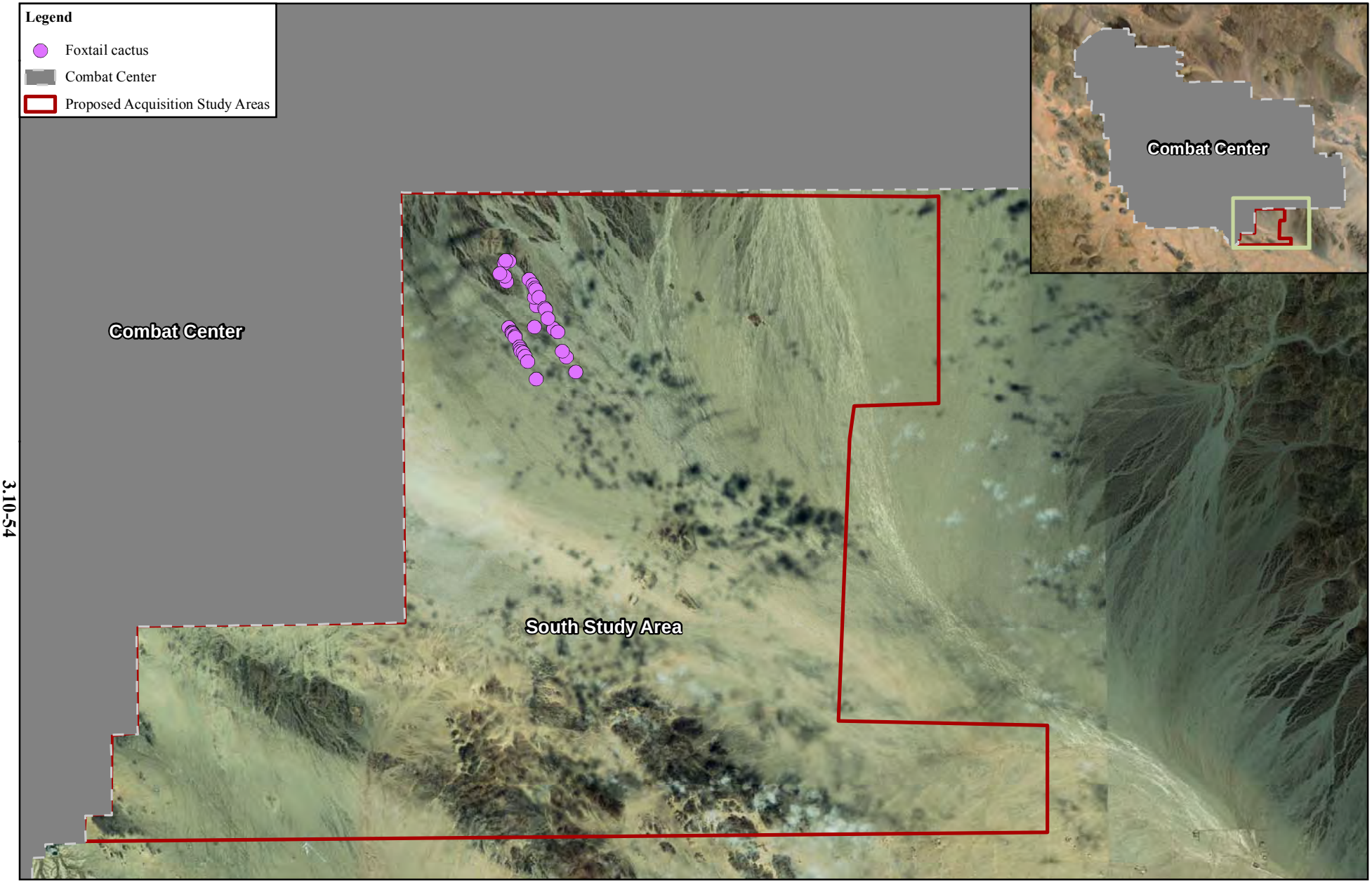
As with the remainder of the ROI, Creosote/Bursage Scrub ecosystems compose the majority of the east study area (Figure 3.10-5).

Table 3.10-12. Plant Communities[1] and Land Classifications in the East Study Area

Plant Community or Land Classification	Area (Percent of Total)	Dominant Species	Subdominant Species (if applicable)
Creosote Bush Scrub	117,209 acres (73%)	Creosote bush White bursage Brittlebush Cheesebush	Sweetbush Spiny senna Desert lavender
Playa	34,270 acres (21%)	N/A	N/A
Creosote Bush – Brittlebush Scrub	2,392 acres (1.5%)	Creosote bush Brittlebush	White bursage Sweetbush Desert holly Barrel cactus (*Ferocactus cylindraceus*)
Saltbush Complex[2]	1,731 acres (1.1%)	Saltbush (*Atriplex* spp.) White bursage Creosote bush	N/A
Mining	1,512 acres (0.9%)	N/A	N/A
Agricultural	1,468 acres (0.9%)	N/A	N/A
Catclaw Acacia	1,436 acres (0.9%)	Catclaw acacia Smoke tree Desert willow	Burrobush Sweetbush Brittlebush
Lava Beds and Cinder Cones	585 acres (0.4%)	Mostly barren	Desert holly
Desert Dunes	218 acres (0.1%)	No dominant species	Desert twinbugs Desert sand verbena Various buckwheat species (*Eriogonum* spp.) Indian ricegrass

Notes: [1]As defined by CNPS (2009).
[2]Because the various saltbush (*Atriplex* spp.) communities such as allscale scrub, fourwing saltbush scrub, and spinescale scrub blended together so heavily, they were combined into a single complex by the USGS (2004) during mapping.

Source: USGS 2004.



Kilometers
0 0.5 1 2
0 0.5 1 2
Miles

MAGTF Training Command 2009a, 2009c,

Figure 3.10-11
Locations of Special Status Plant Species in the South Study Area (modified from MAGTF Training Command 2009a)

N

Other Vegetation Series Ecosystems

Approximately 1,731 acres (700 hectares) of the Saltbush Scrub ecosystem are located in the east study area surrounding the large dry lake beds of Bristol Dry Lake and Cadiz Dry Lake.

Riparian, Wet Areas, and Aquatic Ecosystems

Bristol Dry Lake and a portion of Cadiz Dry Lake occur in the east study area. These lakes, when wet, are highly saline (supporting salt works) and are unable to support most aquatic invertebrate species or the birds that feed on them (Eriksen and Belk 1999). No seeps or springs are known from the east study area, but such features are likely to occur. Man-made water sources would be expected to occur in association with the agricultural operation, and potentially with the mining operations.

Caves and Mines

Several mines are known to exist in the east study area, including the abandoned America Mine. However, there are no descriptions of the ecosystem function of any of these mines, or records of any natural caves in the area.

Cryptobiotic Soils

Similar to the Combat Center, undisturbed or lightly disturbed ground surfaces between higher plants in bajadas and gentler slopes in the east study area would typically be composed of cryptobiotic soils.

Wildlife

A potential habitat linkage in the Bristol Lake Wash between the Combat Center and Joshua Tree National Park was identified by the group South Coast Wildlands (Penrod *et al*. 2008). This habitat linkage/corridor, which overlaps the east study area, could especially serve the Mojave fringe-toed lizard, though it could also benefit many other species. It should be noted that this potential linkage is solely based on modeling; field investigations to determine whether this "potential" linkage is actually in use or would be suitable for use, have not been conducted. Other habitat linkages/corridors are likely present in the east study area but have not been described to date.

Invertebrates

Due to its lower habitat diversity and smaller area as compared to the Combat Center, the east study area would be expected to host a somewhat lower number of terrestrial invertebrate species (e.g., insects, arachnids, etc.) than the Combat Center, which has been estimated to have at least 1,600 resident invertebrate species (Pratt 2005).

When samples for aquatic invertebrates were conducted in the east study area in 2009, Cadiz Dry Lake and Bristol Dry Lake both held some water in spots; however, both lakes are extremely saline to the point of supporting salt works (Simovich 2010). The usual dry lake branchiopod fauna cannot survive such conditions. While the genus *Artemia* is found under saline conditions, it cannot tolerate high levels of calcium chloride as found in these lakes and is not known from this area (Eriksen and Belk 1999).

Fish

No fish species are known to occur in the east study area, though no surveys or inventories have been conducted. Based on USGS mapping, there are no perennial springs in the east study area. Although there are perennial springs located in the vicinity of the Combat Center, there is no documentation of fish species occurring in any of these springs, so even if springs occurred in the east study area they would not be expected to host fish.

Amphibians

No amphibian species were observed in the east study area during surveys (Karl 2009b), but the red-spotted toad may occur in any tinajas, as they do on the Combat Center (Cutler *et al.* 1999). Western toads may also be associated with any permanent water sources that are present at the mining or agricultural operations in the east study area.

Reptiles

The common reptile species observed on the Combat Center (see Section 3.10.3.2 and Appendix I) would also be expected to occur in the east study area, but no wildlife inventories have been conducted. Surveys were conducted for the chuckwalla, which found chuckwalla sign in association with most rock formations in the east study area (Karl 2009b). Notable locations were surrounding the Ship Mountains, and north of the east study area around Amboy Crater.

Birds

Some of the non-special status migrant and resident birds described for the Combat Center (see Section 3.10.3.2 and Appendix I) would be expected to occur in the east study area. However, because a large number of the species observed on the Combat Center were dependent on the permanent water sources at Mainside, many would not be expected to occur as anything other than transients. Some migratory birds could be associated with the playa lakes during the times they are covered with water, but no surveys to study this have been conducted. It is unknown if the Cadiz agricultural operation has a permanent surface water source available or if it simply pumps directly out of its groundwater reserves; if surface water is present the likelihood for occurrence of migratory bird species in the east study area would increase. Based on their presence on the Combat Center, some bird species that could occur in the east study area include the red-tailed hawk, American kestrel, mourning dove, white-winged dove, greater roadrunner, barn owl, great horned owl, common poorwill, lesser nighthawk, white-throated swift, Costa's hummingbird, western kingbird, ash-throated flycatcher, Say's phoebe, horned lark, and cliff swallow (Cutler *et al.* 1999)..

Mammals

Many of the non-special status mammal species known to occur on the Combat Center (see Section 3.10.3.2 and Appendix I) would be expected to occur in the east study area, but no wildlife inventories have been conducted. Because the east study area has subjectively less habitat diversity, it is expected that it may have fewer mammalian species than would be found in the west study area. Some of the species that might potentially occur in the east study area include coyote, raccoon, desert kit fox, desert cottontail, black-tailed jackrabbit, various rodents (e.g., California ground squirrel, little pocket mouse, desert kangaroo rat, etc.). Bats would be expected to occur in association with the known mines and potential caves in the east study area.

Protected and Special Status Species

Table 3.10-13 lists the protected and special status species that are known to occur or could potentially occur within the east study area. The east study area has much less topographic complexity than either the Combat Center or the west study area, so there are fewer types of habitat available and a smaller number of species present or potentially present.

Table 3.10-13. Protected and Special Status Species Known to Occur or Potentially Occurring within the East Study Area

Name		Status			Potential to Occur or Occurrence
Common Name	**Scientific Name**	**Federal**	**State**	**CNPS**	
Note: The migrant federal and state special status species listed in Table 3.10-3 may potentially occur in the east study area, but because they are primarily associated with the permanent water sources at Mainside on the Combat Center, they are not listed here.					
Protected - Federally Threatened or Endangered					
Reptiles					
Desert tortoise – Mojave population	*Gopherus agassizii*	Threatened	Threatened	N/A	Occurs in low densities in the east study area, with much of the area lacking tortoises due to an apparent lack of suitable habitat (Karl 2010).
Other Federal Status					
Reptiles					
Mojave fringe-toed lizard	*Uma scoparia*	BLM-S	CSSC	N/A	Occurs in several areas of the east study area, especially near Cadiz Dunes (Karl 2009b).
Mammals					
Townsend's Western big-eared bat	*Corynorhinus townsendii*	BLM-S	CSSC	N/A	Based on the presence of mineshafts in the east study area and its presence on the Combat Center, this species is highly likely to occur in the east study area.
Pallid bat	*Antrozous pallidus*	BLM-S	CSSC	N/A	Based on the presence of mineshafts in the east study area and its presence on the Combat Center, this species is highly likely to occur in the east study area.
Nelson's bighorn sheep	*Ovis canadensis nelsoni*	BLM-S	None	N/A	Population known to occur in the Ship Mountains in the east study area (CDFG 2009b).
Birds					
Burrowing owl	*Athene cunicularia*	BLM-S, BCC	CSSC	N/A	Small number of individuals and sign observed throughout east study area (Karl 2009b).
Plants					
Harwood's eriastrum	*Eriastrum sparsiflorum* ssp. *harwoodii*	BLM-S	None	1B.2	Within Cadiz Dry Lake and dunes in the east study area (MAGTF Training Command 2009b).
Other State Status (No Federal Status)					
Birds					
All raptors		None	FP (3503)	N/A	Various species known to occur in the east study area (CDFG 2009b).
Mammals					
American badger	*Taxidea taxus*	None	CSSC	N/A	They occur sparsely on the Combat Center (Cutler et al. 1999, B.T. Henen unpublished data). Due to similar available habitat, they are probably similarly distributed in the west study area.

Continued on next page

Table 3.10-13. Protected and Special Status Species Known to Occur or Potentially Occurring within the East Study Area

Name		Status			Potential to Occur or Occurrence
Common Name	**Scientific Name**	**Federal**	**State**	**CNPS**	
Other Status					
Plants					
Foxtail cactus	*Escobaria alversonii*	None	None	4.3	East and north of America Mine Training Area in east study area (MAGTF Training Command 2009b).

Notes: Federal Species of Concern lists are not consistently maintained for southern California. The mammalian CSSC list is outdated (not officially revised since 1986) and is projected to be updated by 2011.
BLM-S = BLM-Sensitive; BCC = Bird Species of Conservation Concern; CNPS = California Native Plant Society; CDFG = California Department of Fish and Game; CSSC = California Species of Special Concern; MAGTF = Marine Air Ground Task Force; WL = Watch List; FP (#) = Fully Protected Under California Department of Fish and Game Code (#)
CNPS List Definitions
List 1B = Rare, threatened or endangered in California and elsewhere
List 2 = Rare, threatened or endangered in California, but more common elsewhere
List 4 = Limited distribution (watch list)
.1 indicates seriously endangered in California; .2 indicates 20-80% occurrences threatened; .3 indicates <20% of occurrences threatened

Protected - Federally Threatened or Endangered Species

Desert Tortoise: The majority of the east study area is estimated to have no tortoises (Table 3.10-14, Figure 3.10-12), most likely due to poor habitat quality (Karl 2010). Much of the east study area is a broad playa (Bristol Dry Lake) and adjacent low valley and sand dunes, which are not tortoise habitat (Karl 2010). The only portions of the east study area containing even moderate densities of tortoises (e.g., 7-9 adult tortoises per km^2) are along its eastern and southwestern boundaries.

Table 3.10-14. Acreage in the East Study Area Covered by Different Categories of Desert Tortoise Density

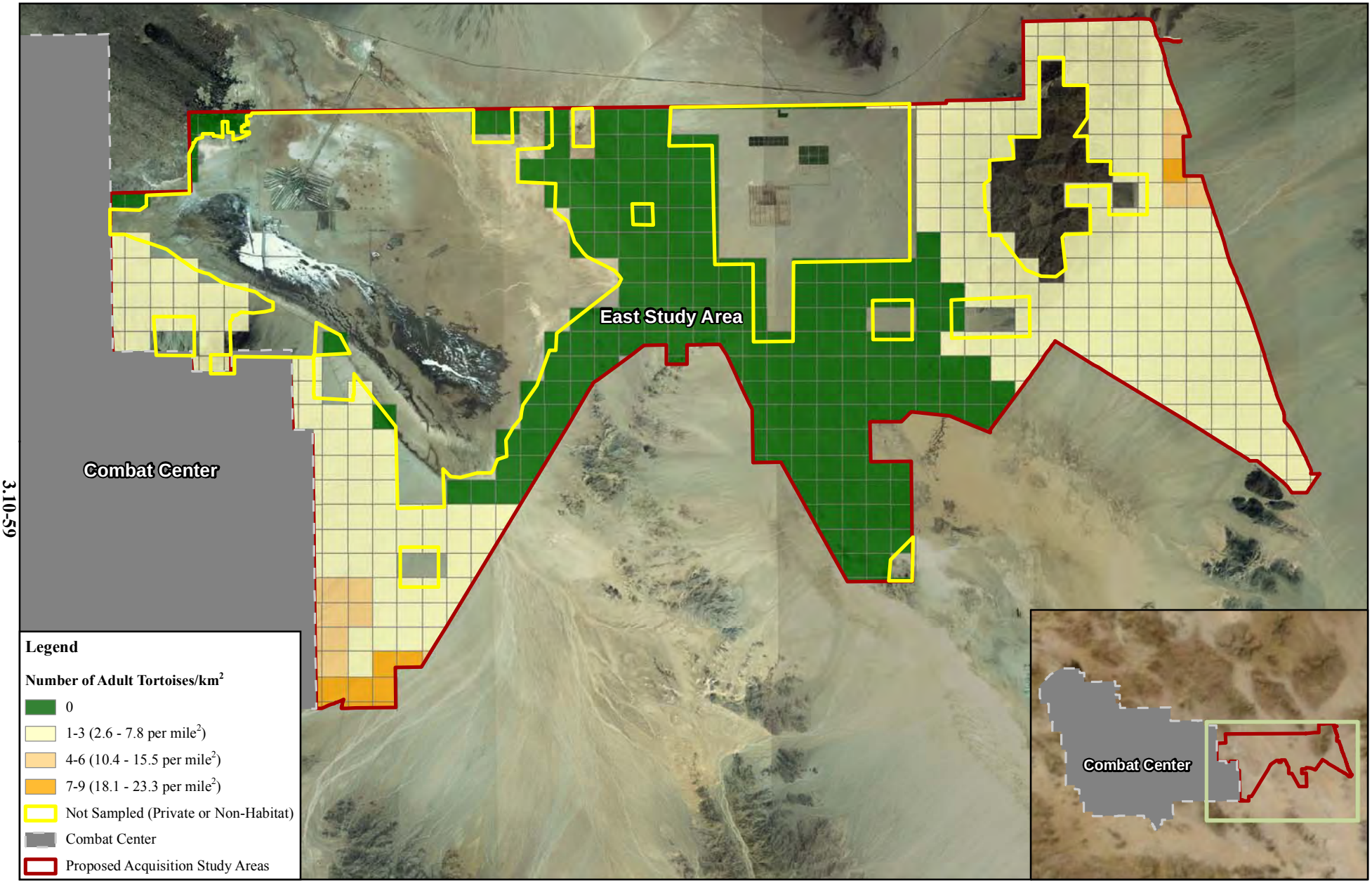
Density Category (Tortoises/Square Kilometer)	Area (acres)	Percent of Total
0	100,077	62.3%
1-3 (3 to 8 per mi^2)	56,142	35.0%
4-6 (10 to 15 per mi^2)	2,743	1.7%
7-9 (18 to 23 per mi^2)	1,606	1.0%
Total	*160,544*	*100%*

Notes: Tortoise surveys conducted in 2009. Based on the TRED survey method GIS data (Karl 2010).
Source: Karl 2010.

Based on these density estimates, the total number of desert tortoises in the east study area is estimated using the TRED survey method at between 608 ± 319 adults (95% CI) (Karl 2010). Tortoises within the east study area are protected to an extent per public land management direction specified in the amended CDCA Plan.

Other Federal Special Status Species

Mojave Fringe-toed Lizard: Sign of Mojave fringe-toed lizards, mostly individuals, was observed throughout the east study area in the many areas characterized by aeolian deposits and/or low dunes (Karl 2009b). Primarily, these were along the edges of both Bristol and Cadiz Dry Lakes, in the dunes and hummocks around Cadiz Dry Lake, and in several sandy patches of the valley. Records of Mojave fringe-toed lizards in the east study area are shown in Figure 3.10-13.

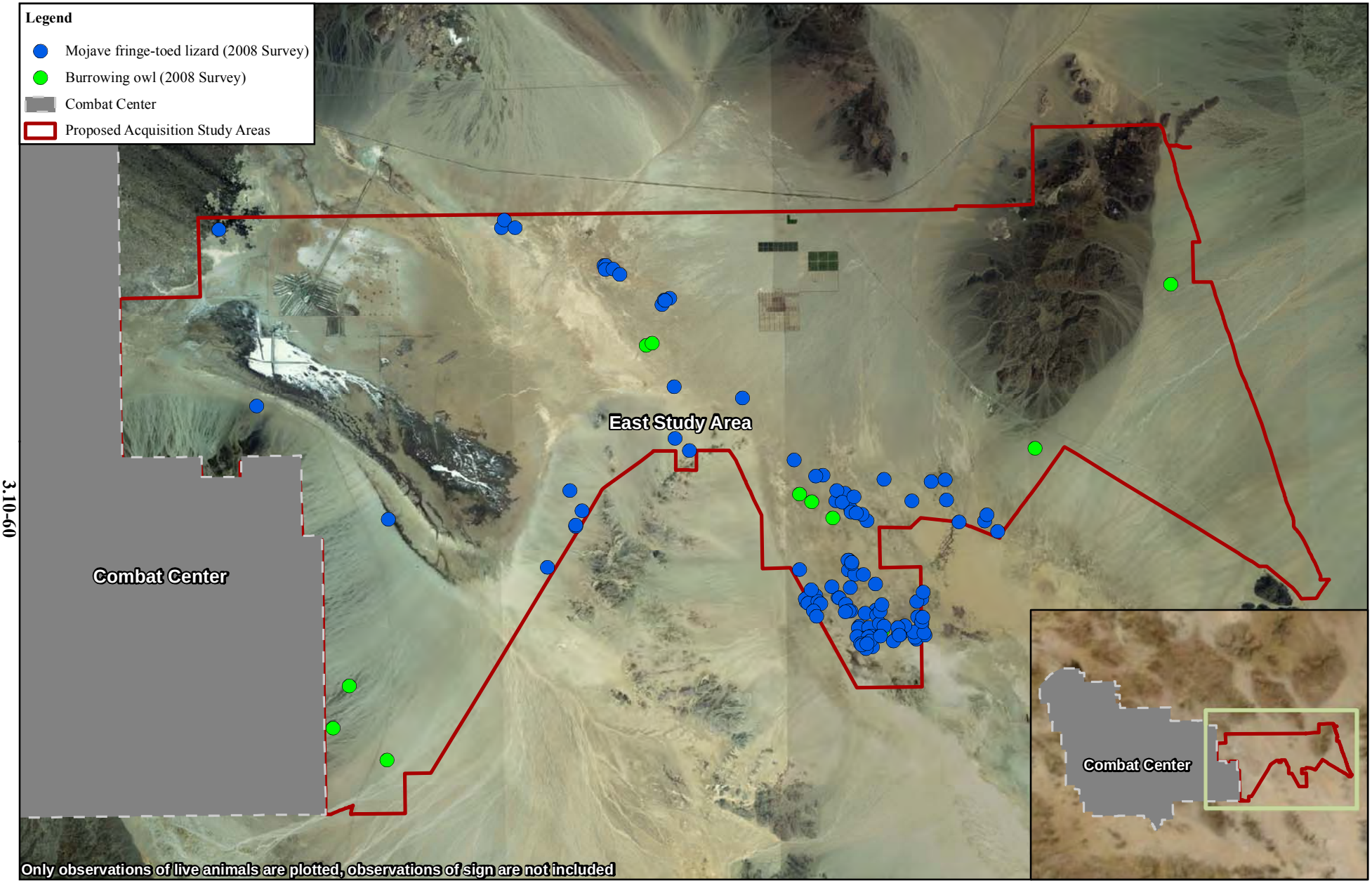


Kilometers
0 1.5 3 6
0 1.5 3 6
Miles

Source: MAGTF Training Command 2009c, Karl 2010

Figure 3.10-12
Desert Tortoise Densities in the East Study Area (modified from Karl 2010)

N



Kilometers
0 1.5 3 6
0 1.5 3 6
Miles

Source: MAGTF Training Command 2009c, Karl 2009b

Figure 3.10-13
Observations of Special Status Wildlife Species in
the East Study Area (Excludes Desert Tortoise, modified from Karl 2009b)

N

Burrowing Owl: Burrowing owls are present in very low densities in the east study area (Karl 2009b). Eighteen burrowing owl sign were observed, distributed throughout the area. Thirteen of the sign were burrows with whitewash or pellets. Four owls were also observed, three in association with burrows, for a total of 16 owl burrows (Figure 3.10-13). Because burrowing owls occupy open grasslands and sparsely vegetated shrublands (Haug *et al.* 1993), it was not unexpected to find owl sign in the broad valley and on the bajadas that characterize most of the east study area. Nor was it unexpected that there were only 18 sign in the entire east study area, as the species is known to be relatively sparse in open desert scrub (Garrett and Dunn 1981, in Campbell 2005). Records of burrowing owls in the east study area are shown in Figure 3.10-13.

Nelson's Bighorn Sheep: A population of Nelson's bighorn sheep estimated at 70 individuals was noted in 1989 as foraging consistently in the Ship Mountains within the east study area when the foliage was green (CDFG 2009b).

Harwood's Eriastrum: Harwood's eriastrum is an annual perennial herb in the Polemoniaceae family that blooms in June and July. It is found on desert slopes less than 7,900 feet (2,408 meters) in elevation. Its stems are much branched from the base, and it reaches 2-12 inches (5-31 centimeters) in height. The leaves are thread-like, woolly, and lobed near the base. The flower is bright blue, pink, yellow, or cream, with a yellow throat. Specimens have been reported from San Bernardino, Riverside, and San Diego counties. A Harwood's eriastrum population was observed in the southern middle extent of the east study area, along the leeward slopes within the partially stabilized saltbush dunes of Cadiz Dry Lake and Dunes (Figure 3.10-14) (MAGTF Training Command 2009b).

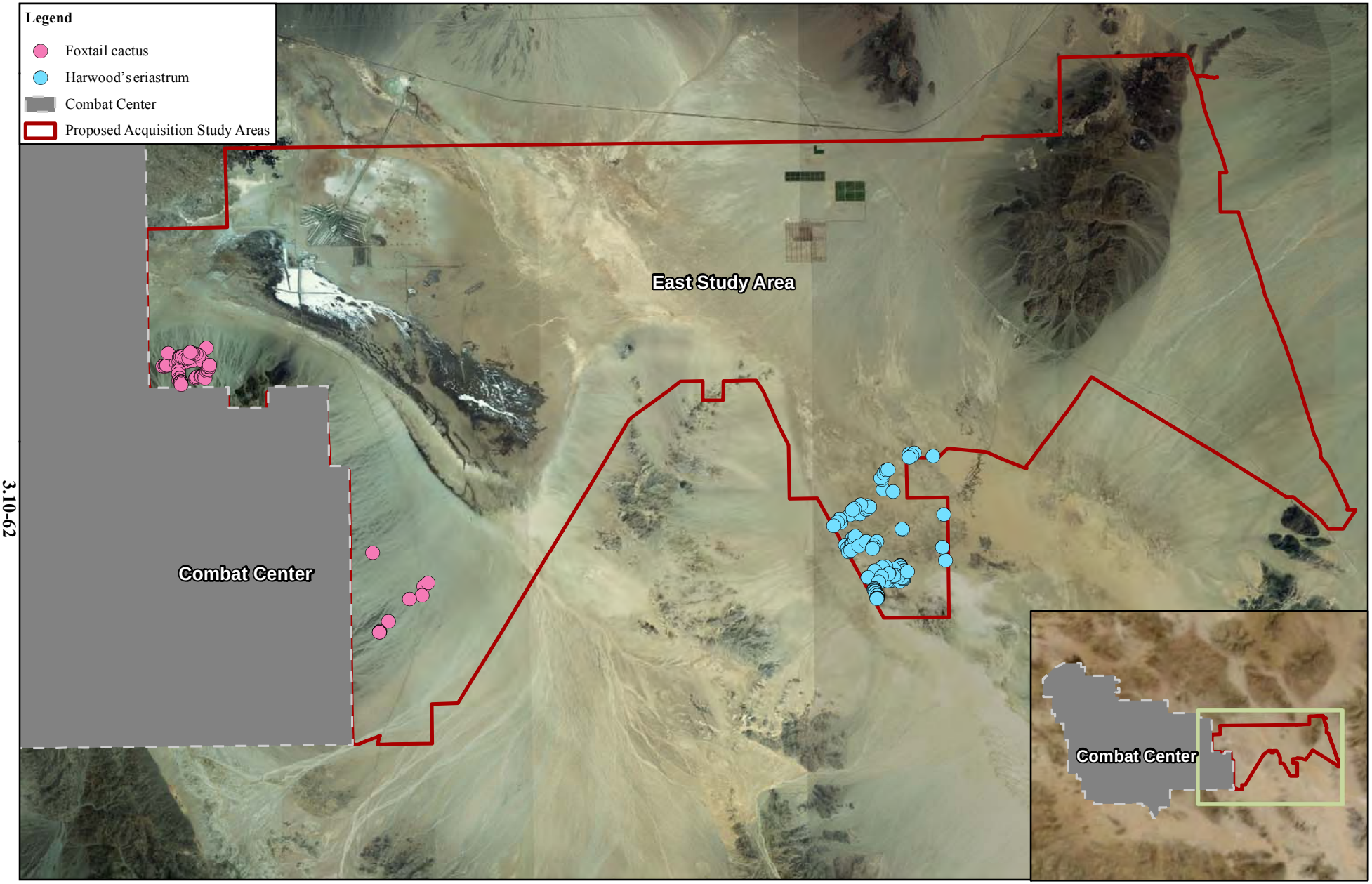
State Special Status Species That Have No Federal Status

Pallid San Diego Pocket Mouse: No surveys are known to have been conducted for this species in the east study area. The record of this species on the Combat Center is approximately 22 miles (35 km) north of the nearest recorded observation, so it is possible that population was unique. Nonetheless, because suitable habitat for this species does exist in the east study area (rocky canyons with compacted soils, and open desert with creosote bush and catclaw acacia plant communities), this species may occur there.

American Badger: No surveys are known to have been conducted for this species in the east study area. They occur sparsely on the Combat Center (Cutler et al. 1999, B.T. Henen unpublished data). Due to similar available habitat, they are probably similarly distributed in the west study area.

Other Status Species

Foxtail Cactus: Two populations of foxtail cactus were found in the east study area, one north of America Mine Training Area between the eastern Combat Center boundary and Amboy Road within the southwestern portion of the east study area, and one east of America Mine Training Area (Figure 3.10-14) (MAGTF Training Command 2009b). The preliminary surveys conducted were not all-inclusive, so other populations might be identified in the east study area.



Kilometers
0 3 6
0 1.5 3 6
Miles

Source: MAGTF Training Command 2009b, 2009c

Figure 3.10-14
Locations of Special Status Plant Species in the East
Study Area (modified from MAGTF Training Command 2009b)

N

3.10.3.6 Areas Outside the Proposed Acquisition Study Areas Where Airspace Would Be Established

Certain areas outside the Combat Center and proposed acquisition study areas would be overlaid by proposed airspace establishment (see Figures 2-5b, 2-6b, 2-7b, 2-8b, 2-9b, 2-10b). Some of these airspace establishments merely expand existing airspace areas to a greater elevation (e.g., Sundance MOA/ATCAA). Areas that might potentially be affected by new airspace are mostly limited to those where new low altitude (e.g., to 1,500 feet [457 meters] above ground surface or lower) limits are established. Aircraft operations at higher altitudes would have fewer effects on biological resources because noise levels would be lower and operation would be above the flight altitude of most birds. Migratory shorebirds using the Pacific flyway often travel at altitudes as great as 7,000 feet (2,134 meters) AGL, and altitudes over 20,000 feet (6,096 meters) AGL have been observed for some migratory species (USFWS 1998). However, commercial and private pilots currently travel regularly through this airspace at a variety of altitudes and bird strikes are rare (FAA 2011). The description of affected biological resources below focuses only on those species which might realistically be affected by low-altitude aircraft operations.

Wildlife

The areas that would underlay the proposed new low-altitude airspace would likely contain similar wildlife species as described for the Combat Center. This would include migratory bird species that might congregate at any ephemeral or permanent water sources, and that could pose a BASH. The ROI is within the Pacific Flyway (USFWS 2010c), which means an increased number of migratory birds may occur as compared to areas to the west (with the exception of the coast).

Protected and Special Status Species

Desert tortoises are present in the lands outside the acquisition study areas that underlie the proposed airspace (Karl 2010; CDFG 2009b). The density of desert tortoises in these lands has not been specifically investigated (BLM 2005).

The population of Nelson's bighorn sheep that forages in the Ship Mountains in the east study area is also known to forage in the Old Woman Mountains, to the east of the east study area and under the proposed Turtle MOA/ATCAA (CDFG 2009b). Other special status species that are known or reasonably expected to be located in the lands outside the acquisition study areas that underlie the proposed airspace include small numbers of burrowing owls, Mojave fringe-toed lizards, and special-status bat species (Karl 2009b; CDFG 2009b).

3.11 CULTURAL RESOURCES

3.11.1 Definition of Resource

Cultural resources include buildings, structures, sites, districts, and objects eligible for or included in the National Register of Historic Places (NRHP), cultural items, Indian sacred sites, archeological artifact collections, and archeological resources (Secretary of the Navy Instruction 4000.35A, *Department of the Navy Cultural Resources Program*; MCO P5090.2A, *Environmental Compliance and Protection Manual [21 May 2009]* chapter 8 "Cultural Resource Management"). Cultural resources can be divided into three major categories: archeological resources, architectural properties, and traditional cultural properties (NPS 2000).

Archeological 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. Archeological resources can include, but are not limited to, village sites, temporary camps, lithic scatters, roasting pits/hearths, milling features, rock art, rock features, and burials.

Architectural properties include real properties such as sites, buildings, structures, works of engineering, industrial facilities, fortifications, and districts.

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

In general, specific locations of archeological sites and traditional cultural properties are not revealed to the public because of the concern of vandalism or cultural sensitivity. Therefore, figures with specific locations of archeological sites are not presented in this chapter.

The ROI for cultural resources includes areas subject to construction, training maneuvers, firing and non-firing ranges, road improvements, and landing zones, among other activities that include OHV recreation. The ROI is the Combat Center, and the proposed acquisition study areas for all considered alternatives (i.e., the west, south, and east study areas) as well as any future corridors that may be developed for roads to enter and exit the acquired land parcels. Under the National Historic Preservation Act (NHPA), the ROI is called the Area of Potential Effects (APE). The formal definition of an APE is found in 36 CFR 800.16(d), and is considered to be "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties."

3.11.2 Regulatory Framework

Historic Preservation is covered under Section 106 of the NHPA. Identification and evaluation of Historic Properties covers the first step in the Section 106 process. Historic Property means "any prehistoric or historic district, site, building, structure or object included in or eligible for inclusion in, the National Register of Historic Places" [16 USC 470w(5)]. The five types of properties eligible for the NRHP are: 1. buildings; 2. structures; 3. sites (archeological sites, either historic or prehistoric); 4. districts, and 5. objects. The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, material workmanship, feeling and association.

Section 106 of the NHPA of 1966 as amended, requires that all federal agencies take into account the effects of their undertakings on historic properties. Several other federal laws and regulations have been

established to manage cultural resources, including the Archeological and Historic Resources Preservation Act (1974), the Archeological Resources Protection Act (1979), and the Native American Graves Protection and Repatriation Act (NAGPRA) (1990).

The Programmatic Agreement Among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers (NCSHPO), Regarding the Manner in Which BLM Will Meet its Responsibilities Under the National Historic Preservation Act (nPA), established guidelines by which the BLM will satisfy its requirements under NHPA. Under the nPA, the Advisory Council on Historic Preservation (ACHP) has an advisory-consultative role in the BLM management process when a proposed project may have an effect on nationally significant cultural properties or when a project involves interstate and/or interagency coordination. A California State Protocol (signed in March 2007 to replace all previous agreements) between the California BLM and the California State Office of Historic Preservation (SHPO) outlines the manner in which the two agencies will interact and cooperate under the nPA. The nPA legally replaces 36 CFR Part 800 as the procedural basis for the BLM to meet its responsibilities under Sections 106, 110(f), and 111(a) of the NHPA.

In addition, coordination with federally recognized American Indian tribes must occur in accordance with the American Indian Religious Freedom Act (1978); EO 13007 *Indian Sacred Sites*; and EO 13175 *Consultation and Coordination with Indian Tribal Governments*, which emphasizes the importance of respecting and consulting with tribal governments on a government-to-government basis. This policy requires an assessment through consultation of the effect of proposed federal actions that could significantly affect tribal resources, tribal rights, and Indian lands before decisions are made by the respective services. The BLM's Manual 8120, *Tribal Consultation under Cultural Resource Authorities* (2004), outlines the methods for consultation and coordination on public lands administered by the BLM. This provides 1) that federally recognized tribal governments and Native American individuals, whose traditional uses of public land might be affected by a proposed BLM action, would have sufficient opportunity to contribute to the decision and 2) that the decision maker would give tribal concerns proper consideration (BLM 2004). Department of Defense Instruction 4710.02 provides additional guidance for all DoD agencies on consultation with tribes.

A Programmatic Agreement between the United States Marine Corps and the California State Historic Preservation Officer Regarding Operation Maintenance Training, Construction at the United States Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center, Twentynine Palms, California was fully executed on 9 April 2007 and is valid for seven years. Pursuant to 36 CFR 800.6(b)(1)(iv), the Marine Corps filed the final Programmatic Agreement (PA) and related documentation at the conclusion of the consultation process with the ACHP to complete the requirements of Section 106 of the NHPA. The PA stipulated the preparation of an ICRMP, which upon written agreement by the SHPO, would be implemented to inventory, manage, and treat any identified historic properties within the boundaries of the installation.

MCO P5090.2A, Chapter 8, *Cultural Resources Management*, provides cultural resources policy (including consultation) for the Marine Corps. The ICRMP prepared in 2007 for the MAGTF Training Command Combat Center provides a framework of cultural resource management and for government-to-government consultation. The Combat Center cultural resources program is monitored by the SHPO, the Tribes, and other interested parties through the annual Historic Preservation Compliance Report, as prescribed by the ICRMP. The cultural resources program has been recognized for outstanding cultural resource stewardship over the last two decades (MAGTF Training Command 2007).

3.11.3 Existing Conditions

3.11.3.1 Regional Cultural Context

Archeological research on the prehistory of the Mojave Desert has been conducted for roughly a century, with particular attention paid to chronology and human-environment adaptations. Refer to Appendix J for a detailed summary.

3.11.3.2 Previous Investigations

Three major sources of information are available for this project. The first comes from sample inventories completed by the BLM in the late 1970s-early 1980s as part of an overall Mojave Desert Conservation Plan. The second consists of previous inventory reports, archeological site records, historic maps, and related archival materials on file at the Combat Center, at BLM offices in Barstow and Sacramento, and available online from BLM and other websites. The third is a collection of archeological data from recent cultural resources inventories in the three acquisition study areas that were completed in support of this EIS. See Appendix J for a summary of available information. Details on investigations occurring on the Combat Center and in each of the acquisition study areas are presented below.

Combat Center

Cultural Resources on the Combat Center have been studied since the late 1970s. Most of the studies completed in the 1980s and early 1990s were project-specific cultural resources surveys, with basic inventory and evaluation projects taking precedence since that time. As of September 30, 2010, approximately 246,164 acres (99,619 hectares) or 45% of Combat Center lands had been inventoried for cultural resources, with approximately 20,000 additional acres (8,093 hectares) slated for inventory in FY 2010 (Hale and Cottrell 2009). As a result of completed inventories, some 1,895 archeological sites have been located and recorded (72 historic, 14 “multicomponent,” and the rest prehistoric) and 528 sites have been tested for NRHP eligibility.

The frequency and scope of cultural resources studies for the Combat Center training areas that are adjacent to the west, south, and east study areas have been largely dependent on the amount of training conducted in each area over the last decade. Near the east study area, inventories at Lead Mountain total 25,998 acres (10,521 hectares), approximately 48.8% of its total area, and at America Mine total 3,241 acres (1,311 hectares), approximately 15.7% of its total area, with 24 and 2 sites so far evaluated in the two training areas, respectively. In proximity to the south study area, inventories total 1,853 acres (750 hectares) at Mainside, approximately 35.2% of total area; 4,400 acres (1,780 hectares) of the East training area, approximately 67.6% of total area; 2,656 acres (1,074 hectares) at Prospect, approximately 20.1% of total area; and 6,426 acres (2,600 hectares) at Cleghorn Pass, approximately 17.7% of total area, with 7 sites evaluated so far each in Prospect and in Cleghorn Pass and 1 site evaluated in the East Training Area. Nearly all of these sites are of prehistoric origin, mostly short-term habitations or toolstone quarries, the few exceptions being historic mining sites.

Considerably more work has been completed adjacent to the west study area. At Maumee Mine, 5,453 acres (2,206 hectares) have been inventoried, approximately 33.8% of total area; at Emerson Lake, 18,377 acres (7,436 hectares) have been surveyed, approximately 57.1% of total area; and at Acorn, 15,206 acres (6,153 hectares) have been examined, approximately 87.1% of total area. Evaluation totals are as follows: 7 sites at Maumee Mine, 80 sites at Emerson Lake, and 47 sites at Acorn. Of the 370 sites currently recorded in these various training areas, 38 are historic, 3 have both historic and prehistoric components, and the rest are prehistoric, the last ranging in age from Early-Middle Holocene to terminal Late Holocene times.

Results from this work indicate that there are some obvious patterns in prehistoric and historic land-use across the Combat Center. In brief, the major dry lake basins on the installation – Lead Mountain, Lavic, Emerson, and Deadman – were all used extensively as habitation areas during Middle to Late Holocene times with apparent peaks during the Pinto period (7,500-4,000 years before present [YBP]) and Shoshonean period (700-150 YBP). On the flanks of the Bullion Mountains, many old fan deposits of mixed alluvium are capped with cobble pavements that contain cobbles of toolstone-quality cryptocrystalline and often other materials as well (e.g., rhyolite, felsite, and basalt). Where abundant, these toolstones were extensively exploited by prehistoric stoneworkers; where limited, they were used sporadically on an opportunistic basis. Finally, historic sites on the Combat Center are almost exclusively mining-related, many of them refuse deposits with few containing evidence of residential use. For the most part, these trends characterize past human land-use patterns in Cadiz Valley, Johnson Valley, and the Twentynine Palms vicinity, as demonstrated by the results of recent EIS inventories discussed below for each acquisition study area; therefore, they provide a good basis for interpreting and anticipating the types of archeological sites present in the current acquisition study areas.

West Study Area

Recent inventories total 27,185 acres (11,001 hectares), representing about 15% of the west study area and accomplished with a mix of systematic transects and judgmental parcels. As shown in Table 3.11-1, a total of 62 archeological sites are known to exist in the west study area (both previously recorded and recently evaluated sites combined); the total includes 39 prehistoric and 23 historic sites. Eight of these sites (all prehistoric) were recorded before recent surveys and have not been revisited/updated; consequently, no recommendations for NRHP eligibility are proposed. The remaining 54 have been preliminarily assessed for NRHP inclusion, only 12 of them recommended eligible (8 prehistoric, 4 historic) and the rest recommended ineligible (23 prehistoric, 19 historic).

Table 3.11-1. Archeological Sites by Acquisition Study Area

	West	South	East	Total
Previously Recorded Sites without NRHP Recommendation				
Prehistoric	8	-	7	15
Historic	-	-	2	2
Total	**8**	**-**	**9**	**17**
Sites with Preliminary NRHP Recommendation	54	9	75	138
Prehistoric				
Eligible	8	-	26	34
Ineligible	23	4	17	44
Total	**31**	**4**	**43**	**78**
Historic				
Eligible	4	-	13	17
Ineligible	19	5	19	43
Total	**23**	**5**	**32**	**60**
Total Sites Recommended Eligible by Acquisition Study Area	**12**	**-**	**39**	**51**
Total Sites Recommended Not Eligible by Acquisition Study Area	**42**	**9**	**36**	**87**

South Study Area

Current inventories total 2,345 acres (950 hectares), accounting for about 11% of the south study area. All coverage was achieved in systematic transects. Nine archeological sites have been identified in the south study area, each one located and recorded during inventories for this EIS. Four of them are prehistoric and five are historic; the former including one segregated reduction loci (SRL) and three lithic

scatters and the latter all being refuse deposits. Preliminary recommendations list all sites in the south study area as ineligible for listing in the NRHP (Table 3.11-1).

East Study Area

A total of 20,560 acres (8,320 hectares), accounting for about 12% of the east study area, has been recently inventoried in support of this EIS through a combination of systematic transects and judgmental parcels. As indicated in Table 3.11-1, a total of 84 archeological sites are known to exist within the east study area (both previously recorded and recently evaluated sites combined), including 50 prehistoric and 34 historic sites. Nine of these sites were recorded before recent surveys and have not been revisited/updated; consequently, no recommendations for NRHP eligibility have been proposed. The remaining 75 have been preliminarily assessed for NRHP inclusion, 39 of which have been recommended eligible (26 prehistoric, 13 historic) and the rest of which have been recommended ineligible (17 prehistoric, 19 historic).

3.11.3.3 Known Significant Resources

Most prehistoric sites recommended as NRHP-eligible are habitations that contain dateable artifacts (e.g., diagnostic projectile points, pottery, beads, or obsidian), have complex surface assemblages (e.g., flaked and ground stone tools and debris), and may have one or more obvious features (e.g., hearths or rock structures). Historic sites recommended as NRHP-eligible generally contain good samples of dateable artifacts (e.g., having maker's marks or diagnostic production attributes); have complex surface assemblages (e.g., refuse deposits and features); and are clearly associated with dateable events, dated land patents and mining claims, or dated constructions (e.g., roads, railways). As such, these kinds of sites are perceived to have moderate to high data potential, possessing the ability to contribute valuable information about the past that is pertinent to one or more key research themes (local and regional) identified in survey reports (Fryman 2009; Lechner and Giambastiani 2009a, 2009b, 2009c; Lechner *et al.* 2010), in the Combat Center ICRMP (2007), and in the regional body of archeological literature for the central Mojave Desert. Most of these sites are recommended eligible for NRHP listing under Criterion D, but certain historic military sites may be eligible under Criterion A (association with important persons [e.g., General Patton]) or Criterion B (association with historic events [e.g., Patton's World War II desert exercises]). In contrast, sites recommended as not eligible for NRHP listing generally lack dateable remains, have simple or limited surface constituents, and may be in relatively poor condition as a result of undue surface erosion, OHV impacts, vandalism, or a combination of these. Such sites are perceived to have low overall data potential and to be incapable of contributing important information under any evaluation criteria.

Preliminary NRHP eligibility recommendations have been prepared for 138 of 155 known sites within the study areas (Table 3.11-2). These recommendations are based on survey-level data and are made in consideration of surface constituents, physical integrity (mainly with respect to natural and man-made impacts), and perceptions of overall data potential derived from all site attributes. To date, no formal (Phase II-level) testing programs of sites have been completed in any of the acquisition study areas to ascertain NRHP eligibility. However, some 2,000 acres at Galway Lake and along proposed MEB routes has recently been inventoried and four prehistoric sites in the west study area (CA-SBR-12933, SBR-12942, SBR-13362, and SBR-13370) were evaluated in winter 2010, with the ultimate goal of providing better information regarding the long-term management of archeological sites. Recovered archeological data will also be critical in generating expectations for the results of future evaluations, and for the ultimate scope and scale of compliance needs for cultural resources in the event of Combat Center land acquisition.

Of those sites within current study area boundaries, 51 sites (34 prehistoric and 17 historic) are recommended as being potentially eligible for NRHP listing. The east study area contains 39 of these sites (26 prehistoric, 13 historic) and the west study area contains the remainder (8 prehistoric and 4 historic); none occur within the south study area. The subsections below provide a discussion of all prehistoric and historic sites located within each study area and their eligibility.

In general, certain types of prehistoric sites are found to be significant, or eligible for NRHP listing (under Section 106 of the NHPA), more often than others. Of those typically found in the Mojave Desert, short-term habitations, resource procurement localities, and rock art sites are the most frequently recommended as important to archeological research. Other prehistoric sites, like lithic scatters or workshops and lithic quarries, are still important to scientific research but tend to portray a narrower range of human behaviors that, in many cases, cannot be dated and are frequently redundant. While they require testing, their NRHP eligibility must be determined within a regional context and against an existing or emergent database.

As with prehistoric sites, certain kinds of historic sites are found more often than others to be eligible for NRHP listing. Of those present in the current acquisition study areas, homesites, mining sites, military camps, and railroad-associated sites have been most often recommended as NRHP-eligible (Fryman 2009; Lechner and Giambastiani 2009b). Other historic sites, like refuse deposits, wells, and roads, may still provide useful data about the past but, in many cases, are redundant in nature.

Table 3.11-2. Known Archeological Sites in all Acquisition Study Areas by Type and Recommended NRHP Eligibility (2008-2009 Surveys)

Type	Eligible	Ineligible	Unevaluated	Total
Prehistoric Sites				
Habitation or Rock Ring	24	1	2	27
Ceramic Scatter	-	1	1	2
Lithic Scatter	9	27	11	47
Lithic Quarry	1	14	-	15
Rock Art	-	-	1	1
Trail	-	1	-	1
Total	**34**	**44**	**15**	**93**
Historic Sites				
Homesite	1	-	-	1
Cemetery	-	-	1	1
Water Well	-	2	-	2
Refuse Deposit	1	22	-	23
Mining	5	12	-	17
Military	2	2	1	5
Road and Railroad Line	-	3	-	3
Railroad Station or Camp	7	-	-	7
Telephone/Telegraph Line	1	2	-	3
Total	**17**	**43**	**2**	**62**
Grand Total	***51***	***87***	***17***	***155***

Note: NRHP = National Register of Historic Places.

West Study Area

Prehistoric Sites

A total of seven short-term habitations have been recorded in the west study area. These sites are concentrated along the north and west shores of Galway Lake and around Means Lake. At Galway Lake,

only one such site looks to be of Lake Mohave age, all others apparently of Late Holocene (post-4,000 YBP) age, and the few habitation sites at Means Lake are also evidently of Late Holocene antiquity. In general, habitation sites have been recommended as eligible for NRHP listing provided that they contain dateable remains and are in good physical condition.

No rock art sites have been documented during acquisition study area inventories. Although one such location, CA-SBR-1811, has been plotted roughly 1 mile (2 km) north of Galway Lake, a recent inventory of 2,000 acres (809 hectares) around its recorded position failed to identify it. Site CA-SBR-1811 was probably recorded in 1970, and unfortunately its meager record does not disclose any useful information about its location or content. Most likely, the available plot for SBR-1811 is in error; whether or not the site lies within the west study area is still unknown.

While there are many other kinds of prehistoric sites in the Mojave Desert, including milling stations, rock rings, cleared circles, and geoglyphs, the only other type identified within any of the acquisition study areas is a single prehistoric trail (CA-SBR-12944). Located at the base of a series of hills fronting the west side of Emerson Lake, the mapped portion of this trail extends for more than 2,200 feet (671 meters) but is obscured at its east end by recent alluvium and is indistinguishable at its west end. One lithic quarry recommended as eligible for listing in the NRHP, CA-SBR-12934, is located in the west study area.

Historic Sites

The west study area encompasses portions of the Ord Mountains, Fry Mountains, and Bessemer historic lode mining districts. Historic mining sites in this area include seven large lode mining complexes with multiple prospects, shafts, structural remains, and miners' refuse deposits (e.g., Bessemer, Morris). These mines were initially developed in the 1910s or 1920s, and expanded or redeveloped during the Depression era and again after World War II. Two historic reduction works (mill sites) were recorded west of Emerson Lake, one of them the Emerson Mill (CA-SBR-8946H) and the other at the Los Padres Mine (CA-SBR-3405H). Of all the historic mining areas within the east and west study areas, the Fry Mountains (west study area) likely contain the largest (and potentially significant) cluster of mines and associated camps that are fairly intact and have not been compromised by contemporary recreational activities.

Created in response to the 1930s depression, the Small Tract Act of 1938 designated 457,000 federal acres for disposal. In an attempt by the Federal Government to bring residents into the Mojave Desert, the Act permitted 5 acre (2 hectare) parcels of land to be given to individuals who agreed to build a small residential structure within 2 years of being allocated the land, under which condition they would be granted title. The Act was repealed in 1976. In the years after, the challenges of providing infrastructure and services became apparent and many cabins soon became neglected. As a result, the southern California desert is dotted with these failed developments—originally just bulldozed grids of "streets" boxing land parcels. Under this Act, areas such as Johnson Valley, Wonder Valley, and Flamingo Heights were developed. However, under the Small Tract Act of 1938 and the Homestead Act of 1862, no developments meet the criteria under these Acts to be eligible for protection under the NHPA.

Traditional Cultural Properties

Combat Center staff are currently in the process of conducting government-to-government consultation for actions described in this EIS. Tribes with whom consultations are ongoing include the Chemehuevi, Colorado River Indian Tribes, Twentynine Palms Band of Mission Indians, Morongo Band of Mission Indians, Fort Mojave Indian Tribe, San Manuel Band of Mission Indians, and the Agua Caliente Band of

Cahuilla Indians. No major issues have been identified as of May 2010. The BLM retains the right to consult with tribes pursuant to guidance found in their Manual 8120.

South Study Area

None of the sites recorded in the south study area appear to have the attributes that could contribute significant data regarding the prehistory or history of the area and as such do not appear to be eligible for listing in the NRHP. No traditional cultural properties have been identified in the south study area.

East Study Area

Prehistoric Sites

A total of 17 short-term habitations have been recorded in the east study area. These sites are clustered along the north and east shores of Bristol Lake. Judging by diagnostic projectile points, most of these sites are quite old, dating to either Lake Mohave (11,000-7,500 YBP) or Pinto times (7,500-4,000 YBP). In general, habitation sites have been recommended as eligible for NRHP listing provided that they contain dateable remains and are in good physical condition.

Only one ceramic scatter has yet been identified and is present in the east study area (CA-SBR-13326), a location where a single pottery vessel was broken and discarded. It contains at least a dozen sherds of Parker Buff ceramic that date to the Patayan II-III periods (Waters 1982), or roughly A.D. 1000-post 1900. Eight lithic scatters have been recorded in the east study area, and these will require further investigations to determine whether they have the attributes necessary to be recommended as eligible for listing in the NRHP.

Historic Sites

Archival and field studies indicate that only two homesteads were established during historic times, both in the east study area: CA-SBR-13213 (now just a dry well) and ASM H-3 (Chambless Homestead). The locations of other historic homestead claims were found to consist of undeveloped land.

The east study area encompasses much of the Bristol and Cadiz playas, from which salt and sodium products were mined during prehistoric as well as historic times. Important mining sites in the east study area include the America and Vulcan lode mining complexes, as well as several historic salt or gypsum prospecting areas.

Two historic resources associated with military use were also documented in the east study area, CA-SBR-11582H, a military camp from the Joint Exercise Desert Strike of 1964 and CA-SBR-13224H, a World War II military camp located near the Ship Mountains southeast of the Town of Cadiz. The most prominent transportation resources are the Parker Branch of the Atchison Topeka & Santa Fe Railroad (built in 1912 and still in use) and the historic section station of Archer (1912-1930s). Although the Archer Station site has been disturbed by artifact collectors, it is a large railroad settlement with a cemetery, various features, and a high potential for buried archeological deposits. Also present alongside the Parker Branch alignment are at least 10 small maintenance camps and related refuse deposits, these resources potentially contributing to our knowledge about the life ways of early 20th century rail workers. Other historic transportation corridors in the acquisition study areas, such as Amboy Road and Cadiz-Rice Road and the Crystal Salt Mining Company Road served as connecting routes between mining areas and are still in use today.

Last, some linear corridors conveyed utilities or communication lines during historic times. Many of these are currently still in use, now supporting high-voltage transmission lines and underground pipelines.

The only such corridor of historic or archeological interest is the 1930s Pacific Telephone and Telegraph Line, small portions of which have been documented and, like the Parker Branch railroad alignment, have associated construction and/or maintenance camps that demonstrate good data potential.

Traditional Cultural Properties

No traditional cultural properties were identified in the east study area as a result of consultation by the Marines. During the development of the California Desert Plan, a Native American Traditional Area was identified at Bristol Lake (BLM 1979). Bean (1987) indicates that it was a Chemehuevi salt collecting area.

3.12 GEOLOGICAL RESOURCES

3.12.1 Definition of Resource

Geological resources are defined as the topography, geology, and soils of a given area. Topography is typically described with respect to the elevation, slope, aspect, and surface features found within a given area. Long-term geological, seismic, erosional, and depositional processes typically influence the topographic relief of an area. The geology of an area includes bedrock materials, mineral deposits, soils, and fossil remains. Bedrock refers to consolidated earthen materials that may be made up of either interlocking crystals (igneous and metamorphic rocks) or fragments of other rocks compressed and cemented together over time by pressure and dissolved minerals that have hardened in place (sedimentary rocks). Soil lies above bedrock and consists of weathered bedrock fragments and decomposed organic matter from plants, bacteria, fungi, and other living things. The value of soil as a geologic resource lies in its potential to support plant growth, especially agriculture.

Mineral resources are metallic or non-metallic earth materials that can be extracted for a useful purpose, such as iron ore that can be refined to make steel, or gravel that can be used to build roads. Fossil/paleontological resources are the remains of dead plants and animals that have hardened into rocks over the passage of thousands or millions of years. Unique geologic features are landforms such as a volcanic cinder cone, lava tube, rock tower, or other aspects of the landscape that owe their shapes to a particular combination of geologic processes such as weathering, erosion, and deposition.

The ROI for geological impacts is the Combat Center and the west, south, and east study areas.

3.12.2 Regulatory Framework

Public health and safety regarding earthquake-related hazards are addressed by the Alquist-Priolo Earthquake Fault Zoning Act (California Public Resources Code §§ 2621-2630; 1972 amended 1994) and State Seismic Hazards Mapping Act (California Public Resources Code §§ 2690-2699, 1990); and the California Building Code (California Geological Survey 2008; California Building Standards Commission 2007). The Alquist-Priolo Act prohibits the construction of structures for human occupancy within 50 feet (15 meters) of an active earthquake fault, as indicated on maps issued by the State Geologist of regulatory zones (known as Earthquake Fault Zones) around the surface traces of active faults. The State Seismic Hazards Mapping Act addresses other earthquake-related hazards, including liquefaction and seismically induced landslides.

Since the 1872 Mining Law, the public has held the legal right to explore for, discover, and purchase certain valuable mineral rights on public domain lands in the U.S. (BLM 2006). This law also set standards and guidelines for “claiming” the mineral rights as “discovered” (BLM 2006). Provisions are also included to allow for local rules to be developed, consistent with federal laws. Therefore, the State of California establishes the manner of locating mining claims, tunnel sites, and mill sites on public lands under the California Public Resources Code (Chapter 1, Division 3.5, Sections 3900 – 3924). The discovery of a valuable mineral deposit properly located under appropriate federal and state laws is essential for a valid mining claim (BLM 2006). The location of mining claims technically comes after the discovery of a valuable mineral deposit (BLM 2006). Some public lands are withdrawn from location of mining claims, including National Parks, National Monuments, Indian reservations, most reclamation projects, military reservations, scientific testing areas, and most wildlife protection areas (such as federal wildlife refuges). BLM classifies minerals for development into three categories: locatable, leasable, and saleable as described below.

- Locatable minerals. These include both metallic minerals (gold, silver, lead, etc.) and nonmetallic minerals (fluorspar, asbestos, mica, gemstones, etc.). Originally, all minerals except coal were obtained under the General Mining Laws; however, Congress has removed certain minerals from the operation of the General Mining Law.
- Leasable minerals. Since 1920, the federal government has leased fuels and certain other minerals. Leasable minerals today include oil and gas, oil shale, geothermal resources, potash, sodium, native asphalt, solid and semisolid bitumen, bituminous rock, phosphate, and coal. Sulfur is leasable on public lands in Louisiana and New Mexico.
- Salable minerals. Since 1947, the federal government has sold common varieties of sand, gravel, stone, pumice, cinders, and ordinary clay. Use of salable minerals requires either a sales contract or a free use permit. The BLM may issue free use permits to a government agency or a non-profit organization (2010a, 2011a).

Locatable minerals can be obtained by filing a mining claim. Table 3.12-1 contains definitions for the claim and mine types that are referred to throughout this section and that are described in more detail below. A mining claim is a selected parcel of Federal land, valuable for a specific mineral deposit or deposits, for which the claimant has asserted a right of possession under the General Mining Law. In an unpatented claim, land ownership resides with BLM and the claim holder's right is restricted to the extraction and development of a mineral deposit as regulated by the BLM. The rights granted by a mining claim are valid against a challenge by the U.S. and other claimants only after the discovery of a valuable mineral deposit. A patented mining claim is one for which the Federal Government has conveyed title to the claim holder, making the claim private land. Historically, the BLM has considered that each claim should have a discovery within its boundaries, even if two or more claims are contiguous (BLM 2006). However, for large low-grade ore deposits spread over a wide area, BLM considers the necessity of a group of claims to successfully develop a mine (BLM 2006).

Generally speaking, a mining claim is referred to as a "lode claim" if the valuable mineral deposit occurs as a vein of ore in bedrock. If the mineral deposit is found as a surface deposit mixed with sand and gravel, the claim is called a "placer claim." Tunnel sites are used to access lode claims, or to explore for suspected lodes. A mill site claim is for land to be used to process locatable minerals and must include a facility for processing, such as a mill, furnace, or reduction works (BLM 2011a).

Lode and placer mining claims and mill sites may be patented if certain requirements are met (BLM 2011a). A discovery (of a valuable mineral deposit) must exist on the claim; $500 worth of improvements must be made for the benefit of the claim, and the claim holder must pay for the claim according to the acreage rates established by BLM (BLM 2011a). In October 1994 BLM stopped accepting new patent applications due to a funding moratorium on the processing of mineral patents imposed by Congress; this funding moratorium remains in effect (BLM 2012a).

Unpatented mining claims may also be explored and mined (BLM 2011a). Once an unpatented mining claim is on file with BLM, claimants must fulfill certain annual responsibilities to maintain the claim, known as keeping the claim "active." A small miners waiver may be filed by those claimants holding 10 or fewer claims nationwide, instead of paying the $140 maintenance fee by September 1 of each year (BLM 2011a). Claimants who file for this waiver must also perform $100 worth of labor or improvements on all placers or lode claims during the assessment year (September 1, noon through September 1, noon). Failure to pay the annual fee or file for a waiver by September 1 and submit an affidavit of assessment by December 30 each year results in the claim becoming forfeit by operation of law (BLM 2011a). Some of the activities that qualify for assessment work are construction and

maintenance of access roads, development drilling and sampling, and buildings that benefit the claim (BLM 2010b).

The California Surface Mining and Reclamation Act of 1975 regulates mine operations to prevent or minimize the negative impacts of surface mining to public health, property, and the environment. The SMARA requirements apply to anyone, including government agencies, engaged in surface mining operations in California (including those on federally managed lands) that disturb more than 1 acre (0.4 hectare) or remove more than 1,000 cubic yards (764 cubic meters) of material. This includes, but is not limited to: prospecting and exploratory activities, dredging and quarrying, streambed skimming, clean fill material sites ("borrow pitting"), and the stockpiling of mined materials. An MOU exists between the California Department of Conservation, BLM, and USFS that the statutes and regulations of SMARA are applicable to lands regulated by BLM and the USFS (California Department of Conservation 2007a). Under SMARA, the mine operator must obtain a mining permit approved by a local appropriate agency, such as a city or county. The permit includes a plan for returning the land to a usable condition that is readily adaptable for alternate land use (known as a "reclamation plan"). Alternate use may include open space, wildlife habitat, agricultural lands, grazing, park lands, and preparing the land for industrial or commercial uses.

The SMARA divides mines into three categories: active, idle, and abandoned (see Table 3.12-1) (California Department of Conservation 2012a). Surface mining operations are "active" if engaged in mining activities on a continuous or intermittent basis, so long as interruptions in mining activities do not exceed one year. A mine is "idle" when an operator of a surface mining operation has curtailed production, with the intent to resume the surface mining operation at a future date, for a period of one year or more by more than 90 percent of its maximum annual mineral production within any of the last five years during which an interim management plan has not been approved (California PRC 2727.1 amended October 2011) (California Department of Conservation 2012b). A surface mining operation that remains idle for over one year after becoming idle as defined in California Public Resources Code Section 2727.1 without obtaining approval of an interim management plan is considered abandoned (California Department of Conservation 2012b).

The process of reclamation includes maintaining water and air quality, minimizing flooding, controlling erosion, and preventing damage to wildlife and aquatic habitats caused by surface mining. The final step in this process is often topsoil replacement and revegetation with suitable plant species (California Department of Conservation 2007a). Mines abandoned before 1976 are not subject to SMARA reclamation requirements (California Department of Conservation 2012b).

A second function of SMARA is to protect construction-related mineral resources such as sand and gravel from incompatible urban development, to ensure that such resources remain available to support future construction needs. Portions of San Bernardino County were surveyed under SMARA to evaluate mineral potential in regards to designating them as areas of regional significance. However, upon establishment of the CDCA, the desert areas were no longer subject to potential urban development, and SMARA mineral surveys were not conducted (California Geological Survey 2010).

Table 3.12-1. Definition of Mining Terms

Term	Definition
Types of Mining Claims	
Patented Mining Claim[1]	A patented mining claim is one for which the federal government has conveyed title to the claim holder, making the claim private land.
Unpatented Mining Claim[1]	An unpatented mining claim is a selected parcel of federal land, valuable for a specific mineral deposit or deposits, for which the claimant has asserted a right of possession under the General Mining Law. This right does not include exclusive surface rights. An unpatented claim is considered **active** if the annual maintenance fee has been paid to BLM by September 1, or the claimant has completed the required annual assessment work worth $100 and an affidavit of assessment is submitted to BLM by December 30 of each year. Failure to pay the fee or apply for a waiver (to do assessment work, only claimants with 10 or fewer claims nationwide are eligible) results in the claim becoming automatically forfeited, subsequently BLM designates the claim **abandoned** and **closed**.
Status of Mine Located on a Patented Mining Claim (as defined by SMARA)	
Active Mine[2]	Surface mining operations are "active" if engaged in mining activities on a continuous or intermittent basis, so long as interruptions in mining activities do not exceed one year.
Idle Mine[3]	A mine is 'idle' when an operator of a surface mining operation has curtailed production, with the intent to resume the surface mining operation at a future date, for a period of one year or more by more than 90 percent of its maximum annual mineral production within any of the last five years during which an interim management plan has not been approved (California PRC 2727.1 amended October 2011).
Abandoned Mine[4]	A surface mining operation that remains idle for over one year after becoming idle as defined in California Public Resources Code Section 2727.1 without obtaining approval of an interim management plan shall be considered abandoned.
Status of Mine Located on an Unpatented Mining Claim (as defined by BLM)	
Active Mine[5]	A mine on an unpatented claim (a site on BLM land) is considered active when surface mining operations are occurring under a BLM plan of operations, OR a site where surface mining operations formerly occurred (under a BLM plan of operations) and reclamation has not been completed per BLM.
Closed Mine[5]	A closed mine is a site on BLM land where surface mining operations formerly occurred under a BLM plan of operations, reclamation has been completed per BLM.
Abandoned Mine[6]	BLM may consider mining operations to be abandoned if, for example, the operator leaves inoperable or non-mining related equipment in the project area, removes equipment and facilities from the project area other than for purposes of completing reclamation according to the mine's reclamation plan, does not maintain the project area, discharges local workers, or there is no sign of activity in the project area over time.
Abandoned Mine[7] Feature	An abandoned mine feature is any aboveground or underground mining opening, working, structure, or disturbance that was abandoned prior to 01 January 1981, the effective date of the federal surface management regulations, with no evidence demonstrating that the miner intends to resume mining.

Sources: [1] BLM 2011c; [2] State Mining and Geology Board 2012; [3] California Department of Conservation 2012; [4] California State Mining and Geology Board 2012; [5] BLM 2010c [6] BLM 2012c; [7] BLM 2012d.

The BLM and SMARA each have policies for mines with respect to operations and closure. 43 CFR subparts 3715, 3809, and 3802 require mining exploration and operations on BLM land to prevent unnecessary or undue degradation of the land. These regulations also require reclamation plans to be submitted to BLM for mining exploration and operations on BLM lands (BLM 2011a). For mining-related activity on an unpatented claim, a BLM plan of operation is required for any work that does not

meet BLM's definition of "casual use" (e.g., working with hand equipment). This includes exploratory drilling. If SMARA thresholds are exceeded, a SMARA permit would be required as well. BLM classifies a mine as "active" when surface mining operations are occurring under a BLM plan of operations, OR a site where surface mining operations formerly occurred (under a BLM plan of operations) and reclamation has not been completed per BLM.

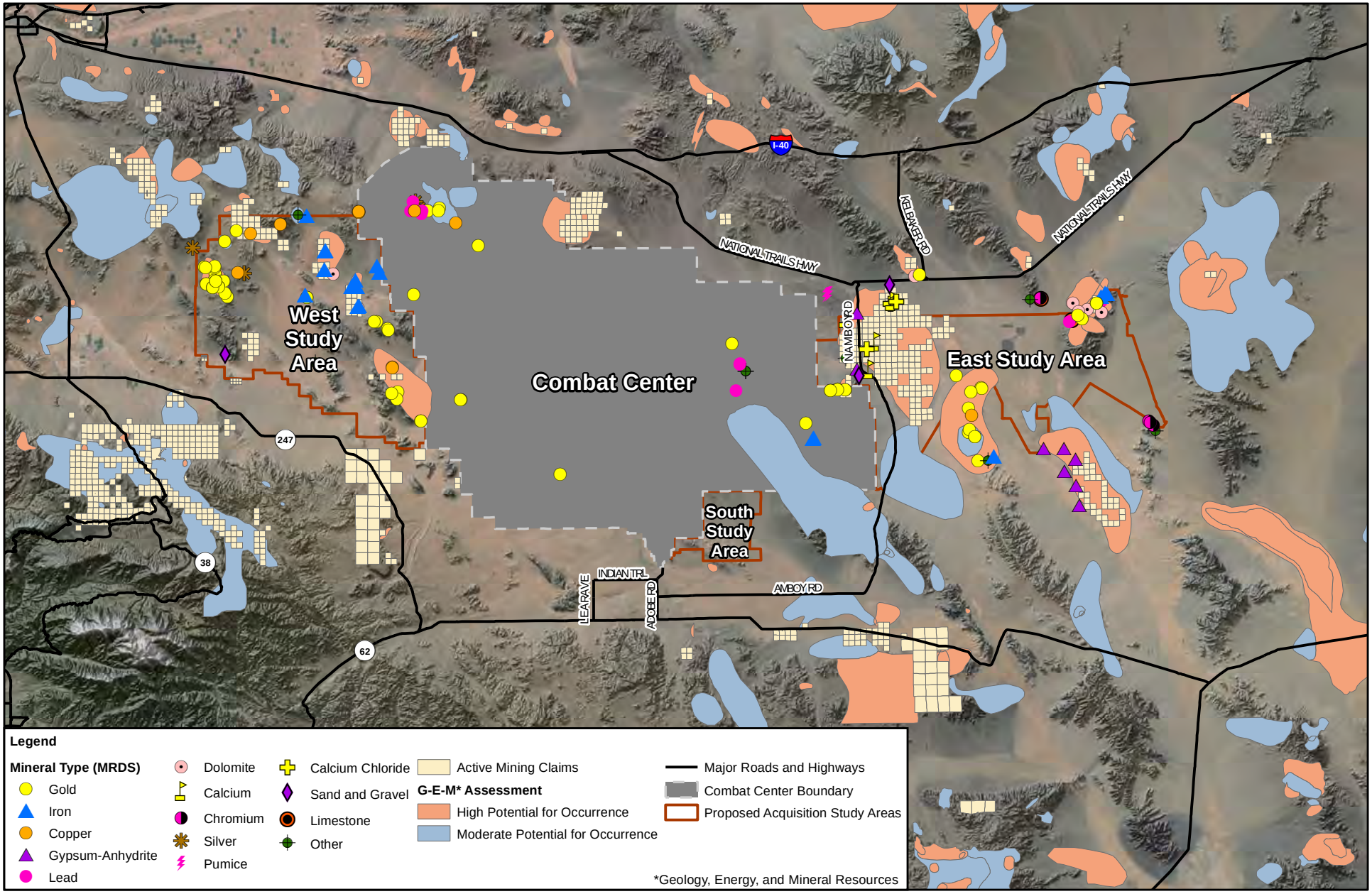
The BLM uses a classification system to determine the level of potential for accumulation of mineral resources. Potential is defined as the potential for the occurrence of concentration of one or more mineral and/or energy resources. The BLM Manual 3031 - *Energy and Mineral Resource Assessment* outlines the Mineral Potential Classification System (BLM 1985). This classification system is used to assess the potential for geologic terrains to host mineral resources in the area studied. High potential is defined as "the geologic environment, the inferred geologic processes, the reported mineral occurrences and/or valid geochemical/geophysical anomaly, the known mines or deposits indicate high potential for accumulation of mineral resources. The "known mines and deposits" do not have to be within the area being classified, but have to be within the same type of geologic environment." Moderate potential is defined as "the geologic environment, the inferred geologic processes, and the reported mineral occurrences or valid geochemical/geophysical anomaly indicate moderate potential for accumulation of mineral resources." The potential areas for accumulation of mineral deposits in the acquisition study areas as well as the region are shown on Figure 3.12-1.

3.12.3 Existing Conditions

3.12.3.1 Combat Center

Geologic Setting

The Combat Center and the acquisition study areas are located in the Mojave Desert geomorphic province that lies between the Garlock Fault and Transverse Ranges to the north and west, respectively, the San Andreas Fault to the south, and the Basin and Range province of the Nevada Desert to the east. The geologic setting of the Combat Center consists of low mountain ranges, lava flows from volcanic activity, and isolated rock outcrops separated by characteristic desert landforms called alluvial (water-laid) fans (MAGTF Training Command 2007). The mountains rise above intervening valleys filled with sediments eroded from the mountains during periodic rainstorms that can cause flash floods. Short-lived streams move sediments downslope, drying out when the storms end, forming a network of dry washes. The sediments spread outward from the mountain canyons into the fan-shaped slopes that are steep near the mountain peaks and gentle to near level at the valley bottom. Sunshine Peak crater, a volcanic crater, is located near the northwestern boundary of the Combat Center. The Bullion Mountains are the predominant range in the area and are formed mostly of quartz monzonite and granite, which are light-colored rocks with high silica content. Elevations on the Combat Center range from 1,887 feet (575 meters) on the Lavic Lake bed to 4,435 feet (1,361 meters) at the summit of Mount Hidalgo. Layers of blown sand, called sand ramps, contribute to lower elevation soils of mountains adjacent to Mainside (MAGTF Training Command 2007).



Kilometers
0 5 10 20
0 5 10
Miles

Source: BLM 2011b; MAGTF Training Command 2009

Figure 3.12-1
Potential Occurrence of Mineral Resources in the Region

N

There is no regional surface water flow through the Mojave Desert, so infrequent runoff from mountains forms lakes in the low-lying areas, known as playas. Water may persist in playas for up to two months per year (NRCS 1999). Minerals dissolved in runoff from the mountains and soils accumulate in the playa lakebeds as the water gradually evaporates. The Combat Center contains 14 playas totaling approximately 7,670 acres (3,100 hectares) (MAGTF Training Command 2007). The two most prominent playas are Mesquite Lake (located near Mainside) and Deadman Lake (located in Sand Hill, Gypsum Ridge, and West Training Areas). Lavic Lake in the northwestern portion of the training area is also a playa. The playa in the northeastern corner of the Combat Center is the western arm of Bristol Lake that was cut off from the main lake body by the eruption of Amboy Crater.

Seismicity

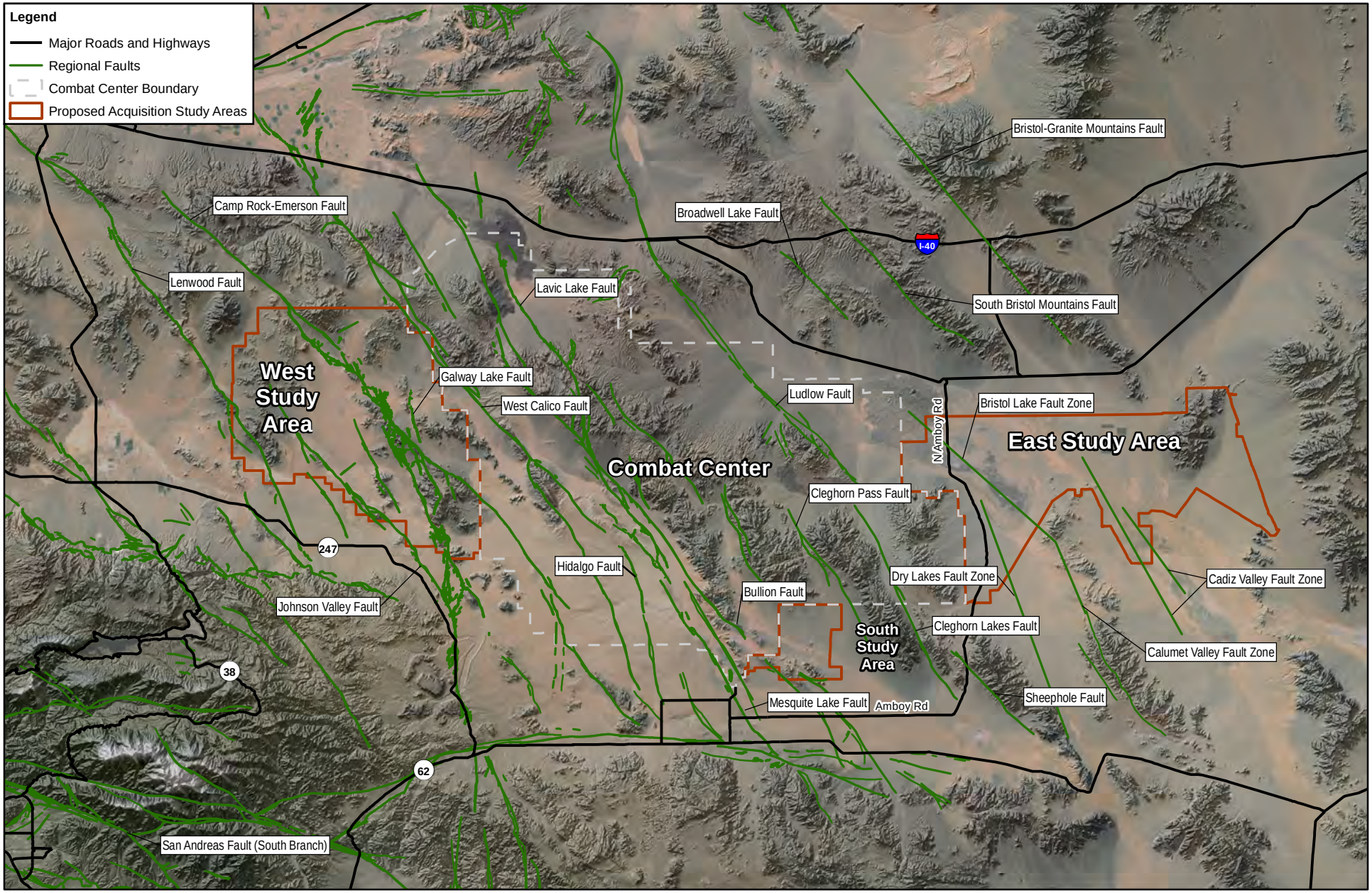
The Mojave Desert is a highly active seismic region. The Garlock and San Andreas Faults on the perimeter of the Mojave Desert are both active strike-slip faults for which slip rates on the order of millimeters per year range are documented. These major earthquake fault systems and their related fault zones have also generated significant earthquakes within the last 200 years (USGS 2010). The San Andreas Fault passes approximately 30 miles (48 km) from the southern boundary of the Combat Center (Geology.com 2010). Multiple northwest-trending strike-slip faults in the Twentynine Palms geographic area are associated with the Eastern California Shear Zone, a network of such faults that extends from the Gulf of California north through the Mojave Desert (Lease *et al.* 2009). Regional faults are shown on Figure 3.12-2.

In the west-central portion of the Mojave Desert where the Twentynine Palms area is located, there are multiple small, southeast-to-northwest trending faults that somewhat parallel the trend of the San Andreas Fault (Norris and Webb 1990). Approximately 50 named and unnamed faults cross the Combat Center (MAGTF Training Command 2007) (see Figure 3.12-2). Prominent faults within the Combat Center include the Lavic Lake, West Calico, Bullion, Mesquite Lake, and Emerson Faults (MAGTF Training Command 2007). Activity has occurred on three of the Combat Center faults: the West Bullion Mountain, Mesquite Dry Lake, and Lavic Lake Faults. Creeping of the West Bullion Mountain and Mesquite Dry Lake Faults is believed to have created an open fissure on the southeastern bank of Mesquite Dry Lake (MAGTF Training Command 2007). In 1999, the magnitude 7.1 Hector Mine earthquake on the Lavic Lake Fault was centered in the northwest portion of the Combat Center. This earthquake caused a 24-mile (38-km) long surface rupture with a maximum offset of 12 to 15 feet (4 to 5 meters) (MAGTF Training Command 2007).

Earthquakes are caused by movement of the earth's crust, and originate at distances of tens to hundreds of miles underground (USGS 2011). To date, there is no evidence linking earthquake activity with the use of explosives at the Combat Center (USGS 2011).

Mineral Resources

Minerals found on the Combat Center include lead, zinc, copper, silver, and gold. The lands that now comprise the Combat Center were previously subject to mining activity and there are abandoned mines at Emerson Lake, Bullion, Delta, Prospect, Maumee Mine, Sunshine Peak, Lavic Lake, and Lead Mountain Training Areas (MAGTF Training Command 2007). Military reservations are typically not open to any type of mining; however, more recently, some military installations in suitable locations have been opened to recovery of oil and natural gas. The geology of the Twentynine Palms area does not include petroleum-bearing source rocks, so it is unlikely that oil and natural gas development would take place at the Combat Center (MAGTF Training Command 2007).



Kilometers

0 5 10 20

0 5 10 20

Miles

Sources: Southern California Earthquake Data Center 2010; MAGTF Training Command 2010b; USGS 2006; MWD and BLM 2001

Figure 3.12-2
Regional Faults

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Soils

The soils at the Combat Center formed through the weathering of fragments of granitic and volcanic parent rocks from the upland areas carried downslope by gravity (colluvium) or water (alluvium). No single parent rock type predominates (NRCS 1999). Wind and water have played major roles in transporting material for soil placement and formation (MAGTF Training Command 2001). Additional processes involved in the formation of soils at the Combat Center include the formation and translocation of silicate clay, accumulation of silica lime, and minerals, and accumulation of organic material. The amount of organic matter that accumulates in desert soils, such as those of the Combat Center, is insignificant in comparison with soils of wetter environments capable of supporting dense vegetation (NRCS 1999). Due to limited moisture and organic material, some Combat Center soils have little horizon development (layers that have different physical and chemical properties than those above and below). Those Combat Center soils with strong horizons are old soils that developed during earlier, more moist climate conditions than occur today (NRCS 1999). There are three common surface horizons at the Combat Center. A soft, fluffy surface layer is found mostly in playas. A compact surface crust occurs in well-drained areas. Dense pavement is found in areas where coarse fragments make up the majority of the initial sediment (MAGTF Training Command 2001).

Desert soils have special characteristics as a result of the limited moisture, vegetation, and extreme temperature conditions where they form. Desert soils form very slowly from the parent rock material and it may take centuries for desert soils that have been disturbed to return to their original state (MAGTF Training Command 2007). Desert soils are very fragile and susceptible to disturbance, leading to wind and water erosion, as well as highly vulnerable to compaction (MAGTF Training Command 2007).

A stabilizing factor unique to the desert environment is a type of soil surface known as cryptobiotic or cryptogamic crusts. These are biological soil crusts formed by living organisms (bacteria, fungi, and lichens) and their by-products, which create a surface covering of soil particles (sand and silt) bound together by organic materials. Cryptobiotic soil crusts form a protective barrier against wind and water erosion and hold soils in place on level surfaces and slopes. Cryptobiotic soil crusts also contribute nitrogen to the soil, which helps support the growth of higher plants. Patches of cryptobiotic soil crust occur at the Combat Center in various soil types that appear uneven and darker than surrounding soil. The time required for soil crusts to develop and their recovery rates are unknown; however, one study estimated a minimum period of recovery to be 100 years (MAGTF Training Command 2007). Desert pavement is another kind of surface unique to dry environments. It consists of an unvegetated surface gravel layer of tightly packed pebbles, often just one pebble deep. The top rocky coating protects underlying layers of finer textured material, often a layer of wind-blown sand above soil formed from alluvial deposits (MAGTF Training Command 2001). Desert pavement is easily disturbed by vehicle passage, leaving the underlying soil subject to erosion (MAGTF Training Command 2001).

In 1999, the U.S. Department of Agriculture NRCS completed a survey of the soil types at the Combat Center (*United States Department of Agriculture Natural Resources Conservation Service Soil Survey of Marine Corps Air Ground Combat Center, Twentynine Palms, California*). The NRCS soil survey provided a description of the physical makeup and drainage capacity of the soils types, their locations, and rated their suitability and limitations for various uses (NRCS 1999). The soil types at the Combat Center are found in a pattern that is the result of geologic parent material, landforms, topography, climate, and vegetation (NRCS 1999). The soil types fall into nine basic mapping units (series) as described in Table 3.12-2.

Table 3.12-2. Combat Center Soil Types and Characteristics

Soil Order	Soil Series	Description	Occurrence	Percent of Combat Center Covered by this Series
Aridisols (Soils that form in water-deficient conditions, with subsurface horizons where clay/and or minerals accumulate.	Dalvord-Goldroad-Rock Outcrop	Very shallow to shallow, loamy-skeletal (consisting of stones) soils formed in residuum and colluvium (i.e. a loose deposit of rock debris) from granitic and metamorphic sources	Southeastern part of Combat Center on granitic mountains	18
	Haleburu	Very shallow to shallow, loamy-skeletal soils formed in residuum and colluvium from volcanic sources	Northwestern part of Combat Center on volcanic mountains	13
	Edalph-Narea-Calcio	Deep, sandy soils formed in granitic alluvium	Southwestern section of Combat Center	9
Aridisols (Soils that form in water-deficient conditions, with subsurface horizons where clay/and or minerals accumulate	Eastrange-Owlshead-Gayspass	Very shallow to very deep soils formed in alluvium from mixed sources	Throughout Combat Center on older alluvial fan piedmonts (the highlands around and above the fans)	6
	Sunrock-Haleburu-Lava Flows	Very shallow to shallow, loamy-skeletal soils formed in residuum and colluvium from volcanic sources	Northern part of Combat Center	6
	Playa (Typic Haplosalids-Amboy Crater)	Deep, salt-affected soils formed in dry lake deposits	Basin floors	3
Entisols (Very young, poorly-developed soils with subsurface horizons)	Arizo	Very deep, sandy-skeletal soils formed in mixed alluvium	Northwestern, central, and southeastern parts of Combat Center, on recent fan piedmonts	20
	Carrizo	Very deep, sandy-skeletal soils formed in mixed alluvium	Northeastern part of Combat Center on recent fan piedmonts	16
	Cajon-Bluepoint	Deep soils formed in sandy material	Southwestern section of Combat Center, on smooth granitic fan piedmonts	9

Source: MAGTF Training Command 2007, 2001; NRCS 1999.

Limitations for the soil types at the Combat Center as defined by NRCS (1999) are included in Table 3.12-3.

Table 3.12-3. Training Limitations of Combat Center Soils

Soil Series	Limitation Area	Limitations
Playa (Typic Haplosalids - Amboy Crater)	Playa lakebeds	Severely limited for vehicle or aircraft use due to periodic wetness and excessive fine dust that reduces maneuverability.
Cajon-Bluepoint; Edalph-Narea-Calcio; Arizo; Carrizo; and Eastrange-Owlshead-Gayspass	8 to 30% slopes	Limited wheeled vehicle mobility. Source of blowing sand during windy conditions.
Dalvord-Goldrock Rock outcrop; Haleburu; and Sunrock-Haleburu-Lava flows	Slopes greater than 20%	Vehicle maneuverability difficult. Dalvord and Haleburu severely limited for vehicle use due to blowing sand.

Source: NRCS 1999.

Paleontological Resources

The MAGTF Training Command NREA Natural and Cultural Resources Branch is responsible for day-to-day operations and long-term management of natural and cultural resources, including paleontological resources within the Combat Center boundaries (MAGTF Training Command 2007). In 2007, the Combat Center opened the Archeology and Paleontology Curation Center to provide the proper storage environment for archeological and paleontological artifacts recovered from the Combat Center (Leatherneck.com 2010).

3.12.3.2 West Study Area

Geologic Setting

The geology of the west study area is characterized by fault-controlled southeast-to-northwest trending mountains formed of granite, volcanics, gneiss, marine carbonate, and non-marine sedimentary rocks. Like the Combat Center, the mountain ranges of the west study area have intervening parallel valleys with alluvial fans and plains. The Johnson Valley Fault, which occupies the central portion of the west study area, is one such fault-bounded valley filled with alluvial sediments. Elevations in the west study area range from 4,100 feet (1,250 meters) at Red Hill in the northwest section of the acquisition study area, to about 2,800 feet (853 meters) in Upper Johnson Valley. The west study area also includes five playas: Emerson, Galway, Melville, Means, and Soggy Dry Lakes.

Seismicity

The Lenwood, Galway Lake, Lockhart, Johnson Valley, and Camp Rock-Emerson Faults cross the west study area (Norris and Webb 1990; MAGTF Training Command 2007). In 1992, the magnitude 7.3 Landers earthquake centered on the Camp Rock-Emerson Fault caused ground rupture and surface displacement (BLM 2008a).

Mineral Resources

As shown on Figure 3.12-1, there is a high potential of occurrence for a number of mineral types in the west study area. The west study area contains iron, gold and copper ore deposits that were historically explored and mined, as well as rock quarries that formerly produced roofing granules and decorative building stone. As of 2010, there were no known producing commercial-scale mines within the west

study area (County of San Bernardino 2010a). In the 1940s through the early 1950s, small quantities of iron ore were produced from the Bessemer Mine, the New Bessemer Mine, the Morris Lode deposit, and the Ebony Mine. The majority of the iron deposits occur in the vicinity of Iron Ridge, in the northern portion of Johnson Valley (see Figure 3.1-5 in Section 3.1, *Land Use*).

Approximately 17,500 tons of ore were produced from the Morris Lode deposit. The Morris Lode Mine has an estimated 18 million tons of iron ore reserves (Manatt, Phelps, and Phillips, LLP 2011). This mine is located on patented claims. In October 2009, Morris Lode Mine claimants requested right-of-way approval from BLM to maintain an existing unimproved road to access Morris Lode Mine (BLM n.d.). Morris Lode Mine claimants have an approved reclamation permit (issued in August 2011) from the County of San Bernardino to mine 71.1 acres of their patented mining claims for a period of up to 45 years (County of San Bernardino 2011a). However, within the timeframe of this Final EIS no mining operations had taken place.

The Bessemer Mine is on patented claims and is estimated to comprise 3 million tons of iron ore reserves (BLM 2008c; Manatt, Phelps, and Phillips, LLP 2011). Magnetite was mined from open pits, shallow shafts, and tunnels (BLM 2008a). Ore production consisted of 2,000 tons in 1945 and 26,000 tons in 1951 (BLM 2008a), however, the deposit has been abandoned since 1954 (BLM 2008a).

The New Bessemer Mine is located on 160 acres owned by Chevron Mining, Inc., about 1 mile north of the Morris Lode Mine (MAGTF Training Command 2011). The property is part of a deposit that produced about 4,000 tons of iron ore in 1949. It is estimated that 164,000 tons of iron ore remain on the property, and another 106,000 tons remain outside its boundaries (BLM 2008a). Total historical production for the New Bessemer Mine is unknown (BLM 2008a). In October 2011, a newly-graded road was noted leading from Bessemer Mine Road toward the New Bessemer Mine (MAGTF Training Command 2011). However, BLM and County of San Bernardino have not been contacted by the property owners about resuming operations at the New Bessemer Mine (MAGTF Training Command 2011).

The Ebony Mine is made up of two separate ore deposits. The ore resources were estimated at a total of 100,000 tons before the deposits were mined from two open pits, the first approximately 100 feet (30 meters) northwest of the second. The remaining capacity is unknown (BLM 2008a). Iron ore is regionally important as a raw material used in cement manufacturing, an important local and regional industry in San Bernardino County. The ore is used as an additive to reduce the amount of heat required for the cement manufacturing process (BLM 2008a). In 1994 when the BLM prepared a mineral report for a proposed land exchange with the purpose of designating land for the Johnson OHV Area, approximately 62,000 short tons of iron ore were used in the manufacture of Portland cement in Southern California (BLM 2008a). According to the 1994 BLM report, most of the ore came from small deposits locally in San Bernardino County (BLM 2008a).

As of 2010, there were only two permitted and operating iron mines in San Bernardino County supplying iron ore for cement manufacturing plants in Lucerne Valley and southern California (County of San Bernardino 2010a). Continued operations at these two mines, the Silver Lake Mine at Fort Irwin and the Baxter Quarry, are uncertain (County of San Bernardino 2010a). According to the terms of its SMARA permit, reclamation must begin at the Silver Lake Mine in 2022. The ore reserves at the Silver Lake Mine are consistent enough to justify extending the permit. The Silver Lake Mine is part of BLM lands that were included in the expansion of Fort Irwin so continued operation there is subject to military land use priorities (U.S. Army 2006; County of San Bernardino 2010a). The Baxter Quarry, located about 20 miles (32 km) north of the Combat Center (California Department of Conservation 2000-2005) is owned by the California Portland Cement Company, and supplies iron ore exclusively for that company's use

(County of San Bernardino 2010a). The SMARA permit for this mine expires in 2020. Continued operation beyond 2020 is uncertain because the Baxter Quarry iron deposit is not consistent enough to support extending the permit (County of San Bernardino 2010a). The Baxter Quarry and Silver Lake Mine have about 4 million tons of reserves between them (Manatt, Phelps, and Phillips, LLP 2011). According to the BLM, the larger iron deposits in Southern California have been depleted, and there are few small deposits that can be mined economically. Therefore, the BLM believes that access to iron ore deposits, such as those in Johnson Valley, are of great importance to the local cement manufacturing companies (BLM 2008a). However, as described in Section 4.3.2.4 (*Socioeconomics*), recent government data shows that in 2009 iron ore made up only 0.5% of the total raw material used to produce cement (USGS 2010). In addition, substitutes to iron ore, most notably mill scale, have recently surpassed iron ore as the most commonly used ferrous material used in cement production. Since the use of mill scale represents a recycling of waste (results from the process of hot-rolling steel), as opposed to the exploitation of new resources, mill scale is considered an economically viable material to use and is generally considered a more sustainable material for producing cement than is iron ore (Portland Cement Association 2005). The local cement manufacturing industry does utilize mill scale (Portland Cement Association 2005), but not exclusively; the industry also utilizes iron ore and does benefit from having nearby sources – due to low transportation costs.

Multiple small mine workings in the west study area historically produced gold, although the actual amounts recovered from most of the mines are not known (BLM 2008a). These mines were active from the 1900s through the 1940s. Copper occurs with gold at some of the locations. Five of the former gold mines are in the western portion of Johnson Valley (township 6 north, ranges 2 and 3 east). One of these five, the Gold Peak Mine, produced $40,000 worth of gold when active in the early 1900s. The area around the Blue Ribbon Mine in the eastern portion of the west study area has a high potential for the occurrence of gold and copper and has an above-average mining claim density (BLM 2008a). The Los Padres Mine (township 4 north, range 5 east, section 36; 3 miles (5 km) south of Emerson Lake and near the western boundary of the Combat Center) has gold, copper, and iron oxides and sulfides in a 2 to 3 foot (0.6 to 1 meter) wide vein. There are three copper prospects in deposits in township 4 north, range 5 east, in the eastern portion of the west study area, and one more in the western portion (BLM 2008a). Unlike iron resources, there is no potential connection between the gold and copper deposits of the west study area and local/regional industry.

A SMARA Permit (No. CA034346, RP 95M-02) and SMARA Reclamation Plan exist for the Kilo Gold Mine in the Hartwell Hills (township 4 north, range 5 east, section 9). According to RP 95M-02 issued for the Kilo Gold Mine, a shallow open pit operation was initiated to recover gold from a placer deposit. The Kilo Gold Mine was listed as active in 2003, but was not listed at all in 2004 and 2005 by the California Department of Conservation Office of Mine Reclamation (California Department of Conservation 2000-2005). According to the SMARA permit, final reclamation of this mine is to begin in 2015 and be completed by 2016 (County of San Bernardino 1995). However, in 2009 the County of San Bernardino notified the operator of Kilo Gold Mine that due to years of inactivity at the site, the Kilo Gold Mine was declared abandoned, which triggered a review of the reclamation process and timeframe (County of San Bernardino 2009a). Approximately 4 acres (2 hectares) were disturbed during the operations that occurred at the site, and less than 1,500 cubic yards (1,147 cubic meters) of material were excavated from two small pits east of the mill site (County of San Bernardino 2010b). During an annual County SMARA site inspection conducted in March 2010, the Kilo Gold Mine site was noted to be generally stable and secure with security fencing enclosing the mill site and associated equipment (County of San Bernardino 2010b). As described above in Section 3.12.2, even though mining operations

have ceased at this site, the BLM considers the Kilo Gold Mine "active" until all the equipment is removed and reclamation at the site is complete.

As described above, the west study area contains multiple unworked mines. Table 3.12-4 lists mines in the west study area, based on information obtained during site visits as well as information readily available from permits, and BLM reports provided as part of the Application for Withdrawal. The table includes mine type and potential safety hazards associated with the site, if known.

Table 3.12-4. West Study Area Mine Summary

Mine	Claim Type	Location - Latitude / Longitude or Township / Range	Status	Remarks
Morris Lode Mine[1,2,3,4]	Patented and Unpatented	34.534063 -116.508093	Not in operation, but has an approved Conditional Use Permit and Reclamation Plan to resume operations.	In 2011, the County of San Bernardino approved a SMARA permit to resume production at a proposed open pit mine. Iron mining operations are proposed for 71.1 acres (28 hectares) of patented claims. The primary iron ore is magnetite (iron oxide). The site was first explored in the early 1940s. Between 1949 and 1950, the mine supplied iron ore to a local cement company. The ore body is exposed in several historic open pits. No shafts or adits were noted during site visits in March 2010 and September 2011. Waste rock and mine tailings from historical mining activities and drilling exploration are spread across the site. The site shows evidence of recent OHV activity.
Bessemer Mine[1,2,4] .	Patented and Unpatented	34.579516 -116.559844	Abandoned	The primary ore is magnetite. This former mine operated in 1945, 1951 and 1954 (the last year it operated). On-site processing included crushing and pulverization of ore followed by recovery of minerals. The processing station contains mounds of fine-grained mine tailings (approximately 18 feet [5 meters]) high. Several shallow open pits remain at the site.

Continued on next page

Table 3.12-4. West Study Area Mine Summary

Mine	Claim Type	Location - Latitude / Longitude or Township / Range	Status	Remarks
New Bessemer Mine[1,2]	Unpatented	34.334975 -116.303128	Abandoned	The primary ore is magnetite. This former mine operated in 1949. The iron ore has been exposed in open pits from past on-site mining. A newly-graded road leading to the site and many excavations from exploratory mining activities and mounds of waste rock were noted on-site during a site visit in October 2011. No open pits, shafts or adits were noted at the site at that time. Rusted pieces of a container for storing dynamite were also found during the same site visit.
Ebony Mine[1,5]	Unpatented	Township 6 North Range 4 East Section 15	Abandoned	Magnetite was mined from two open pits. One pit was 200 feet long by 25 feet wide (66 meters by 8 meters) and 75 feet (23 meters) deep. The second pit was 50 feet (15 meters) in diameter and 30 feet (10 meters) deep.
Blue Ribbon Mine[1,2]	Unpatented	34.273 -116.2715	Abandoned	This former gold mine operated in the 1930s and mid-1950s. Cyanidation processes and other chemicals may have been used at the site. The site reportedly has a 100-foot (33-meter) vertical shaft to access small amounts of copper sulfides and gold in narrow quartz veins. Abandoned workings consisting of shallow pits and trenches for 0.5 mile (0.8 km) along the Emerson fault were noted in 1964. Pits, tailings piles, a vertical shaft opening and a cabin foundation were noted during a site visit in March 2010.

Continued on next page

Table 3.12-4. West Study Area Mine Summary

Mine	Claim Type	Location - Latitude / Longitude or Township / Range	Status	Remarks
Kilo Gold Mine[1,2,4,6]	Unpatented	34.439851 -116.46612	In process for reclamation and closure with the county and BLM.	This is a former gold mine and mill site. BLM classifies the site as "active" until reclamation is complete. The operator's SMARA Permit expires in 2016. Chlorine appears to have been used for processing the ore on-site. Gasoline and diesel containers and partially full 55-gallon drums of oxides and corrosives have not been properly disposed of and remain on-site. The mill site contains about 80 acres (32 hectares) where trash, motor homes, inoperable vehicles, and milling equipment are surrounded by a chain-link fence. In addition, a nearby, approximately 15 acre (6 hectare), shallow open pit was mined before 1994 presumably for placer gold.
CA000000093[7]	Unpatented	34.46925 116.54269	Abandoned	This abandoned mine was identified from BLM's Abandoned Mine Program Protection and Response Information System database. BLM records indicate the site has an open shaft that presents a physical hazard. No further information is available.
Los Padres Mine[4]	Not applicable. State-owned land.	34.387793 -116.411672	Abandoned	This is a former gold mine. Cyanidation processes and other chemicals may have been used at the site. The site consists of a waste rock dump, mill site, two concrete pads, and several partially in-filled adits and vertical shafts. Mounded and terraced waste rock covers the main mine portal.

Continued on next page

Table 3.12-4. West Study Area Mine Summary

Mine	Claim Type	Location - Latitude / Longitude or Township / Range	Status	Remarks
Emerson Mine[4]	Unpatented	34.431125 -116.447478	Abandoned	This former gold mine operated intermittently from 1927 through 1938. Cyanidation processes and other chemicals may have been used at the site. The site consists of approximately five partially open vertical shafts, a linear vertical shaft connecting to an open horizontal adit, and mounds of waste rock and mine tailings. The remains of a processing tank, a stone cabin, and two domestic trash dumps with food cans, rusted debris, and scraps of assumed asbestos tiles were noted during a site visit in September 2011.
Cumberland (High Hope) Mine[1]	Unpatented	Township 6 North Range 2 East Section 25	Abandoned	This former gold mine operated in 1939. A quartz vein at the site contains free gold, pyrite, and marcasite (iron sulfides) and hematite (iron oxide). There are six shafts 50 to 135 feet (15 to 41 meters) deep spread over a length of 2,000 feet (600 meters).
Fry Mountain Mine No. 1[4]	Unpatented	34.5675583 -116.7232111	Abandoned	This is a former gold mine. Cyanidation processes and other chemicals may have been used at the site. The site contains a large mound of waste rock and mine tailings and a long horizontal adit that extends approximately 656 feet (200 meters) then forks into two passages. There are several vertical shafts nearby.
Fry Mountain Mine No. 2[4]	Unpatented	34.5735722 -116.7251833	Abandoned	This is a former gold mine and concrete mill site from the early 1900s, before 1914. Cyanidation processes and other chemicals may have been used at the site. The site contains the remains of two wood and stone arrastras. One large open vertical pit has been filled with wood debris and waste rock. There are two more vertical shafts, the remains of a constructed rock roadway, and mounds of eroded mine tailings. There are also several concrete mill sites and dwelling areas.

Continued on next page

Table 3.12-4. West Study Area Mine Summary

Mine	Claim Type	Location - Latitude / Longitude or Township / Range	Status	Remarks
Copper Strand Mine[4]	Unpatented	34.62956 -116.671369	Abandoned	This former copper mine operated from 1900 to 1940. The use of cyanidation processes is confirmed at this site. Gasoline and diesel may have been stored on site to fuel the heavy equipment used for mining operations. The site consists of the remains of a rock cabin that covers the entrance to a 6 feet (1.8 meters) deep horizontal adit, four former cyanide tanks, and a large waste disposal area with rusted food cans and empty 55-gallon containers. The hillside and waste rock have been terraced, and large mounds of mine tailings containing large pieces of copper ore are adjacent to the open excavations. Cyanide solution was used during the processing of the copper ore, and the residue from the processing activity was disposed on the ground surface beside the tanks.
Bailey Mine[4]	Unpatented	34.505266 -116.671652	Abandoned	There are no distinct mining features at this site other than possible areas of waste rock and dirt roads through the area that have recently been used by OHVs. The ore type is unknown.
Green Rock Mine[1,4]	Unpatented	34.497114 -116.725248	Abandoned	This site was mined for epidote (calcium aluminum iron hydroxide) until 1980. The material was crushed for use as roofing granules. Abandoned mine features at the site include several open pits, piles of waste rock and a milling site complete with a concrete pad dated August 10, 1976. Damaged, assumed asbestos tile was noted near milling site area during a site visit in October 2011.
Brown Paisley Mine[4]	Unpatented	34.346308 -116.450008	Abandoned	This mine could not be located; coordinates provided by BLM led to a permanent residence surrounded by a chain link fence. The ore type is unknown.

Continued on next page

Table 3.12-4. West Study Area Mine Summary

Mine	Claim Type	Location - Latitude / Longitude or Township / Range	Status	Remarks
Mine Shaft and Concrete Pads[4]	Unpatented	34.46047 -116.724183	Abandoned	The site consists of a shallow mine shaft (approximately 20 feet [6 meters]) deep, a concrete pad stamped "May 1903" with evidence of milling structures and equipment, and a second concrete pad similar to those used for residential structures. A metal standpipe beside the mine shaft may indicate the location of a well. Discarded mining equipment and domestic items (obsolete and contemporary age) are scattered around the concrete pads. The ore type is unknown.
Unnamed Mine 4[4]	Unpatented	34.441143 -116.447389	Abandoned	This is the site of a former gold mine. Cyanide and other chemicals may have been used during the processing of the ore on site. Gasoline and diesel may have been stored on site to fuel the heavy equipment for mining operations. The site consists of a large open pit that has been partially in-filled with waste rock, a backfilled vertical shaft, several exploratory access excavations, as well as terraced mine tailings, waste rock and a deteriorated access road.
Unnamed Mine 5[4]	Unpatented	34.466438 -116.702357	Abandoned	The site consists of a small adit excavation that extends approximately 50 feet (15 meters) into the hillside. The ore type is unknown. There are tailings and waste rock from presumed mining exploration at the entrance and throughout the mine. Debris of contemporary origin is scattered near the mine entrance area, including remnants of firearm ammunition and ash debris from campfires.

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Table 3.12-4. West Study Area Mine Summary

Mine	Claim Type	Location - Latitude / Longitude or Township / Range	Status	Remarks
Unnamed Mine 6[4]	Unpatented	34.511625 -116.731026	Abandoned	The site is a former copper mine. Cyanidation processes may have been used at the site. The main adit runs approximately 300 feet (91 meters) to the southwest. An additional adit (approximately 200-250 feet [61-76 meters]) long runs southeast from the main adit. Remaining mine structures consist of various metal and wooden support structures. There are copper ore-containing tailings and waste rock at the mine entrance and in nearby surrounding areas. A few yards (meters) from the mine entrance, there is a second, shallow mine shaft with copper ore visible throughout.
Elsie Mine[1,2]	Patented	Township 6 North Range 2 East Section 36	Abandoned	This former gold mine operated in the 1920s and 1935, and has not operated since 1940. Gold is associated with pyrite, arsenopyrite (iron sulfide and arsenic-iron sulfide, respectively), in a zone of quartz and iron oxides. There are two shafts 500 feet (150 meters) apart, 150 feet (50 meters) and 200 feet (60 meters) deep.
Gold Peak Mine[1]	Patented	Township 6 North Range 3 East Section 31	Abandoned	The site is a former gold mine operated in the early 1900s, before 1914. Free gold is associated with pyrite in four vertical veins. The site has a 120-foot (40-meters) deep vertical shaft with level workings at depths of 50 and 100 feet (15 and 33 meters).
Red Hills Prospect[1]	Unpatented	Township 6 North Range 3 East Section 7	Abandoned	The site is a former gold mine that has not operated since 1945. The ore is distributed in a quartz vein. The site has two shallow shafts, 200 feet (66 meters) apart, and a 200-foot (66-meter) long tunnel.

Continued on next page

Table 3.12-4. West Study Area Mine Summary

Mine	Claim Type	Location - Latitude / Longitude or Township / Range	Status	Remarks
Johnson Mine[1,2]	Unpatented	Township 6 North Range 2 East Section 36	Abandoned	According to BLM records this former gold mine was abandoned long before 1964. Gold is associated with pyrite and arsenopyrite (sulfides) in quartz. The site has one four-hundred-foot (120-meter)-long diagonal access tunnel and one 250-foot-(83 meter) long horizontal excavation into the deposit from the surface. Two unbarricaded tunnel openings (presumably the access tunnel and the excavation) remain at the site.
North Maumee Prospects[1]	Unpatented	Township 4 North Range 5 East Section 10 West of Emerson Lake	Abandoned	This site was prospected for copper, date unknown. The deposits comprise very small amounts of iron and copper sulfides in quartz. The site was prospected by a 20-foot (6-meter) long tunnel and a shallow shaft southwest of the tunnel.
Maumee Prospects [1]	Unpatented	Township 4 North Range 5 East Section 15 2 mi (3.2 km) west of Emerson Lake	Abandoned	The site was prospected for copper in the early 1960s. The deposits comprise copper and iron sulfides, possibly some gold. The site has three vertical shafts, one that is more than 60 feet (20 meters) deep, about 300 feet (100 meters) apart from one another, and some shallow trenches. There is also a shallow shaft about 1,300 feet (400 meters) south and two shafts about 2,600 feet (800 meters) southeast of the three vertical shafts.
Unnamed Prospect A[1]	Unpatented	Township 4 North Range 5 East Section 24 1 mile (1.6 km) southwest of Emerson Lake	Abandoned	These sites were explored for possible copper and gold, the dates are unknown.
Unnamed Prospect B[1]	Unpatented	Township 4 North Range 5 East Section 20 2 mi (3.2 km northeast of Means Lake	Abandoned	The date of exploration at this site is unknown. According to BLM records a vertical shaft was noted in 1964. Blue copper oxides are present in a 15-foot (5-meter) deep vertical shaft.

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Table 3.12-4. West Study Area Mine Summary

Mine	Claim Type	Location - Latitude / Longitude or Township / Range	Status	Remarks
Unnamed Prospect C[1]	Unpatented	Township 6 North Range 4 East Section 6	Abandoned	This site was explored for copper in 1962. Copper ore occurs as malachite (hydrated copper carbonate) and chrysocolla (copper aluminum silicate) ores at the site. According to BLM records there are shallow pits at the site.

Notes: BLM = Bureau of Land Management; km = kilometer; OHV = off-highway vehicle; SMARA = (California) Surface Mining and Reclamation Act.
Morris Lode, Bessemer, Elsie, and Gold Peak are the only known mines on patented claims in the west study area as of February 2012. A full title search may determine additional patented claims within the area proposed for acquisition.
Sources: [1]BLM 2008a; [2]MAGTF Training Command 2010a; [3]County of San Bernardino 2011a; [4] NAVFAC 2011; [5]Mindat.org 2010; [6]County of San Bernardino 1995; [7] BLM 2012b

The west study area also contains deposits of alluvial sand and gravel that have potential for use as construction aggregate. Natural alluvial materials (sand and gravel) are preferable for use in construction aggregate due to lower extraction costs and better physical properties than crushed stone (California Geological Survey 2006). Construction aggregate is a low-unit-value, high-bulk-weight commodity that must be obtained from nearby sources to minimize both the dollar cost to the aggregate consumer and other environmental and economic costs associated with transportation (California Geological Survey 2006). San Bernardino County has only 24% of the permitted aggregate resources as compared to the 50 year demand (California Geological Survey 2006). Permitted sources of aggregate declined by 24% in San Bernardino County in the period from 2001 through 2005 (California Geological Survey 2006). It is BLM policy to make sand and gravel on its lands available for use by communities and contractors through a contract sales process (BLM 2010a). No quarries or other signs of extraction of construction aggregate materials currently exist in the west study area.

Soils

Landforms of the proposed acquisition study areas are similar to those present on the Combat Center. No U.S. Department of Agriculture NRCS soil survey exists for the proposed acquisition study areas (BLM 2004). Information about soil characteristics in the three acquisition study areas can be extrapolated from the soil survey published for the Combat Center, and surveys for other similar areas of the Mojave Desert (BLM 2004). No one landform dominates the west study area, so all nine soil map units are likely present there.

As discussed in Section 3.2, the west study area is highly used by OHVs. Off-highway vehicles impact soils properties in several ways. Off-highway vehicles increase soil compaction, which in turn affects the soil's ability to absorb water, water erosion, soil chemistry, and increases water and wind erosion (BLM 2004). Most desert soils, including many sands, are susceptible to intense compaction if driven across a sufficient number of times. Areas heavily used by OHVs such as pit areas, trails, and hill climbs generally are intensely compacted. Where highly compacted trails run for long distances down gentle slopes, significant erosion may occur on relatively level terrain with slopes as low as 3% (BLM 2004).

Type of vehicle, amount of activity, and soil moisture during vehicle use are more important in causing compaction than differences in soil properties (BLM 2004). For example, increased OHV activity on wet soils would increase compaction. Some cohesion-less sands such as sand dunes, however, are very

resistant to compaction whether wet or dry while many playa soils would have considerable resistance to compaction if driven on when dry (BLM 2004). Intense OHV use in steep areas (primarily hill climbs on slopes over 20%) causes large increases in water erosion and move soils out of place.

Most desert soils are much more susceptible to wind erosion after disturbance than in an undisturbed condition (BLM 2004). Wind erosion occurs whenever bare, loose, dry soil is exposed to wind of sufficient speed to cause soil movement. In general, erodibility increases with increasing sand content and decreases with clay content (NRCS 1999).

Under existing conditions, the soils in the west study area have been disturbed by vehicle activity in the Johnson Valley OHV area. The sandy-gravelly soils of alluvial fans are heavily disturbed in such areas as the slopes north of Soggy Dry Lake and throughout upper Johnson Valley. Dry washes and rocky mountain slopes, where soil is naturally less consolidated due to the active erosional/depositional environment, have also been affected by OHV activity. The surfaces of Means and Melville Dry Lakes have been extensively disturbed. In addition to the areas affected by OHV activity, the west study area contains multiple localized disturbed areas associated with abandoned mine sites.

Paleontological Resources

Mojave Desert alluvial sediments in the Twentynine Palms-Yucca Valley vicinity have the potential to contain significant fossil remains (County of San Bernardino 2009b). Similar alluvial sediments are found in the west study area, but the occurrence of fossils depends on the specific sediment location and type, so whether paleontological resources are likely to be present at any given location is difficult to determine without a field survey (County of San Bernardino 2009b).

3.12.3.3 South Study Area

Geologic Setting

Broad alluvial fan slopes at the base of the Bullion Mountains make up the majority of the south study area. Ridges of the Valley Mountains rise above the slopes to elevations of approximately 2,000 feet (610 meters).

Seismicity

Two unnamed faults cross the south study area (Southern California Earthquake Data Center 2010).

Mineral Resources

There are no active mines in the south study area and little potential occurrence for mineral resources (refer to Figure 3.12-1). Volcanic rock from an approximately 80-acre (32-hectare) site in the south study area (township 2 north, range 10 east, section 32) was formerly quarried for sale as a building stone material known as “desert mahogany” rubble stone (MAGTF Training Command 2010b; BLM 2008c). The light-colored rock with an orange-brown patina was sold by BLM for about $2.70 per ton, in quantities of 25 to 70 tons, in the 1990s (BLM 2008a). Rubble stone is used for decorative purposes such as fireplaces and masonry. The last such sale occurred in 1999, perhaps due to consumption of the flattest (most useful) material (BLM 2008a). There is a second abandoned mine site located about 2.5 miles (4 km) to the west, in the south study area (township 2 north, range 10 east, section 34) (MAGTF Training Command 2010c).

Table 3.12-5 summarizes information readily available from BLM reports provided as part of the Application for Withdrawal, and site visits to abandoned mines in the south study area.

Table 3.12-5. South Study Area Mine Summary

Mine	Claim Type	Location - Latitude/ Longitude or Township/Range	Mine Status	Remarks
Mahogany Mine[1,2,3]	Unpatented	34.210901 -115.94911	Abandoned	According to BLM documents, this mine produced "Desert Mahogany," a volcanic rock with orange-brown patina. The mine was active in the 1990s; last sale of the rock material by BLM was 1999. Low mounds of waste rock were noted during the site visit.
Unknown historic mine[2]	Unpatented	Township 2 North Range 10 East Section 34	Abandoned	Mine tailings remain at the site. Type of ore and dates of operation are unknown.
Unnamed Mine 1[3]	Unpatented	34.224612 -115.991158	Abandoned	There is disturbed surface material and mine tailings from an unnamed decorative rock mine at this location. Dates of operation unknown.
Unnamed Mine 2[3]	Unpatented	34.256633 -115.938753	Abandoned	Surface disturbances and small mine tailings show evidence of exploratory mining activity at this location. Ammunition casings noted during the site visit indicate that the location appears to have been used for shooting practice. The shaft associated with the mine has been filled in. Dates of site work unknown.
Unnamed Mine 3[3]	Unpatented	34.247477 -115.938533	Abandoned	Surface disruption and evidence of exploratory mining activity at this location are minimal. Dates of site work unknown.

Notes: BLM = Bureau of Land Management; site visit was conducted in September 2011); all unpatented claims in the south study area are closed (NAVFAC Southwest 2012).
Sources: [1]BLM 2008a; [2]MAGTF Training Command 2010b; [3]NAVFAC 2011

The south study area also contains alluvial sand and gravel that have potential for use as construction aggregate as described in Section 3.12.2. Currently, BLM makes sand and gravel resources on its lands available for use by communities and contractors through a contract sales process (BLM 2010a). No quarries or other signs of extraction of construction aggregate materials currently exist in the south study area.

Soils

Soil types in the south study area can be interpolated to be mostly those of alluvial fans. Soils in the south study area do not exhibit areas of significant disturbance relative to the west and east study areas.

Paleontological Resources

The potential for the south study area to contain paleontological resources is similar to that described above in Section 3.12.2 for the west study area; i.e., the south study area has alluvial fan deposits similar to those that have yielded fossils in other parts of the Mojave Desert. However, as with the west study area, whether fossils are present at any particular location is difficult to determine without a field survey.

3.12.3.4 East Study Area

Geologic Setting

A large playa (Bristol Dry Lake) and alluvial fans are the predominant geological features of the east study area. There are also a few granitic peaks of the Ship Mountains. There are many dry washes on the alluvial fans. The alluvial fans are about 800 feet (244 meters) MSL and the peaks rise to elevations of 2,000 feet (610 meters). Amboy Crater, a volcanic crater that last erupted about 10,000 years ago, is located on the western perimeter of the east study area (BLM 2008b). The western edge of the east study area overlaps the toe of the Amboy Crater lava flow.

Seismicity

The east study area encompasses multiple faults. The Bristol Lakes, Dry Lakes, and Calumet fault zones cross Bristol Lake (MWD and BLM 2001). The Cadiz Valley fault zone runs through the center of the acquisition study area, between Bristol Dry Lake and Cadiz Lake (MWD and BLM 2001). These four northwest trending, right lateral strike-slip faults are associated with the eastern boundary of the Eastern California Shear Zone District (MWD and BLM 2001). There are two unnamed normal faults (the land on one side of the fault appears to be offset vertically relative to the land on the other side) in the part of the acquisition study area that lies between Bristol Dry Lake and Cadiz Lake (USGS 2002a, 2002b). The Scanlon Thrust Fault passes adjacent to the southeastern boundary of the acquisition study area and the Scanlon Fault crosses the eastern "tip" of the acquisition study area (USGS 2002a, 2002b). Evidence of a concealed fault was found during drilling beneath Cadiz Dry Lake, suggesting the presence of concealed faults in the bedrock of this dry lake basin and beneath Bristol Dry Lake (USGS 2002a, 2002b). Most recent movement on the faults in the Bristol Lake-Cadiz Lake area occurred in early Pleistocene time (about 1.6 million years ago) (USGS 2002a). Therefore, the faults in the east study area would not be considered active according to the criteria established by the Alquist-Priolo Earthquake Fault Zoning Act that identify fault movement within the last 11,000 years as "active" (California Geological Survey 2007).

Mineral Resources

As shown on Figure 3.12-1, there is a high potential of occurrence for a number of mineral types in the east study area. Mining activity has taken place at the Bristol Lake Playa since 1908. Gypsum (calcium sulfate) was mined from open pit mines along the playa edge until the mid-1920s, and rock salt was mined from open pits until the 1970s. Four mining operations have produced minerals from Bristol Dry Lake: National Chloride, Hills Brothers, Coachella Valley Organic Fertilizers, and TETRA. Only two of these, TETRA and National Chloride are active.

TETRA produces 90,000 tons of liquid calcium chloride per year (Gresham *et al.* 2009). This mineral is used for fertilizer and as a roadway stabilizer (Gresham *et al.* 2009). Calcium chloride is also used as a cement additive, due to its ability to reduce the time needed for the concrete to set by up to two-thirds in cool and cold weather conditions (TETRA Technologies, Inc. 2010a). TETRA also produces 60,000 tons of granular sodium chloride (table salt) used for water softening and food processing (Gresham *et al.* 2009). Total production to date is estimated at 7 million tons (BLM 2008c).

TETRA uses solar evaporation to recover solid sodium chloride and liquid calcium chloride from brine pumped from groundwater wells drilled along the edge of the playa, and from a series of collection pits and trenches on the Bristol Lake playa (County of San Bernardino 2001). The brine solution is pumped to solar evaporation areas, where the solution concentrates, forming sodium chloride crystals that are scraped out. The evaporation areas are located in the former open pit mines along the western playa edge (BLM 2008c). Brines from the pits and trenches are combined with the liquid removed from the crystallizer and concentrated further to produce market-grade liquid calcium chloride (County of San Bernardino 2001). Both the solid sodium chloride and the liquid calcium chloride are shipped from the site in bulk quantities by truck and rail (County of San Bernardino 2001).

Along with its 2001 SMARA permit application, TETRA applied to the County of San Bernardino to expand its operation by improving existing, or adding more, collection wells and trenches within its BLM permit boundary (County of San Bernardino 2001). The potential duration of the chloride resources has not been determined, but past operating history and current operating conditions indicate that the TETRA chloride recovery operation at Bristol Lake should continue for the foreseeable future (County of San Bernardino 2001). TETRA's operations are contained within a 10,835-acre (4,384-hectare) site, with a total disturbed area of 4,792 acres (1,940 hectares) (County of San Bernardino 2001). New land disturbance proposed under the 2001 permit was to take place primarily within the established production/processing area. The natural playa lakebed at the site is unvegetated and has no topsoil layer (County of San Bernardino 2001).

National Chloride produces liquid calcium chloride and sodium chloride from the Bristol Lake playa lakebed deposits, also by solar evaporation from collection trenches. Production is in the range of 10,000 to 20,000 tons per year (County of San Bernardino 2008). As of 1990, National Chloride had approximately 9 miles (14 km) of collection trenches on Bristol Lake. The collection trenches are about 6 feet (2 meters) wide and 12 to 14 feet (4 to 5 meters) deep. Brine in groundwater that seeps into the ditches is gravity fed to a central sump, then pumped to evaporation ponds where it reaches the desired concentration. The evaporation ponds are 40 to 60 feet (12 to 18 meters) wide, 300 to 600 feet (90 to 180 meters) long, and about 3 feet (1 meter) deep (County of San Bernardino 2008). Water from two groundwater wells is pumped into the trenches to raise the brine levels and assist with collection during dry periods (County of San Bernardino 2008).

In 2008, the County of San Bernardino approved a 42-acre (18-hectare) expansion for National Chloride's operations at Bristol Lake, increasing the amount of disturbed acreage from 162 to 203 acres (65 to 83 hectares) within the 25,365-acre (10,264-hectare) site. The new production area was formerly used by another solar salt operation (Leslie Salt) and was completely disturbed (County of San Bernardino 2008). The expansion added 5.8 miles (9.3 km) of new collection ditches and new evaporation ponds 40 to 60 feet (12 to 18 meters) wide, 2,000 to 2,200 feet (610 to 670 meters) long, and 12 to 14 feet (4 to 5 meters) deep. The 1990 SMARA permit estimated the future life span of the National Chloride mine at Bristol Lake to be 60 years, i.e., 2050 (County of San Bernardino 2008).

Other minerals associated with the Bristol Lake Playa deposits include lithium and strontium. There is no known potential for the occurrence of coal, potassium minerals, geothermal resources, or oil and gas in the Bristol Lake sediments. Saleable mineral commodities such as clay and sand are found around the playa edge, but there is no market for these materials other than for local use as fill in the mining operations (BLM 2008c).

The abandoned America Mine gold mine is located at the edge of the Bullion Mountains adjacent to the America Mine Training Area (township 4 north, range 12). A cyanide milling process was used to extract gold from the ore excavated from the open pit mine. Ore tailing piles remain on the property. The

mining claim is patented, but the tailings piles may exceed the patented claim boundary (MAGTF Training Command 2010d). Reclamation status for this property is unknown. The abandoned Vulcan gold mine is located in the northern Ship Mountains (township 5 north, range 15 east, section 11). An open pit, sedimentation pond, and discarded equipment remain at the site (MAGTF Training Command 2010e).

Table 3.12-6 summarizes information readily available from BLM reports provided as part of the Application for Withdrawal and site visits to abandoned mines in the east study area.

Table 3.12-6. East Study Area Mine Summary

Mine	Claim Type	Location - Township/Range	Mine Status	Remarks
Tetra Technologies, Inc. (TETRA)[1,2,3]	Unpatented	Multiple holdings in Townships 4, 5 North and Ranges 11, 12, and 13. Bristol Dry Lake.	Active	The mine is currently producing 90,000 tons of calcium chloride and 60,000 tons of sodium chloride per year. Brine wells, collection trenches, pits, and settling ponds are located at the site. The mine has an estimated operating life to 2050.
National Chloride[4]	Unpatented	Township 4 and 5 North Range 12 and13 East Multiple sections Bristol Dry Lake.	Active	The mine is currently producing 10,000 to 20,000 tons per year of liquid calcium chloride and sodium chloride. Brine wells, collection trenches, pits, and settling ponds are located at the site. The mine has an estimated operating life to 2050.
America Mine[2,5]	Patented	Township 4 North Range 12 East Section 9	Abandoned	The ore type of this mine is unknown; it occurs as a lode deposit. Ore tailings piles possibly containing cyanide remain at the site, along with a tank and other debris. A total of 12 active claims (6 lode claims and 6 mill site claims) are associated with this site. The mine was active through 1980s, possibly until the 1990s.
Vulcan Mine[6]	Unpatented	Township 5 North Range 15 East Sections 11 and 15 in Ship Mountains, in the northeastern corner of the acquisition study area.	Abandoned	The primary ore is gold that occurs as a lode deposit. An open pit, mill pond made of plastic sheeting, and debris from possible cyanide milling equipment remain at the site.

Sources: [1]BLM 2008c; [2]BLM and U.S. Forest Service 2010; [3]Gresham *et al.*2009; [4]County of San Bernardino 2008; [5]MAGTF Training Command 2010d; [6]MAGTF Training Command 2010e.

The east study area also contains alluvial sand and gravel that have potential for use as construction aggregate as described in Section 3.12.2. Currently, BLM makes sand and gravel resources on its lands available for use by communities and contractors through a contract sales process (BLM 2010a). No quarries or other signs of extraction of construction aggregate materials currently exist in the east study area.

Soils

The predominant soil types in the east study area are expected to be those of playas and those of alluvial fan slopes. There are two highly disturbed areas of playa lakebed soils associated with TETRA and National Chloride mining operations; 4,792 acres (1,940 hectares) at TETRA and 203 acres (83 hectares) at National Chloride (County of San Bernardino 2001, 2008). Under existing conditions, per SMARA, reclamation of the TETRA mining lands would be completed within three years of termination of mining activity, and must adhere to the reclamation plan approved by the County of San Bernardino under Conditional Use Permit SMA/DS 881-160/00 issued to TETRA. During reclamation, buildings would be removed; collection ditches, storage ponds, and evaporation ponds would be refilled with native material that has been stored beside the excavations; and the natural topographic grade would be recreated at the reclaimed site. Revegetation would not take place because the disturbed areas are confined to the Bristol Dry Lake bed, which is naturally unvegetated due to lack of topsoil and a saline/brackish environment that does not support plant life (BLM 2008a). The BLM is not limited to the mitigation measures outlined in the County Conditional Use Permit and would also require certain mitigation measures as required according to BLM environmental review (BLM 2008c).

Per its SMARA permit, National Chloride does not have a reclamation schedule as such (County of San Bernardino 2008). At the time of reclamation, all collection trenches, storage ponds, and the gravel pit would be backfilled, all mining equipment would be removed, and the surface would be graded to natural lakebed contours (County of San Bernardino 2008). No vegetation would be planted on the site because none exists on the natural lake bed (County of San Bernardino 2008).

Soils in the east study area are utilized for agricultural purposes. Cadiz Inc. has produced a variety of crops on alluvial soils in the north-central portion of the east study area since the 1980s, including citrus fruits, vegetables, and grapes (Cadiz Inc. 2009a). The geology beneath the Cadiz agricultural operations forms a suitable location for groundwater recharge and storage (Cadiz Inc. 2009b). A Final Environmental Impact Report has been prepared for the Cadiz Groundwater Storage and Dry-Year Supply Program (MWD and BLM 2001). The proposed Cadiz groundwater project is described in Section 5.3, *Other Past, Present, and Reasonably Foreseeable Future Actions.*

Paleontological Resources

As described in Sections 3.12.2 and 3.12.3, Mojave Desert alluvial sediments in the Twentynine Palms-Yucca Valley vicinity have the potential to contain significant fossil remains (County of San Bernardino 2009b). Similar alluvial sediments are found in the east study area. Identifiable fossils were found in 23 of the 24 locations surveyed for the Cadiz Groundwater Storage and Dry-Year Supply Program on land in the east study area, documenting the presence of paleontological resources in the east study area alluvial deposits (MWD and BLM 2001).

3.13 WATER RESOURCES

3.13.1 Definition of Resource

This section describes water resources, including surface and subsurface water, within the Combat Center and adjacent proposed acquisition study areas. Surface water includes all lakes, ponds, rivers, streams, impoundments, and wetlands. Subsurface water, commonly referred to as groundwater, is typically found in aquifers, which consist of mostly high porosity alluvium or fractured rock where water can be stored within alluvium pore spaces or fractures. Water quality describes the chemical and physical composition of water as affected by natural conditions (e.g., erosion) and human activities (e.g., hazardous waste spills). Water budget refers to the recharge and extraction of water volumes from groundwater aquifers.

Key sources of information on existing water resources conditions include the REVA (Headquarters Marine Corps 2008), the installation's INRMP (MAGTF Training Command 2007), *Programmatic Environmental Assessment for Ongoing and Proposed Training Activities at the Marine Corps Air Ground Combat Center Twentynine Palms, California* (DoN 2003), assessment of water management strategies at Twentynine Palms (Li and Martin 2011), California Department of Water Resources (DWR) Bulletin 118 (last updated 2004), and the EIS for the West Mojave Plan (BLM 2004).

The area of potential effect for water resources includes all of the land area under MAGTF Training Command control and the proposed acquisition study areas.

3.13.2 Regulatory Framework

The Clean Water Act (CWA) of 1972 is the primary federal law that protects the nation's waters, including lakes, rivers, aquifers, and coastal areas. The primary objective of the CWA is to restore and maintain the integrity of the nation's waters. Jurisdictional waters of the U.S. are regulated resources and are subject to federal authority under Section 404 of the CWA. Waters of the U.S. are broadly defined to include navigable waters (including intermittent streams), impoundments, tributary streams, and wetlands. Areas meeting the waters of the U.S. definition are under the jurisdiction of the USACE.

Responsibility for the protection of water quality in California resides with the State Water Resources Control Board (SWRCB) and nine Regional Water Quality Control Boards (RWQCBs). The SWRCB establishes statewide policies and regulations for the implementation of water quality control programs mandated by federal and state water quality statutes and regulations. The RWQCBs implement the *State Porter-Cologne Water Quality Control Act* (PCWQCA) and the federal CWA. The PCWQCA is the principal law governing water quality in California. Under the PCWQCA, the SWRCB and the nine RWQCBs were established as statewide and regional water quality planning agencies, respectively. The PCWQCA requires the development of statewide and regional Water Quality Control Plans (Basin Plans) to protect the quality of surface water and groundwater. The SWRCB and RWQCBs are required to designate beneficial uses of surface waters and groundwater, establish water quality objectives to protect these beneficial uses, and develop implementation programs to meet the water quality objectives. The SWRCB and RWQCBs have permitting and enforcement authority to prevent and control waste discharges that could affect waters of the state through the issuance of National Pollutant Discharge Elimination System (NPDES) permits and Waste Discharge Requirements (WDR). The project site is located in the Colorado River Basin (Region 7) and therefore, subject to regulatory requirements of the Colorado River Basin RWQCB.

3.13.3 Existing Conditions

3.13.3.1 Surface Water

Surface Water Features

Annual precipitation in the region averages approximately 4 inches (10 centimeters), the majority of which occurs as a result of summer and early fall thunderstorms. Most of the runoff collects in streams and washes which flow to lakes or playas (seasonally wet lakebeds) that are otherwise dry during most of the year. The surface water features within the Combat Center and adjacent acquisition study areas include streambeds, dry washes, and playas (Figure 3.13-1). All naturally occurring, surface water features are ephemeral and contain water only during and after infrequent rain events.

Rainfall events are infrequent but they can be locally intense. During heavy rainfall events, water flows across the bedrock surface of the mountains into drainage channels that lead toward the basin floor. A small amount of the water flowing off the flanks of the mountains infiltrates across the bedrock-alluvial deposit interface, migrating through quaternary deposits to recharge deep aquifers. The ephemeral washes and playas fill with water during and after storm events. Some recharge to the groundwater might result from infiltration in these washes, but the infrequency of the storms and high evaporation rates in the area make this a minor contribution to the total groundwater recharge (see Section 3.13.3.4). The majority of the surface runoff ends up in the playas.

Playa soils are composed of fine clays that impede infiltration due to their low permeability. As a result, when playas are flooded with water, evaporation predominates over infiltration. However, some recharge to the shallow groundwater beneath the playas is likely to occur. Evaporation of playa waters results in precipitation of alkali salts at or near the surface of the playa (MAGTF Training Command 2007). Surface waters in lakes or playas can persist for periods of up to several weeks depending on the amount of rainfall and evaporation and percolation rates. Nevertheless, when surface waters are present, the playas represent important biological habitat and have been identified by the Combat Center as environmentally sensitive areas. Major floods are infrequent, occurring approximately once every 10 years, and typically are not severe enough to interrupt operations (MAGTF Training Command 2007; Headquarters Marine Corps 2008).

Runoff from the mountain ranges carries sand, gravel, cobbles, and even boulder-sized rocks as part of the bedload transport. Deposition of this bedload material across less steep terrain has resulted in the formation of alluvial fans commonly observed in this region (MAGTF Training Command 2007).

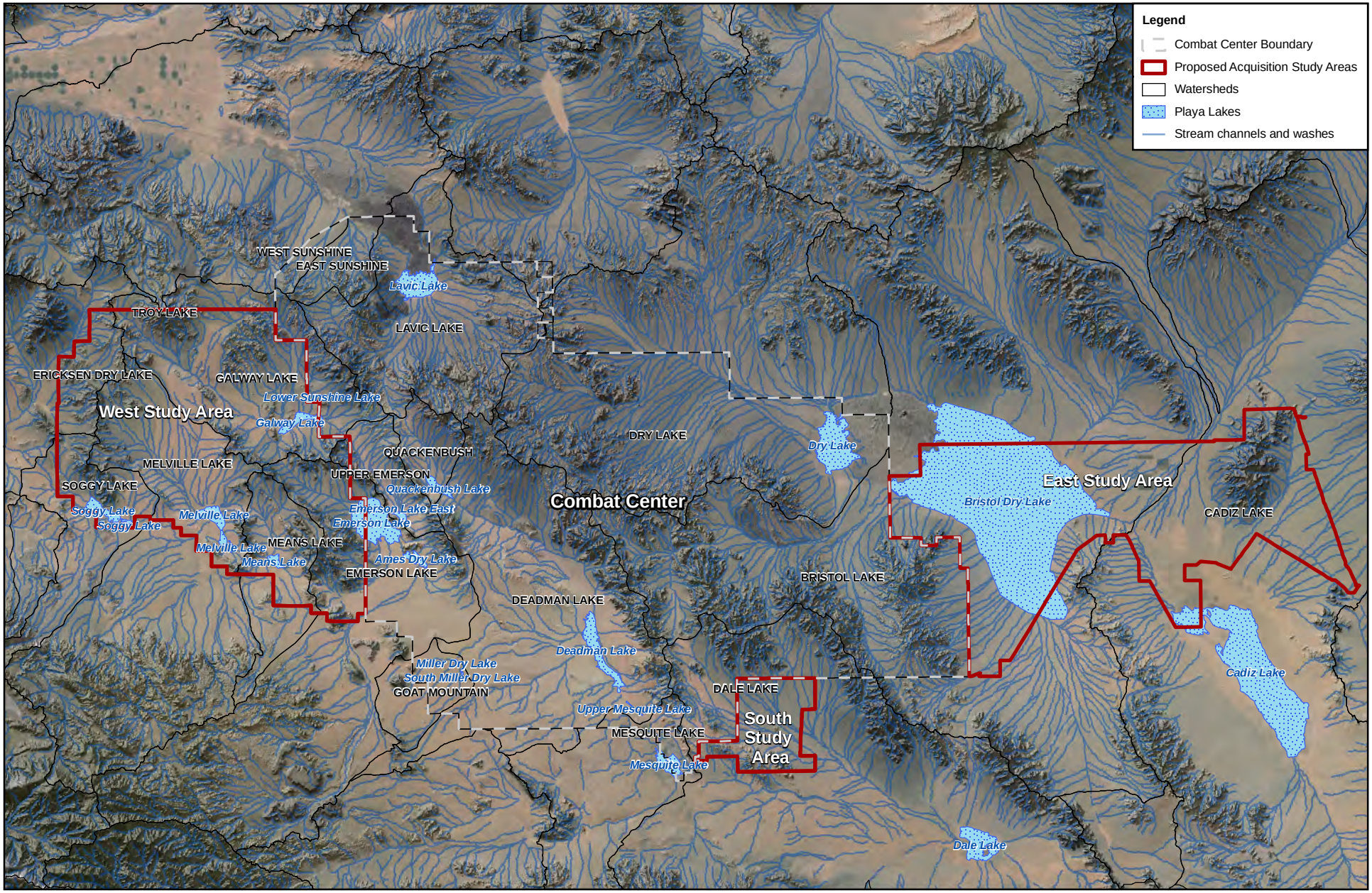


Figure 3.13-1
Surface Water Features

Source: MAGTF Training Command 2009, USDA 2008 California Watershed Boundary Dataset

Combat Center

The Combat Center overlies portions of 13 internally-draining watersheds (closed basins) characterized by stream channels that terminate at playas (Figure 3.13-1). Only one of these watersheds (Quackenbush Lake watershed, see below) is entirely within Combat Center boundaries. The larger watersheds are: Dry Lake, Bristol Lake, Deadman Lake, Lavic Lake, and Dale Lake. The Dry Lake watershed is 130,000 acres (52,600 hectares), comprising the largest drainage area within the northwest portion of the Combat Center. This drainage area contains numerous stream channels that drain to dry washes and eventually to the Dry Lake playa. The Deadman Lake watershed is 125,000 acres (50,600 hectares) and includes much of the western portion of the Combat Center; it consists of a network of intermittent streams that flow to Deadman Lake playa, approximately 4 miles (6 km) northwest of Mainside. The Bristol Lake watershed is 100,000 acres (40,500 hectares), comprising a network of intermittent streams flowing easterly and northerly into Bristol Dry Lake playa. The Lavic Lake watershed covers 76,500 acres (31,000 hectares) located in the northwest corner of the Combat Center. It consists of a stream network that flows into Lavic Lake playa. The Dale Lake watershed is 33,000 acres (13,400 hectares), consisting of a network of streams that primarily flow southward and eventually into Dale Lake playa. Dale Lake is located 18 miles (29 km) southeast of the Combat Center, although a portion of the drainage flows eastward into Cleghorn Lake playa, which is outside of the Combat Center boundary in the BLM Cleghorn Lakes Wilderness Area. Quackenbush Lake watershed covers 12,800 acres (5,200 hectares) on the western side of the Combat Center, and lies entirely within the Combat Center boundary (see Figure 3.13-1). Streams within this watershed drain into Quackenbush Lake playa (Headquarters Marine Corps 2008). The Mainside portion of the Combat Center is located in the Mesquite Lake watershed.

A 1994 waters of the U.S. study by USACE identified several types of "wet areas" that are of special concern at the Combat Center, including playa lakes, dry washes, seeps and springs, and man-made water bodies. Each of these resources is important, even though, with the exception of some man-made water bodies, they are ephemeral in nature (DoN 2003). The 1994 USACE study identified 11 important playas that are entirely or partially in the Combat Center: Lavic Lake, Galway Lake, Emerson Lake, Little Emerson Lake, Ames Dry Lake, Quackenbush Lake, Miller Dry Lake, South Miller Dry Lake, Deadman Lake, Dry Lake (Lead Mountain), and Mesquite Lake. These playas have a combined surface area of 7,674 acres (3,100 hectares). The playas maintain intra/inter-ecosystem integrity and were settings for prehistoric cultural activities. Following rain events, when surface waters are present, playas attract wintering waterfowl, whereas, when dry, playas are often populated by terrestrial birds and mammals where adequate vegetative cover exists (DoN 2003).

There are no known perennial springs within the Combat Center. However, there are two intermittent springs: the Surprise Spring in the Deadman Lake watershed and an unnamed spring at the northwest boundary of the Lavic Lake watershed. Surprise Spring was a historically important source of surface water, but it no longer flows due to groundwater pumping. Seasonal seeps are located in the Imperial Lode mining area and Lead Mountain area (MAGTF Training Command 2007). Seeps and springs are a valuable biological resource, particularly when standing or flowing water is available for wildlife.

Man-made water bodies at the Combat Center include stormwater retention ponds to the northeast of Mesquite Lake (Mainside) and golf course ponds. None of these man-made waters are regulated under Section 404 of the CWA. Man-made water bodies are utilized by wildlife, most often migrating birds (MAGTF Training Command 2007).

West Study Area

The west study area includes the following watersheds and playas: the Galway Lake watershed is 57,700 acres (23,300 hectares) and drains into the Galway Lake playa; the Melville Lake watershed is 47,100 acres (19,100 hectares) and drains into the Melville Lake playa; the Means Lake watershed is 19,400 acres (7,850 hectares) and drains into the Means Lake playa; the Soggy Lake watershed is 15,200 acres (6,150 hectares) and drains into the Soggy Lake playa; and the Ericksen Dry Lake watershed is 14,500 acres and drains into the Ericksen Dry Lake playa located outside of the acquisition study area (see Figure 3.13-1). Similar to conditions within the Combat Center, surface water features within the west study area consist of ephemeral streams and dry lake beds. Annual precipitation averages 4 to 8 inches (10 to 20 centimeters). The USGS has not mapped any springs, seeps, or man-made water features within the west study area.

East Study Area

The east study area is entirely within the Bristol Lake and Cadiz Lake watersheds (see Figure 3.13-1). The east study area includes 94,800 acres (38,400 hectares) of the Bristol Lake watershed which drains into Bristol Dry Lake. The east study area includes the majority of Bristol Dry Lake with 48,000 acres (19,400 hectares) of the lakebed located within the acquisition study area. The east study area also includes 66,100 acres (26,700 hectares) of the Cadiz Lake watershed which drains into Cadiz Dry Lake. The northwest corner of Cadiz Dry Lake is included in the east study area. Similar to conditions within the Combat Center, surface water features within the east study area consist of ephemeral streams and dry lake beds (Bristol Dry Lake and Cadiz Dry Lake). The average annual precipitation at Bristol Dry Lake is 3.6 inches (9 centimeters). The USGS has not mapped any springs, seeps, or man-made water features within the east study area.

South Study Area

The south study area is entirely within the Dale Lake watershed, overlying 19,400 acres (7,850 hectares) of the watershed (see Figure 3.13-1). Surface water features consist of a network of ephemeral streams that primarily flow southward and eventually into Dale Lake, located outside of the acquisition study area. The USGS has not mapped any springs, seeps, or man-made water features within the south study area.

Water Quality

No information is available on existing water quality conditions associated with intermittent wet areas (washes and playas) at the Combat Center. It is likely that water quality for intermittent flows is influenced by the amounts of suspended sediment and/or dissolved salts, which are expected to vary for different substrate types, such as bedrock, alluvial fans, and playa surfaces. Surface water quality also may be affected locally by runoff from historic mining operations – including metals such as iron, lead, and copper – that occurred historically on BLM-administered lands that are within the proposed acquisition study areas (BLM 2008).

Since 1996, MAGTF Training Command has been conducting a program to eliminate all industrial stormwater discharges to desert playas. All treated, domestic wastewater is disposed of through solar evaporation or irrigation within the boundaries of the Combat Center, as regulated by the RWQCB. Wastewater from treatment facilities and stormwater runoff are collected in separate retention ponds. The retention ponds do not have impermeable synthetic liners; however, the impermeable clay cap on the Mesquite Lake bed effectively prevents percolation (MAGTF Training Command 2007). The retention ponds include:

- Two ponds (12 million gallon capacity) near the golf course that store recycled water for golf course irrigation.
- Three active retention ponds are located at the Mainside Wastewater Treatment Plant. Overflow from these ponds enters four storage ponds that retain water during winter for summer use. The seven ponds associated with the Treatment Plant cover about 40 acres (16 hectares).

The MAGTF Training Command has a SWPPP that meets the requirements of the California Non-Point Source Pollution Control Plan. This program uses a series of stormwater conveyance and retention systems that avoid discharges of potentially polluted stormwater to the environment. For example, a primary stormwater retention pond is used to contain civilian industrial runoff (e.g., from a gas station and an automobile hobby shop) and incorporates a wildlife viewing area for educational purposes. Three other industrial stormwater retention ponds that are used to contain runoff from military-related areas are generally dry except after significant precipitation. Additionally, Camp Wilson has a stormwater retention basin (MAGTF Training Command 2007). Other stormwater control systems include settling basins to trap sediment that would otherwise flow into Mesquite Lake.

The recent REVA (Headquarters Marine Corps 2008) provided a screening level assessment of the potential for release of MC from the existing operational ranges or range complex areas at the Combat Center to human and sensitive wildlife in off-site areas. The assessments were based on modeling the behavior and fate of the indicator constituents TNT, HMX, RDX, and perchlorate. Lead is another component of small arms ammunition, but it could not be modeled due to lack of site-specific geochemical data. The REVA concluded that MC can migrate from the range training areas via dissolution and transport in periodic surface water flows and eventually deposit and accumulate within the playas. Leaching to groundwater and subsequent transport via groundwater flow was considered highly unlikely due to high evaporation, low percolation rates, and deep groundwater. The greatest potential for off-base transport of MC is from the Lead Mountain area to Bristol Dry Lake and from the Prospect area to Dale Lake. The REVA only considers potential receptors outside Combat Center range boundaries. The Basin Plan does not provide regulatory criteria for MC, and there are no documented uses of either Bristol Dry Lake or Dale Lake. Nevertheless, the predicted concentrations of some MC exceeded the REVA trigger levels[9] at the edge of the loading areas and/or at the playas. However, predicted levels were substantially below toxicity thresholds for sensitive indicator species. The REVA also concluded that lead from small-arms ammunition represented minimal environmental concern due to the low precipitation rate, long distance between ranges and intermittent receiving surface water bodies, and deep groundwater, which limit lead migration and potential impacts (Headquarters Marine Corps 2008).

[9] Range Environmental Vulnerability Assessment Trigger Values are screening level values to which modeling results are compared to determine whether additional actions are needed. The REVA Trigger Values are based on the median value of compiled method detection limits (MDLs) from various laboratories. The USEPA defines an MDL as "the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero." Detection above an MDL simply indicates that the constituent is present in a sample analyzed by the laboratory, not that there is an immediate health concern. If REVA trigger values indicate a need for additional study, samples are compared to DoD Range and Munitions Use Screening Values. These values were developed based on existing state and USEPA guidelines to promote consistency across the services' operational range assessment program.

Beneficial Uses

The Basin Plan for the Colorado River Basin Region identifies beneficial uses for surface waters in the vicinity of the project site and describes the water quality that must be maintained to support those uses (RWQCB 2006). Beneficial uses for the general category of washes (ephemeral streams) in the West Colorado River Basin, including the Combat Center and proposed acquisition study areas, are intermittent uses for the following: groundwater recharge, wildlife habitat, and non-contact recreation (REC II). None of the surface waters in the vicinity of the project site are on the 2008 draft 303(d) list and none of the beneficial uses are considered impaired.

3.13.3.2 Groundwater

Groundwater at the Combat Center and adjacent acquisition study areas occurs in alluvium-filled basins that are separated by faults and bedrock outcrops. The bedrock uplands are virtually non-water-bearing (Riley *et al.* 2001). Under predevelopment conditions, perennial springs, such as Surprise Spring, discharged at the land surface as a result of faults that acted as partial barriers to groundwater flow (Londquist and Martin 1991).

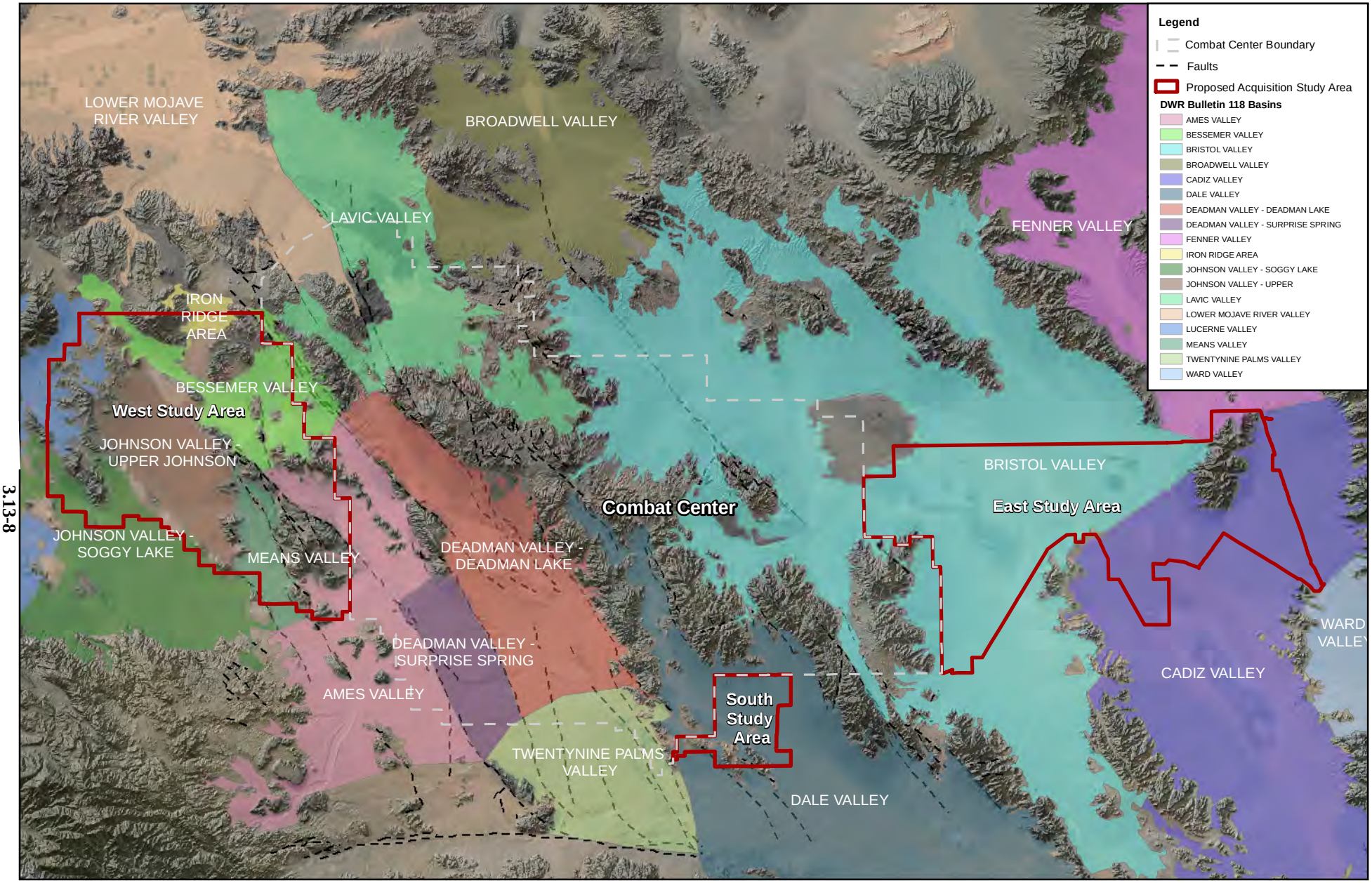
The groundwater basin boundaries and descriptions presented in the following sections were adopted by the California DWR in the 2004 update of Bulletin 118 on California's groundwater (DWR 2004) (Figure 3.13-2). Other studies before 2004 in this area have resulted in evolving boundaries and the naming of basins and subbasins that are not always consistent with Bulletin 118 boundaries. For example, the USGS (Stamos *et al.* 2004) referred to a groundwater basin in the western portion of the project area as the Morongo groundwater basin and subdivided it into numerous subbasins. The most recent USGS subbasin boundaries are included for comparison to DWR basin boundaries as well as the subareas of the adjudicated Mojave Basin Area (Figure 3.13-3).

Combat Center

The groundwater basins within or partially within the Combat Center boundary include Deadman Valley (Surprise Spring and Deadman Lake subbasins), Twentynine Palms Valley, Bristol Valley, Ames Valley, Lavic Valley, and Dale Valley, as detailed below.

Deadman Valley Basin – Surprise Spring Subbasin

Groundwater in the Surprise Spring subbasin flows from recharge areas near the end of Pipes Wash towards discharge areas at Surprise Spring near the Surprise Spring Fault (Londquist and Martin 1991). The Surprise Spring Fault is a barrier to groundwater flow and, under predevelopment conditions, water discharged at the land surface in this area. The depth to groundwater in the Surprise Spring subbasin ranges from 200 feet to over 400 feet (60 meters to 120 meters) below ground surface (bgs) (USGS 2003). Groundwater levels have declined more than 190 feet (58 meters) as a result of pumping since the 1950s and groundwater no longer discharges at the land surface (Li and Martin 2011). The alluvial deposits can be divided into upper and lower aquifers. The upper aquifer is unconfined and consists of unconsolidated sands with moderately high permeability, whereas the lower aquifer is confined and consists of consolidated sediments of low permeability. The groundwater from the Surprise Spring subbasin, which is used for potable water supply, is from the unconfined portions of the upper aquifer (Li and Martin 2011).



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Figure 3.13-2
Department of Water Resources Groundwater Basins

Source: Groundwater basins from DWR 2004 Bulletin 118, and faults from MAGTF Training Command 2009.

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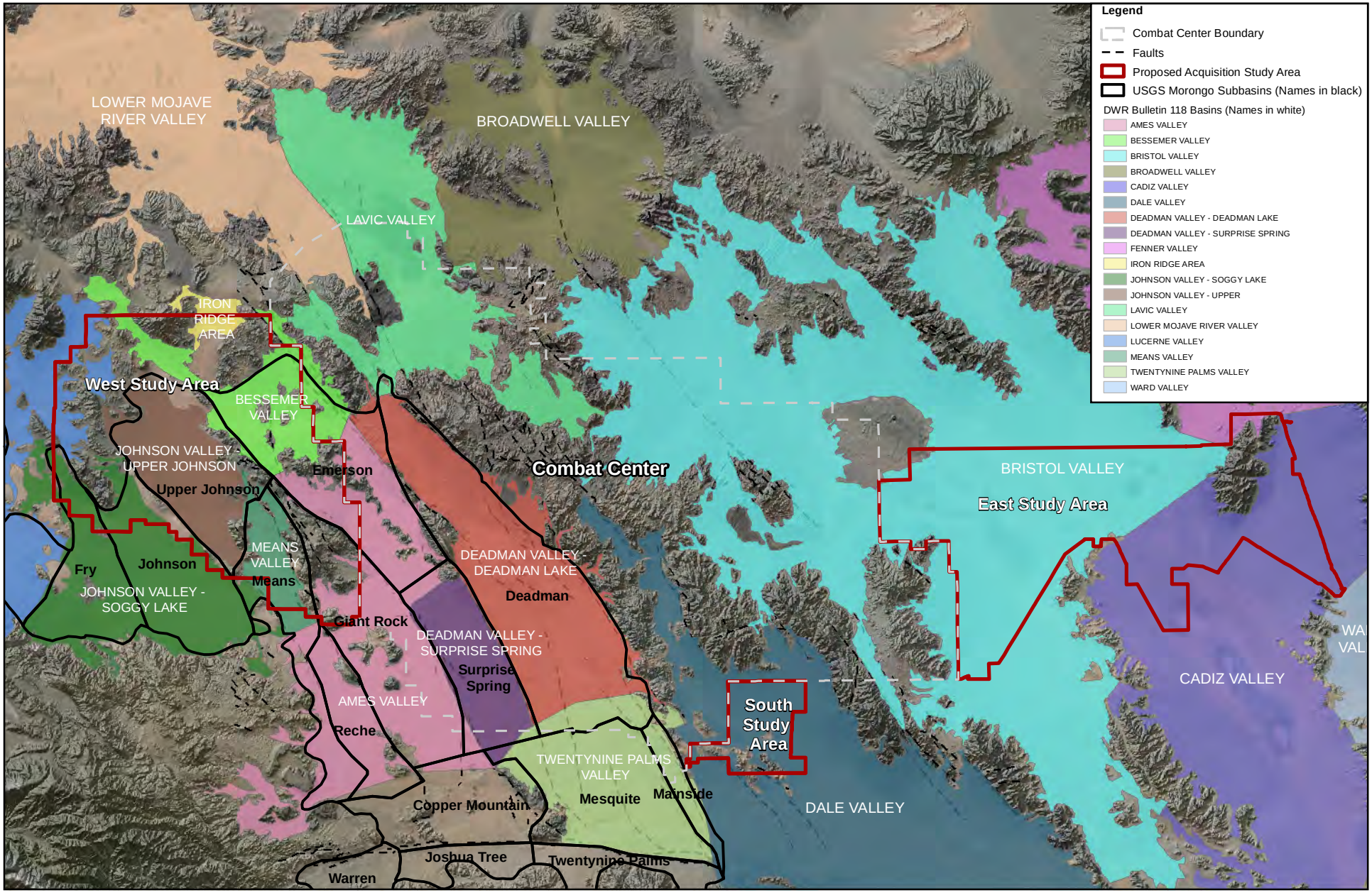


Source: USGS subbasins from MAGTF Training Command 2009, DWR basins from DWR 2004 Bulletin 118

Figure 3.13-3
USGS Morongo Subbasins

Groundwater within the Surprise Spring subbasin is the primary source of potable water for the Combat Center. While it does not have a sole source designation, Surprise Spring would meet the criteria of sole source aquifer by providing over 50% of the water to the community (Combat Center). The sole source designation is meant to be used by communities to help prevent contamination of groundwater from federally-funded projects, and designations typically come from the local communities. Because only the military pumps from Surprise Spring, it is unlikely that a sole source designation would be requested. The Surprise Spring groundwater wells are located in a Restricted Area of the Combat Center where mechanized maneuvers, OHVs, and training using vehicles are not permitted. The Surprise Spring subbasin contains fossil water dated to be approximately 5,000 years old (Izbicki and Michel 2004). The primary source of recharge to Surprise Spring subbasin is subsurface flows from the adjacent Ames Valley Groundwater basin. The quality of groundwater in the Surprise Spring subbasin varies, but groundwater from the southern portion of the basin, where the Combat Center production wells are located, has total dissolved solids (TDS) concentrations from 159 to 210 milligrams per liter (mg/L) and meets criteria established under the Safe Drinking Water Act and associated amendments (DWR 2004). However, groundwater from the lower aquifer of the Surprise Spring subbasin contains relatively higher TDS, fluoride, and arsenic concentrations than those of the upper aquifer (Li and Martin 2011).

Deadman Valley Basin – Deadman Lake Subbasin

The Deadman Lake subbasin groundwater is not potable and does not meet drinking water standards due to high concentrations of fluorides, sulfates, and boron. However, groundwater from this subbasin can be utilized for landscaping and other non-consumptive uses. Measurements of the water level in wells indicated a southward flow from the Deadman Lake area into Twentynine Palms Valley basin (DWR 2004).

Twentynine Palms Valley Basin

The Twentynine Palms Valley Groundwater Basin (also known as the Mesquite and Mainside subbasins by the USGS [Londquist and Martin 1991]) includes the water-bearing sediments below Mesquite Lake and the City of Twentynine Palms. This basin contains water that exceeds federal limits for concentrations of sulfates, fluorides, and TDS. Water quality in this basin, primarily a sodium sulfate type, is inferior to water from both the Surprise Spring and Deadman Lake subbasins. The Combat Center utilizes the non-potable groundwater from the Mainside subbasin for golf course irrigation. South of the Combat Center, Twentynine Palms Water District (TPWD) pumps groundwater from the Mesquite subbasin. Twentynine Palms Water District plans to increase groundwater pumping in the future and treat the high fluoride levels to reduce the groundwater overdraft in the Joshua Tree Basin, where they currently pump the majority of their water (TPWD 2008). The Twentynine Palms Basin groundwater also supports mesquite trees near the ecologically sensitive Mesquite Dry Lake (Li and Martin 2011).

Bristol Valley Basin West of Bristol Lake

The Bristol Valley Basin west of Bristol Lake is located northeast of the Bullion Mountains. Groundwater exists in unconsolidated, upper and lower alluvial deposits. The upper and lower aquifers are separated by a discontinuous layer of silt and clay (DWR 2004). Depths to groundwater typically range from 125 to 200 feet bgs (38 to 61 meters), although perched zones exist near Bristol Dry Lake and Dry Lake, where water levels range from 14 to 89 feet bgs (4 to 27 meters). Recharge is from percolation of surface runoff through stream beds and washes. Groundwater moves towards Bristol Lake, where groundwater elevations are close to the ground surface. Koehler (1983) estimated that 640,000 acre-feet (AF) (789,000 megaliters [ML]) of water is stored in the alluvium west of the Ludlow fault, which runs diagonally through the Bristol Valley Basin west of Bristol Lake. (An AF is a unit of volume equal to an

area of 1 acre with a depth of 1 foot and is equivalent to 325,851 gallons. As a rule of thumb, 1 AF is considered a typical annual water consumption rate for a suburban family household, whereas a household in an arid desert region may use 0.25 AF annually.) However, there are no drinking water wells in this portion of the Combat Center because groundwater quality does not appear to be suitable for human consumption due to the high TDS, chloride, and arsenic concentrations.

Ames Valley Basin

The eastern portion of the Ames Valley Basin is within the Combat Center boundary. Groundwater in this basin flows eastward from the San Bernardino Mountains to the Emerson Fault and into the Surprise Spring subbasin and northeast toward Emerson (dry) Lake (Mendez and Christensen 1997). Groundwater quality is good, with TDS levels generally below 500 mg/L and no elevated concentrations of other constituents of concern. Ames Valley basin is a source of potable water for 8,300 individuals living in the Johnson and Ames Valley, southwest of the Combat Center (Kennedy/Jenks/Todd LLC 2007).

Dale Valley Basin

The Combat Center includes the northern portions of the Dale Valley Groundwater Basin. This basin is bounded by nonwater-bearing rocks of the Bullion Mountains to the north, Pinto Mountains to the south, Sheephole Mountains to the east, and the Mesquite fault to the west. Groundwater moves toward Dale Lake in the southeastern part of the valley. Analyses of water from 11 wells in the basin show an average TDS content of 53,457 mg/L with a range of 1,218 to 332,000 mg/L. The water quality in this basin is generally unsuitable for domestic and agricultural uses. Total dissolved solids and fluoride concentrations impair domestic use, and boron and sodium concentrations impair agricultural use of groundwater in this basin (DWR 2004).

Lavic Valley Basin

This groundwater basin underlies Lavic Valley in central San Bernardino County. The basin is bounded by nonwater-bearing rocks of the Cady Mountains on the north and east, the Bullion Mountains on the south and east, the Lava Bed Mountains on the southwest, and the Pisgah fault on the west. Total dissolved solids concentrations in groundwaters range from 278 to 1,721 mg/L. Water at one well in the basin also exceeds drinking water standards for sulfate and chloride content (DWR 2004). The water quality in this basin is generally unsuitable for domestic and agricultural uses.

<u>West Study Area</u>

Regionally, the City of Twentynine Palms relies on groundwater to meet its municipal water supply needs. Except where perched water exists in some locations as a result of regional faulting, the depth to groundwater in the region is typically at least 200 feet below ground surface (RWQCB 2009). As a purveyor of drinking water, the Twentynine Palms Water District is required to meet maximum contaminant level (MCL) water quality standards established by U.S. EPA. Elevated arsenic concentrations in drinking water due to background arsenic have been reported in some regional production wells. On January 22, 2001 U.S. EPA adopted a new MCL for arsenic in drinking water of 10 parts per billion (ppb), replacing the previous standard of 50 ppb. The rule became effective on February 22, 2002. Systems were required to comply with the new 10 ppb standard by January 23, 2006.

Based on data from Twentynine Palms Water District supply wells sampled prior to 2006 (RWQCB 2009), the average concentration of arsenic was 10.27 ppb. Arsenic concentrations in the 12 production wells sampled ranged from less than method detection limit to 31 ppb. To meet the new rule standards, three supply wells were taken offline and one well was outfitted with a wellhead treatment system which

reduces arsenic concentrations from approximately 15-16 ppb influent to 5-6 ppb effluent (Twentynine Palms Water District 2011).

The main water-bearing materials in the west study area are alluvial deposits that are part of the Johnson Valley Basin, Means Valley Basin, Ames Valley Basin, Bessemer Valley Basin, and the Este Subarea of the Adjudicated Mojave Basin Area. The principal source of recharge to these basins is infiltration of runoff from the surrounding mountains in the washes and alluvial fans.

The Mojave Water Agency was created by High Desert voters in 1960 to serve as a special act water agency that provides wholesale water within its boundaries (from the State Water Project). The Agency, in cooperation with other water districts, is responsible for managing the region's water resources to ensure a sustainable supply of water for present and future use. In addition, the Mojave Water Agency is the court-appointed Watermaster for the Mojave River Basin adjudication. The Bighorn Desert View Water Agency provides domestic and retail water service within the communities of Johnson Valley, Flamingo Heights, and Landers. The agency is developing plans in conjunction with the Mojave Water Agency to recharge water to the groundwater basin.

Johnson Valley Basin

Northwest-trending faults divide this basin into two subbasins referred to by DWR as Upper Johnson and Soggy Lake. The USGS further divides the Soggy Lake subbasin into the Fry and Johnson subbasins. The west study area includes the Upper Johnson subbasin and small portions of the northern parts of the Soggy Lake subbasin. Groundwater generally flows from southern recharge areas to the north toward the groundwater basin discharge areas at the Means Valley Groundwater Basin and Melville and Soggy dry lakes. Groundwater leaves the basin as subsurface outflow and evaporation beneath the dry lakes. Total dissolved solids concentrations in the Upper Johnson subbasin within the west study area are up to 3,000 mg/L (DWR 2004), whereas TDS concentrations in the southern portion of the Johnson Valley basin south of the west study area are less than 500 mg/L (Kennedy/Jenks/Todd LLC 2007).

Means Valley Basin

The Means Valley Basin is located between Johnson Valley and Ames Valley basins. The alluvial sediments are less than 500 feet (150 meters) thick and much thinner in the southern portion of the basin. Natural recharge occurs from runoff from the adjacent mountains, which percolates in the Means Wash to the groundwater. Recharge from precipitation that falls directly on the basin is considered negligible. Groundwater generally flows from the southern recharge area to the north where it evaporates from Means Dry Lake. The basin is characterized by relatively poor water quality (Kennedy/Jenks/Todd LLC 2007).

Ames Valley Basin

A small portion of the northern part of the Ames Valley Basin is within the west study area. Groundwater in this basin flows eastward from the San Bernardino Mountains to the Emerson Fault and into the Surprise Spring subbasin and northeast toward Emerson (dry) Lake (Mendez and Christensen 1997). Groundwater quality is good, as represented by TDS concentrations generally below 500 mg/L.

Bessemer Valley Basin

The west study area contains most of the Bessemer Valley Basin. This basin is bounded by nonwater-bearing rocks of the Iron Ridge Mountains on the north and bedrock highlands on the south, and by the West Calico fault on the east and the Emerson fault on the west (Rogers 1967). Water quality of the basin is unknown (DWR 2004).

Este Subarea of the Adjudicated Mojave Basin Area

The western edge of the west study area includes part of the Este Subarea of the Mojave Basin Area. This area was adjudicated in 1996 in the Mojave Basin Judgment. The Judgment assigned Base Annual Production quotas to each producer using 10 AF per year (12 ML per year) or more, based on historical production. Users are assigned a variable Free Production Allowance (FPA), which is a uniform percentage of Base Annual Production set for each subarea. This percentage is reduced, or "ramped-down" over time until total FPA comes into balance with available supplies. This percentage was set at 70% for most subareas as of June 2003. Any water user that pumps more than their FPA is compelled to purchase replenishment water from Mojave Water Agency equal to the amount of production in excess of the FPA. Water levels in Este have remained stable for the past several years, indicating a relative balance between recharge and discharge.

East Study Area

The east study area includes portions of the Bristol Valley and Cadiz Valley Groundwater basins. It also includes portions of Cadiz Inc. landholdings. Cadiz Inc., a publicly-traded corporation, proposes to use the property to develop the Cadiz Valley Water Project that would conserve water evaporated from Cadiz and Bristol Dry Lakes and extract it for delivery to southern California water agencies. In Phase II of the project, the basin would be recharged with imported water from Colorado River water during wet years and would be extracted down gradient during drought years (Cadiz Inc. 2011).

Bristol Valley East of Bristol Lake and Cadiz Valley Groundwater Basins

Groundwater in the Bristol and Cadiz Valley Basins flows from Fenner Valley through Fenner Gap then southwest to Bristol Lake and south to Cadiz Lake. The Fenner Valley watershed is the principal source for groundwater recharge to the area through the Fenner Gap. The aquifer in these basins is divided into an upper aquifer consisting of sands and gravels that reach 600 feet (180 meters) thick, and a lower aquifer containing a higher proportion of fine material which is generally less permeable than the upper aquifer. Wells in the Fenner Gap area of the basin yield 1,000 to 3,000 gallons per minute (gpm) (3,800 to 11,300 liters per minute). Wells in other portions of the Cadiz Valley Groundwater Basin yield as much as 167 gpm (630 liters per minute). With the exception of the areas underlying and adjacent to Bristol Lake and Cadiz Lake, the quality of the groundwater in the Fenner Gap area is relatively good, with TDS concentrations averaging approximately 300 mg/L. Brines containing calcium and sodium chloride occur in the playa sediments beneath Bristol Dry Lake. A commercial mining operation drains the brines and harvests the salts (BLM 2008).

South Study Area

Water-bearing materials in the south study area are part of the Dale Valley Basin.

Dale Valley Basin

Groundwater conditions are expected to be similar to those in the Bristol Valley and Twentynine Palms basins, with the general exceptions that the water-bearing deposits may be comparatively thinner in proximity to bedrock deposits and average groundwater elevations may be shallower (Headquarters Marine Corps 2008). Groundwater recharge is primarily from infiltration of runoff from the slopes of the surrounding mountains and under-flow of groundwaters past the Mesquite fault to the west. Groundwater moves toward Dale Lake in the southeastern part of the valley. Analyses of water from 11 wells in the basin show an average TDS content of 53,457 mg/L with a range of 1,218 to 332,000 mg/L. Total dissolved solids and fluoride concentrations impair domestic use, and boron and sodium concentrations impair agricultural use in this basin (DWR 2004).

Groundwater Quality

Measurements of groundwater quality at the Combat Center have been conducted by the USGS since the 1950s; data are stored in the USGS National Water Inventory System (NWIS) database. As discussed above for the individual groundwater basins or subbasins, groundwater quality varies throughout the region, as characterized primarily by concentrations of TDS, fluoride, arsenic, boron, sodium, and chromium from natural sources. The magnitude of the constituent concentrations affects the potability of the water. High concentrations of chromium occur naturally in aquifers throughout the western Mojave Desert, including the lower aquifer system underlying the Surprise Spring area (Ball and Izbicki 2004). Hexavalent chromium concentrations up to 22 micrograms per liter (µg/L) were reported in groundwater from the lower Surprise Spring aquifer, which may reflect the high chromium concentrations in the alluvium deposits that comprise the lower aquifer (Ball and Izbicki 2004). Perchlorate has been detected in several water supply wells and in the Combat Center water treatment system equalization tanks at concentrations up to 0.47 µg/L. The source of the perchlorate is unknown; however, based on directions of groundwater flow in the region, it is unlikely that perchlorate is from live-fire areas on the Combat Center (Headquarters Marine Corps 2008). Mines in the area contain sulfide within the mineral deposits. Under the right conditions, sulfide materials undergo reactions with water and microorganisms to oxidize the sulfide into sulfuric acid which forms Acid Mine Drainage. The dry arid environment of the Mojave Desert, coupled with the limited amount of groundwater flows, poses a very low risk of conditions that may cause Acid Mine Drainage or affect groundwater quality in the area.

Beneficial Uses

The Basin Plan for the Colorado River Basin Region identifies beneficial uses for groundwaters in the vicinity of the project site and describes the water quality that must be maintained to support those uses (RWQCB 2006). The beneficial uses for groundwater in the hydrologic units associated with the Combat Center and proposed acquisition study areas are shown in Table 3.13-1. The three categories of beneficial uses are municipal, industrial, and agricultural.

Table 3.13-1. Beneficial Uses of Groundwater in the Colorado River Basin – Lucerne Valley Planning Area.

Hydrologic Unit	MUN	IND	AGR
Lucerne	X	X	X
Johnson	X	X	X
Bessemer			
Means	X		
Emerson	X		X
Lavic			
Deadman	X		
Joshua Tree	X	X	
Dale	X	X	X
Bristol	X	X	X
Cadiz	X	X	
Ward	X		X

Notes: MUN = municipal; IND = industrial; and AGR = agricultural
Source: RWQCB 2006.

3.13.3.3 Imported Water

Water that originates from one hydrologic region and is transferred to another hydrologic region is defined as imported water. The nearest imported water facilities are the Morongo Pipeline that delivers

imported State Water Project water for the Mojave Water Agency and the Colorado River Pipeline that transports imported water from the Colorado River (Figure 3.13-4).

Combat Center

The Combat Center obtains all potable water from an on-base source of groundwater and does not import water from other sources.

West Study Area

Water is not currently imported into the west study area. The Morongo Basin Pipeline is located south of the west study area and currently delivers State Water Project water for the Mojave Water Agency to the Hi-Desert Water District to recharge the Warren subbasin. The Morongo Basin Pipeline has the capacity to deliver imported water to the benefit of Bighorn-Desert View Water Agency, Joshua Basin Water District, and County of San Bernardino special districts (see Figure 3.13-4). To date no imported water deliveries have been made to these agencies by Mojave Water Agency (Kennedy/Jenks/Todd LLC 2007). The TPWD does not receive imported water.

East Study Area

There is no existing use of imported water in the east study area. The east study area includes portions of Cadiz Inc. landholdings. Cadiz Inc. proposes to use their property for a conjunctive use project that would recharge the basin with imported water from the Colorado River water during wet years and extract it down-gradient during drought years (Cadiz Inc. 2011).

South Study Area

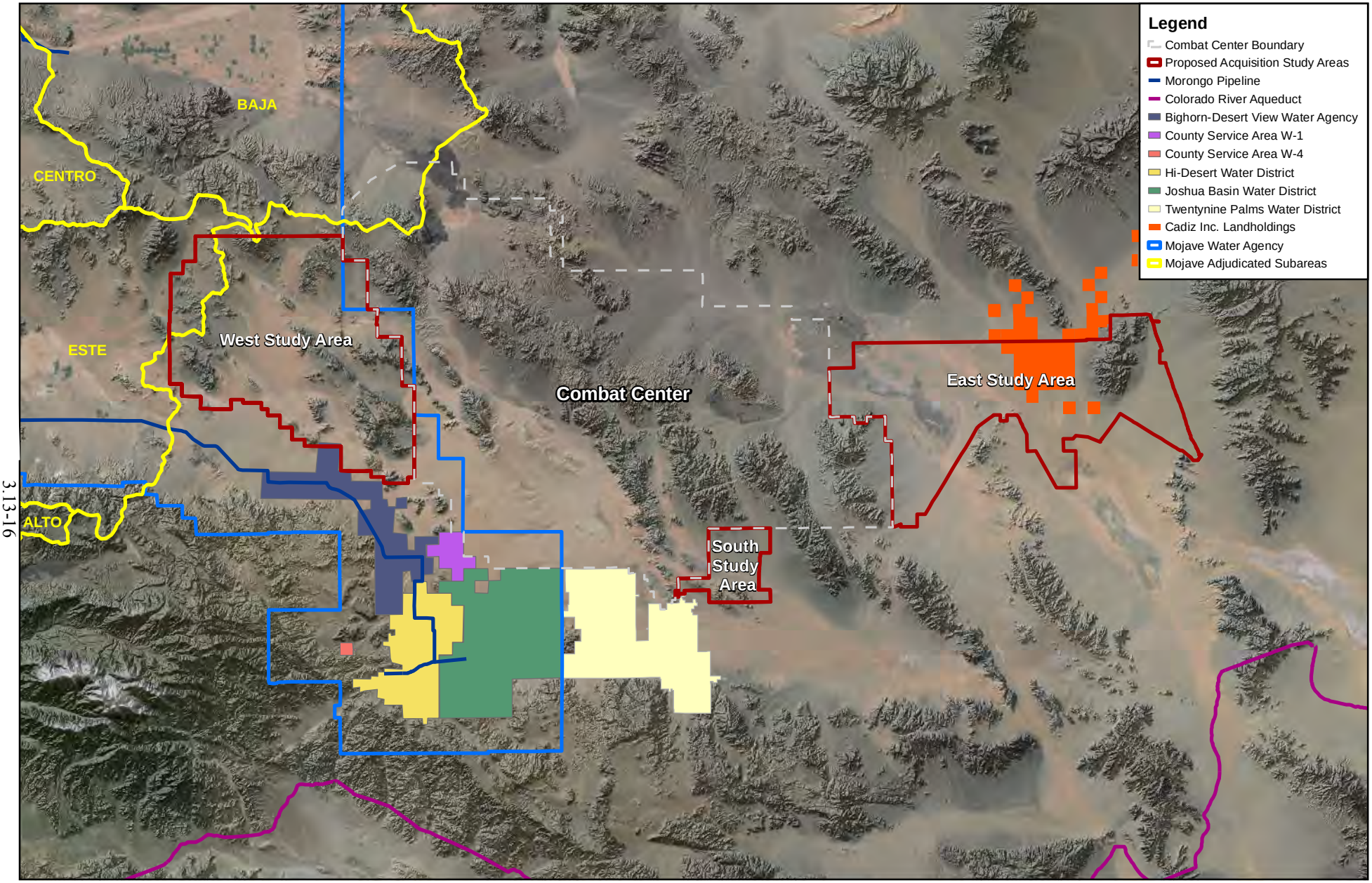
Water is not being imported into the south study area.

3.13.3.4 Water Budget

A water budget compares the amount of recharge to extraction from each groundwater basin to estimate the change (i.e., surplus or deficit) in groundwater storage. The water recharge and extraction for each groundwater basin are based on available reports. The values presented in the following sections are for the entire basins or subbasins, including portions of basins or subbasins located outside the Combat Center or proposed acquisition study areas.

Water Recharge

Groundwater recharge is principally from groundwater subsurface flow originating as surface runoff from the surrounding mountains, recharging along the bedrock-alluvial deposit interface, and migrating through adjacent basins. The source of water recharge for the Combat Center is natural recharge to the Surprise Spring subbasin via subsurface flow with annual recharge being approximately 110 AF per year (136 ML per year) (Li and Martin 2011). The groundwater within the Surprise Spring basin storage was estimated by Lewis (1972) to be 322,000 AF (397,000 ML) as of 1967 and by Schaefer (1978 as referenced in DWR 2004) to be 600,000 AF (740,000 ML) as of 1975. Lewis and Schaefer used 100 feet (30.5 meters) and 200 feet (61 meters), respectively, for saturated thickness. By subtracting the additional groundwater extracted since the estimates were made, the groundwater in storage in the Surprise Spring Basin is estimated to be 200,000 to 500,000 AF (247,000 to 617,000 ML). Estimates of average recharge to the groundwater basins, groundwater in storage, and water quality in the project area are based on available reports and summarized in Table 3.13-2.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Figure 3.13-4
Water Agencies and Imported Water Infrastructure

Source: MAGTF Training Command 2009, Mojave Water Agency 2008, MWD and BLM 2001

N

Table 3.13-2. Groundwater Recharge

Groundwater Basin	Estimated Recharge (AF per year)	Total Groundwater in Storage Estimate (AF)	Water Quality
Combat Center			
Deadman Valley- Surprise Spring	110[1]	200,000 to 500,000[5]	Good (TDS 159 to 210 mg/L)
Deadman Valley – Deadman Lake	0[1]	290,000[2]	Poor (high fluorides, sulfates, and boron)
Twentynine Palms Valley	300[2]	132,000[2]	Poor (high fluoride, TDS, sulfates)
Bristol Valley west of Bristol Lake	---	640,000[6]	Poor (within Combat Center)
Ames Valley	523[3]	1,450,000[3]	Good (TDS below 500 mg/l)
Lavic Valley	300[2]	---	Poor (high sulfates, chlorides, TDS)
West Study Area			
Means Valley	25[3]	89,600[3]	Poor (high TDS, fluoride, locally nitrate)
Johnson Valley	910[3]	2,272,800[3]	Poor (high TDS and fluoride)
Bessemer Valley	---	---	---
Este Subarea	3,600[4]	---	---
East Study Area			
Cadiz and Bristol Valley east of Bristol Lake	---	17,000,000 to 34,000,000	Good except near Cadiz Lake and Bristol, which has high TDS
South Study Area			
Dale Valley	900[2]	---	Poor (high TDS, fluoride, sodium)

Notes: --- Data unavailable ; AF = acre-feet; TDS = total dissolved solids; mg/L = milligrams per liter

Sources: [1]Li and Martin 2011 – Table 6; [2]DWR 2004; [3]Kennedy/Jenks/Todd LLC 2007; [4]Mojave Basin Area Watermaster 2009 Table 5-2; [5]Lewis (1972) to Schaefer (1978 in DWR 2004) minus pumping since reports (Li and Martin 2011); [6]Koehler 1983

Water Extraction

Estimated annual extraction for each groundwater basin within, or partially within, the Combat Center and adjacent acquisition study areas is provided in Table 3.13-3. Annual extraction values are for the consumptive use of the water, which is calculated by subtracting return flows from the estimated production.

Potable water extraction in the Combat Center area is from 11 wells in the Surprise Spring basin. From 2000 to 2009, the potable water produced annually from the Surprise Spring subbasin ranged from 2,700 to 4,200 and averaged 3,300 AF per year (3,300 to 5,200 and averaged 4,100 ML) (Table 3.13-4). Annual production in 2008 and 2009 was 3,250 AF (4,000 ML) and 2,900 AF (3,600 ML), respectively. Over the last five years (2005 to 2009) the waste treatment plant treated approximately 1,100 AF per year (1,360 ML per year), of which 500 AF per year (620 ML per year) was used to irrigate the golf course and 600 AF per year (740 ML per year) evaporated in evaporation ponds. In addition to potable water pumped from the Surprise Spring Subbasin, 540 AF per year (670 ML per year) of non-potable water is pumped from the Mainside subbasin to irrigate the golf course.

Table 3.13-3. Groundwater Extraction

Groundwater Basin	Estimated Annual Extraction (AF per year)
Combat Center	
Deadman Valley – Surprise Spring Subbasin	3,000[1]
Deadman Valley – Deadman Lake Subbasin	0 [1]
Twentynine Palms Valley	1,340[2]
Bristol Valley west of Bristol Lake	---
Ames Valley	535[3]
Lavic Valley	0[3]
West Study Area	
Means Valley	0[4]
Johnson Valley	11[4]
Bessemer Valley	---
Este Subarea	6,500[5]
East Study Area	
Bristol and Cadiz Valley	5,000 to 6,000[6]
South Study Area	
Dale Valley	---

Notes: --- Data unavailable; AF = acre-feet

Sources: [1]Li and Martin 2011, Combat Center average from 2005 to 2009; [2]Includes 540 AFY from the Mainside subbasin by Combat Center and 800 AF per year from the Mesquite subbasin by TPWD (Li and Martin 2011); [3]DWR 2004; [4] Kennedy/Jenks/Todd LLC 2007; [5]Mojave Basin Area Watermaster 2009; [6]MWD and BLM 2001.

Table 3.13-4. Historical Personnel and Potable Water Use at the Combat Center

Year	Personnel Supported	Support Personnel	Total Personnel[1]	Potable Water Use (AF per year)	Potable Water Use/ Personnel (AF per year per person)
2000	9,700	2,200	11,900	4,200	0.35
2001	9,500	2,100	11,600	3,800	0.33
2002	9,300	2,400	11,700	3,500	0.30
2003	10,100	2,100	12,200	3,100	0.25
2004	9,600	2,000	11,600	3,300	0.28
2005	9,800	2,000	11,800	2,900	0.25
2006	11,000	2,200	13,200	2,700	0.20
2007	10,800	2,300	13,100	3,300	0.25
2008	11,200	2,800	14,000	3,300	0.24
2009	13,000	3,100	16,100	2,900	0.18

Note: [1]Total Personnel represents Combat Center-based personnel plus support personnel consisting of Headquarters Battalion; Appropriated Funds personnel, and Non-appropriated Funds personnel. AF = acre-feet

Source: Combat Center 2010.

Total personnel at the Combat Center has increased from 2000 to 2009 by 34% (Table 3.13-4). During the same period, potable water use at the Combat Center from Surprise Spring subbasin has declined by 26%. The substantial reduction in potable demand as the number of personnel at the Combat Center has increased is the result of an increase in water conservation, more use of recycled water, and more use of non-potable water for irrigation.

Water Budget Summary

The current surplus/deficit of the groundwater basins within the Combat Center and the adjacent acquisition study areas is summarized in Table 3.13-5.

Table 3.13-5. Water Budget Summary

Groundwater Basin	Estimated Recharge (AFY))	Estimated Extraction (AFY)	Surplus (+)/ Deficit (-) (AF per year)
Combat Center			
Deadman Valley – Surprise Spring Subbasin	110[1]	3,000[2]	-2,900
Deadman Valley – Deadman Lake Subbasin	0[1]	0[2]	0
Twentynine Palms Valley	300[3]	1,340[4]	-1,040
Bristol Valley west of Bristol Lake	---	---	---
Ames Valley	523[5]	535[3]	-12
Lavic Valley	300[3]	0[3]	+300
West Study Area			
Means Valley	25[5]	0[5]	+25 (Poor WQ)
Johnson Valley	910[5]	11[5]	+899 (Poor WQ)
Bessemer Valley	---	---	---
Este Subarea	3,600[6]	6,500[7]	-2,900
East Study Area			
Cadiz and Bristol Valley	---	5,000 to 6,000[8]	---
South Study Area			
Dale Valley	900[3]	---	--- (Poor WQ)

Note: --- Data unavailable; AF = acre-feet; WQ = water quality

Source: [1]Li and Martin 2011 – Table 6; [2]Li and Martin 2011, Combat Center average from 2005 to 2009; [3]DWR 2004; [4]Includes 540 AFY from the Mainside subbasin by Combat Center and 800 AF per year from the Mesquite subbasin by TPWD (Li and Martin 2011); [5]Kennedy/Jenks/Todd LLC 2007; [6]Mojave Basin Area Watermaster 2009 Table 5-2; [7]Mojave Basin Area Watermaster 2009; [8]MWD and BLM 2001.

Combat Center

The Combat Center's main potable water source, the Surprise Spring subbasin, has an annual average deficit of approximately 2,900 AF per year (3,600 ML per year). Groundwater pumping has resulted in a drop of depth to groundwater by as much as 190 feet (58 meters) near Surprise Spring and has decreased the saturated thickness of the productive upper aquifer in the Surprise Spring subbasin by almost 50% compared to predevelopment conditions near the original pumping wells (Li and Martin 2011). The drop in the groundwater elevation is attributed to the rate of water withdrawals compared to recharge rates; proximity to the Surprise Spring fault that represents a partial barrier to groundwater flow; and close spacing of wells (Li and Martin 2011). The groundwater in the Surprise Spring subbasin is approximately

5,000 years old (Izbicki and Michel 2004), indicating that recharge is limited and water extracted from the Surprise Spring subbasin is not a renewable source.

The USGS (Li and Martin 2011) recently completed an assessment of the potable water management strategy at the Combat Center. The USGS (Li and Martin 2011) study modeled water availability under four development/water management scenarios, but it did not predict when the aquifer would be exhausted or when water quality would exceed drinking water standards under existing conditions. The model accounts for discharges related to evapotranspiration, evaporation from playa surfaces, and groundwater outflow. Historically, groundwater fed surface springs in the area, but those stopped flowing when groundwater extraction was initiated.

The potable groundwater in the Surprise Spring subbasin is diminishing due to pumpage-induced overdraft and limits on potable groundwater sources due to more restrictive federal drinking water standards on arsenic concentrations; therefore, the Combat Center needs to establish a long-term strategy for regional water-resources development to ensure the future viability of water supply at the Combat Center. The Combat Center has implemented several procedures to reduce the potable water usage while continuing the mission and meeting future goals. For example, the Combat Center is recycling all wastewater for irrigation use, which has provided a significant reduction in potable water usage. The Combat Center also has enacted watering hours and other conservation measures which are included in Combat Center Order 4100.3D and enforced by the NREA Compliance Support Branch. NREA is working on an Installation Energy and Sustainability Strategy (IESS) which will include water use strategies and conservation measures at the Combat Center.

To achieve a sustainable water supply, the Combat Center is evaluating plans to "blend" groundwater from the Surprise Springs subbasin with those from another aquifer(s). Some blending scenarios modeled by USGS (Li and Martin 2011) were shown to meet future demands, minimize or eliminate over-drafting of Surprise Springs Subbasin, and provide recharge. The Combat Center is also evaluating other options for managing the potable water supply, including development and implementation of an EISS as directed by EO 13423 and EO 13514. Currently, there is no target completion date for implementation of the EISS (Combat Center 2010).

The water-management strategies involve modifying the quantity and distribution of Combat Center pumpage from the Surprise Spring subbasin, Deadman Lake subbasin, and Twentynine Palms Valley Basin. One of the main objectives of the water-management strategies is to replace groundwater pumpage of potable water in the Surprise Spring subbasin with ground-water pumpage of non-potable water in the Deadman Lake subbasin and Twentynine Palms Valley Basin. Based on the water budget, there is no surplus water in the Deadman Lake subbasin and a deficit in the Twentynine Palms Valley Basin.

Because of the proximity of the ecologically sensitive Mesquite Lake (dry) to the proposed pumping locations in the Deadman Lake subbasin and Twentynine Palms Valley Basin, it is important to monitor water levels and to determine if the geologic structures are effective barriers to groundwater flow. The TPWD have plans to pump additional groundwater from the Twentynine Palms Valley Basin. All of the water-management scenarios indicated that pumpage by the TWPD would result in a lowering of the groundwater table throughout a large portion of the Twentynine Palm Valley Basin by less than 5 feet (1.5 meters). Declines in groundwater levels will eventually decrease the amount of natural groundwater discharge from the basin.

West Study Area

There is surplus groundwater recharge in Means Valley and Johnson Valley; however, the water quality is poor with high concentrations of TDS and fluoride. In addition, groundwater in the region has been found to have elevated arsenic concentrations, indicative of background conditions. Should groundwater be used for potable water supply, technologies such as a wellhead treatment system may be necessary to meet maximum contaminant level (MCL) water quality standards established by the USEPA (Twentynine Palms Water District 2011). The water budget for the Este subarea indicates a deficit of approximately 2,900 AF per year (3,600 ML per year). However, through active management by the Mojave Basin Area Watermaster, ground water levels in Este subarea have remained stable for the past several years, indicating a relative balance between recharge and discharge (Mojave Basin Area Watermaster 2009).

South Study Area

The surplus/deficit in the Dale Valley basin has not been quantified. The water quality is poor with high concentrations of TDS, fluoride, and sodium.

East Study Area

There have been numerous studies concerning the amount of supply in the Bristol and Cadiz Valley basins as part of the development of the Cadiz Valley Water Project. The most recent study by CH2M Hill for Cadiz Inc. estimates the recharge rate at 32,500 AF per year (40,000 ML per year) (Cadiz Inc. 2011). Other estimates have ranged from 2,000 to 70,000 AF per year (2,500 to 86,000 ML per year) (Bredehoeft 2001). The existing agricultural pumping of 5,000 to 6,000 AF per year (6,200 to 8,000 ML per year) has occurred for more than a decade without significant adverse impacts to water supply and quality, springs, and wildlife (Bredehoeft 2001).

CHAPTER 4.
ENVIRONMENTAL CONSEQUENCES

This chapter describes potential environmental consequences associated with implementation of each action alternative and the No-Action Alternative. Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) state that the environmental consequences discussion shall include any direct and indirect impacts and an evaluation of significance. Consistent with the discussion of the affected environment (Chapter 3), this chapter has been divided into 13 resource areas to provide a comparative framework for evaluating the impacts of each action alternative and the No-Action Alternative on individual resources. Each resource area identifies the potential impacts that could be expected under each alternative. In addition to the special conservation measures (SCMs) identified in Chapter 2 of this Environmental Impact Statement (EIS), appropriate mitigation measures have been identified to further reduce impacts.

4.1 LAND USE

4.1.1 Approach to Analysis

4.1.1.1 Methodology

Topics analyzed in this section include changes in land ownership and status, consistency with plans and policies, land use compatibility, impacts to grazing and agriculture, mines and mining claims, existing utilities rights-of-way, residential and other relocations, and noise impacts to sensitive land uses. Additional analysis of these topics is contained in Section 4.2, *Recreation*; Section 4.4, *Public Health and Safety*; Section 4.6, *Transportation and Circulation*; Section 4.9, *Noise*; and Section 4.12, *Geological Resources*.

In that regard, Section 4.2, *Recreation*, focuses on off-highway vehicle (OHV) visitation and dispersed recreation, including, for example, wilderness area recreation, whereas the land use analysis focuses primarily on consistency with applicable OHV plans. Impacts to Amboy Road and other transportation facilities are addressed in Section 4.6, *Transportation and Circulation*, and are not evaluated further in the land use section. Section 4.9, *Noise*, evaluates whether projected noise levels would exceed the respective significance thresholds for aircraft and ordnance noise, whereas the land use analysis further addresses significant noise impacts to the extent that they are incompatible with sensitive land uses.

4.1.1.2 Evaluation Criteria

Land use impacts would be evaluated for the potential for:

- Inconsistency with the enforceable provisions of applicable land use plans, policies, and controls, including plans and policies for federally managed lands, state lands, and local jurisdictions;
- Incompatibility with existing land uses or preclusion of future land uses that support regional environmental and resource management goals; and
- Relocation of residences and/or businesses.

4.1.1.3 Public Scoping Issues

Public scoping comments for land use primarily addressed concerns about potential loss of access to OHV recreation areas. Other comments included concerns regarding:

- possible prevention of other development opportunities (e.g., solar and wind energy generators, as well as geothermal exploration) on the lands being studied;
- impacts to other current land uses (e.g., Southern California Edison distribution lines and facilities);
- potential impacts on farmland used for agriculture/grazing, rights-of-way, easements, and other land uses and authorizations/designations;
- impacts to existing and proposed utilities and transportation networks (pipelines and roads); and
- acquisition of private property.

4.1.2 Alternative 1 Impacts

There are no indirect land use impacts from the project alternatives and this topic is not addressed further in this section. The potential for existing OHV use in Johnson Valley to shift to other locations if access to Johnson Valley were reduced by prohibition of OHV use or shared OHV use, could be considered an indirect impact and is addressed in Section 4.2, *Recreation*. Direct land use impacts of the project alternatives are addressed below and cumulative land use impacts are addressed in Chapter 5.

4.1.2.1 Plans and Policies

Alternative 1 would prohibit public access, displace non-military land uses, and replace other land uses with military training operations. As a result, Alternative 1 would potentially be inconsistent with certain plans and policies.

- Alternative 1 would be inconsistent with the Johnson Valley OHV Area Management Plan applicable to portions of the west study area, because existing OHV recreation and other recreation uses would be prohibited on approximately 171,830 acres (69,537 hectares) currently designated for such use, leaving only 9% of the Johnson Valley OHV Area accessible to recreation use (see Figure 3.1-4 for the OHV area location and Section 3.2, *Recreation*, for a description of the existing OHV recreation activity). By eliminating OHV use on lands to be acquired, Alternative 1 would not further the purpose of Executive Order (EO) 11644 to control OHV use to protect resources or minimize conflicts among the various uses of those lands. This, along with inconsistencies with the Johnson Valley OHV Area Management Plan, would represent a significant unavoidable impact.
- Alternative 1 would withdraw 25,222 acres (10,207 hectares) or 16.3% of the total acreage from the Ord Mountain Allotment, an active cattle grazing operation in and adjacent to the west study area. It would therefore be inconsistent, in part, with grazing provisions in the California Desert Conservation Area (CDCA) Plan and subsequent amendments (see Figure 3.1-6 for the location of the allotment and the grazing discussion below, for more details). The remainder of the 154,970-acre (62,714-hectare) allotment could continue operating. Safety and conservation measures described in Chapter 2 would include military patrolling of the installation and its perimeter by Conservation Law Enforcement Officers to minimize unauthorized entry. In addition, a 3,280-foot (1,000-meter) buffer zone would be designated within which no munitions training would occur. No fencing is proposed. This plan inconsistency related to grazing would represent a less than significant impact.
- Proposed land acquisition for Alternative 1 includes the Upper Johnson Valley Yucca Ring Area of Critical Environmental Concern (ACEC) in the west study area (see Figure 3.1-6). Because

this ACEC is located well to the west of where any training exercises would occur and is protected by a mountain range, biological impacts would not be significant. This area would be managed in a manner consistent with ACEC designation, which, for example, would mean keeping it fenced and prohibiting access (see Section 4.10, *Biological Resources*) via the Integrated Natural Resources Management Plan (INRMP). This would represent a less than significant impact.

- San Bernardino County has designated lands in the west and west/south study areas for residential and open space use, respectively. The lands designated as residential are essentially uninhabited (see Land Status and Ownership below). Private open space lands are sparsely interspersed within Bureau of Land Management (BLM) lands, do not contain large and generally accessible public open space, and in addition, are sometimes subject to trespass and nuisance from users of nearby public lands. Local plans and policies and development controls would no longer apply to private lands acquired by the Department of the Navy (DoN) for training use; any future amendments would designate these lands for military use. Inconsistencies with residential and open space plans and policies would represent a less than significant impact.

4.1.2.2 Land Status and Ownership

For the purposes of the land use impact analysis, it is assumed that all applicable federal statutes, regulations, and programs related to property acquisition, acquisition of existing rights-of-way, surface and subsurface mining rights, and other property rights and ownership, would apply. For example, this includes purchase of private property at fair market value and, as appropriate, applicable relocation assistance. Note that the disposition of active mines is discussed in more detail under the topic of Mining below.

Alternative 1 would result in the acquisition of 186,312 acres (75,400 hectares) of federal land, 12,080 acres (4,890 hectares) of non-federal land, and 3,265 acres (1,321 hectares) of state land, for a total of 201,657 acres (81,608 hectares).

Field surveys and analysis of assessor's parcel data (DoN 2010) indicate that the west and south areas are essentially uninhabited although there are a number of small cabins, shacks, and other scattered improvements, abandoned mines, communication and utility towers, and pipelines in the area. There are no active mine in the west or south areas. Cattle grazing occurs on the Ord Mountain Grazing Allotment. No other businesses have been identified. Mines, utilities, and grazing land uses are each addressed separately under those topics below. Consistent with federal land acquisition programs, property owners would be offered fair market value for their property and, as appropriate, would receive applicable relocation and technical assistance depending upon individual conditions. The government would prepare a relocation assistance plan before the acquisition of any private parcels. As part of this plan, the government would make a determination as to the availability of replacement housing. If relocation assistance is required, the government would contract with a relocation assistance contractor to serve the relocation needs of the former parcel owner.

Given that no or a minimal number (i.e., less than 10) of residences and businesses are present, relocation impacts of Alternative 1 would be less than significant.

4.1.2.3 Recreation and OHV Use

Recreation is addressed under the Plans and Policies heading above in regard to management plan consistency. Section 4.2, *Recreation*, addresses impacts to recreation visitation and identifies significant and unavoidable impacts due to the loss of unique OHV recreation opportunities. No additional findings regarding recreation are made for land use.

4.1.2.4 Mining

As described in Section 3.1, *Land Use*, the west study area contains patented and unpatented mining claims, and multiple abandoned mines (see Figure 3.1-5). As described in Section 2.6, *Disposition of Mines*, under Alternative 1 the Marine Corps would acquire the patented and unpatented claims associated with the Morris Lode and Bessemer Mines, which are known to coincide with areas proposed for exclusive military use. The mines would be closed and reclaimed in compliance with applicable federal and state law. With respect to all other patented and unpatented mining claims, claim owners would be offered fair market value for their claims, or would be afforded reasonable access to their claims. Decisions on whether to purchase a mining claim, or provide access to the claim, would be made on a case-by-case basis. The location of the mining claim relative to Marine Expeditionary Brigade (MEB) training locations would determine whether a mining claim is to be purchased or reasonable access provided.

Abandoned mines would be physically closed by the Marine Corps following protocols developed by the BLM. Any contamination from abandoned mines would be remediated in accordance with applicable federal, state, and local statutes and regulations.

Section 4.12, *Geological Resources*, identifies less than significant impacts to mineral resources if the Morris Lode is producing ore and is purchased and closed; no impact if the Morris Lode Mine is not producing ore. Land use impacts related to incompatibility with mining are considered to be less than significant. Land use impacts related to purchase of claims are also considered to be less than significant.

4.1.2.5 Grazing

The west study area contains 102,888 acres (41,637 hectares) within the inactive Johnson Valley Allotment (sheep) and 25,222 acres (10,207 hectares) within the active Ord Mountain Allotment (cattle) (see Figure 3.1-6). There is no active grazing on the Johnson Valley Allotment, nor will there be in the future because of a provision in the West Mojave Plan that prohibits domestic sheep from grazing within nine miles of occupied habitat for bighorn sheep. The Ord Valley Allotment contains over 125,000 acres (50,586 hectares) of land outside the west area; the proposed acquisition would reduce the existing allotment by approximately 16.3%. Also, the boundaries of the Combat Center would not be fenced and would potentially allow movement of cattle into the buffer zone. Sufficient forage and access are available in the remaining portions of the Ord Valley Allotment for continued grazing use assuming that Camp Rock Well is avoided (BLM 2010c). Special conservation measures related to public health and safety described in Section 2.8.1 would include overflights, military patrols and sweeps of the training area preceding military use to minimize unauthorized entry. In addition, a 3,280-foot (1,000-meter) buffer zone would be designated within which no munitions training would occur. No fencing is proposed. Land use impacts related to incompatibility with grazing are considered to be less than significant because the Johnson Valley Allotment is inactive and continued grazing of cattle on the remainder of the Ord Mountain Allotment would be possible.

4.1.2.6 Utilities

Utilities are addressed for land use in regard to rights-of-way issues. Under Alternative 1, approximately 43 miles (70 kilometers [km]) of 500 kilovolt and 230 kilovolt Southern California Edison aboveground transmission facilities in the northwest portions of the west study area could remain in place with provision of various safety and security procedures (see Chapter 2), avoidance during training, and provisions allowing periodic utility maintenance and repair. These lines bring electrical power to southern California load centers and may need to be upgraded in the future to enable integration of

renewable energy resources in the area. Because the facilities could be operated safely in concert with training uses, the impact would be less than significant.

4.1.2.7 Sensitive Land Uses

Overflights would increase within existing and proposed airspace and could operate at lower altitudes than currently allowed in specified areas. The results of noise modeling for proposed aircraft and ordnance activities are presented in Section 4.9, *Noise*. Analysis of noise effects on wildlife is included in Section 4.10, *Biological Resources*. Figure 3.1-8 illustrates points of interest (POIs) in the acquisition study area selected for noise analysis; these points represent sensitive land uses or designated areas including communities, rural residential areas designated in the San Bernardino County General Plan, wilderness areas (center points and points closest to the acquisition study area), actively farmed or mined areas, and other selected points. Tables 4.1-1 and 4.1-2 presents baseline noise levels, projected noise levels, and changes (decibel [dB]) from baseline, for airspace and ordnance use, respectively for each action alternative and POI.

As described in Section 4.9.2, the 65 dB Community Noise Equivalent Level (CNEL) contour for airfield-related activities would be fully contained within the acquisition study areas for Alternative 1. Therefore, no individuals outside the installation would be exposed to CNEL greater than or equal to 65 dB from airfield-related noise.

The 65 dB Onset-Rate Adjusted Monthly Community Noise Equivalent Level ($CNEL_{mr}$) contour for airspace-related activities in current and proposed airspace would be fully located within the proposed boundaries of the Combat Center (see Table 4.1-1 and Table 4.9-1). Therefore, no individuals outside the installation would be exposed to $CNEL_{mr}$ greater than or equal to 65 dB from airspace-related activities.

For ordnance, the 62 C-weighted decibel (dBC) CNEL contour under Alternative 1 would be mostly located within the proposed Combat Center boundaries (see Table 4.1-2 and Table 4.9-2). As shown on Figure 4.9-3, the 62 dBC CNEL contour would extend beyond the boundaries of the Combat Center Complex to the northeast and southwest. However, there are no sensitive noise receptors located within the areas where the 62 dBC CNEL contour extends outside the proposed boundaries. Therefore, noise impacts on sensitive land uses, including POIs, would be less than significant.

With regard to potential noise effects on wilderness areas in the vicinity of the Combat Center and acquisition study areas, provisions of the California Desert Protection Act (CDPA) of 1994 address the intention of Congress that designation of these wilderness areas was not intended to limit military overflights (i.e., including those that can be seen or heard within wilderness areas), nor provide for creation of protective perimeters or buffer zones around the wilderness areas. Therefore, impacts to wilderness areas from Alternative 1 are considered to be less than significant with regard to compatibility with the character of wilderness areas. Further details on these wilderness provisions are provided below.

The wilderness areas in the immediate and general vicinity of the Combat Center were designated as such by the CDPA of 1994. The only exception to this are the wilderness areas in the former Joshua Tree National Monument, which were designated in 1976. The 1994 Act made the Monument a National Park and added more wilderness areas.

Table 4.1-1. Projected Airspace Noise ($CNEL_{mr}$ [dB]) at POIs for Baseline and Action Alternatives

$CNEL_{mr}$ (dB) from Airspace Activity for Baseline and Alternatives															
				Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
ID	Category	Site Name	Baseline	*$CNEL_{mr}$ (dBA)*	*Increase re Baseline*	*$CNEL_{mr}$ (dBA)*	*Increase re Baseline*	*$CNEL_{mr}$ (dBA)*	*Increase re Baseline*	*$CNEL_{mr}$ (dBA)*	*Increase re Baseline*	*$CNEL_{mr}$ (dBA)*	*Increase re Baseline*	*$CNEL_{mr}$ (dBA)*	*Increase re Baseline*
1	Town/City	Newberry Springs	<45	<45	n/a	<45	n/a	<45	n/a	<45	n/a	<45	n/a	<45	n/a
2		Ludlow	<45	<45	4	<45	4	<45	4	<45	4	<45	4	<45	4
3		Amboy	<45	<45	3	<45	3	<45	3	<45	3	<45	3	<45	3
4		Chubbuck	<45	46	n/a	46	n/a	53	n/a	46	n/a	46	n/a	46	n/a
5		Wonder Valley	<45	46	7	47	8	47	8	47	8	46	7	46	7
6		Twentynine Palms	<45	<45	n/a	<45	n/a	<45	n/a	<45	n/a	<45	n/a	<45	n/a
7		Joshua Tree	<45	<45	n/a	<45	n/a	<45	n/a	<45	n/a	<45	n/a	<45	n/a
8		Yucca Valley	<45	<45	n/a	<45	n/a	<45	n/a	<45	n/a	46	n/a	<45	n/a
9		Morongo Valley	<45	<45	n/a	<45	n/a	<45	n/a	<45	n/a	46	n/a	<45	n/a
10		Yucca Mesa	<45	47	9	47	9	<45	5	47	9	47	9	47	9
11		Flamingo Heights	<45	47	9	47	9	<45	5	47	9	47	9	47	9
12		Homestead Valley	<45	47	9	47	9	<45	5	47	9	47	9	47	9
13		Landers	<45	47	9	47	9	<45	5	47	9	47	9	47	9
14		Johnson Valley	<45	47	9	47	9	<45	5	47	9	47	9	47	9
15	Wilderness (Closest Point)	Newberry Mountains	<45	<45	n/a	<45	n/a	<45	n/a	<45	n/a	<45	n/a	<45	n/a
16		Rodman Mountains	<45	47	9	<45	5	<45	5	47	9	47	9	47	9
17		Bighorn Mountains	<45	47	9	47	9	<45	5	47	9	47	9	47	9
18		Bristol Mountain	<45	<45	5	<45	5	<45	5	<45	5	<45	5	<45	5
19		Kelso Dunes	<45	<45	5	<45	5	<45	5	<45	5	<45	5	<45	5
20		Trilobite	<45	46	8	<45	5	47	9	46	8	46	8	46	8
21		Clipper Mountain	<45	46	8	46	8	47	9	46	8	46	8	46	8
22		Cleghorn Mountains	<45	<45	4	<45	4	<45	5	<45	4	<45	4	<45	4
23		Sheephole Mountains	<45	47	8	47	8	47	9	46	7	46	7	47	8
24		Cadiz Dunes	<45	46	8	46	8	59	21	46	8	46	8	46	8
25		Old Woman Mountains	<45	46	8	46	8	58	20	46	8	46	8	46	8
26		Turtle Mountains	<45	46	n/a	46	n/a	46	n/a	46	n/a	46	n/a	46	n/a
27		Stepladder Mountains	<45	46	n/a	46	n/a	46	n/a	46	n/a	46	n/a	46	n/a
28		Piute Mountains	<45	46	n/a	46	n/a	46	n/a	46	n/a	46	n/a	46	n/a
29		Chemehuevi Mountains	<45	46	n/a	46	n/a	46	n/a	46	n/a	46	n/a	46	n/a
30		Whipple Mountains	<45	46	n/a	<45	n/a	46	n/a	46	n/a	46	n/a	46	n/a

Continued on next page

Table 4.1-1. Projected Airspace Noise ($CNEL_{mr}$ [dB]) at POIs for Baseline and Action Alternatives

$CNEL_{mr}$ (dB) from Airspace Activity for Baseline and Alternatives															
				Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
ID	Category	Site Name	Baseline	*$CNEL_{mr}$ (dBA)*	*Increase re Baseline*	*$CNEL_{mr}$ (dBA)*	*Increase re Baseline*	*$CNEL_{mr}$ (dBA)*	*Increase re Baseline*	*$CNEL_{mr}$ (dBA)*	*Increase re Baseline*	*$CNEL_{mr}$ (dBA)*	*Increase re Baseline*	*$CNEL_{mr}$ (dBA)*	*Increase re Baseline*
31	Wilderness (Center)	Clipper Mountain	<45	<45	5	<45	5	58	20	<45	5	<45	5	<45	5
32		Trilobite	<45	<45	4	<45	4	<45	4	<45	4	<45	4	<45	4
33		Piute Mountains	<45	<45	n/a	46	n/a	46	n/a	<45	n/a	<45	n/a	<45	n/a
34		Cleghorn Lakes	<45	<45	4	<45	2	<45	2	<45	2	<45	2	<45	4
35		Sheephole Valley	<45	46	8	<45	5	47	9	46	8	47	9	46	8
36		Cadiz Dunes	<45	46	8	46	8	58	20	46	8	46	8	46	8
37		Old Woman Mountains	<45	46	n/a	46	n/a	46	n/a	46	n/a	46	n/a	46	n/a
38		Bristol Mountain	<45	<45	3	<45	5	<45	3	<45	5	<45	5	<45	3
39		Kelso Dunes	<45	<45	n/a	<45	n/a	<45	n/a	<45	n/a	<45	n/a	<45	n/a
40		Stepladder Mountains	<45	46	n/a	46	n/a	46	n/a	46	n/a	46	n/a	46	n/a
41		Turtle Mountains	<45	46	n/a	46	n/a	46	n/a	46	n/a	46	n/a	46	n/a
42		Whipple Mountains	<45	46	n/a	46	n/a	46	n/a	46	n/a	46	n/a	46	n/a
43		Chemehuevi Mountains	<45	46	n/a	46	n/a	46	n/a	46	n/a	46	n/a	46	n/a
44		Bighorn Mountains	<45	47	9	47	9	<45	3	47	9	47	9	47	9
45		Rodman Mountains	<45	<45	n/a	<45	n/a	<45	n/a	<45	n/a	46	n/a	<45	n/a
46		Newberry Mountains	<45	<45	n/a	<45	n/a	<45	n/a	<45	n/a	46	n/a	<45	n/a
47	General Plan Residential	West Study Area	<45	n/a	n/a	n/a	n/a	<45	3	n/a	n/a	n/a	n/a	n/a	n/a
48		South of Existing Base	<45	<45	4	<45	4	<45	4	<45	4	46	7	<45	4
49		South of South Study Area	45	48	3	48	3	48	3	48	3	48	3	48	3
50	Other	Cadiz in East Study Area (General Plan Agricultural)	<45	46	8	46	8	n/a	n/a	45	7	45	7	46	8
51		West Residence (Occupied)	<45	n/a	n/a	<45	3	<45	3	n/a	n/a	n/a	n/a	46	8
52		Bristol Lake (Mining)	<45	50	10	51	11	n/a	n/a	<45	3	<45	3	50	10
		$CNEL_{mr}$ Band (dBA)	Counts												
		<65	52	50	(2)	51	(1)	50	(2)	50	(2)	50	(2)	51	(1)
		65-70	-	-	-	-	-	-	-	-	-	-	-	-	-
		70-75	-	-	-	-	-	-	-	-	-	-	-	-	-
		75+	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: $CNEL_{mr}$ = Onset-Rate Adjusted Monthly Community Noise Equivalent Level; dB = decibel; dBA = A-weighted decibel; FARP = Forward Arming and Refueling Point

Table 4.1-2. Projected Ordnance Noise (CNEL [dBC]) at POIs for Baseline and Alternatives

C-Weighted CNEL from Ordnance Expenditure for Baseline and Alternatives										
ID	**Category**	**Site Name**	**Ordnance CNEL Contour (dBC)**							
			Baseline	*No Action*	*1*	*2*	*3*	*4*	*5*	*6*
1	Town/City	Newberry Springs	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
2		Ludlow	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
3		Amboy	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
4		Chubbuck	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
5		Wonder Valley	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
6		Twentynine Palms	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
7		Joshua Tree	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
8		Yucca Valley	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
9		Morongo Valley	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
10		Yucca Mesa	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
11		Flamingo Heights	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
12		Homestead Valley	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
13		Landers	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
14		Johnson Valley	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
15	Wilderness Closest	Newberry Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
16		Rodman Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
17		Bighorn Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
18		Bristol Mountain	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
19		Kelso Dunes	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
20		Trilobite	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
21		Clipper Mountain	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
22		Cleghorn Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
23		Sheephole Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
24		Cadiz Dunes	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
25		Old Woman Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
26		Turtle Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
27		Stepladder Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
28		Piute Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
29		Chemehuevi Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
30		Whipple Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
31	Wilderness Center	Clipper Mountain	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
32		Trilobite	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
33		Piute Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
34		Cleghorn Lakes	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
35		Sheephole Valley	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
36		Cadiz Dunes	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
37		Old Woman Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
38		Bristol Mountain	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
39		Kelso Dunes	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
40		Stepladder Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
41		Turtle Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
42		Whipple Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
43		Chemehuevi Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
44		Bighorn Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
45		Rodman Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
46		Newberry Mountains	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62

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Table 4.1-2. Projected Ordnance Noise (CNEL [dBC]) at POIs for Baseline and Alternatives

C-Weighted CNEL from Ordnance Expenditure for Baseline and Alternatives										
ID	**Category**	**Site Name**	**Ordnance CNEL Contour (dBC)**							
			Baseline	*No Action*	*1*	*2*	*3*	*4*	*5*	*6*
47	General Plan Residential	West Study Area	< 62	< 62	n/a	n/a	< 62	n/a	n/a	n/a
48		South of Existing Base	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
49		South of South Study Area	< 62	< 62	< 62	< 62	< 62	< 62	< 62	< 62
50	Other	Cadiz in East Study Area (General Plan Agricultural)	< 62	< 62	< 62	< 62	n/a	< 62	< 62	< 62
51		West Residence (Occupied)	< 62	< 62	n/a	< 62	< 62	n/a	n/a	< 62
52		Bristol Lake (Mining)	< 62	< 62	< 62	< 62	n/a	< 62	< 62	< 62
		Ordnance CNEL Contour	**Counts**							
		<62	52	52	52	52	52	52	52	52
		62-70	0	0	0	0	0	0	0	0
		70+	0	0	0	0	0	0	0	0

Notes: CNEL = Community Noise Equivalent Level; dBC = C-weighted decibel; n/a = not applicable.

Section 103(d) of the Act provides: "NO BUFFER ZONES." The Congress does not intend for the designation of wilderness areas in section 102 of this title to lead to the creation of protective perimeters or buffer zones around any such wilderness area. The fact that non wilderness activities or uses can be seen or heard from areas within a wilderness area shall not, of itself, preclude such activities or uses up to the boundary of the wilderness area."

Section 802(a) of the Act provides: "OVERFLIGHTS." Nothing in this Act, the Wilderness Act, or other land management laws generally applicable to the new units of the National Park or Wilderness Preservation Systems (or any additions to existing units) designated by this Act, shall restrict or preclude low-level overflights of military aircraft over such units, including military overflights that can be seen or heard within such units."

The Combat Center's current INRMP would be amended to address new management actions related to the proposed acquisition study areas and utilization of airspace. The Combat Center would continue coordination with local jurisdictions to minimize encroachment on the installation.

Noise impacts to sensitive land uses would be less than significant.

4.1.2.8 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible; therefore, no mitigation measures are recommended. Consequently, Alternative 1 would result in significant, unmitigable impacts.

4.1.3 Alternative 2 Impacts

4.1.3.1 Plans and Policies

Alternative 2 would be inconsistent with the Johnson Valley OHV Area Management Plan (BLM 1992) applicable to portions of the west study area because existing OHV recreation and other recreation uses would be prohibited on approximately 103,270 acres (41,792 hectares) currently designated for such use, leaving 46% of the Johnson Valley OHV Area accessible for recreation. By eliminating OHV use on lands to be acquired, Alternative 2 would not further the purpose of EO 11644 to control OHV use to protect resources or minimize conflicts among the various uses of those lands. This would create a

significant and unavoidable impact. All other plans and policies impacts would be less than significant for similar reasons to those described under Alternative 1, although Alternative 2 would result in acquisition of less land. The Upper Johnson Valley Yucca Ring ACEC would be excluded from the land acquisition so there would be no impacts resulting from inconsistencies with management plans for this ACEC.

4.1.3.2 Land Status and Ownership

Alternative 2 would be similar to Alternative 1 but would result in the acquisition of less land: acquisition of 124,534 acres (50,400 hectares) of federal land, 8,249 acres (3,338 hectares) of non-federal land, and 2,080 acres (840 hectares) of state land, for a total of 134,863 acres (54,577 hectares). Given that no or a minimal number (i.e., less than 10) of residences and businesses are present on lands proposed for acquisition, minimal residential and non-residential relocations would be required and, therefore, relocation impacts of Alternative 2 would be less than significant.

4.1.3.3 Recreation and OHV Use

Recreation is addressed under the Plans and Policies heading above in regard to plan consistency. Section 4.2, *Recreation*, addresses impacts to recreation visitation and identifies significant and unavoidable impacts due to the loss of unique OHV recreation opportunities. No additional findings regarding recreation are made for land use.

4.1.3.4 Mining

Impacts from Alternative 2 would be similar to Alternative 1. As described in Section 2.6, under Alternative 2 patented and unpatented claims associated with the Morris Lode and Bessemer Mines would be acquired and the mines would be closed and reclaimed. Section 4.12, *Geological Resources*, identifies less than significant impacts to mineral resources if the Morris Lode Mine is producing ore and is purchased and closed; no impact if the mine is not producing ore. Therefore, land use impacts related to incompatibility with mining would be the same as Alternative 1, i.e., less than significant. As with Alternative 1, with respect to all other patented and unpatented claims, a decision would be made on a case-by-case basis whether to purchase any particular mining claim for fair market value or allow the claim owner reasonable access to their claim.

4.1.3.5 Grazing

The (partial) west study area for Alternative 2 contains 51,949 acres (21,023 hectares) within the inactive Johnson Valley Allotment (sheep) and 11,633 acres (4,708 hectares) within the active Ord Mountain Allotment (cattle), representing 7.5% of the 154,970 acre allotment. Similar to Alternative 1, land use impacts related to incompatibility with grazing are considered to be less than significant because the Johnson Valley Allotment is inactive and continued grazing of cattle on the remainder of the Ord Mountain Allotment would be possible.

4.1.3.6 Utilities

Land use impacts from Alternative 2 related to utilities rights-of-way would be less than significant, because existing Southern California Edison transmission facilities would not be displaced. The length of lines affected would be approximately 21 miles (34 km) of Southern California Edison transmission facilities in the west study area, less than for Alternative 1.

4.1.3.7 Sensitive Land Uses

As described in Section 4.9.3, the 65 dB CNEL contour for airfield-related activities would be fully contained within the acquisition study areas for Alternative 2. Therefore, no individuals outside the installation would be exposed to CNEL greater than or equal to 65 dB from airfield-related noise.

The 65 dB $CNEL_{mr}$ contour for airspace-related activities in current and proposed airspace would be mostly located within the proposed boundaries of the Combat Center (see Table 4.1-1 and 4.9-1). However, there are no sensitive noise receptors located within the areas where the 65 $CNEL_{mr}$ extends outside the proposed boundaries.

For ordnance, the 62 dBC CNEL contour under Alternative 2 would be mostly located within the proposed Combat Center boundaries (see Table 4.1-2 and Table 4.9-2). As shown on Figure 4.9-5, the 62 dBC CNEL contour would extend beyond the boundaries of the Combat Center Complex, primarily to the west (though also slightly in the northeast). However, there are no sensitive noise receptors located within the areas where the 62 dBC CNEL contour extends outside the proposed boundaries. Therefore, noise impacts on sensitive land uses, including POIs, would be less than significant.

4.1.3.8 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible; therefore, no mitigation measures are recommended. Consequently, Alternative 2 would result in significant, unmitigable impacts.

4.1.4 Alternative 3 Impacts

4.1.4.1 Plans and Policies

Alternative 3 would potentially be inconsistent with the CDCA Plan's multiple use objectives, including provisions for mining access and, in turn, approved plans and permits that allow for current operation of the TETRA Technologies, Inc. (TETRA) Amboy Operation and National Chloride mines in the east study area (see Figure 3.1-5 and Section 4.12, *Geological Resources*). Although the ability to continue mine operations would be considered on a case-by-case basis if Alternative 3 were implemented, it is possible that these two mines could, after such an evaluation, require closure (see Mining below). In addition, BLM has assigned a Known Sodium Leasing Area land classification to lands in the vicinity of these two mines, further indicating its intent to retain access to mineral resources without interference from other uses.

Alternative 3 would be inconsistent with San Bernardino County agricultural land use designation in the east study area and associated agricultural operations on 1,600 acres (648 hectares) within the Cadiz Inc. landholdings.

These inconsistencies with plans and policies related to mining on public lands and agriculture on private, agriculturally designated lands are considered to be significant and unavoidable.

4.1.4.2 Land Status and Ownership

Alternative 3 would result in the acquisition of 168,035 acres (68,000 hectares) of federal land, 28,785 acres (11,649 hectares) of non-federal lands, and 1,760 acres (710 hectares) of state lands, for a total of 198,580 acres (80,362 hectares). Note that active mines are addressed under Mining below. There would be minimal (i.e., less than 10) or no residential relocations required because the area is essentially uninhabited. Alternative 3 would result in minimal residential and non-residential relocations and therefore, would result in less than significant relocation impacts.

4.1.4.3 Recreation and OHV Use

Recreation is addressed under the Plans and Policies heading above in regard to management plan consistency. Section 4.2, *Recreation*, addresses impacts to recreation visitation and identifies less than significant impacts. No additional findings regarding recreation are made for land use.

4.1.4.4 Mining

As described in Section 2.6, under Alternative 3 mining claim owners would be offered fair market value for their claims or would be afforded reasonable access to their claims. Decisions on whether to purchase a mining claim, or provide access to the claim, would be made on a case-by-case basis. The location of the mining claim relative to MEB training locations would determine whether a mining claim is to be purchased or reasonable access provided. Section 4.12 *Geological Resources* identifies a less than significant impact to mineral resources if the claims comprising these two calcium chloride operations are purchased and the mines are closed. This is because the production from these two facilities is not a major contribution to national or worldwide supply. From a land use perspective, however, there is the potential for the case-by-case analysis of these two active mining operations to find that mining operations could not continue because of incompatibility with training activities due to access, human health and safety or environmental considerations. The potential for closure of these active mines, the infeasibility and/or cost of relocating these facilities, and preclusion of access to these mineral resources in the future would result in significant land use impacts related to mining.

4.1.4.5 Agriculture

The majority of the Cadiz Inc. land holdings are undeveloped with the exception of approximately 1,600 acres (648 hectares) of existing agricultural operations which contain citrus, vineyards, and row crops. No prime or unique soils or farmlands of state or local importance have been identified. There are seven groundwater production wells that supply water for agricultural irrigation. Alternative 3 would be incompatible with existing agricultural land use. Approximately 1,000 acres (405 hectares) are cultivated in citrus and vineyards, which constitutes over 25% of San Bernardino County's fruit and nut crop acreage. However, land use impacts associated with agricultural land use are considered to be less than significant on a county-wide basis due to the fact that there were 1,021,585 acres (413,400 hectares) in agricultural production in San Bernardino County (San Bernardino County 2008), of which the 1,000 acres cultivated by Cadiz Inc. represent less than 2% of the agricultural acreage in San Bernardino County.

Note that socioeconomic effects on the agricultural sector (e.g., jobs) are addressed in Section 4.3.4. A proposed major water recharge project on the Cadiz Inc. landholdings is addressed in Section 4.13.3, *Water Resources* and Chapter 5, *Cumulative Impacts*.

4.1.4.6 Utilities

An existing Southern California Gas high pressure natural gas pipeline bisects the east study area from northeast to southwest (Figure 3.1-7 in Section 3.1 Land Use). An environmental assessment (EA) addressing a proposed upgrade and extension of these facilities for the North-South Interconnect project was completed, by the BLM Needles field office in July, 2010 (BLM 2010d). The existing pipeline would remain in place if Alternative 3 were approved. The feasibility of the upgrade under Alternative 3 is a topic addressed in the ongoing Southern California Gas Company North-South Interconnect Project EA and is discussed in Chapter 5, *Cumulative Impacts*. Other existing utilities/facilities including a communication tower, microwave tower, and weather station would remain in place. Impacts to utility uses would be less than significant.

4.1.4.7 Sensitive Land Uses

As described in Section 4.9.4, the 65 dB CNEL contour for airfield-related activities and the 65 dB $CNEL_{mr}$ contour for airspace-related activities in current and proposed airspace, would be fully contained within the acquisition study areas for Alternative 3 (see Table 4.1-1 and Table 4.9-1). Therefore, no individuals outside the installation would be exposed to CNEL or $CNEL_{mr}$ greater than or equal to 65 dB from airfield-related or airspace-related noise.

For ordnance, the 62 dBC CNEL contour under Alternative 3 would be mostly located within the proposed Combat Center boundaries (see Table 4.1-2 and Table 4.9-2). As shown on Figure 4.9-7, the 62 dBC CNEL contour would extend beyond the boundaries of the Combat Center Complex, primarily to the northeast. However, there are no sensitive noise receptors located within the areas where the 62 dBC CNEL contour extends outside the proposed boundaries. Therefore, noise impacts on sensitive land uses, including POIs, would be less than significant.

4.1.4.8 Potential Mitigation Measures

No significant and unavoidable impacts would occur with implementation of this alternative. No mitigation measures are recommended.

4.1.5 Alternative 4 Impacts

4.1.5.1 Plans and Policies

Alternative 1 and Alternative 4 would acquire the same acreages in the west and south study areas; however, Alternative 4 would allow restricted public access in the west study area when MEB training is not taking place, subject to fulfillment of individual education requirements and approval of user permits (see Section 2.5, *Management of Restricted Public Access Areas (RPAAs) under Alternatives 4, 5, and 6*). Alternative 4 would establish areas in which the Marine Corps could meet the live-fire and maneuver objective training requirements for a MEB, while also providing restricted public access to the west study area for recreational uses. In conjunction with the preparation of an INRMP, this alternative substantially meets the purposes of EO 11644 to control OHV use to protect resources, promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands. Inconsistencies with land use policies and designations, including the Ord Mountain Grazing Allotment, Upper Yucca Valley ACEC, San Bernardino County residential and open space land use designations would be the same as Alternative 1, less than significant. Inconsistencies with plans and policies are considered to be significant and unavoidable due to the fact that greater access is currently allowed by the Johnson Valley OHV Area Management Plan than would be allowed under restricted public access. See Section 4.2, *Recreation*, for detailed discussion of recreation impacts. Land use impacts related to plans and policies are considered to be significant and unavoidable.

4.1.5.2 Land Status and Ownership

Acquisition acreages under Alternative 4 would be the same as Alternative 1, and would result in the acquisition of an estimated 186,312 acres (75,400 hectares) of federal land, 12,080 acres (4,890 hectares) of non-federal land, and 3,265 acres (1,321 hectares) of state land, for a total of 201,657 acres (81,608 hectares). Minimal (i.e., less than 10) residential and non-residential relocations would be required and therefore, relocation impacts of Alternative 4 would be less than significant.

4.1.5.3 Recreation and OHV Use

Recreation is addressed under the Plans and Policies heading above in regard to management plan consistency. Section 4.2, *Recreation*, addresses impacts to recreation visitation and identifies significant and unavoidable impacts due to the loss of unique OHV recreation opportunities. The creation of the RPAA as part of this alternative would provide public access for recreational use. No additional findings regarding recreation are made for land use.

4.1.5.4 Mining

As described in Section 2.6, under Alternative 4 mining claim owners would be offered fair market value for their claims or would be afforded reasonable access to their claims. Decisions on whether to purchase a mining claim, or provide access to the claim, would be made on a case-by-case basis. The location of the mining claim relative to MEB training locations would determine whether a mining claim is to be purchased or reasonable access provided. Section 4.12, *Geological Resources*, identifies less than significant impacts to mineral resources if the Morris Lode Mine becomes operable and is purchased and closed; no impact if either the mine is not operating and is purchased and closed or is not purchased. Therefore, land use impacts related to incompatibility with mining would be the same as Alternative 1, i.e., less than significant.

4.1.5.5 Grazing

Land use impacts related to incompatibility with grazing are considered to be less than significant because the Johnson Valley Allotment is inactive and continued grazing of cattle on the remainder of the Ord Mountain Allotment would be possible. Impacts would be the same as Alternative 1.

4.1.5.6 Utilities

Impacts would be less than significant because existing Southern California Edison transmission facilities could remain in place. Impacts would be the same as Alternative 1,

4.1.5.7 Sensitive Land Uses

As described in Section 4.9.5, the 65 dB CNEL contour for airfield-related activities and the 65 dB $CNEL_{mr}$ contour for airspace-related activities in current and proposed airspace, would be fully contained within the acquisition study areas for Alternative 4 (see Table 4.1-1 and Table 4.9-1). Therefore, no individuals outside the installation would be exposed to CNEL or $CNEL_{mr}$ greater than or equal to 65 dB from airfield-related or airspace-related noise.

For ordnance, the 62 dBC CNEL contour under Alternative 4 would be mostly located within the proposed Combat Center boundaries (see Table 4.1-2 and Table 4.9-2). As shown on Figure 4.9-9, the 62 dBC CNEL contour would extend beyond the boundaries of the Combat Center Complex, slightly to the northeast. However, there are no sensitive noise receptors located within the areas where the 62 dBC CNEL contour extends outside the proposed boundaries. Therefore, noise impacts on sensitive land uses, including POIs, would be less than significant.

4.1.5.8 Potential Mitigation Measures

In addition to creation of the RPAA (described in Chapter 2) the Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 4 would result in significant, unmitigable impacts.

4.1.6 Alternative 5 Impacts

Similar to Alternative 4, Alternative 5 includes restricted public access to the west study area when MEB exercises are not occurring, but unlike Alternative 4, this alternative excludes acquisition of the south study area.

4.1.6.1 Plans and Policies

CDCA Plan designations and policies applicable to the south study area (e.g., multiple use, public access, and dispersed recreation access) and San Bernardino County open space designation and development controls would continue.

Alternative 1 and Alternative 5 contain the same west (i.e., full west) and south areas; however, Alternative 5 would allow restricted public access in the west study area when MEB training is not taking place, subject to fulfillment of individual education requirements and approval of user permits (see Section 2.5, *Management of RPAAs under Alternatives 4, 5, and 6*). Alternative 5 would establish areas in which the Marine Corps could meet the live-fire and maneuver objective training requirements for a MEB, while also providing restricted public access to the west study area for recreational uses. In conjunction with the preparation of an INRMP, this alternative substantially meets the purposes of EO 11644 to control OHV use to protect resources, promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands. Inconsistencies with other land use policies and designations applicable to the west area, including the Ord Mountain Grazing Allotment, Upper Yucca Valley ACEC, San Bernardino County residential and open space land use designations would be less than significant. Inconsistencies with plans and policies are considered to be significant and unavoidable due to the fact that greater access is currently allowed by the Johnson Valley OHV Area Management Plan than would be allowed under restricted public access. See Section 4.2, *Recreation*, for detailed discussion of recreation impacts. Land use impacts related to plans and policies are considered to be significant and unavoidable.

4.1.6.2 Land Status and Ownership

Under Alternative 5, the Marine Corps would acquire an estimated 165,663 acres (67,040 hectares) of federal land, 12,065 acres (4,882 hectares) of non-federal land, and 2,625 acres (1,062 hectares) of state land, for a total of 180,353 acres (72,987 hectares). Alternative 4 and Alternative 5 would require the same land acquisition in the west study area, but Alternative 5 excludes the south study area. Minimal (i.e., less than 10) residential and non-residential relocations would be required and therefore, relocation impacts of Alternative 5 would be less than significant.

4.1.6.3 Recreation and OHV Use

Recreation is addressed under the Plans and Policies heading above in regard to management plan consistency. Section 4.2, *Recreation*, addresses impacts to recreation visitation and identifies significant and unavoidable impacts due to the loss of unique OHV recreation opportunities. The creation of the RPAA as part of this alternative would provide public access for recreational use. No additional findings regarding recreation are made for land use.

4.1.6.4 Mining

As described in Section 2.6, under Alternative 5 mining claim owners would be offered fair market value for their claims or would be afforded reasonable access to their claims. Decisions on whether to purchase a mining claim, or provide access to the claim, would be made on a case-by-case basis. The location of the mining claim relative to MEB training locations would determine whether a mining claim is to be

purchased or reasonable access provided. Section 4.12, *Geological Resources*, identifies less than significant impacts to mineral resources if the Morris Lode Mine becomes operable and is purchased and closed; no impact if either the mine is not operating and is purchased and closed or is not purchased. Therefore, land use impacts related to incompatibility with mining would be the same as Alternative 4, i.e., less than significant.

4.1.6.5 Grazing

Land use impacts related to grazing are considered to be less than significant because the Johnson Valley Allotment is inactive and continued grazing of cattle on the remainder of the Ord Mountain Allotment would be possible. Impacts would be the same as Alternative 4.

4.1.6.6 Utilities

Utilities rights-of-way impacts would be less than significant because existing Southern California Edison transmission facilities could remain in place. Impacts would be the same as Alternative 4.

4.1.6.7 Sensitive Land Uses

As described in Section 4.9.6, the 65 dB CNEL contour for airfield-related activities would be fully contained within the acquisition study areas for Alternative 5. Therefore, no individuals outside the installation would be exposed to CNEL greater than or equal to 65 dB from airfield-related noise.

The 65 dB $CNEL_{mr}$ contour for airspace-related activities in current and proposed airspace would be mostly located within the proposed boundaries of the Combat Center (see Table 4.1-1 and 4.9-1). However, there are no sensitive noise receptors located within the areas where the 65 $CNEL_{mr}$ extends outside the proposed boundaries.

For ordnance, the 62 dBC CNEL contour under Alternative 5 would be mostly located within the proposed Combat Center boundaries (see Table 4.1-2 and Table 4.9-2). As shown on Figure 4.9-11, the 62 dBC CNEL contour would extend beyond the boundaries of the Combat Center Complex, slightly to the northeast. However, there are no sensitive noise receptors located within the areas where the 62 dBC CNEL contour extends outside the proposed boundaries. Therefore, noise impacts on sensitive land uses, including POIs, would be less than significant.

4.1.6.8 Potential Mitigation Measures

In addition to creation of the RPAA (described in Chapter 2) the Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 5 would result in significant, unmitigable impacts.

4.1.7 Alternative 6 Impacts (Preferred Alternative)

4.1.7.1 Plans and Policies

This alternative excludes the northwest portion of the land in the west study area that would be acquired under Alternatives 1, 4, and 5 and therefore avoids approximately 43 miles (70 km) of Southern California Edison transmission facilities. Like Alternatives 4 and 5, it would allow shared OHV use and other recreational use of the acquired land. Approximately 44% of the Johnson Valley OHV Area would be available for public recreation at least 10 months per year (38,137 acres [15,434 hectares] available for 10 months per year and 44,665 acres [18,075 hectares] available year round). Alternative 6 would establish areas in which the Marine Corps could meet the live-fire and maneuver objective training requirements for a MEB, while also providing an RPAA for recreational uses. In conjunction with the

preparation of an INRMP, this alternative substantially meets the purposes of EO 11644 to control OHV use to protect resources, promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands. Alternative 6 would result in inconsistencies with plans and designations including the Ord Mountain Grazing Allotment, Upper Yucca Valley ACEC, and San Bernardino County residential and open space land use designations that would be less than significant, as described under Alternative 1. Inconsistencies with plans and policies are considered to be significant and unavoidable due to the fact that greater access is currently allowed by the Johnson Valley OHV Area Management Plan than would be allowed under restricted public access. See Section 4.2, *Recreation*, for detailed discussion of recreation impacts. Land use impacts related to plans and policies are considered to be significant and unavoidable.

4.1.7.2 Land Status and Ownership

Under Alternative 6 the Marine Corps would acquire an estimated 154,668 acres (62,592 hectares) of federal land, 10,746 acres (4,349 hectares) of non-federal land, and 2,558 acres (1,035 hectares) of state land, for a total of 167,971 acres (67,976 hectares). Note that the difference between total acres (hectares) and the summation of the individual components is due to rounding. Alternative 6 would reduce the land acquisition requirements of Alternative 1 in the west area. Minimal (i.e., less than 10) residential and non-residential relocations would be required and therefore, relocation impacts of Alternative 6 would be less than significant.

4.1.7.3 Recreation and OHV Use

Recreation is addressed under the Plans and Policies heading above in regard to management plan consistency. Section 4.2, *Recreation*, addresses impacts to recreation visitation and identifies significant and unavoidable impacts due to the loss of unique OHV recreation opportunities. The creation of the RPAA as part of this alternative would provide public access for recreational use; however, its size would be smaller than under Alternatives 4 and 5. No additional findings regarding recreation are made for land use.

4.1.7.4 Mining

Impacts from Alternative 6 would be similar to Alternative 1. As described in Section 2.6, under Alternative 6 patented and unpatented claims associated with the Morris Lode and Bessemer Mines would be acquired and the mines would be closed and reclaimed. Section 4.12, *Geological Resources*, identifies less than significant impacts to mineral resources if the Morris Lode Mine is producing ore and is purchased and closed; no impact if the mine is not producing ore. As with Alternative 1, with respect to all other patented and unpatented mining claims, a decision would be made on a case-by-case basis whether to purchase any particular mining claim for fair market value or allow the claim owner reasonable access to their claim. Therefore, land use impacts related to incompatibility with mining would be the same as Alternative 1, i.e., less than significant.

4.1.7.5 Grazing

This (partial) west area contains 83,582 acres (33,825 hectares) within the inactive Johnson Valley Allotment (sheep). It contains 11,497 acres (4,653 hectares) within the active Ord Mountain Allotment (cattle), which represents 7.4% of the total allotment area. Impacts would be less than significant because the Johnson Valley Allotment is inactive and grazing could continue on the remaining portions of the Ord Mountain Allotment.

4.1.7.6 Utilities

There would be no impacts to utilities because Alternative 6 does not encompass any of Southern California Edison's transmission facilities or other utilities.

4.1.7.7 Sensitive Land Uses

As described in Section 4.9.7, the 65 dB CNEL contour for airfield-related activities and the 65 dB $CNEL_{mr}$ contour for airspace-related activities in current and proposed airspace, would be fully contained within the acquisition study areas for Alternative 6 (see Table 4.1-1 and Table 4.9-1). Therefore, no individuals outside the installation would be exposed to CNEL or $CNEL_{mr}$ greater than or equal to 65 dB from airfield-related or airspace-related noise.

For ordnance, the 62 dBC CNEL contour under Alternative 6 would be mostly located within the proposed Combat Center boundaries (see Table 4.1-2 and Table 4.9-2). As shown on Figure 4.9-13, the 62 dBC CNEL contour would extend beyond the boundaries of the Combat Center Complex, to the west and northeast. However, there are no sensitive noise receptors located within the areas where the 62 dBC CNEL contour extends outside the proposed boundaries. Therefore, noise impacts on sensitive land uses, including POIs, would be less than significant.

4.1.7.8 Potential Mitigation Measures

In addition to creation of the RPAA (described in Chapter 2), the Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 6 would result in significant, unmitigable impacts.

4.1.8 No-Action Alternative

The No-Action Alternative would continue current land use trends. Use of public land would continue to be managed by the BLM through implementation of the CDCA Plan to provide for multiple use including the Johnson Valley OHV Area Management Plan, Upper Johnson Valley Yucca Ring ACEC, designated grazing allotments, granting of mining rights and utilities rights-of-way, and permitting of resource development. Regulation by San Bernardino County of unincorporated private lands designated as residential, open space, and agriculture would continue as would state management of school lands. Inconsistencies with plans and policies, land use incompatibility with mining and agriculture, and any relocations that would be created by Alternatives 1-6 would be avoided. Therefore, the No-Action Alternative would have no impact on land use.

4.1.9 Summary of Impacts

Table 4.1-3 summarizes the impacts of each action alternative and the No-Action Alternative.

Table 4.1-3. Summary of Impacts

Alternative	Impacts
Alternative 1	SI <u>Plans and Policies</u> • SI and inconsistent with the Johnson Valley OHV Area Management Plan because of loss of access to approximately 91% of the Johnson Valley OHV Area. • SI for not furthering the purpose of EO 11644 to control OHV use to protect resources or minimize conflicts among the various uses of those lands. LSI <u>Plans and Policies</u> • LSI and inconsistent with other plans and policies including CDCA Plan grazing provisions and designated allotments, Upper Johnson Valley Yucca Ring ACEC, and San Bernardino County residential land use designations. <u>Land Status and Ownership</u> • Acquisition of 201,657 acres of federal, non-federal, and state lands. • Minimal (i.e., less than 10) or no relocation of residential and non-residential properties. <u>Mining</u> • No active mines. One mine with an approved Conditional Use Permit and Reclamation Plan, but with no mining operations occurring. . • Mining claims and abandoned mines are present. • Acquisition of the patented and unpatented claims associated with the Morris Lode and Bessemer Mines. • Acquisition of all other patented and unpatented mining claims if not able to provide reasonable access to the claim. <u>Grazing</u> • Loss of 16.3% of the active Ord Mountain Allotment, but grazing feasible on the remaining portion. • Acquisition and loss of portions of the inactive Johnson Valley Allotment, but no grazing is allowed or planned. <u>Utilities</u> • 43 miles of Southern California Edison transmission lines could remain in place and operate. LSI <u>Sensitive Land Uses</u> • All of the 65 dB CNEL contour for airfield-related activities, all of the 65 dB $CNEL_{mr}$ contour for airspace-related activities, and most of the 62 dBC CNEL contour for ordnance activities would be located within the proposed Combat Center boundaries. No sensitive noise receptors located in areas where CNEL contours extend outside of proposed boundaries. • Wilderness areas in vicinity of the Combat Center were designed by the CDPA of 1994. The designation was not intended to limit military overflights. The current INRMP would be amended to address new management actions related to land acquisition and airspace utilization. NA <u>Recreation and OHV Use</u> • No additional land use findings are made for recreation other than those related to plans and policies above. See Recreation discussion in Section 4.2.

Continued on next page.

Table 4.1-3. Summary of Impacts

Alternative	Impacts
Alternative 2	SI <u>Plans and Policies</u> • SI and inconsistent with the Johnson Valley OHV Area Management Plan because of loss of access to approximately 54% of the Johnson Valley OHV Area. • SI for not furthering the purpose of EO 11644 to control OHV use to protect resources or minimize conflicts among the various uses of those lands. LSI <u>Plans and Policies</u> • LSI and inconsistent with other plans and policies including CDCA Plan grazing provisions and designated allotments, and San Bernardino County residential land use designations. <u>Land Status and Ownership</u> • Acquisition of 134,863 acres of federal, non-federal, and state lands. • Minimal (i.e., less than 10) or no relocation of residential and non-residential properties. <u>Mining</u> • Same as Alternative 1. <u>Grazing</u> • Loss of 7.5% of the active Ord Mountain Allotment, but grazing feasible on the remaining portion. • Acquisition and loss of portions of the inactive Johnson Valley Allotment, but no grazing is allowed or planned. <u>Utilities</u> • 21 miles of Southern California Edison transmission lines are located in the west acquisition study area and could remain in place and operate. <u>Sensitive Land Uses</u> • All of the 65 dB CNEL contour for airfield-related activities, most of the 65 dB $CNEL_{mr}$ contour for airspace-related activities, and most of the 62 dBC CNEL contour for ordnance activities, would be located within the proposed Combat Center boundaries. No sensitive noise receptors located in areas where CNEL contours extend outside of proposed boundaries. NA <u>Recreation and OHV Use</u> • Same as Alternative 1.

Continued on next page

Table 4.1-3. Summary of Impacts

Alternative	Impacts
Alternative 3	SI Plans and Policies • SI and inconsistent with CDCA Plan multiple use provisions, including access to two active mines, and with San Bernardino County agricultural land use designations on 1,600 acres under cultivation. Mining • SI due to potential for a future case-by-case real estate analysis to find that two active mines would be incompatible with training activities and would require acquisition and closure. LSI Mining • Mining claims and abandoned mines are present. • Acquisition of mines and patented and unpatented mining claims if not able to provide reasonable access to the claim. Land Status and Ownership • Acquisition of 198,580 acres of federal, non-federal, and state lands. • Minimal (i.e., less than 10) or no relocation of residential and non-residential properties. Utilities • Southern California Gas Company high pressure pipelines could remain in place and operate. Sensitive Land Uses • All of the 65 dB CNEL contour for airfield-related activities, all of the 65 dB $CNEL_{mr}$ contour for airspace-related activities, and most of the 62 dBC CNEL contour for ordnance activities, would be located within the proposed Combat Center boundaries. No sensitive noise receptors located in areas where CNEL contours extend outside of proposed boundaries. Agriculture • LSI and incompatible due to loss of 1,600 acres of cultivated agricultural lands; the 1,000 acres cultivated by Cadiz Inc. represents less than 2% of the agricultural acreage in San Bernardino County. NA Recreation and OHV Use • Same as Alternative 1.
Alternative 4	SI Plans and Policies • SI and inconsistent with the Johnson Valley OHV Area Management Plan because of loss of open access to 91% of the Johnson Valley OHV Area; includes restricted public access of the west study area 10 months per year. LSI Plans and Policies • LSI and inconsistent with other plans and policies including CDCA Plan grazing provisions and designated allotments, Upper Johnson Valley Yucca Ring ACEC, and San Bernardino County residential land use designations. Land Status and Ownership • Acquisition of 201,657 acres of federal, non-federal, and state lands. • Minimal (i.e., less than 10) or no relocation of residential and non-residential properties. Mining • No active mines. One mine with an approved Conditional Use Permit and Reclamation Plan, but with no mining operations occurring. • Acquisition of mines and patented and unpatented mining claims if not able to provide reasonable access to the mine or claim.

Continued on next page

Table 4.1-3. Summary of Impacts

Alternative	Impacts
Alternative 4 (continued)	LSI <u>Grazing</u> • Loss of 16.3% of the active Ord Mountain Allotment, but grazing feasible on the remaining portion. • Acquisition and loss of portions of the inactive Johnson Valley Allotment, but no grazing is allowed or planned. <u>Utilities</u> • 43 miles of Southern California Edison transmission lines are located in the acquisition study area and could remain in place and operate. <u>Sensitive Land Uses</u> • All of the 65 dB CNEL contour for airfield-related activities, all of the 65 dB $CNEL_{mr}$ contour for airspace-related activities, and most of the 62 dBC CNEL contour for ordnance activities, would be located within the proposed Combat Center boundaries. No sensitive noise receptors located in areas where CNEL contours extend outside of proposed boundaries. NA <u>Recreation and OHV Use</u> • Same as Alternative 1.
Alternative 5	SI <u>Plans and Policies</u> • Same as Alternative 4. LSI <u>Plans and Policies</u> • Same as Alternative 4. <u>Land Status and Ownership</u> • Acquisition of 180,353 acres of federal, non-federal, and state lands. • Minimal (i.e., less than 10) or no relocation of residential and non-residential properties. <u>Grazing</u> • Same as Alternative 4. <u>Utilities</u> • Same as Alternative 4. <u>Sensitive Land Uses</u> • All of the 65 dB CNEL contour for airfield-related activities, most of the 65 dB $CNEL_{mr}$ contour for airspace-related activities, and most of the 62 dBC CNEL contour for ordnance would be located within the proposed Combat Center boundaries. No sensitive noise receptors located in areas where CNEL contours extend outside of proposed boundaries. LSI <u>Mining</u> • Same as Alternative 4. NA <u>Recreation and OHV Use</u> • Same as Alternative 1.

Continued on next page

Table 4.1-3. Summary of Impacts

Alternative	Impacts
Alternative 6	SI <u>Plans and Policies</u> • Similar to Alternatives 4 and 5 except acreage of the RPAA is reduced; access to roughly 56% of the Johnson Valley OHV Area would be lost. LSI <u>Plans and Policies</u> • Same as Alternative 4. <u>Land Status and Ownership</u> • Acquisition of 167,971 acres of federal, non-federal, and state lands. • Minimal (i.e., less than 10) or no relocation of residential and non-residential properties. <u>Mining</u> • Same as Alternative 1. <u>Grazing</u> • Loss of 7.4% of the active Ord Mountain Allotment, but grazing feasible on the remaining portion. • Acquisition and loss of portions of the inactive Johnson Valley Allotment, but no grazing is allowed or planned. <u>Sensitive Land Uses</u> • All of the 65 dB CNEL contour for airfield-related activities, all of the 65 dB $CNEL_{mr}$ contour for airspace-related activities, and most of the 62 dBC CNEL contour for ordnance activities, would be located within the proposed Combat Center boundaries. No sensitive noise receptors located in areas where CNEL contours extend outside of proposed boundaries. NI <u>Utilities</u> • Avoids Southern California Edison transmission lines. NA <u>Recreation and OHV Use</u> • Same as Alternative 1.
No-Action Alternative	NI • Existing conditions would remain unchanged, and no impacts to land use would occur.

Notes: ACEC = Area of Critical Environmental Concern; BLM = Bureau of Land Management; CDCA = California Desert Conservation Area; CDPA = California Desert Protection Act; CNEL = Community Noise Equivalent Level; $CNEL_{mr}$ = Onset-Rate Adjusted Monthly Community Noise Equivalent Level; dB = decibel; dBC = C-weighted decibel; EO = Executive Order; INRMP = Integrated Natural Resources Management Plan; km = kilometer; LSI = Less than significant impact; NA=Not applicable; NI = No impacts; OHV = off-highway vehicle; RPAA = Restricted Public Access Area; SI = Significant impact

4.2 RECREATION

4.2.1 Approach to Analysis

4.2.1.1 Methodology

This description of environmental consequences addresses the proposed action that may affect recreational resources. The discussion includes a description of the methodology and evaluation criteria used to identify and analyze potential impacts, followed by the potential effects associated with each alternative, including the No-Action Alternative. A summary of impacts and a summary of recommended mitigation measures specific to each alternative is presented at the end of this section.

Information on recreational resources was collected through interviews with BLM, interviews with recreation stakeholders and organizations, Geographic Information System (GIS) databases, literature review, and the limited visitor-days of use data that are available for the acquisition study areas.

As discussed in Section 3.2.3.2, visitor-days of use estimates from key recreation stakeholders and organizations could not be independently confirmed; therefore, this analysis relied on visitor-days of use estimates from existing data and assumptions provided by BLM. Existing baseline data for conducting recreational resource impact analyses are limited because BLM does not collect comprehensive visitor data (e.g., user counts, visitor satisfaction, user conflicts, and visitor demands). As discussed in Section 3.2.3.2, visitor-days of use are estimated using the Recreation Management Information System (RMIS) database and accounts for dispersed use. Visitor-days of use associated with scheduled events are collected through permit applications, and are based on estimates provided by the event promoter/permittee. Also, as previously noted in Chapter 3, BLM recognizes that this estimation process likely underestimates visitor-days of use in Johnson Valley. Estimates of visitor use are based on best available BLM data as presented in Section 3.2.3.2 (Visitor Use). Specifically, a Year 2015 baseline estimate of 337,000 average annual visitor-days was assumed in this analysis, based on 2010 visitor data estimated by BLM and the agency's projections for growth in visitors to the area over the next few years. Visits can also be differentiated by their purpose: "event-related" visits are assumed to include those participants and spectators of organized OHV races or other similar events that visit exclusively because of a scheduled event (and would not visit if the event were not being held); while "dispersed use" visits are those that may occur for any other reason (e.g., family vacations, weekend excursions, etc.). Dispersed use visitors are also assumed to include a proportion of race spectators that would come to the project area anyway, even if race events did not occur. The BLM estimates that approximately 17% of visitor-days are event-related according to the definition used here and approximately 83% of visitor-days are dispersed use.

No data or estimates have been identified that quantify OHV and other recreational use in the south and east study areas. Neither area is reported to be a particularly popular location for OHV use or other recreational pursuits, although residents of Wonder Valley have registered complaints with local authorities about OHV use. Both areas provide terrain and other conditions that are similar to those in the west study area, and both areas are adjacent to designated wilderness areas. For purposes of this analysis, a level of 800 visitor-days per year was assumed for the south study area and 500 visitor-days per year was assumed for the east area.

In accordance with the CEQ regulations at 40 CFR 1502.22, *Incomplete or Unavailable Information*, the Marine Corps conducted interviews with BLM and key recreation organizations and stakeholders to obtain reliable data on annual visitor-days of use. As discussed above, baseline visitor data are not precise but are sufficiently accurate to support the EIS analysis. As stated in Section 2.4, *Alternatives*

Carried Forward for Analysis, the Marine Corps developed alternatives to avoid or minimize impacts on recreational users, and more precise visitor data would not result in the development of a new alternative or mitigation measure, or substantially affect the EIS analysis.

The methodology used to reach a particular significance conclusion for each action alternative took this estimate and used the same conservative assumptions for reduction in use under each alternative as was developed for the socioeconomic impact analysis (see Section 4.3). The estimated dispersed use visits and event-related visits reduction percentages were used to quantify estimated loss of visitor-days of use under each alternative, to effectively formulate a reasonable impact conclusion. This analysis also considered GIS overlay data of the affected areas, estimated proportional loss and remaining areas compared with regional OHV areas, and analysis of relative popularity/recreational value of areas lost and areas remaining for various types of recreational activities.

4.2.1.2 Evaluation Criteria

For the purposes of this analysis, the project alternatives would cause a significant impact to recreational resources if they would:

- impede access to recreational resources;
- substantially reduce recreational opportunities;
- substantially reduce the use or exceed the capacity of an existing recreation area;
- cause substantial conflicts between recreational users; or
- cause substantial physical deterioration of recreational resources.

4.2.1.3 Public Scoping Issues

Concerns that were raised by the public, including recreation stakeholders and organizations, during the 90-day scoping period (October 30, 2008 – January 31, 2009), and during subsequent interviews with a sampling of recreation stakeholders (January – February 2010) are addressed in this analysis. These recreation concerns include, but are not limited to:

- loss of access for recreation;
- loss of Johnson Valley OHV Area, the largest OHV area in the country, the size of which provides a remote experience not found in other OHV areas;
- cumulative loss of OHV areas in the region;
- access for recreational activities other than OHV use;
- impacts due to displacement of users to other areas; and
- illegal use of OHVs on public and private lands.

4.2.2 Alternative 1 Impacts

Two separate land areas would be acquired with implementation of Alternative 1: the west study area comprising approximately 180,353 acres (72,987 hectares), and the south study area comprising approximately 21,304 acres (8,621 hectares). The subsections below discuss the potential direct and indirect impacts to recreation within each of these areas, including the indirect impacts at other recreation sites that would likely attract the recreational activities that would be displaced from these study areas.

4.2.2.1 West Study Area

With implementation of Alternative 1, a total of 180,353 acres (72,987 hectares) would be acquired within the west study area. However, approximately 17,640 "usable" acres (7,139 hectares) or roughly 9% of the existing Johnson Valley OHV Area (189,470 acres [76,676 hectares]) would remain available for public recreation year-round (Table 4.2-1).

Table 4.2-1. Percentage of Usable Acreages Remaining under each Alternative

Alternative	"Usable" Acreage* Available for Recreation[1]	Percent of Johnson Valley OHV Area Available for Recreation
No-Action Alternative	189,470	100% (12 months per year)
Alternative 1[2]	17,640	9% (12 months per year)
Alternative 2[3]	86,200	46% (12 months per year)
Alternative 3[4]	189,470	100% (12 months per year)
Alternative 4[5]	189,470	100% (10 months per year)
Alternative 5[5]	189,470	100% (10 months per year)
Alternative 6[6]	82,802	44% (10 months per year)

Notes: * Acreage is approximate.

[1] "usable" acreage is defined as the total acreage for public recreation, with the exception of small non-connecting areas, which for the purposes of this analysis are not considered "usable" for public recreation.

[2] 17,640 usable acres/189,470 Johnson Valley OHV acres = 9%

[3] 86,200 usable acres/189,470 Johnson Valley OHV acres = 46%

[4] Alternative 3 is not applicable (NA) since the east study area is not an open OHV area.

[5] All of the 189,470 acres of the Johnson Valley OHV Area would be available for public recreation 10 months per year under Alternatives 4 and 5, 2 months per year this area would be exclusive military use.

[6] Total acquisition in the west study area would be 146,667 acres, 108,530 would be exclusive military use, and 38,137 acres would be available for 10 months per year. Acreage available for at least 10 months per year = 38,137+44,665= 82,802. Percent of Johnson Valley OHV Area available for Recreation = 82,802/189,470 Johnson Valley OHV acres = 44%. The 44,665 acre area of Johnson Valley includes the Cougar Buttes and Anderson Dry Lake areas, which would not be acquired under Alternative 6 and would therefore be available for public recreation 12 months per year.

To provide context with the regional OHV areas identified in Section 3.2, this remaining portion available for recreational activities would be the fourth largest OHV area, larger than Dumont Dunes (8,150 acres [3,298 hectares]) and smaller than El Mirage (24,000 acres [9,713 hectares]). Cougar Buttes and Anderson Dry Lake, two major OHV staging and camping areas are located within this area, along with several popular OHV trails, including but not limited to Bullfrog, Cakewalk, Chicken Rock, and Hammerdown Trails. In addition, this area is frequently used for a variety of recreational activities, such as, hiking, picnicking, photography, geocaching, and wildlife and wildflower viewing.

Alternative 1 would involve exclusive military use of the entire west study area; public use of most of the Johnson Valley OHV Area would be lost. Therefore, implementation of Alternative 1 would impede access to and prevent the use of the existing recreational resources within the Johnson Valley OHV Area. Figure 4.2-1 shows the boundaries of the Alternative 1 acquisition study area in relation to Johnson Valley.

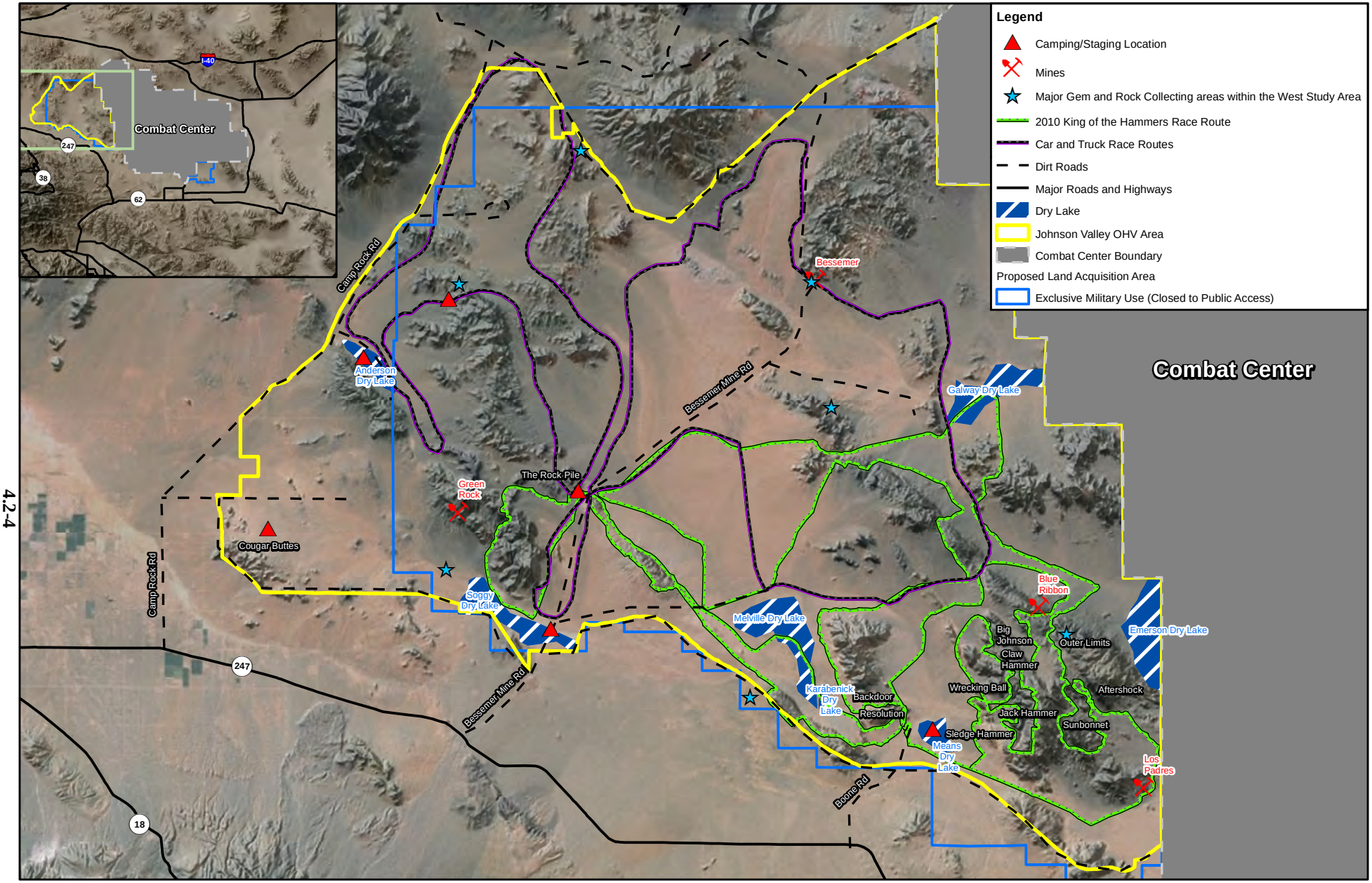


Figure 4.2-1
Boundaries of Alternative 1 in Johnson Valley

Land acquisition in the west study area would represent a loss of access to nearly half (45%) of the acres available for open OHV recreation in the region (Tables 4.2-2 and 4.2-3). However, as discussed above, the 17,640-acre (7,139-hectare) Cougar Buttes and Anderson Dry Lake area would still be available for recreational use. Comparable recreational activities (OHV use, hiking, camping, geocaching, rock hounding, etc.) would also continue to be available in a variety of regional recreational areas and BLM estimates that 90% of the displaced recreation users (dispersed use) would go elsewhere within San Bernardino County (see Figure 3.2-3) (BLM 2010l).

Table 4.2-2. Regional OHV Acreages

Recreation Areas	Acres
Johnson Valley	189,470
Spangler Hills	57,000
Stoddard Valley	53,000
Rasor	30,000
El Mirage	24,000
Dumont Dunes	8,150
Keyesville	7,133
Jawbone	7,000
Dove Springs	5,000
TOTAL Regional OHV Acres	**380,753**

Note: OHV = off-highway vehicle

Table 4.2-3. Percentage Loss of Regional OHV Acreages under each Action Alternative

Alternative	Loss of Open OHV Acreages*	Total Regional OHV Acres	Percent Loss of Regional OHV Acreages
Alternative 1	171,830[1]	380,753	45%
Alternative 2	113,558	380,753	30%
Alternative 3	NA[2]	NA[1]	0%
Alternative 4	180,353[1,3]	380,753	45%
Alternative 5	180,353[1,3]	380,753	45%
Alternative 6	108,530[4]	380,753	29%

Notes: *Acreage is approximate.
[1]Loss of Open OHV Acreage equates to the Johnson Valley OHV Area minus the usable OHV acres shown in Table 4.2-1 (189,470-17,640 = 171,830).
[2] Alternative 3 is not applicable (NA) since the east study area is not an open OHV area.
[3]Acreages lost under Alternatives 4 and 5 would only occur 2 months per year.
[4]Acreages lost under Alternative 6 includes the exclusive military use area only since 38,137 acres would be available for restricted public access 10 months per year.
OHV = off-highway vehicle

However, the vast scale of the Johnson Valley OHV Area contributes to its uniqueness, and provides a remote experience that many recreational users desire, and the combination of resources that would be lost is unique to the region. According to the California Off-Road Vehicle Association, the combination of vast open space, large variety of desert views and scenic vistas, and unique geologic formations is not found within any other single OHV area in the country (California Off-Road Vehicle Association 2010). Proposed land acquisition under Alternative 1 would also prevent access to the Rock Pile and the informal memorial site that has been established in memory of the individuals who were killed at the location during the August 2010 Mojave Desert California 200 Race.

Estimated loss of visitor-days of use from Johnson Valley under each alternative is provided in Table 4.2-4. Included in Table 4.2-5 is an estimate of the visitor-days of use that would be displaced to other recreation and OHV areas within the county.

Table 4.2-4. Loss of Visitor-Days of Use from Johnson Valley under each Action Alternative

Visitor-Days of Use Lost from Johnson Valley	2015 Baseline	% Lost	Alt. 1	% Lost	Alt. 2	% Lost	Alts. 4&5	% Lost	Alt. 6
Dispersed use	279,710	75%	209,783	25%	69,928	18%	50,348	30%	83,913
Event-related	57,290	100%	57,290	60%	34,374	15%	8,594	60%	34,374
Total	**337,000**		**267,073**		**104,302**		**58,942**		**118,287**

Note: Alternative 3 is not applicable since it does not include Johnson Valley.

Table 4.2-5. Displaced Visitor-Days of Use to Other County OHV Areas

Visitor-Days of Use Displaced to County OHV Areas	% Displaced[1]	Alt. 1	Alt. 2	Alts. 4&5	Alt. 6
Dispersed use	90%	188,804	62,935	45,313	75,522
Event-related	0%	0	0	0	0
Total		**188,804**	**62,935**	**45,313**	**75,522**

Notes: [1]Assumes that 90% of dispersed use visitor-days under each alternative from Table 4.2-3 , would be displaced to other recreation and OHV areas within San Bernardino County (BLM 2010l). Assumes that none of the event-related visitor-days would be accommodated at regional OHV areas (BLM 2010l).
[2]Alternative 3 is not applicable since it does not include Johnson Valley.
OHV = off-highway vehicle

Implementation of Alternative 1 would result in displacement of a large majority of the estimated 337,000 annual visitor-days of use that occur within the Johnson Valley OHV Area. For the purposes of this analysis, it is estimated that 25% of the existing dispersed use visitor-days of use would still occur within the remaining 17,640-acre (7,139-hectare) area, and none of the event-related visitor-days of use would be accommodated in this area., Implementation of Alternative 1 would result in a loss of an estimated 267,073 visitor-days of use per year from Johnson Valley (Table 4.2-4).

Additional recreational areas in southern California have been identified as alternative sites that may attract the OHV activities that would be displaced from Johnson Valley (see Section 3.2 and Appendix M of this EIS). The BLM estimates that a majority (90%) of the displaced recreational activity (dispersed use) would go elsewhere in San Bernardino County for recreation (BLM 2010l), resulting in an increase of approximately 188,804 visitor-days of use at other regional OHV areas (refer to Table 4.2-5). Appendix M provides an evaluation of alternative OHV recreation sites and discusses a potential distribution of displaced OHV activity to these alternative areas. For example, Stoddard Valley OHV Area would likely receive a majority of the displaced activity since it is the closest OHV area to Johnson Valley and features similar terrain and accessibility; it would therefore likely be subject to the most substantial indirect impacts to recreation. Other OHV areas, such as El Mirage, Imperial Sand Dunes, Spangler Hills, and Jawbone Canyon, as well as designated OHV routes in the West Mojave route system near Johnson Valley, would also be expected to attract substantial proportions of the displaced OHV activity (see Appendix M). Other more distant or otherwise dissimilar OHV recreation areas would be expected to absorb relatively low increases in activity from Johnson Valley displacement, with substantially less indirect impact.

According to BLM, there were approximately 237,750 visitor-days of use in Stoddard Valley OHV Area in 2009 (BLM 2010h). During major events, the area is currently at full capacity (BLM 2010h). Also according to BLM, most major events at Stoddard Valley OHV area could be eliminated if this shift of visitor-days of use is realized under Alternative 1, due to overcrowding and safety concerns (BLM 2010h). Displacement of recreational users and crowding at the alternative OHV areas may cause a

decrease in satisfaction and enjoyment of the recreational areas and major events at other OHV areas may also be eliminated.

The surge in visitor-days of use at other regional OHV areas may lead to a reduction of recreational opportunities within existing recreational areas, as more users would compete for recreational use (e.g., competing for camping spaces, trail use, solitary experience). This could cause conflicts between recreational users. Many of the local and regional OHV areas already experience high levels of use, particularly during weekends, holidays, and scheduled events. The sharp increase in potential visitor days spread out over a few regional OHV areas would further contribute to the crowded feel. Reduced opportunities for space, decreased time for activity, elimination of major events, conflicts between user groups, and deterioration of the existing trails and routes from overuse are some of the potential indirect effects from additional users. The increased number of users within regional recreational areas would lead to reduced opportunity for recreation and potential elimination of major events, leading to diminished user satisfaction. These indirect impacts would be potentially significant at the alternative areas and routes that would be expected to absorb substantial proportions of displaced visitors (such as Stoddard Valley OHV Area and nearby West Mojave system routes - see Appendix M), but less than significant in other areas that would be expected to receive relatively small numbers of displaced visitors.

Increased numbers of visitors to alternative recreational areas are also likely to lead to competition for space for organized events. According to BLM, the demand for dispersed use (e.g., weekend and holiday users) and use associated with organized events could not be accommodated within the remaining regional OHV areas under this alternative (BLM 2010h). Under Alternative 1, all racing events, including car and truck races, that currently occur within the Johnson Valley OHV Area would likely be eliminated, with the possible exception of 3 to 5 mile (5 to 8 km) track skill-type events held at Cougar Buttes, which is outside the boundaries of the west study area (BLM 2010i). It is also likely that the 32 annual scheduled events in the Johnson Valley OHV Area would not be fully accommodated at other regional OHV areas (BLM 2010h). The surrounding OHV areas are simply not large enough to accommodate the number of scheduled events or the size of some of the existing race events. The King of the Hammers race is unique to Johnson Valley, and there is reportedly no other OHV area in the country that is similar in the scale and unique combination of terrain required to support this event. Elimination of this event alone would displace approximately 15,000 visitors (45,438 visitor-days), including spectators, promoters, participants, and vendors (BLM 2010h). Furthermore, some scheduled events in Stoddard Valley OHV Area may also be eliminated to accommodate the displaced visitors associated with closure of the Johnson Valley OHV Area (BLM 2010h).

In addition, because more people would be concentrated into smaller available OHV areas, there would likely be an increase in general degradation of the existing space available (see also Appendix M for discussion of the likelihood of increased illegal OHV activity). As a result, the quality of the surrounding OHV resources may experience substantial physical deterioration. An increase of illegal OHV use may also occur as a result of being “squeezed” into smaller open spaces and competition for space and time. Illegal OHV use may occur on nearby closed public land (i.e., public land not designated for OHV use), on private property, and within local and regional wilderness areas. Implementation of the following SCMs would minimize the occurrence of illegal OHV use in public and private lands adjacent to the west study area.

REC SCM-1 Develop an Educational Outreach Plan and distribute educational materials (via website, public meetings, OHV events, etc.) to promote awareness regarding environmentally

sensitive areas and responsible OHV use. Highlight the law enforcement penalties for illegal OHV use.

REC SCM-2 Assist local government and community members with developing appropriate signage (for restricted use/limited use areas) at key points of entry, areas of concern, or areas that have experienced frequent illegal OHV use.

REC SCM-3 Coordinate with County of San Bernardino Law Enforcement officials, other local government officials, OHV community leaders, interested community members, and other interested parties to reduce the illegal OHV use within the communities surrounding the acquisition areas.

Heightened awareness through education about environmentally sensitive areas and responsible use of OHV areas would contribute towards minimizing deterioration of resources and illegal OHV use. Although implementation of the above mentioned SCMs would help to limit the increase in illegal OHV use on public and private lands adjacent to the west study area, an increase in illegal OHV use would still likely occur. Indirect impacts to the County of San Bernardino Law Enforcement Division may also occur if additional resources are required to respond to the increase in illegal activity as a result of this alternative. However, implementation of the SCMs discussed above would collectively reduce the potential for increased illegal OHV activity. The impacts of the proposed action with regards to increased OHV activity is expected to be less than significant.

In summary, access to and use of the majority of the Johnson Valley OHV Area would be lost, representing a significant impact. Eliminating OHV use on lands to be acquired under Alternative 1 would not further the purpose of EO 11644 to control OHV use to protect resources or minimize conflicts among the various uses of those lands. This recreational resource is unique to the region given its combination of vast open space, large variety of desert views and scenic vistas, and unique geologic formations. Although some alternative OHV areas exist, the acreages of all other regional OHV areas combined is approximately equal to the acreage of the Johnson Valley OHV Area alone. In addition, the displacement of users to the remaining portion of the Johnson Valley OHV Area and to other recreation areas would result in indirect impacts to recreation (which, for areas subject to the largest increases in use, would be significant). Therefore, Alternative 1 would result in significant direct and indirect impacts to recreational resources in and around the west study area.

4.2.2.2 South Study Area

No recreational user profile or visitor-days of use data are available for the south study area. However, this area reportedly receives dispersed use within BLM designated areas, primarily from OHV riders during weekends and holidays. For the purposes of this analysis, it is estimated that approximately 800 annual visitor-days of use occur within the south study area. Under Alternative 1, the south study area would no longer be available for recreational use, and the recreational users who currently enjoy this area would be displaced, thereby adding to the indirect impacts on alternative recreation areas described above for the west study area.

During the public scoping period and during subsequent interviews with key stakeholders and organizations, concerns were raised that acquisition of the south study area by the Marine Corps would cause an increase in illegal OHV use on private lands, especially in the community of Wonder Valley located immediately south of the south study area. The community of Wonder Valley reportedly experiences periodic illegal OHV activity, particularly on weekends and holidays. Therefore, significant impacts may occur if illegal OHV use were to increase as a result of acquisition of the south study area.

Although implementation of SCMs would likely reduce the occurrence of illegal OHV use in public and private lands adjacent to the south study area, an increase in illegal riding would still potentially occur. Indirect impacts to the County of San Bernardino Law Enforcement Division may also occur if additional resources are required to respond to the increase in illegal activity as a result of this action. However, implementation of the SCMs discussed under Section 4.2.2.1 would reduce these impacts to a less than significant level.

4.2.2.3 East Study Area

No land would be acquired in the east study area with implementation of Alternative 1; therefore, no impacts to recreation in this area would occur.

4.2.2.4 Potential Mitigation Measures

In addition to the adoption of recreation SCMs (see Chapter 2 and Section 4.2.2.1), the Marine Corps considered potential mitigation measures but determined that none were feasible for Alternative 1. No mitigation measures are recommended. Consequently, Alternative 1 would result in significant, unmitigable impacts to Recreation.

Numerous comments on the Draft EIS stated that the Marine Corps should designate or obtain other lands in the region to mitigate the loss of OHV area in the Johnson Valley. The Marine Corps does not have the jurisdiction or capability to designate or obtain other lands for OHV use and could not commit to such measures as part of the Record of Decision (ROD) for this action. The State of California has management jurisdiction over state lands. The BLM has management jurisdiction over public lands, which are designated for multiple use management. BLM determines appropriate uses for public lands through the land use planning process. The areas that are currently unavailable for motorized recreation were designated as unavailable through that process in order to protect other resources, or because they were otherwise unsuitable for motorized recreation. BLM has informed the Marine Corps that at this time there are no lands available to designate as a replacement OHV area.

4.2.3 Alternative 2 Impacts

Two separate land areas would be acquired with implementation of Alternative 2: a substantially reduced west study area of approximately 113,558 acres (45,955 hectares) (smaller than the 180,353 acres [72,987 hectares] that would be acquired under Alternative 1) and the 21,304-acre (8,621-hectare) south study area. The subsections below discuss the potential direct and indirect impacts to recreation within each of these areas, including the indirect impacts at other recreation sites that would likely attract the recreational activities that would be displaced from these study areas.

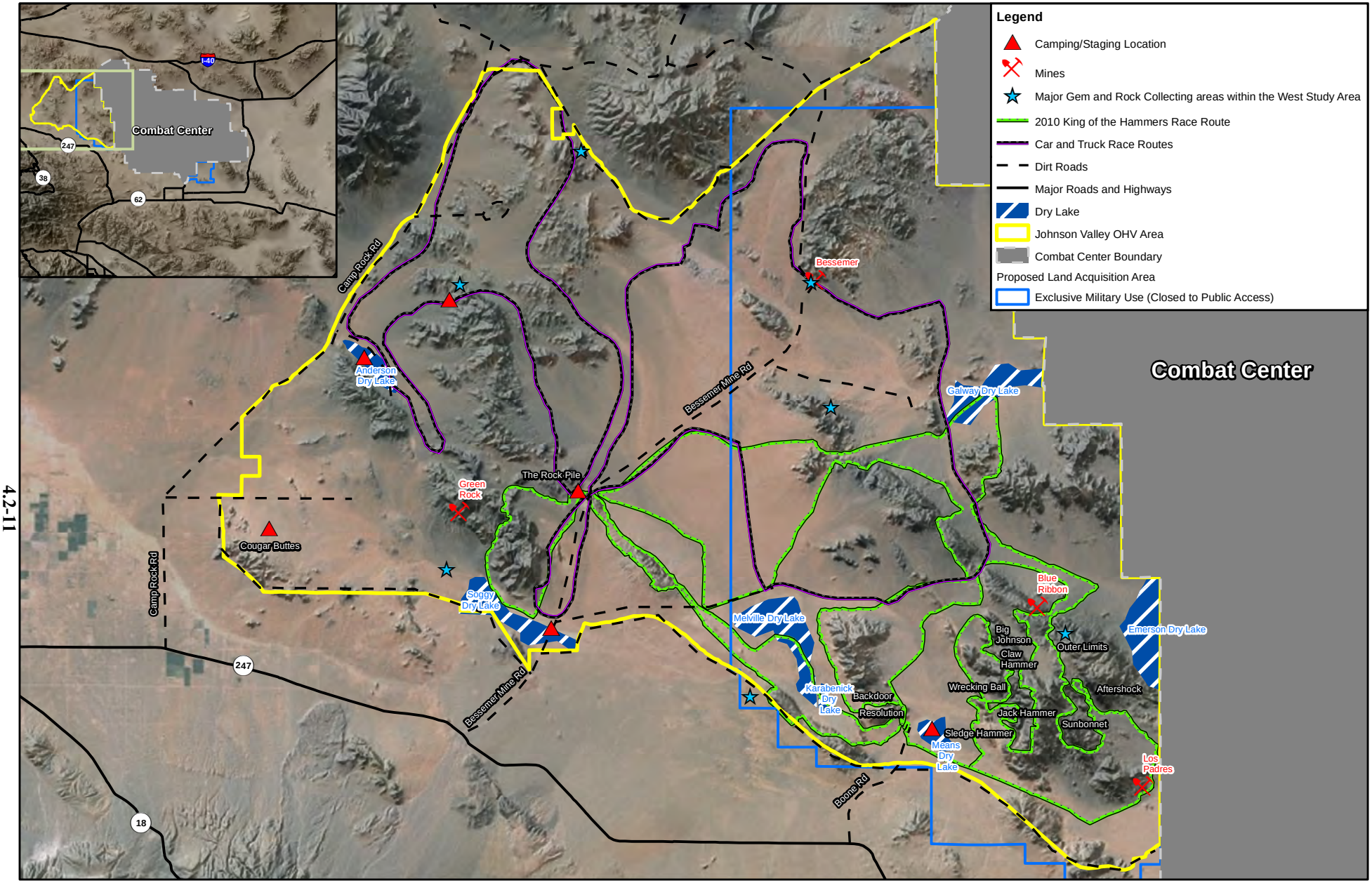
4.2.3.1 West Study Area

With implementation of Alternative 2, a total of 113,558 acres (45,955 hectares) would be acquired within the west study area. However, approximately 86,200 “usable” acres (34,844 hectares) or roughly 46% of the existing Johnson Valley OHV Area (189,470 acres [76,676 hectares]) would remain available for public recreation year-round (see Table 4.2-1). To provide context with the regional OHV areas, this remaining portion available for recreational activities would be substantially larger than the largest of the regional OHV areas (Spangler Hills - 57,000 acres [23,067 hectares]). Cougar Buttes, Anderson Dry Lake, and Soggy Dry Lake are three major OHV staging and camping areas located within this area, along with several popular OHV trails, including but not limited to The Rock Pile, Bullfrog, Cakewalk, Chicken Rock, and Hammerdown Trails. In addition, this area is frequently used for a variety of recreational activities such as hiking, picnicking, photography, geocaching, and wildlife and wildflower viewing.

Alternative 2 would remove approximately 54% of the Johnson Valley OHV "usable" acreage for exclusive military use. This represents a loss of approximately 30% of the acres available for open OHV recreation in the region (see Table 4.2-3). The portions of the Johnson Valley OHV Area that would be lost to public access under Alternative 2 include a major staging/camping area at Means Dry Lake and the majority of the unique and popular rock crawling trails known as the "Hammers." These include Sledge Hammer, Jack Hammer, Claw Hammer, Wrecking Ball, Backdoor, Resolution, Outer Limits, Aftershock, Big Johnson, and Sunbonnet trails. Potential impacts under Alternative 2 would be similar to those described under Alternative 1. However, the intensity and scope of most of the impacts would be reduced compared to Alternative 1 because the amount of land acquired, thus restricted from public use, would be considerably less under this alternative and roughly 46% of the Johnson Valley OHV Area would remain available for public recreation. Figure 4.2-2 shows the boundary of the Alternative 2 acquisition study area in relation to Johnson Valley.

Implementation of Alternative 2 would result in displacement of visitor-days of use that currently occur within the Johnson Valley OHV Area annually. For the purposes of this analysis, it is estimated that 75% of the existing dispersed use visitor-days of use and 40% of event-related visitor-days would still occur within the remaining 113,558-acre (45,955-hectare) area. It is estimated that implementation of Alternative 2 would result in the loss or displacement of 104,302 visitor-days of use per year from Johnson Valley (see Table 4.2-4).

Additional recreational areas in southern California have been identified as alternative sites that may attract the OHV activities that would be displaced from Johnson Valley (see Section 3.2 and Appendix M of this EIS). The BLM estimates that a majority (90%) of the displaced recreational activity (dispersed use) would go elsewhere in San Bernardino County for recreation (BLM 2010l), resulting in an increase of approximately 62,935 visitor-days of use at other regional OHV areas in the county (see Table 4.2-5). Similar to Alternative 1, the Stoddard Valley and Mirage OHV areas and nearby portions of the West Mojave routes system would likely receive the majority of the displaced activity. Indirect impacts from this displaced activity would occur to a substantially lesser extent than under Alternative 1, because under Alternative 2 roughly 46% of the Johnson Valley OHV Area would still be available. Indirect impacts of such displacement would include potential overcrowding at the alternative OHV areas and a reduction of recreational opportunities as more users would compete for recreational use (e.g., competing for camping spaces, trail use, solitary experience). This could cause conflicts between recreational users and may cause a decrease in satisfaction and enjoyment of the recreation areas. These indirect impacts would be potentially significant at the Stoddard Valley and El Mirage areas, and in the West Mojave routes in the vicinity, but would be less than significant at other more distant or otherwise dissimilar OHV areas because of relatively minimal projected increases in use levels in these other areas.



Kilometers
0 1.5 3 6
0 1.5 3 6
Miles

Figure 4.2-2
Boundaries of Alternative 2 in Johnson Valley

The space available for organized events would also be impacted under this alternative. As mentioned above, it is reasonable to assume that roughly 60% of existing racing events, including car and truck races that currently occur within the Johnson Valley OHV Area would be displaced or eliminated. The loss of existing events in the Johnson Valley OHV Area may not be fully accommodated at other regional OHV areas (BLM 2010h). According to BLM, the surrounding OHV areas are simply not large enough to accommodate the number of scheduled events or the size of some of the existing race events. The King of the Hammers race is unique to Johnson Valley, and reportedly there is no other OHV area in the U.S. that is similar in the scale and unique combination of terrain required to support this event. Elimination of this event alone would displace approximately 15,000 visitors (45,438 visitor-days), including spectators, promoters, participants, and vendors (BLM 2010h).

An increase of illegal OHV use may also occur as a result of being "squeezed" into smaller open spaces and competition for space and time. Illegal OHV use may occur on nearby closed public land (i.e., public land not designated for OHV use), on private property, and within local and regional wilderness areas. Implementation of the SCMs discussed in Section 4.2.2.1 would reduce the potential for deterioration of resources and illegal OHV use. Although implementation of the SCMs would help to limit the increase illegal OHV use on public and private lands near the west study area, some increase in illegal OHV use would likely occur. Indirect impacts to the County of San Bernardino Law Enforcement Division may also occur if additional resources are required to respond to the increase in illegal activity as a result of Alternative 2. However, implementation of the SCMs, discussed under Section 4.2.2.1, would reduce these impacts to a less than significant level.

In summary, access to and use of approximately 54% of the Johnson Valley OHV Area would be lost, representing a significant impact. Eliminating OHV use on lands to be acquired under Alternative 2 would not further the purpose of EO 11644 to control OHV use to protect resources or minimize conflicts among the various uses of those lands. This resource is unique to the region given its combination of vast open space, large variety of desert views and scenic vistas, and unique geologic formations. Although not all of Johnson Valley OHV Area would be lost, approximately 30% of the acres available for open OHV recreation in the region would be lost. In addition, the displacement of recreational activity to the remaining portion of the Johnson Valley OHV Area and to other OHV areas would result in indirect impacts to recreation. Therefore, Alternative 2 would result in significant direct and indirect impacts to recreational resources in and around the west study area, albeit at a substantially reduced level relative to the potential impacts described for Alternative 1.

4.2.3.2 South Study Area

With implementation of Alternative 2, potential impacts to the south study area would be the same as described under Alternative 1. These potential impacts are discussed in Section 4.2.2.2. Significant impacts would occur if illegal OHV use increases as a result of acquisition of the south study area by the Marine Corps.

Although implementation of the SCMs discussed in Section 4.2.2.1 would likely minimize the occurrence of illegal OHV use in public and private lands adjacent to the south study area, an increase in illegal riding would likely still occur. Indirect impacts to the County of San Bernardino Law Enforcement Division may also occur if additional resources are required to respond to the increase in illegal activity as a result of this action. However, implementation of the SCMs discussed under Section 4.2.2.1 would reduce these potentially significant impacts to a less than significant level.

4.2.3.3 East Study Area

No land would be acquired in the east study area with implementation of Alternative 2; therefore, no impacts to recreation in this area would occur.

4.2.3.4 Potential Mitigation Measures

In addition to the adoption of recreation SCMs (see Chapter 2 and Section 4.2.2.1), the Marine Corps considered potential mitigation measures but determined that none were feasible for Alternative 2. No mitigation measures are recommended. Consequently, Alternative 2 would result in significant, unmitigable impacts to recreation.

Numerous comments on the Draft EIS stated that the Marine Corps should designate or obtain other lands in the region to mitigate the loss of OHV area in the Johnson Valley. The Marine Corps does not have the jurisdiction or capability to designate or obtain other lands for OHV use and could not commit to such measures as part of the Record of Decision (ROD) for this action. The State of California has management jurisdiction over state lands. The BLM has management jurisdiction over public lands, which are designated for multiple use management. BLM determines appropriate uses for public lands through the land use planning process. The areas that are currently unavailable for motorized recreation were designated as unavailable through that process in order to protect other resources, or because they were otherwise unsuitable for motorized recreation. BLM has informed the Marine Corps that at this time there are no lands available to designate as a replacement OHV area.

4.2.4 Alternative 3 Impacts

Two separate land areas would be acquired with implementation of Alternative 3: the east study area comprising approximately 177,276 acres (71,741 hectares), and the south study area comprising approximately 21,304 acres (8,621 hectares).

4.2.4.1 West Study Area

With implementation of Alternative 3, no land would be acquired in the west study area; therefore, no impacts to recreation in this area would occur.

4.2.4.2 South Study Area

With implementation of Alternative 3, potential impacts to the south study area would be the same as described under Alternative 1. These potential impacts are discussed in Section 4.2.2.2. Significant impacts would occur if illegal OHV use increases as a result of acquisition of the south study area by the Marine Corps.

Although implementation of the SCMs discussed in Section 4.2.2.1 would help to limit the increase in illegal OHV use on public and private lands adjacent to the south study area, some increase in illegal riding would still be likely to occur. Indirect impacts to the County of San Bernardino Law Enforcement Division may also occur if additional resources are required to respond to the increase in illegal activity as a result of this action. However, implementation of the SCMs discussed under Section 4.2.2.1 would reduce these impacts to a less than significant level.

4.2.4.3 East Study Area

Although no established recreation areas are located within the east study area, this area does reportedly receive some dispersed use on BLM lands and along existing dirt roads. However, as discussed in Section 3.2.3.4, this area does not receive frequent recreational use. For the purposes of this analysis, it is estimated that approximately 500 annual visitor-days of use occur within the east study area. A large impassable dry lake bed covers much of the east study area, which further discourages frequent recreation

activity in this area. Furthermore, this area is not unique to the region and comparable resources (e.g., hiking, wildlife and wildflower viewing, geocaching, OHV opportunities) are available within the regional recreational areas identified in Section 3.2.2 and illustrated on Figure 3.2-1. Impacts to individual recreation visitors who use this area would occur because continued use of the east study area would not be permitted under Alternative 3. However, as discussed above, the recreational resources in this area are not unique to the region, comparable recreation opportunities are available in surrounding areas, and the displacement of the small number of current visitor-days of use to other areas would not represent a substantial increase in use at other regional recreation areas (i.e., indirect impacts on alternative locations would be minimal). In addition, the area is located far away from large population centers, when compared with other nearby recreation areas, and is not expected to receive high concentrations of recreational use. Therefore, acquisition of the east study area under Alternative 3 would result in less than significant impacts to recreational resources.

4.2.4.4 Potential Mitigation Measures

No significant impacts to recreation would occur with implementation of Alternative 3 in the east study area. However, significant impacts may occur as a result of acquisition of the south study area; but would be reduced to less than significant levels through implementation of the SCMs discussed under Section 4.2.2.1. In addition to the adoption of recreation SCMs (see Chapter 2 and Section 4.2.2.1), the Marine Corps considered potential mitigation measures but determined that none were feasible for Alternative 3. No mitigation measures are recommended. However, Alternative 3 would result in less than significant impacts.

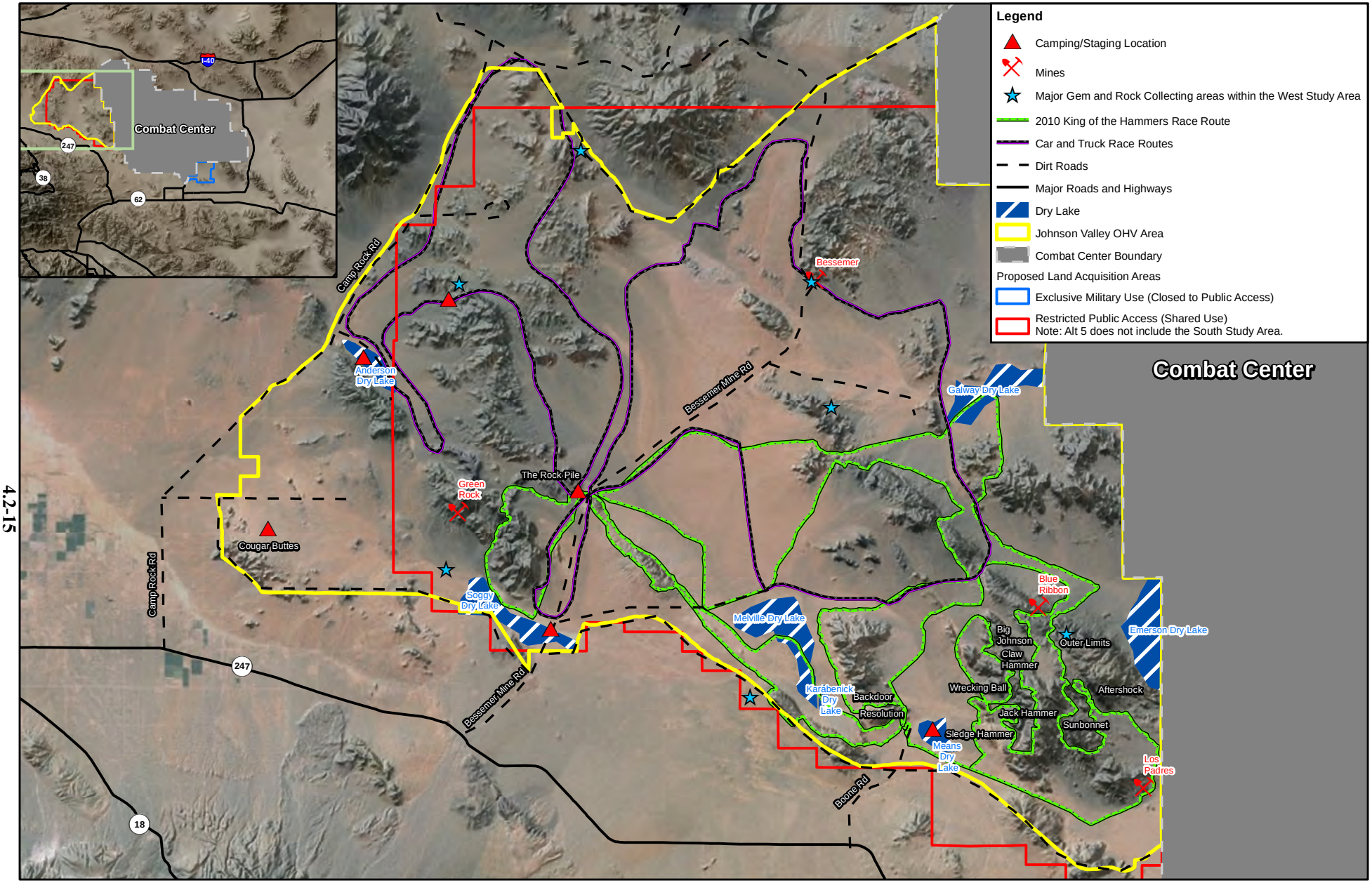
4.2.5 Alternative 4 Impacts

This alternative would involve the acquisition of the same land areas as for Alternative 1: approximately 180,353 acres (72,987 hectares) in the west study area and approximately 21,304 acres (8,621 hectares) in the south study area. However, unlike Alternative 1, this alternative was designed to support a west-to-east direction of training maneuver to support restricted public access of the Johnson Valley OHV Area when MEB exercises are not occurring. The subsections below discuss the potential direct and indirect impacts to recreation within each of these areas, including the indirect impacts at other recreation sites that would likely attract the recreational activities that would be displaced from these study areas.

4.2.5.1 West Study Area

With implementation of Alternative 4, the public would have access to the Johnson Valley OHV Area for recreational activities when Marine Corps training and/or maintenance is not scheduled. Figure 4.2-3 shows the boundaries of the Alternative 4 proposed acquisition study area in relation to Johnson Valley. As discussed in Section 2.4.4.3, only non-dud producing munitions would be used within the acquired lands. Training and/or maintenance would be scheduled twice per year for approximately 30 days each time (2 months total per year), leaving the Johnson Valley OHV Area available for restricted public access for approximately 10 months each year.

During the 2 months each year that the area would be used for military training and/or maintenance and restricted from public access, impacts to recreational resources would be the same as discussed under Alternative 1. Access to and use of the Johnson Valley OHV Area would be lost during this period, representing a significant impact 2 separate months out of the year. In addition, the displacement of recreational users to other OHV areas during the 2 months of exclusive military use would have an indirect impact on recreational areas and opportunities elsewhere in the region (particularly at Stoddard Valley OHV Area), as discussed in Section 4.2.2.1.



Kilometers
0 1.5 3 6
0 1.5 3 6
Miles

Figure 4.2-3
Boundaries of Alternatives 4 and 5 in Johnson Valley

N

Accounting for the 2 months lost per year and the potential decrease in use since some visitors may not want to complete Marine Corps management procedures as discussed in Section 2.5, it is estimated that 82% of the existing dispersed use visitor-days of use and 85% of event-related visitor-days of use would still occur within the area during the remaining 10 months per year., It is estimated that implementation of Alternative 4 would result in the loss or displacement of 58,942 visitor-days of use per year from Johnson Valley (see Table 4.2-4).

Additional recreation areas have been identified in southern California (see Section 3.2 and Appendix M of this EIS) as alternative sites that may attract the recreational activities that would be displaced from Johnson Valley. The BLM estimates that a majority (90%) of the displaced recreational users (dispersed use) would go elsewhere in San Bernardino County for recreation (BLM 2010l), resulting in an increase of an estimated 45.313 visitor-days of use at other regional OHV areas in the county (see Table 4.2-4). Similar to Alternative 1, the Stoddard Valley and Mirage OHV areas and nearby portions of the West Mojave route system would likely receive the majority of the displaced activity.

During the other 10 months of the year that the Johnson Valley OHV Area would be available for restricted public access, the recreational opportunities would function much the same as they currently do, with the exception of additional management procedures required to protect public health and safety of recreational users. Section 2.5 outlines proposed management procedures that the Marine Corps would implement to ensure safe and effective public use of the west study area when MEB exercises are not occurring. These include procedures for public notification, public access, signage for restricted areas, etc. Implementation of these management procedures, and engagement with local leaders, communities, and groups that are likely to use the RPAA would minimize impacts to recreational users during the approximately 10 months each year that the area is available for public recreational use. Because Johnson Valley would only be available for public use during approximately 10 months of the year, the time available for individual use and organized events would be impacted. As a result, potential scheduling conflicts between event promoters, clubs, and other user groups and individuals may also occur. Alternative 4 would establish RPAAs in which the Marine Corps could meet the live-fire and maneuver objective training requirements for a MEB, while also providing public access to as much of the Johnson Valley area as possible for recreational uses. In conjunction with the preparation of an INRMP, this alternative substantially meets the purposes of EO 11644 to control OHV use to protect resources, promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands.

In summary, under Alternative 4 access to and use of the Johnson Valley OHV Area would be lost during approximately 2 months each year, representing a significant impact to recreation. This recreational resource is unique to the region given its combination of vast open space, large variety of desert views and scenic vistas, and unique geologic formations. These significant impacts would be somewhat offset and reduced through the proposed restricted public access of the Johnson Valley OHV Area during approximately 10 months of the year when not used for military training. In addition, this alternative meets the purposes of EO 11644 to control OHV use to protect resources, promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands. However, displacement of recreational activities to other recreation areas would represent an indirect impact to recreational opportunities at those areas, and such impacts would be potentially significant at any areas and routes that would receive the largest relative proportions of the displaced activities. Therefore, Alternative 4 would result in significant direct and indirect impacts to recreational resources in the west study area, albeit at a substantially reduced level relative to the impacts described for Alternative 1.

4.2.5.2 South Study Area

With implementation of Alternative 4, potential impacts to the south study area would be the same as described under Alternative 1. These potential impacts are discussed in Section 4.2.2.2. Significant impacts would occur if illegal OHV use increases as a result of acquisition of the south study area by the Marine Corps.

Although implementation of the SCMs discussed in Section 4.2.2.1 would likely minimize the occurrence of illegal OHV use in public and private lands adjacent to the south study area, an increase in illegal riding would likely still occur. Indirect impacts to the County of San Bernardino Law Enforcement Division may also occur if additional resources are required to respond to the increase in illegal activity as a result of this action. However, implementation of the SCMs under Section 4.2.2.1 would reduce these potentially significant impacts to a less than significant level.

4.2.5.3 East Study Area

No land would be acquired in the east study area with implementation of Alternative 4; therefore, no impacts to recreation in this area would occur.

4.2.5.4 Potential Mitigation Measures

Significant impacts to recreational resources would occur as a result of Alternative 4. With implementation of mitigation measures **REC-1** and **REC-2** (in addition to recreation SCMs identified in Chapter 2 and Section 4.2.2.1), impacts to the OHV community and other recreational opportunities would be marginally reduced but would still be significant.

REC-1 The Marine Corps, in cooperation with the BLM, would establish a Restricted Public Access Area (RPAA) Management Group that would be charged with preparing and implementing a Recreation Management Plan for the RPAA. This Recreation Management Plan would be a component of the INRMP per MCO 5090.2A, Section 11204 (Outdoor Recreation) and would fulfill the requirements of Executive Order 11644. The Recreation Management Plan would include a recreational carrying capacity analysis that addresses recreational use, user profile, demand preferences, conflicts, and conditions consistent with other applicable natural resource and environmental laws.

REC-2 The RPAA Management Group would meet at least once a year to discuss the suitability of procedures to facilitate recreational use of the RPAA. The RPAA Management Group would seek information from representatives of relevant State agencies, private OHV interest groups, event managers, conservationists, and others as needed and appropriate. Through this process, the Recreation Management Plan would be continuously improved to balance Marine Corps training needs with recreational demand. The RPAA Management Group would also consider the potential use of portions of the Exclusive Military Use area for limited recreational use on a case-by-case basis for organized OHV race events.

The Marine Corps considered additional potential mitigation measures but determined that none were feasible. Numerous comments on the Draft EIS stated that the Marine Corps should designate or obtain other lands in the region to mitigate the loss of OHV area in the Johnson Valley. The Marine Corps does not have the jurisdiction or capability to designate or obtain other lands for OHV use and could not commit to such measures as part of the Record of Decision (ROD) for this action. The State of California has management jurisdiction over state lands. The BLM has management jurisdiction over public lands, which are designated for multiple use management. BLM determines appropriate uses for public lands

through the land use planning process. The areas that are currently unavailable for motorized recreation were designated as unavailable through that process in order to protect other resources, or because they were otherwise unsuitable for motorized recreation. BLM has informed the Marine Corps that at this time there are no lands available to designate as a replacement OHV area. Accordingly, significant unmitigable impacts to recreational resources would occur with implementation of Alternative 4, albeit much less than those described under Alternative 1.

4.2.6 Alternative 5 Impacts

This alternative would involve the acquisition of the west study area only, comprising approximately 180,353 acres (72,987 hectares) within the west study area. Similar to Alternative 4, this alternative was designed to support a west-to-east direction of training maneuver to support restricted public access of the Johnson Valley OHV Area when MEB exercises are not occurring. The following subsection discusses the potential direct and indirect impacts to recreation within this area, including the indirect impacts at other recreation sites that would likely attract the recreational activities that would be displaced from the west study area.

4.2.6.1 West Study Area

The public would have access to the Johnson Valley OHV Area for recreational activities when Marine Corps training and/or maintenance are not scheduled. Figure 4.2-3 shows the boundaries of the Alternative 5 acquisition study area in relation to Johnson Valley. As discussed in Section 2.4.4.3, only non-dud producing munitions would be used within the acquired lands. Training and/or maintenance would be scheduled twice per year for approximately 30 days each time (2 months total), leaving the Johnson Valley OHV Area available for public use for approximately 10 months each year.

With implementation of Alternative 5, potential impacts to the west study area would be the same as described under Alternative 4. These potential impacts are discussed in Section 4.2.5.1. In summary, access to and use of the Johnson Valley OHV Area would be lost during approximately 2 separate months each year, representing a significant impact. This recreational resource is unique to the region given its combination of vast open space, large variety of desert views and scenic vistas, and unique geologic formations. These significant impacts would be somewhat offset and reduced through the proposed restricted public access of the Johnson Valley OHV Area during approximately 10 months of the year when not used for military training. In addition, this alternative meets the purposes of EO 11644 to control OHV use to protect resources, promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands. However, as in the case of Alternative 4, displacement of recreational activities to other recreation areas would indirectly impact recreational opportunities at those areas, and such impacts would be potentially significant at any areas and routes that would receive the largest relative proportions of the displaced activities. Therefore, Alternative 5 would result in significant direct and indirect impacts to recreational resources, albeit at a substantially reduced level relative to the impacts projected under Alternative 1.

4.2.6.2 South Study Area

No land would be acquired in the south study area with implementation of Alternative 5; therefore, no impacts to recreation in this area would occur.

4.2.6.3 East Study Area

No land would be acquired in the east study area with implementation of Alternative 5; therefore, no impacts to recreation in this area would occur.

4.2.6.4 Potential Mitigation Measures

Significant impacts to recreational resources would occur as a result of Alternative 5. With implementation of mitigation measures **REC-1** and **REC-2 (**as described in Section 4.2.5.4 for Alternative 4) and the recreation SCMs described in Chapter 2, impacts to the OHV community and other recreational opportunities would be marginally reduced but would still be significant**.**

The Marine Corps considered additional potential mitigation measures but determined that none were feasible. Numerous comments on the Draft EIS stated that the Marine Corps should designate or obtain other lands in the region to mitigate the loss of OHV area in the Johnson Valley. The Marine Corps does not have the jurisdiction or capability to designate or obtain other lands for OHV use and could not commit to such measures as part of the Record of Decision (ROD) for this action. The State of California has management jurisdiction over state lands. The BLM has management jurisdiction over public lands, which are designated for multiple use management. BLM determines appropriate uses for public lands through the land use planning process. The areas that are currently unavailable for motorized recreation were designated as unavailable through that process in order to protect other resources, or because they were otherwise unsuitable for motorized recreation. BLM has informed the Marine Corps that at this time there are no lands available to designate as a replacement OHV area. Accordingly, significant, unmitigable impacts to recreational resources would occur with implementation of Alternative 5, albeit at a substantially reduced level relative to the impacts under Alternative 1.

4.2.7 Alternative 6 Impacts (Preferred Alternative)

This alternative would require the acquisition of approximately 146,667 acres (59,354 hectares) in the west study area and approximately 21,304 acres (8,621 hectares) in the south study area. The land acquired within the west study area in Johnson Valley would be divided into two areas: 38,137 acres (15,434 hectares) of restricted public access and 108,530 acres (43,921 hectares) of exclusive military use. The subsections below discuss the potential direct and indirect impacts to recreation within each of these areas, including the indirect impacts at other recreation sites that would likely attract the recreational activities that would be displaced from these study areas.

4.2.7.1 West Study Area

Figure 4.2-4 shows the boundaries of the Alternative 6 acquisition study area with respect to Johnson Valley. The northern portion of the west study area would be designated as exclusive military use, and would be closed to public access. Dud-producing as well as non-dud producing ordnance would be used in this area. The southern portion of the west study area would be designated as restricted public access, and only non-dud producing ordnance would be used in this area.

With implementation of Alternative 6, approximately 146,667 acres (59,354 hectares) would be acquired within the west study area. Approximately 82,802 “usable” acres (33,509 hectares) or roughly 44% of the existing Johnson Valley OHV Area (189,470 acres [76,676 hectares]) would be available for public recreation at least 10 months per year (an estimated 38,137 acres [15,434 hectares] would be available for 10 months per year and 44,665 acres [18,075 hectares] would be available all year) (see Table 4.2-1).

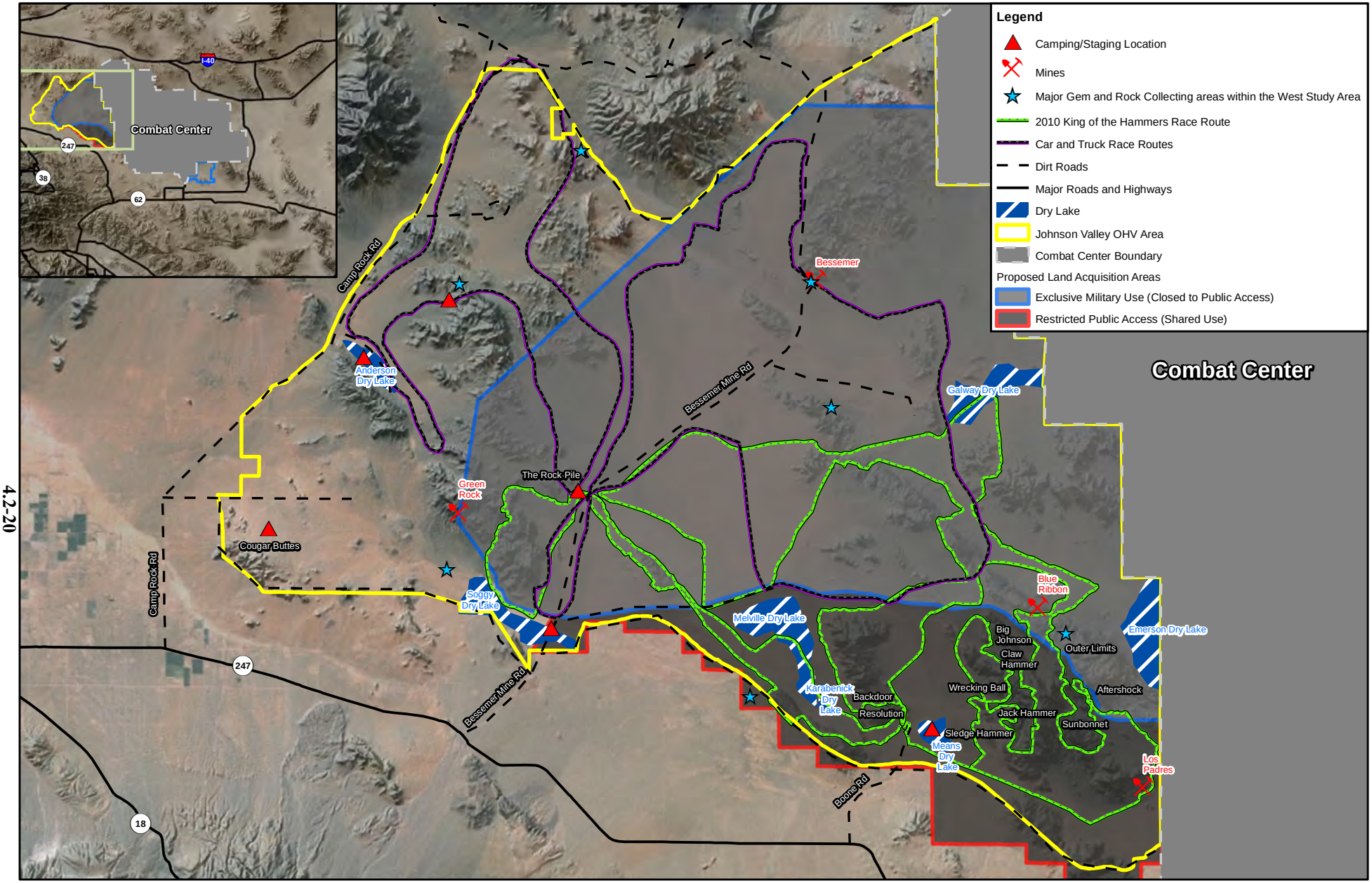


Figure 4.2-4
Boundaries of Alternative 6 in Johnson Valley

To provide context with the regional OHV areas, this remaining portion available for recreational activities all year (44,665 acres [18,075]) would be larger than the Rasor OHV Area (30,000 acres [12,141 hectares]) but smaller than the Stoddard Valley OHV Area (53,000 acres [21,448 hectares]). Cougar Buttes, Anderson Dry Lake, and Soggy Dry Lake are three major OHV staging and camping areas located within this area, along with several popular OHV trails, including but not limited to Bullfrog, Cakewalk, Chicken Rock, and Hammerdown Trails. In addition, this area is frequently used for a variety of recreational activities such as hiking, picnicking, photography, geocaching, and wildlife and wildflower viewing.

In addition, 38,137 acres (15,434 hectares) would be available for restricted public access approximately 10 months per year, when the Marine Corps is not conducting MEB level training. When added to the 44,665 acres (18,075 hectares) remaining for public use, approximately 44% of the existing Johnson Valley OHV Area would be available for public recreation 10 months per year (for the portion acquired as RPAA) or all of the year (for the area not acquired). The 38,137 acres (15,434 hectares) available for restricted public access 10 months of the year includes a major staging/camping area, Means Dry Lake, along with several unique and popular OHV trails, most notably the "Hammer" trails. During the 10 months of the year that this area would be available for restricted public access, the recreational opportunities would function much the same as they currently do, with the exception of additional management procedures that would be required to protect the public's health and safety as well as the elimination or alteration of current race routes. Section 2.5 outlines proposed management procedures that the Marine Corps would implement to ensure safe and effective public use of the restricted public access area when MEB exercises are not occurring. These would include procedures for public notification, public access, and signage for restricted areas. Implementation of these management procedures, and engagement with local leaders, communities, and groups that are likely to use the RPAA, would minimize impacts to recreational users during the approximately 10 months each year that the area is open for public recreational use. Because the southern portion of the Johnson Valley OHV Area would only be available for public use during approximately 10 months of the year, the space and time available for individual use and organized events would be impacted. As a result, potential scheduling conflicts between event promoters, clubs, and other user groups and individuals may also occur.

Implementation of Alternative 6 would impede access to and the use of the existing recreational resources within the northern portion of the Johnson Valley OHV Area, 108,530 acres (43,921 hectares) acquired for exclusive military use, which represents a loss of access to approximately 56% of the Johnson Valley OHV Area and approximately 29% of the acres available for open OHV recreation in the region (see Table 4.2-3). The portions of Johnson Valley OHV Area that would be lost to public access under Alternative 6 include The Rock Pile (a popular rock crawling trail and camping area and the location of an informal memorial site established in memory of individuals who were killed during the August 2010 Mojave Desert California 200 Race), a variety of trails used for major OHV events (such as the car and truck routes), and portions of the King of the Hammers route (not including the "Hammers") (see Figure 4.2-4).

Implementation of Alternative 6 would result in displacement of a substantial portion of the estimated 337,000 annual visitor-days of use that occur within the Johnson Valley OHV Area. For the purposes of this analysis, it is estimated that 70% of the existing dispersed use visitor-days of use and 40% of event-related visitor-days of use would still occur within the remaining 44,665 acres (18,075 hectares) available for year-round use and 38,137 acres (15,434 hectares) available 10 months per year, implementation of Alternative 6 would result in a loss of an estimated 118,287 visitor-days of use per year (see Table 4.2-4). Additional recreation areas have been identified in southern California (see

Section 3.2 and Appendix M) as alternative sites that may attract the OHV and other recreational activities that would be displaced from Johnson Valley. Potential indirect impacts to recreation at these alternative areas were described for Alternative 1 in Section 4.2.2 and would also apply under Alternative 6, though to a substantially reduced degree of impact relative to Alternative 1.

Alternative 6 would establish RPAAs in which the Marine Corps could meet the live-fire and maneuver objective training requirements for a MEB, while also providing public access to as much of the Johnson Valley area as possible for recreational uses. In conjunction with the preparation of an INRMP, this alternative substantially meets the purposes of EO 11644 to control OHV use to protect resources, promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands.

The BLM estimates that a majority (90%) of the displaced recreational users (dispersed use) would go elsewhere in San Bernardino County for recreation (BLM 2010l) resulting in an increase in approximately 75,522 visitor-days of use at other regional OHV areas in the county (see Table 4.2-5). Appendix M provides an evaluation of alternative OHV recreation sites and discusses a potential distribution of displaced OHV activity to these alternative areas. For example, Stoddard Valley OHV Area would likely receive a majority of the displaced activity since it is the closest OHV area to Johnson Valley and features similar terrain and accessibility; it would therefore likely be subject to the most substantial indirect impacts to recreation. Other OHV areas, such as El Mirage, Imperial Sand Dunes, Spangler Hills, and Jawbone Canyon, as well as designated OHV routes in the West Mojave route system near Johnson Valley, would also be expected to attract substantial proportions of the displaced OHV activity (see Appendix M). Other more distant or otherwise dissimilar OHV recreation areas would be expected to absorb relatively low increases in activity from Johnson Valley displacement, with substantially less indirect impact.

As described in Section 4.2.2 for Alternative 1, OHV trails and routes in the Johnson Valley OHV Area, Stoddard Valley OHV Area, and other nearby OHV areas may be subject to overcrowding under Alternative 6 as more OHV users seek nearby open areas to ride, although to a lesser extent than under Alternative 1. Displacement of recreational activities and crowding at the alternative OHV areas may lead to a reduction of recreational opportunities within other existing recreational areas, as more users would compete for recreational use (e.g., competing for camping spaces, trail use, solitary experience). This could cause conflicts between recreational users and may cause a decrease in satisfaction and enjoyment of the recreation areas. These indirect impacts would be potentially significant at the alternative sites that would be expected to absorb substantial proportions of displaced visitors (such as Stoddard Valley OHV Area and nearby West Mojave system routes – see Appendix M), but less than significant in other areas that would be expected to receive relatively small numbers of displaced visitors.

The ability of the area to support organized events would also be impacted under Alternative 6. It is assumed that roughly half of the existing racing events, including car and truck races that currently occur within the Johnson Valley OHV Area, would be displaced or eliminated. The loss of existing events in the Johnson Valley OHV Area may not be fully accommodated at other regional OHV areas (BLM 2010h). According to BLM, the surrounding OHV areas are simply not large enough to accommodate the number of scheduled events or the size of some of the existing race events. The King of the Hammers race is unique to Johnson Valley. Elimination of this event alone would displace approximately 15,000 visitors (45,438 visitor-days), including spectators, promoters, participants, and vendors (BLM 2010h). In order for the King of the Hammers race to continue under this alternative, portions of the race route would need to be relocated.

An increase of illegal OHV use may also occur as a result of recreational opportunities being "squeezed" into smaller open spaces and competition for space and time. Illegal OHV use may occur on nearby closed public land (i.e., public land not designated for OHV use), on private property, and within local and regional wilderness areas. Implementation of the SCMs discussed in Section 4.2.2.1 would reduce the likelihood of deterioration of resources and illegal OHV use. Although implementation of these SCMs would help to limit the increase in illegal OHV use in public and private lands near the west study area, an increase in illegal riding would still likely occur. Indirect impacts to the County of San Bernardino Law Enforcement Division may also occur if additional resources are required to respond to the increase in illegal activity as a result of this alternative. However, implementation of **SCMs 1-3**, discussed under Section 4.2.2.1, would reduce these impacts to a less than significant level.

In summary, under Alternative 6 access to and use of approximately 56% of the Johnson Valley OHV Area would be lost, representing a significant impact to recreation. This recreational resource is unique to the region, given its combination of vast open space, large variety of desert views and scenic vistas, and unique geologic formations. These significant impacts would be somewhat offset and reduced through the proposed public availability of the remaining 44% of the Johnson Valley OHV Area during approximately 10 months per year (for the portion acquired as RPAA) or all of the year (for the area not acquired). In addition, this alternative meets the purposes of EO 11644 to control OHV use to protect resources, promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands. However, the displacement of recreational activities to the remaining portion of the Johnson Valley OHV Area and other OHV areas would impact recreational opportunities, particularly at areas and routes that would receive the largest relative proportions of the displaced activities (see also Appendix M). Therefore, Alternative 6 would result in significant direct and indirect impacts to recreational resources, albeit at a substantially reduced level relative to the impacts projected under Alternative 1.

4.2.7.2 South Study Area

Under Alternative 6, potential impacts to the south study area would be the same as under Alternative 1. These potential impacts are discussed in Section 4.2.2.2. Significant impacts would occur if illegal OHV use increases as a result of acquisition of the south study area by the Marine Corps.

Although implementation of the SCMs discussed in Section 4.2.2.1 would likely minimize the occurrence of illegal OHV use in public and private lands adjacent to the south study area, an increase in illegal OHV use would likely still occur. Indirect impacts to the County of San Bernardino Law Enforcement Division may also occur if additional resources are required to respond to the increase in illegal activity as a result of this action. However, implementation of **SCMs 1-3**, discussed under Section 4.2.2.1, would reduce these potentially significant impacts to a less than significant level.

4.2.7.3 East Study Area

No land would be acquired in the east study area with implementation of Alternative 6; therefore, no impacts to recreation in this area would occur.

4.2.7.4 Potential Mitigation Measures

Significant impacts to recreational resources would occur as a result of Alternative 6. With implementation of mitigation measures **REC-1** and **REC-2** (as described in Section 4.2.5.4 for Alternative 4) and recreation SCMs described in Chapter 2, impacts to the OHV community and other recreational opportunities would be marginally reduced, but would still be significant.

The Marine Corps considered other potential mitigation measures but determined that none were feasible for the Marine Corps to implement unilaterally to compensate for the loss of recreational opportunities within the exclusive military use area (year round) and the RPAA during the 2 month period when MEB exercises are occurring. Numerous comments on the Draft EIS stated that the Marine Corps should designate or obtain other lands in the region to mitigate the loss of OHV area in the Johnson Valley. The Marine Corps does not have the jurisdiction or capability to designate or obtain other lands for OHV use and could not commit to such measures as part of the Record of Decision (ROD) for this action. The State of California has management jurisdiction over state lands. The BLM has management jurisdiction over public lands, which are designated for multiple use management. BLM determines appropriate uses for public lands through the land use planning process. The areas that are currently unavailable for motorized recreation were designated as unavailable through that process in order to protect other resources, or because they were otherwise unsuitable for motorized recreation. BLM has informed the Marine Corps that at this time there are no lands available to designate as a replacement OHV area. Accordingly, significant unmitigable impacts to recreational resources would occur with implementation of Alternative 6, albeit much less than those described under Alternative 1.

4.2.8 No-Action Alternative

Under the No-Action Alternative, the Marine Corps would not establish a large-scale training facility to accommodate sustained, combined-arms, live-fire and maneuver training exercises and the Marine Corps would not acquire land in any of the proposed acquisition study areas. Therefore, implementation of the No-Action Alternative would maintain existing conditions and there would be no impacts to recreational resources. However, implementation of the No-Action Alternative would not meet the purpose of and need for the Proposed Action.

4.2.9 Summary of Impacts

Table 4.2-6 summarizes the impacts of each action alternative and the No-Action Alternative.

Table 4.2-6. Summary of Impacts

Alternative	Impacts
Alternative 1	SI • Access to and use of 91% of the Johnson Valley OHV Area would be lost. This resource is unique to the region. • Eliminating OHV use on lands to be acquired under Alternative 1 would not further the purpose of EO 11644 to control OHV use to protect resources or minimize conflicts among the various uses of those lands. • Displacement of recreational activities to other recreation areas and OHV routes would indirectly impact the recreational opportunities at those alternative areas through potential overcrowding, reduced capacity to support organized events, diminished user satisfaction and quality of the recreational experience, and more rapid deterioration of trails. LSI • Although implementation of SCMs would reduce the occurrence of illegal OHV use in public and private lands, an increase in illegal riding would likely still occur. Indirect impacts to the County of San Bernardino Law Enforcement Division may also occur if additional resources are required to respond to the increase in illegal activity as a result of this action. Implementation of SCMs 1-3, discussed under Section 4.2.2.1, would reduce these potentially significant impacts to a less than significant level.
Alternative 2	SI • Access to and use of approximately 54% of the Johnson Valley OHV Area would be lost, representing a significant impact. • Eliminating OHV use on lands to be acquired under Alternative 2 would not further the purpose of EO 11644 to control OHV use to protect resources or minimize conflicts among the various uses of those lands. • Although not all of Johnson Valley OHV Area would be lost, approximately 30% of the acres available for open OHV recreation in the region would be lost. • Displacement of recreational activities to the remaining portion of the Johnson Valley OHV Area and to certain other OHV areas and OHV routes would directly and indirectly impact recreational opportunities through potential overcrowding, reduced capacity to support organized events, diminished user satisfaction and quality of the recreational experience, and more rapid deterioration of trails. LSI • Although implementation of SCMs would reduce the occurrence of illegal OHV use in public and private lands, an increase in illegal riding would likely still occur. Indirect impacts to the County of San Bernardino Law Enforcement Division may also occur if additional resources are required to respond to the increase in illegal activity as a result of this action. Implementation of SCMs 1-3, discussed under Section 4.2.2.1, would reduce these potentially significant impacts to a less than significant level.

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Table 4.2-6. Summary of Impacts

Alternative	Impacts
Alternative 3	LSI • The east study area is not unique to the region, and comparable recreation opportunities are available in surrounding areas, and this area does not receive frequent recreational use. • Although implementation of SCMs would reduce the occurrence of illegal OHV use in public and private lands, an increase in illegal riding would likely still occur. Indirect impacts to the County of San Bernardino Law Enforcement Division may also occur if additional resources are required to respond to the increase in illegal activity as a result of this action. Implementation of SCMs 1-3, discussed under Section 4.2.2.1, would reduce these potentially significant impacts to a less than significant level.
Alternative 4	SI • Access to and use of the Johnson Valley OHV Area would be lost during approximately 2 months each year. This resource is unique to the region. • These significant impacts would be somewhat offset and minimized through the proposed restricted public access of the Johnson Valley OHV Area during approximately 10 months of the year when not used for military training. • This alternative meets the purposes of EO 11644 to control OHV use to protect resources, promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands. • Displacement of recreational activities to alternative OHV areas and routes (though substantially reduced relative to other alternatives because of restricted public access permitted approximately 10 months each year) would directly and indirectly impact recreational opportunities through potential overcrowding, reduced capacity to support organized events, diminished user satisfaction and quality of the recreational experience, and more rapid deterioration of trails. • With implementation of mitigation measures REC-1 and REC-2 (in addition to recreation SCMs identified in Chapter 2 and Section 4.2.2.1), impacts to the OHV community and other recreational opportunities would be marginally reduced, but would still be significant. LSI • Although implementation of SCMs would reduce the occurrence of illegal OHV use in public and private lands adjacent to the south study area, an increase in illegal riding would likely still occur. Indirect impacts to the County of San Bernardino Law Enforcement Division may also occur if additional resources are required to respond to the increase in illegal activity as a result of this action. Implementation of SCMs 1-3, discussed under Section 4.2.2.1, would reduce these potentially significant impacts to a less than significant level.
Alternative 5	SI • Impacts would be the same as under Alternative 4. LSI • An increase in illegal riding may occur on public and private lands near the west study area. Indirect impacts to the County of San Bernardino Law Enforcement Division may also occur if additional resources are required to respond to the increase in illegal activity as a result of this action. Implementation of SCMs 1-3, discussed under Section 4.2.2.1, would reduce these potentially significant impacts to a less than significant level.

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Table 4.2-6. Summary of Impacts

Alternative	Impacts
Alternative 6	SI • Access to and use of approximately 56% of the Johnson Valley OHV Area would be lost. This resource is unique to the region. • The remaining 44% of the Johnson Valley OHV Area would be available for public recreation 10 months per year (for the portion acquired as RPAA) or all of the year (for the area not acquired). • This alternative meets the purposes of EO 11644 to control OHV use to protect resources, promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands. • Displacement of recreational activities to the remaining portion of the Johnson Valley OHV Area and to certain alternative OHV areas and routes (though substantially reduced relative to Alternative 1) would directly and indirectly impact recreational opportunities through potential overcrowding, reduced capacity to support organized events, diminished user satisfaction and quality of the recreational experience, and more rapid deterioration of trails.. • With implementation of mitigation measures REC-1 and REC-2 (in addition to recreation SCMs identified in Chapter 2 and Section 4.2.2.1), impacts to the OHV community and other recreational opportunities would be marginally reduced, but would still be significant. LSI • Although implementation of SCMs would reduce the occurrence of illegal OHV use in public and private lands adjacent to the south study area, an increase in illegal riding would likely still occur. Indirect impacts to the County of San Bernardino Law Enforcement Division may also occur if additional resources are required to respond to the increase in illegal activity as a result of this action. Implementation of SCMs 1-3, discussed under Section 4.2.2.1, would collectively reduce the potential for increased illegal OHV activity. The impacts of the proposed action with regards to increased OHV activity is expected to be less than significant.
No-Action Alternative	NI • Existing conditions would remain unchanged and no impacts to recreation would occur.

Notes: EO = Executive Order; LSI = Less than significant impact; NI = No impact; OHV = off-highway vehicle; RPAA = Restricted Public Access Area; SCM = special conservation measure; SI = Significant impact; SI-M = Significant impact mitigable to less than significant

4.3 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

4.3.1 Approach to Analysis

4.3.1.1 Methodology

The primary focus of the socioeconomic impact analysis was on the direct and indirect effects of net changes in local and regional business activity related to anticipated reductions in recreational and film industry expenditures, potential acquisition/closure of private properties currently or potentially used for mining or agriculture, and a small increase in the number of resident Combat Center personnel. These changes were evaluated in terms of direct and indirect impacts to total economic output (sales volume), employment, income (or earnings), and population change. *Direct* impacts are represented by the details of the proposed action itself. For example, depending on the alternative, the action would involve a direct increase of 59 to 77 new jobs at the Combat Center, a small direct increase in population to fill those jobs (to the extent that people move to the area to fill the new jobs), and a direct increase in income and personal spending as the new employees participate in the local economy. These direct impacts would have a *multiplier effect* on the local economy, thereby creating *indirect* impacts. For example, the additional payroll paid to new personnel would translate to increased spending on goods, services, housing, etc., which would lead to increased rental income for landlords and sales volume for local businesses, which in turn might yield increases in employment, population, and spending in response to the increased demand. Essentially, the multiplier effect describes how the initial influence of the direct impacts is multiplied as they filter through the economy.

Another relevant example of direct impacts (which in some cases would more than offset the positive impacts described above) would be the direct reduction in spending and economic activity associated with the loss of recreational opportunities that would no longer be available to the public under certain project alternatives. The direct reduction in visitors to the Johnson Valley OHV Area, for example, would be accompanied by a direct reduction in recreational spending on food, gasoline, equipment, supplies, etc., which in turn would cause indirect impacts because less business revenue would ripple through the local and regional economies and reduce indirect employment, income, and population.

The first step in the methodology used in this analysis involved compiling available data and making reasonable assumptions to conservatively estimate the direct project-related changes in expenditures (both positive and negative) from various sources. Note that the focus was primarily on the anticipated changes in expenditures or personnel more so than any absolute amount (although direct changes in recreation expenditures were derived relative to an estimated baseline scenario). Potential reductions in recreational visitor spending were the largest single source of project-related expenditure changes. The analysis also considered direct changes in other sources of spending, representing both increases (e.g., new government personnel) as well as decreases (e.g., reduced property taxes due to removal of private property from tax rolls; elimination of sodium chloride mining and agricultural ventures in the east study area). As appropriate for the analysis of each project alternative, all relevant spending changes of appreciable size were combined to yield a net change in direct spending.

The estimates of spending related to recreational use under baseline conditions and each action alternative were based on a range of variables, including:

- the average annual visitor-days of use in each study area;

- the allocation of OHV visitors by purpose of trip (i.e., dispersed use or attendance at an organized event [see Section 3.2, *Recreation*]);
- the tendency to visit for a single day or multiple days, the average number of days per multi-day visit, and the average number of people in the same visitor group;
- the average per capita spending per day (plus appropriate sales taxes);
- for Johnson Valley only, the spending pattern differences based on visitor origin (e.g., "local" visitors are assumed to spend all of the daily amount within the local area, while visitors from outside the county are expected to spend some proportion in their home county before they leave, some in transit, and the rest in the local area during their visit);
- the reduction in recreational visitor and annual film industry expenditures that would be likely to result; and
- the proportion of displaced visitors and film industry spending that would potentially transfer to an alternative recreational area or film location within the county, thereby retaining economic benefits that accrue to the region from those activities.

The specific assumptions applied to these variables, as well as the detailed results of the analysis, are provided in Appendix K.

Several of these assumptions were first used to estimate the baseline conditions associated with recreational visitor use and associated spending behavior. Additional assumptions were then used to estimate the change in these variables under each of the project alternatives. Other estimated expenditures (e.g., by the film industry) were added as appropriate to the recreational spending assumptions to create the complete baseline scenario and scenarios for each project alternative.

To estimate the amount of indirect economic impact that would be associated with the direct changes in net spending, the methodology also involved the use of an economic impact model. Given the limited scope of the direct spending (focused largely on relatively few economic sectors such as retail sales), the Economic Impact Forecasting System (EIFS) was identified as an appropriate modeling system for this purpose. The EIFS was developed under a joint project of the U.S. Army Corps of Engineers (USACE), the U.S. Army Environmental Policy Institute, and the Computer and Information Science Department of Clark Atlanta University (USACE 1994). It is an on-line system that consists of underlying national data sets and models used to calculate the appropriate multiplier for a given region/county. The EIFS has long been used to support regional economic impact analyses by military planners in the preparation of NEPA-related documents.

The EIFS system takes as input certain details about direct local expenditures, employment, and income, and outputs forecasts of the associated direct, indirect, and total impacts on sales volume, income, employment, and population. Direct changes in net expenditures were estimated for the local area (within 50 miles [80 km] of the trip destination) and for the remainder of the county. These estimates were then combined for input into the EIFS model. Only the total county spending changes were input to the model to calculate indirect impacts. Estimated direct changes in net spending outside the county (from more distant travelers) were not modeled for evaluation of indirect impacts, and were provided only for comparison to local and in-county expenditure changes.

The model was used to calculate projected direct and indirect impacts in San Bernardino County, based on assumptions provided by BLM about future recreational visitor patterns, and using average expenditure data adjusted for inflation to 2015 dollars. The analysis uses 2015 as the "future baseline"

year because that is approximately when the proposed action would be implemented. Other types of socioeconomic impacts associated with the proposed action were analyzed qualitatively.

4.3.1.2 Evaluation Criteria

In general, potential impacts are evaluated qualitatively in the context of the relative size, complexity, and health of the regional and local economy within which the impacts occur. There are few standardized metrics or criteria that would apply to every analysis. Qualitatively, impacts would occur if implementation of an action alternative would result in a rapid or sizeable shift in population trends or would notably affect regional employment, spending and earning patterns, or community resources in a manner that could not be easily absorbed or accommodated by the economy as a whole. The EIFS model provides a more objective measure, called the Rational Threshold Value (RTV), by which significance of impacts can be assessed. This analytical tool reviews the historical trends for the defined region and develops a separate measure of the maximum positive and negative variances in the local historical fluctuations for sales volume, income, employment, and population. The RTV is reported by the model for the total impact (direct and indirect) in each of these four categories. An RTV value for a given variable that exceeds 100% of the maximum positive historical deviation is considered to indicate a significant positive impact, and an RTV value that exceeds 75% of the maximum negative historical deviation indicates a significant negative impact. The RTV values are provided with the model results and are used to support a significance finding for county-wide impacts. Impacts that may disproportionately affect a sub-regional portion of the economy (e.g., a particular community within the county or a particular business or sector) are analyzed qualitatively.

To comply with EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, ethnicity and poverty status in the vicinity of the proposed action were examined to determine if any minority or low-income communities would be disproportionately impacted by implementation of any of the action alternatives or the No-Action Alternative. Three criteria are used to assess the significance of impacts to minority and low-income communities in the context of environmental justice: 1) there must be one or more such populations within the project area; 2) there must be adverse (or significant) impacts from the action; and 3) the environmental justice populations within the project area must bear a disproportionate burden of these adverse impacts. If any of these criteria are not met, then impacts with respect to environmental justice would not be significant.

4.3.1.3 Public Scoping Issues

The following socioeconomic issues were raised during the scoping process for this EIS:

- Decrease in revenue/employment and associated tax revenue from the tourism, recreational, and film industries.
- Loss of revenue/jobs from acquisition/closure of agricultural production and calcium chloride/sodium chloride mining facilities in the east study area (Alternative 3 only).
- Loss of future mining opportunities.
- Devaluation of surrounding private property.
- Increased costs to federal, state, and local jurisdictions for increased law enforcement.
- Economic impact to the larger southern California region from reduced sales of OHV-related vehicles.
- Economic impact to the larger southern California region from the potential loss of the Cadiz Inc. water project (Alternative 3 only).

4.3.2 Alternative 1 Impacts

4.3.2.1 Impacts to Displaced Residents and Businesses

As noted in Section 3.3, there are no existing populations within the boundaries of the west and south study areas that would be displaced by the proposed land acquisition under Alternative 1. Only one occupied residence has been identified in the west study area and none are located in the south study area. There are no operating businesses or other economic activities that currently occur within the proposed acquisition study area boundaries for Alternative 1. As discussed in Section 3.12, *Geological Resources*, several abandoned mine properties (on 19 patented claims) would be acquired as part of the proposed acquisition in the west study area. One of these mines (the Morris Lode Mine), though not currently operating, comprises patented and unpatented claims that contain an estimated 18 million tons of iron ore reserves (Manatt, Phelps, and Phillips, LLP 2011). The Morris Lode claimants have recently requested a right-of-way approval from BLM to maintain an existing road to access the mine, and have an approved reclamation permit (issued in August 2011) from the County of San Bernardino to mine 71.1 acres of their patented mining claims for a period of up to 45 years (County of San Bernardino 2011). As discussed in Section 2.6, *Disposition of Mining Claims*, the Morris Lode and Bessemer mine properties/claims would be acquired under Alternative 1 because of their location relative to the proposed MEB operating areas, while other patented and unpatented claimants may be afforded reasonable access to their claims on a case-by-case basis.

The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Section 201, and the *Uniform Relocation Act Amendments of 1987* were passed by the government as a means of providing uniform and equitable treatment for persons displaced by federal or federally assisted programs. Under the Federal Relocation Assistance Program, any individual, family, business, or farm displaced by a federal or federally-assisted program shall be offered relocation assistance services for the purpose of locating a suitable replacement property. Reimbursement of moving costs may be paid on the basis of actual reasonable moving costs and related expenses or under certain circumstances, a fixed payment may be provided. If an individual or business were to be required to relocate as a result of a federal or federally assisted program, a relocation counselor would contact that individual or business. Relocation services are provided by qualified agency employees to assist individuals in a successful relocation (49 CFR Part 24). The Government would prepare a relocation assistance plan before the acquisition of any private parcels. As part of this plan, the Government would make a determination as to the availability of replacement housing. If relocation assistance is required, the Government would contract with a relocation assistance contractor to serve the relocation needs of the former parcel owner.

Given the existence of this program to assist and fairly compensate displaced individuals, businesses, and claim holders, as well as the fact that only one residential property, no operating businesses, and 19 patented mining claims occur in the acquisition study areas, Alternative 1 would have less than significant direct impacts to private property owners in the west and south study areas. A potential indirect impact from the acquisition of the Morris Lode Mine would be related to the loss of a potential local source of iron ore as a future input to local cement manufacturing; this impact is addressed in Section 4.3.2.4.

4.3.2.2 Impacts from Changes in Local Spending

The primary socioeconomic impacts of Alternative 1 would derive from the displacement of specific activities that take place on public lands within the acquisition study areas, but which generate business sales, jobs, sales tax revenues, and employee income in the local communities surrounding the acquisition study areas. These displaced activities would include:

- recreational opportunities in the Johnson Valley OHV Area (and to a much lesser extent in the south study area), which bring tourism spending and sales tax revenues to the surrounding communities; and
- motion picture, television, and other types of film industry activity, which also stimulate local businesses, tax revenues, employment, and income.

The anticipated reductions in local expenditures associated with these displaced activities would be partially offset by increased spending by the new personnel that would be hired at the Combat Center under the proposed action. This section describes the analysis conducted to estimate both of these impacts and the net or combined effect of both changes in direct expenditures relative to baseline conditions.

Reduction in Direct Expenditures by Recreational Visitors and the Film Industry

The first step in the analysis was to determine a baseline level of spending on recreation to enable a comparison with each project scenario. The amount of spending is a function of the level of use by recreational visitors and other assumptions about the amount and distribution of money spent during each visit. Estimates of visitor use are based on the best available BLM data as presented in Sections 3.2.3.2 (Visitor Use) and 4.2.1.1. Specifically, a Year 2015 baseline estimate of 337,000 average annual visitor-days was assumed in this analysis, based on 2010 visitor data estimated by BLM and the agency's projections for growth in visitors to the area over the subsequent five years. Recreational visits to Johnson Valley include a mix of single-day and multi-day trips (the analysis assumed a mix of 20% single-day and 80% multi-day). Visits can also be differentiated by their purpose: "event-related" visits are assumed to include those participants and spectators of organized OHV races or other similar events that visit exclusively because of a scheduled event (and would not visit if the event were not being held); while "dispersed use" visits are those that may occur for any other reason (e.g., family vacations, weekend excursions, etc.). Dispersed use visitors are also assumed to include a proportion of race spectators that would come to the project area anyway, even if race events did not occur. The BLM estimates that approximately 17% of visitor-days are event-related according to the definition used here and approximately 83% of visitor-days are dispersed use. All assumptions used in the analysis of economic impacts for this section are described in Appendix K.

No data or estimates have been identified that quantify OHV and other recreational use in the south and east study areas. Neither area is reported to be a particularly popular location for OHV use or other recreational pursuits, although residents of Wonder Valley have registered complaints with local authorities about OHV use. Both areas provide terrain and other conditions that are similar to those in the west study area, and both areas are adjacent to designated wilderness areas. For purposes of estimating baseline recreational spending in the south and east study areas, a level of 800 visitor-days per year was assumed for the south study area and 500 visitor-days per year was assumed for the east area: all visits were assumed to be single day instead of multi-day visits and all by local area residents only. See Appendix K for a complete description of modeling assumptions and results for baseline conditions and for each project alternative.

For purposes of this EIS analysis, the assumed baseline level of film industry spending in the project area is an average of $1.6 million per year, based on estimates prepared by the Inland Empire Film Commission (refer to Table 3.3-10 in Section 3.3) of the total economic impact of film industry activity in the Johnson Valley area between 2001 and 2008 (Inland Empire Film Commission 2010a). The actual annual average derived from the Film Commission estimates (as reported in Table 3.3-10 of Section 3.3)

was $1.56 million in economic impact, but the estimate was rounded up to $1.6 million as a conservative assumption for this analysis. This analysis is also conservative in that it applies this measure of total economic impact of the film industry (which included direct spending and the additional indirect benefits associated with a "multiplier effect") as an assumption for direct spending only. In addition, all of this assumed annual film industry spending was accrued in this analysis to the "local" area within 50 miles (80 km) of Johnson Valley, even though the Film Commission data included film industry spending in the City of Barstow, which is located outside the radius of the "local" area in this EIS analysis. Half of film industry expenditures were assumed to be taxable at a 10% rate (average transient occupancy tax rate for the area). Overall, the assumption of $1.6 million used in this analysis for baseline film industry spending in the "local" area around Johnson Valley is considered to be very conservative and the actual annual average of direct spending from filming activities is likely to be lower.

The next step in the analysis of changes in direct recreational and film industry spending was to estimate the reductions that would be associated with implementation of Alternative 1. The same assumptions used to estimate visitor use and direct spending for the baseline condition were used to estimate the change in recreational visitor spending associated with Alternative 1. In addition, the analysis assumed that 100% of organized race events would be displaced (along with all visitor-days of use associated with such events) and 75% of the visitor-days categorized as dispersed use would not occur. Some dispersed use was assumed to continue because a few popular areas within the Johnson Valley OHV Area would remain available for public OHV and other recreational use under Alternative 1. The remaining area would comprise approximately 17,628 acres (7,134 hectares), or roughly 9% of the existing Johnson Valley OHV Area. The remaining area would include Cougar Buttes and Anderson Dry Lake (two major OHV staging and camping areas), along with several popular OHV trails, including Bullfrog, Cakewalk, Chicken Rock, and Hammerdown Trails. This area is frequently used for a variety of recreational activities, such as hiking, picnicking, photography, geocaching, and wildlife and wildflower viewing. A reduction of 75% of dispersed use under such conditions represents a conservative estimate (i.e., a higher estimate of economic impact) given the remaining size and attributes of the area.

The analysis also assumed that 90% of the total annual visitor-days displaced from the "local" area (within 50 miles [80 km] of Johnson Valley) would be transferred to other recreational areas within San Bernardino County (BLM 2010c) rather than leaving the county entirely (e.g., as described in Section 3.2, *Recreation*, there are several other designated OHV areas in the county). In the analysis of recreational spending it is assumed that none of the displaced "local" spending would occur at other "local" OHV areas (such as Stoddard Valley); this is likely a conservative assumption, and if some of the displaced recreational use from Johnson Valley were to transfer to Stoddard Valley or other "local" areas then "local" recreational spending would not decline as much as is assumed in this analysis. Other assumptions used in the analysis are described in Appendix K.

With regard to film industry expenditures, the portion of Johnson Valley that would remain outside the Alternative 1 acquisition area is also used for filming (e.g., the movie "Valkyrie" was filmed in the Cougar Buttes area) and would be expected to continue to be in demand with implementation of Alternative 1. The direct reduction in "local" area film activity due to implementation of Alternative 1 (compared to baseline conditions) was assumed to be 75%, with 80% of the displaced film-related spending from the "local" economy assumed to be spent in the vicinity of other potential filming sites elsewhere in San Bernardino County.

Table 4.3-1 displays the estimated changes in direct recreational and film industry expenditures that would be associated with implementation of Alternative 1, based on the assumptions and analysis

described above (and in more detail in Appendix K). The Table displays both the baseline and Alternative 1 scenarios for these two sources of spending in the applicable acquisition study areas (and the percentage change from baseline) for (1) San Bernardino County, (2) the "local" area surrounding Johnson Valley (a subset of the total County spending from these two sources), and (3) for all other areas outside of the county where spending may be impacted by reduced use of Johnson Valley. For each of these geographic areas, the estimated reductions in recreational and film industry direct spending associated with Alternative 1 are greater than the estimated spending reductions associated with any of the other action alternatives. As described above, many of the assumptions used to generate these projections of reduced spending were conservative, and actual spending reductions may be somewhat less than the amounts estimated.

As shown in Table 4.3-1, the combined recreational and film industry direct spending county-wide is estimated to decline from a baseline total of $8.7 million per year to approximately $8 million per year under Alternative 1 – a potential decline of $700,000. Recreational and film industry spending mainly contributes to the Retail Trade and Accommodation/Food Services sectors of the economy, which in 2007 generated total county-wide revenues of $13.8 billion; the estimated $700,000 reduction would represent only 0.005% of the $13.8 billion in overall county-wide spending in those sectors. The estimated reduction in recreational and film industry expenditures under Alternative 1 would represent a less than significant impact on the county economy.

In the "local" economy within 50 miles of Johnson Valley, the combined recreational and film industry direct spending under Alternative 1 would decline from a baseline estimate of $5.96 million per year to approximately $2.37 million per year, a potential annual reduction of $3.6 million in direct spending. Recreational and film industry sales mainly contribute to the Retail Trade and Accommodation/Food Services sectors, which in 2007 generated combined revenues of $1.1 billion in Victorville, Yucca Valley, and Apple Valley (i.e., the three largest communities in the "local" area; similar data for Lucerne Valley were not available). The $3.6 million reduction in spending would represent only 0.3% of total sales in those sectors in these "local" communities. The 0.3% reduction in sector spending under Alternative 1 would represent a less than significant impact on the economy of the "local" area.

Table 4.3-1. Estimated[1] Change in Direct Recreational and Film Industry Expenditures[2] - Baseline to Alternative 1

	Total In-County			Local Only[3]			Outside County		
	Baseline	**Alt 1**	**% Change**	**Baseline**	**Alt 1**	**% Change**	**Baseline**	**Alt 1**	**% Change**
Expenditures	$8,251,050	$7,604,325	-7.8%	$5,656,150	$2,254,042	-60.1%	$7,077,000	$6,400,642	-9.6%
Sales Taxes	$458,278	$423,146	-7.7%	$310,694	$118,849	-61.7%	$402,504	$364,037	-9.6%
Totals	$8,709,328	$8,027,471	-7.8%	$5,966,844	$2,372,890	-60.2%	$7,479,504	$6,764,679	-9.6%

Notes: [1]See Appendix K for assumptions and detailed results of analysis.
[2]Includes recreational spending, film industry expenditures, and associated taxes only, except "Outside County" does not include an estimate of film industry spending.
[3]The "local" area represents a subset of the total in-county expenditures within 50 miles (80 km) of Johnson Valley.

Direct Increase in Combat Center Personnel

Alternative 1 would increase the number of military (15) and civilian (55) personnel stationed at the Combat Center to meet additional requirements for security, range management, resource conservation, and other important functions. Average salaries were compiled according to the pay grade distribution of the required positions, and the resulting salaries were averaged independently for the military and civilian positions. The mix of required military personnel for Alternative 1 yielded an average salary of $39,602

for military and $38,658 for civilian positions (see Appendix K). All new civilian personnel would be expected to live within the 30-minute commute area that currently encompasses 99% of Combat Center personnel living outside the installation. New military personnel were assumed to be distributed 25% living on the installation and 75% living in surrounding communities (Marine Corps 2006). It was also assumed that 70% of all new positions would be filled by people migrating from outside the county.

The additional personnel would be expected to affect the local economy as a function of increased employment and personal spending, increased demand for housing and community services, and general community involvement. Two recent NEPA EAs (DoN 2007; 2009) evaluated the impacts of adding a projected 2,125 Marines (plus dependents) to the Combat Center as part of the Marine Corps' Grow the Force Initiative. These reports identified sufficient housing supply and capacity in local community services to accommodate such an increase, and follow-up investigation as part of this EIS indicates that the capacity continues to exist to accommodate the manpower increase proposed in Alternative 1.

Total Direct and Indirect Impacts from Net Changes in Spending and Personnel

Table 4.3-2 displays the results from the EIFS model based on inputs described above for estimated direct changes in recreational and film industry spending and personnel payroll. Details about model inputs and assumptions are provided in Appendix K. The results indicate a net increase in sales volume (also often called total economic output) in San Bernardino County of approximately $4.5 million. The corresponding RTV of 0.01% is well under the threshold level of significance for positive impacts (13.46%) and well above the threshold for negative impacts (-5.93%), indicating that this level of net direct and indirect change in total sales would be less than significant in the regional context. The modeling results indicate that the positive influence of the additional Combat Center payroll and jobs (approximately $2.1 million per year in direct income and 70 jobs) would, on a county-wide basis, offset the direct and indirect impacts of the reduction in recreational/filming expenditures. Similar results are evident in Table 4.3-2 for income (a net increase of over $3.1 million) and employment (a net increase of 90 jobs). These net impacts would also be less than significant at a regional scale. The model estimates a net increase in county population of 133 persons, which would also be less than significant.

Table 4.3-2. Estimated[1] Direct, Indirect, and Total Net Impacts[2] of Alternative 1 Within San Bernardino County

	Direct	Indirect	Total	EIFS Model RTV	Threshold RTV	Regionally Significant?
Sales Volume	$1,286,448	$3,267,579	$4,554,028	0.01%	-5.93%	No
Income	$2,606,911	$542,996	$3,149,908	0.01%	-4.33%	No
Employment	76	14	90	0.01%	-3.85%	No
Local Population	N/A	133	133	0.01%	-2.16%	No

Notes: [1]See Appendix K for assumptions and detailed results of analysis.
[2]Includes net effects of reduced recreation spending, film industry expenditures, and increased Combat Center personnel.
EIFS = Economic Impact Forecasting System; RTV = Rational Threshold Value

The EIFS model does not break out the relative influence of estimated economic impacts on the individual communities within the county. Given the size and diversity of the local economies in cities such as Victorville, Apple Valley, Yucca Valley, and Twentynine Palms, any reasonable distribution of the estimated Alternative 1 impacts across these communities would also be less than significant relative to baseline conditions. The relative influence of reduced Johnson Valley visitor spending and film industry expenditures would be expected to be much smaller in communities like Twentynine Palms,

Joshua Tree, and Yucca Valley, which are likely to be influenced to a far greater extent by tourism spending associated with Joshua Tree National Park and the Marine Corps presence at the Combat Center.

Of the various cities and towns in the vicinity of Johnson Valley that provide goods and services to OHV and other recreational visitors, the Community of Lucerne Valley would be likely to have the most difficulty absorbing the potential reduction in tourist visitation to Johnson Valley. Lucerne Valley is a small community (2010 population of 5,811) located on the main route into the Johnson Valley OHV Area for visitors coming from the west (via Victorville). Lucerne Valley and the larger Town of Yucca Valley (about the same distance from the OHV Area to the south), are the nearest communities with any appreciable retail and traveler services presence (though limited) that can support the purchasing needs of people visiting Johnson Valley. Lucerne Valley is also ideally located to accommodate the needs of travelers heading to the mountain attractions of Big Bear and Lake Arrowhead from the north (the turn-off to Big Bear via Highway 18 is in Lucerne Valley). Lucerne Valley currently supports three markets, three gas stations, about eight restaurants, and various other small businesses that cater to travelers.

Very limited data are available to help quantify the severity of the impact to Lucerne Valley businesses. There are no known data to identify the relative proportions of Johnson Valley-related recreational and film industry sales that accrue to Lucerne Valley, Yucca Valley, Apple Valley, or any other communities within the local area. Based on their locations relative to the two main routes used to travel to Johnson Valley, it could be assumed that Lucerne Valley and Yucca Valley together benefit from the majority of the "local" spending from Johnson Valley visits. Yucca Valley is a much larger town with more services and vendors, but Lucerne Valley is well situated relative to visitor traffic from areas like Victorville, Barstow, etc. The U.S. Census Bureau's (USCB's) 2007 economic census reports include data for Yucca Valley, Apple Valley, and other major cities/places in the area, but do not include data for Lucerne Valley. As an indication of the relative impact of reduced sales, the estimated $3.6 million reduction in local spending due to Alternative 1, if displaced exclusively from Yucca Valley sales, would represent only 1.7% of the town's sales ($207 million) in the relevant Retail Trade and Accommodation/Food Services sectors.

While no data are available to indicate total Lucerne Valley sales in the relevant economic sectors, the owners of the largest of the three markets in town provided sales data and assumptions indicating that approximately 7.5% of their average annual sales are attributable to the OHV Area visitors (Lucerne Valley Market and Hardware and Lucerne Valley Economic Development Association 2010). They expressed concern that displacement of a large contingent of OHV visitors would make it extremely challenging to stay in business. The President of the Lucerne Valley Economic Development Association indicated that some businesses in town are "subsidized" by their owners (i.e., that they remain open despite very low profit margins or return on investment because of the owner's strong affinity for the community) and expressed concerns that "half the businesses would go away" in response to a large-scale displacement of visitors (Lucerne Valley Market and Hardware and Lucerne Valley Economic Development Association 2010).

As indicated in the analysis described above and in Appendix K, it is conservatively assumed that 25% of the total dispersed-use OHV activity would continue to occur after implementation of Alternative 1. The area around Cougar Buttes and Anderson Dry Lake that would remain open to OHV activities under Alternative 1 would likely receive a substantially higher density and frequency of dispersed visitor use than it currently does (see Section 4.2, *Recreation*). This area is also the portion of the OHV area in closest proximity to Lucerne Valley. This suggests a likelihood that a higher proportion of visitors that

would continue to visit Johnson Valley would potentially patronize the business district of Lucerne Valley rather than traveling a greater distance to the larger community of Yucca Valley.

While Lucerne Valley businesses would likely experience some level of overall reduction in business patronage from OHV visitors that would potentially be displaced by Alternative 1, the proportion of Johnson Valley visitors that spend money in Lucerne Valley may increase (as noted above, because the remaining recreational opportunities in Johnson Valley would be in closer proximity to Lucerne Valley). The town also appears to have a contingent of businesses and major employers that are not as dependent on tourism. Tourism revenues associated with travelers to Big Bear and Lake Arrowhead areas would not be affected by the proposed action, and demand for goods and services from employees of resident companies would also not be affected. However, it is very possible that individual retail businesses that are struggling to continue under existing conditions could fail as a consequence of reduced recreational patronage at Johnson Valley. In this respect, Alternative 1 could result in adverse economic impacts to certain businesses and business owners in Lucerne Valley. In a small town with relatively few retail businesses currently, even a small number of business closures would be more detrimental to the local economy and the overall community culture than would be the case in a larger town with a more extensive or diverse retail business sector. However, the town reportedly experiences an estimated 20% turnover in such businesses currently (Lucerne Valley Market and Hardware and Lucerne Valley Economic Development Association 2010), even as the popularity of Johnson Valley as a recreational destination has grown steadily in recent years. The local economy has adapted to these fluctuations without an adverse effect to the overall economy. There would also be at least two and perhaps more years (from the time that a final decision is made about the proposed action and the time that any selected alternative would be implemented) for business owners to plan for and adapt to any changes in customer base or other market conditions that may result from the proposed action. Based on the analysis above, the potential socioeconomic impacts to Lucerne Valley and other similar or larger communities in the local area from reduced retail expenditures would be adverse but less than significant under Alternative 1.

4.3.2.3 Reduction in Property Taxes

As shown in Table 4.3-3, a total of 141 privately-owned land parcels comprising just over 10,000 acres (4,050 hectares) would be acquired by the Marine Corps under Alternative 1. Only six of these parcels have been improved, and only one property is known to be permanently inhabited. Removal of these private parcels from the tax rolls would reduce county tax revenues by approximately $34,435 per year. Such revenues are used to pay for public services such as police, fire protection, education, and other county personnel.

As of June 2009, the county's total property tax revenue was over $585.6 million. The reduction in tax revenues attributable to the implementation of Alternative 1 would be less than 0.006% of current county tax revenue and would not be expected to result in any reduction in the availability or quality of public services that are funded by such revenue. Therefore, Alternative 1 would have a less than significant impact to county tax revenue and the public services that are funded by such revenue.

Table 4.3-3. Reduction in County Property Taxes from Alternative 1

Alternative 1	Private Land
Number of Parcels	141
2009 Parcel Tax	$34,435
Total Value of Parcels	$2,881,891
Land Value	$2,820,525
Improvement Value	$61,366
Total Number of Improved Parcels	6
Individual	6
Business	0
Acres	10,407

Source: California State Controller's Office 2010.

4.3.2.4 Other Socioeconomic Issues

Loss of Future Mining Potential

As indicated in Section 2.6, *Disposition of Mining Claims*, the patented (but not currently operating) Morris Lode and Bessemer Mines would be acquired under Alternative 1. Direct and indirect impacts associated with the acquisition of these two mines in the west study area could occur if the acquisition prevented or delayed future development of a local source of iron ore. The direct economic impact would stem from the loss of potential future jobs required to operate the mine. The indirect impact would relate to the loss of locally extracted iron ore as an input to the local cement manufacturing industry.

The acquisition of the Morris Lode Mine would have some direct economic impacts to the local economy. It is expected that six permanent jobs would be required to operate the mine at capacity (County of San Bernardino 2011). The loss of the potential six jobs at the Morris Lode Mine would be a less than significant impact to the local economy.

The acquisition of the Morris Lode Mine might also have some indirect economic impacts to the local economy. Cement manufacturing is an important local industry, and is one that benefits from having local sources of raw materials, including iron ore. Locally sourced materials keep transportation costs low and improve profitability. The Morris Lode Mine, with planned production of 400,000 tons annually, would likely ensure that the local cement industry would have a nearby source of iron ore for the foreseeable future (County of San Bernardino 2011; Manatt, Phelps, and Phillips, LLP 2011). If the acquisition of land in the west study area and the resulting loss of potential iron ore production were to put the continuing operations of the local cement manufacturing industry at risk, then there may be a significant indirect economic impact.

Currently, there are two active iron ore mines in the vicinity that supply local cement manufacturing; one mine has an expected 10-year supply of iron ore remaining and the other, located at Fort Irwin, has an agreement to operate until 2022 (Manatt, Phelps and Phillips, LLP 2011). At present, given the industries' overall cost structure (to include iron ore), with the Morris Lode Mine currently not producing ore, the local cement industry is economically viable. The continuing viability of the industry is subject to many factors including future prospects for the construction industry in general, the prevalence of concrete in impending green building codes, and the cost of raw materials necessary to produce cement.

Recent government data show that in 2009, the entire U.S. cement industry used 93.6 million tons of raw materials to produce cement, including 481,000 tons of iron ore; thus, iron ore made up only 0.5% of the total raw material used to produce cement (U.S. Geological Survey [USGS] 2011). Iron ore is not the only ferrous (indicating the presence of iron) material used in cement production; in total, ferrous

materials comprised 1.1% of raw materials used in cement production. Substitutes to iron ore, most notably mill scale, have recently surpassed iron ore as the most commonly used ferrous material used in cement production. Mill scale is a waste product that results from the process of hot-rolling steel. In 2009, compared to the 481,000 tons of iron ore used, 536,000 tons of mill scale was used in the production of cement. Since the use of mill scale represents a recycling of waste, as opposed to the exploitation of new resources, mill scale is generally considered a more sustainable material for producing cement than is iron ore (Portland Cement Association 2005). Also, as the price of iron ore has increased 319% (adjusted for inflation) from 2000 to 2010 (World Bank 2011), the economics of using recycled materials in production have become increasingly viable. The local cement manufacturing industry does utilize mill scale (Portland Cement Association 2005), but not exclusively; the industry also utilizes iron ore and does benefit from having nearby sources – due to low transportation costs.

In the event of depletion of local iron ore resources (e.g., if the Morris Lode Mine did not produce iron ore due to the proposed action and other current sources were fully exploited), it is likely that transportation costs related to iron ore would marginally increase. However, the cost of iron ore is a small component of the total cost of making cement and transportation costs are a small component of the total cost of iron ore (i.e., an increase in transportation costs for iron ore would not necessarily equate to a substantial increase in total costs for the industry) and there is some potential for the industry to pass along any increased costs. Also, iron ore has substitutes that have been increasingly taking its place in the production of cement; iron ore is not as necessary to cement production as it was in the past and it is becoming decreasingly important to cement production relative to alternatives (USGS 2011a). A marginal increase in the transportation costs of iron ore, which may be caused as a result of the acquisition of the Morris Lode mine, would be considered an impact to the cement industry, but would not pose a serious operational or economic risk; therefore, it would represent a less than significant impact.

Devaluation of Surrounding Private Property

The closest communities to the west study area are Landers and Johnson Valley, located less than 10 miles (16 km) from the southwest corner of the existing Combat Center boundary. Some members of the public expressed concern during the public review of the Draft EIS that the proposed action would increase noise levels in these and other nearby communities and that the noise would reduce property values. These concerns are valid since noise modeling results described in Section 4.9 indicate that noise would increase in the acquired areas and would extend outside the revised boundaries of the Combat Center to a few small/isolated areas. However, a mapping analysis in Section 4.9 based on noise contour areas and underlying census data identified no resident populations that would be affected by cumulative noise exposure levels that exceed standard land use compatibility thresholds for residential land uses or sensitive receptors. Section 4.9 does identify an increased potential for single-event ordnance noise to inspire noise-related complaints in some local communities.

Section H.1.3.9 in Appendix H summarizes research about the potential for noise in the vicinity of airports to negatively affect property values. Such research acknowledges that properties located within noise zones that exceed compatibility thresholds may face challenges in the availability of federally-guaranteed loans and that property values in such noise zones could decline between 0.5 and 2% per decibel increase of cumulative noise exposure (Newman and Beattie 1985). Other, more recent research (Fidell *et al*. 1996) found that aircraft noise had no meaningful effect on residential property values and that differences in sales prices between homes with and without aircraft noise were frequently due to factors other than noise. Since none of the local communities in the vicinity of the Combat Center and the

proposed acquisition areas would be affected by cumulative noise exposure levels that exceed land use compatibility and planning thresholds, no appreciable decline in property values is anticipated to result from the proposed action.

Irrespective of noise levels, the Combat Center has been used by the Marine Corps for training since 1952; therefore, local communities have existed in close proximity to the Combat Center for many years, so if there is a negative correlation between housing prices and proximity to the Combat Center then it is a factor that has long been ingrained in the local housing market. Furthermore, property values are sensitive to many factors that are entirely unrelated to the proposed action, which by itself would only affect property values to a marginal degree if at all. The value of properties would likely be affected more by regional employment and income levels, mortgage rates, lending standards, and demographic trends than they would be by noise associated with implementation of the proposed action. Alternative 1 would not be likely to stimulate a general decline in property values for nearby communities, thus impacts on property values would be less than significant.

Increased Costs to Federal, State, and Local Jurisdictions to Provide Community Services

Under the proposed action, there would be no change in the provision of community services such as law enforcement or emergency services. The acquisition study areas are currently served by both federal and local/regional authorities by negotiated agreement and funding arrangements. Under Alternative 1, the Marine Corps would establish or transfer such agreements or supplement certain services in the same way that the BLM does currently. Funding for such services would continue to be at federal expense. Furthermore, San Bernardino County Service Areas 29 and 70 Improvement Zone M receive funding through the imposition of special taxes and would not be impacted by the land acquisition under Alternative 1. Therefore, there would be no impact associated with the cost of providing community services to the project area.

Economic Impact from Reduced Sales of OHVs

Any reduction in visitors to the Johnson Valley OHV Area under any of the action alternatives would have minimal effect on regional or statewide sales of OHVs. Ninety percent of the displaced recreational use is expected to shift to other recreational areas and resources within San Bernardino County, and any displaced visitors that did not return to the county would likely continue to enjoy recreational activities at other locations in the state. Visitors that travel greater distances to come to Johnson Valley probably make substantial vehicle purchases near their place of residence, so the reduction in OHV opportunities in Johnson Valley would be unlikely to change their buying decisions or desire to participate in off-road recreation. The proposed action is expected to have no significant impact on regional or statewide sales of OHVs.

Economic Impacts Related to the Loss of Land for Grazing

The loss of lands currently or potentially in use for grazing would prove economically detrimental to a region if the loss of land were to substantially restrict or reduce current or potential economic activity related to livestock ranching or farming. As described in Section 4.1.2.5, grazing in the Johnson Valley Allotment is currently prohibited and while 16.3% of the Ord Mountain Allotment would no longer be available for grazing, the remaining 83.7% would prove sufficient for continued grazing (BLM 2010b). Since sufficient grazing land would remain and economic activity associated with livestock ranching or farming would not be substantially curtailed, there would be less than significant economic impacts related to the loss of land for grazing.

Economic Impacts to Civil Aviation from Changes in Access to and Use of Airspace

As described in Section 4.7, Airspace Management, the proposed establishment of and modifications to airspace in the vicinity of the Combat Center would potentially result in impacts to civil aviation that use established airways, jet routes, and airfields in the area. As a result of public comments and discussions with the FAA, the proposed airspace boundaries have been modified from those presented in the Draft EIS. The modifications reduced the amount of time airways would be used and the extent of the boundaries, which would result in overall reduced impacts to civilian aviation. During consultation with FAA, data would continue to be evaluated and boundaries modified as needed. In general, the airspace in this area supports a high volume of civil aviation traffic, particularly on jet routes that are heavily used by aircraft transiting between the major airports serving the Los Angeles area and other airports across the country. Impacts to civil aviation would potentially occur only during times when the military airspace is activated (see Section 2.4), which would be limited in frequency and duration. Potential civil aviation impacts (described in Section 4.7) may include slightly increased flight distances and increased flight time when the airspace is active and pilots either cannot enter restricted airspace, elect not to transit the Military Operations Areas (MOAs), or if pilots flying to and from private airports or airfields were directed by Air Traffic Control (ATC) to divert their flight routes to avoid the active airspace and military activities. To the extent that they would occur, these potential aviation impacts would result in economic impacts due to additional operating costs (primarily related to increased fuel use) associated with avoiding active airspace, and the costs of any expended efforts in tracking the airspace status through available advisory services.

Such impacts would depend on civil air traffic densities/peak periods and the individual areas and timeframes in which the proposed military flight activities would occur. The Federal Aviation Administration (FAA) and Marine Corps would address any impacts and mitigation measures to be taken before implementation of any airspace proposals. This would include advanced coordination between military scheduling agencies and the Los Angeles Air Route Traffic Control Center (LA ARTCC), as currently occurs, to avoid those time periods and altitudes that are most problematic for the ATC system. In addition, commercial and general aviation routinely experience flight diversions due to weather, airport delays, air traffic congestion, air traffic deconflictions, flight safety, and other such conditions that are unrelated to military airspace use.

The economic impacts of any commercial or other civil aviation aircraft being delayed or diverted to any extent around the proposed airspace when active cannot be quantified due to the many factors to be considered in estimating such impacts. These factors include aircraft type and weight, type and number of engines, an aircraft's phase of flight and altitude at the time of a diversion, air traffic conditions, the additional time/distance incurred by any diversion, etc. Other factors such as maintenance, labor, and aircrew costs would also have to be considered, as applicable, for commercial and general aviation impacts. Economic impacts to general aviation pilots would depend on routes of flight and decisions on whether to delay flight when the airspace is active versus flying through or avoiding the active airspace.

Fuel consumption rates for the different turboprop and jet aircraft types are identified in technical manuals and other documents that provide operators with a general basis for estimating fuel use for flight planning and other purposes. While fuel use alone is not the only factor to be considered in determining the cost of any flight diversion, this information provides a general idea of the average amount and cost of fuel an aircraft type would use per mile or minute traveled during normal flight conditions. For instance, this consumption rate data indicates that five minutes flying time for a Boeing 737 equates to approximately $348 based on its fuel usage rate and jet fuel cost of $4.75 a gallon. Five minutes for a

Boeing 777 would be approximately $900, while a McDonnell Douglas MD 80 would be approximately $396. Variable operating costs that include fuel and maintenance costs can vary from nearly $100 per hour for a single piston engine aircraft up to several thousand dollars for multi-engine long range jet aircraft. This information is only intended to provide a general estimate of aircraft fuel and operating costs that would have to be examined in much more depth and in consideration of many other factors for those aircraft types that could be potentially affected by flight diversions around the Combat Center airspace.

Some economic impacts (higher fuel costs) related to civil aviation impacts would be expected to occur. However, since the proposed airspace would be active during relatively brief and infrequent periods of time, and advance coordination between the Marine Corps and FAA would be expected to minimize direct impacts to civil aviation (see Section 4.7), the economic impacts from the proposed airspace configuration are expected to be less than significant.

4.3.2.5 Environmental Justice Impacts

As identified in Section 3.3.3.3, three locations in the vicinity of the Combat Center meet the Census Bureau definition of a "poverty area" (Homestead Valley, Lucerne Valley, and Joshua Tree). Socioeconomic impacts that are attributable to Alternative 1 would not be significantly adverse and would apply equally to any affected persons, regardless of minority or income status. Therefore, in accordance with EO 12898 Criteria 2 and 3 for assessing environmental justice impacts, no environmental justice impacts would occur with respect to socioeconomics.

As described in Section 4.9 *Noise*, no civilians residing outside the installation boundaries under Alternative 1 (including the land areas proposed for acquisition) would be exposed to average noise levels that exceed standard compatible land use thresholds (for airspace noise or ordnance noise). In addition, all three of the areas that meet the criteria for "poverty area" status would remain outside the area identified as having medium potential for noise complaints under Alternative 1 (refer to Figure 4.9-4 in Section 4.9). Therefore, populations in the identified "poverty areas" would not be exposed to disproportionately high or adverse human health effects or risks from noise associated with implementation of Alternative 1. In accordance with EO 12898 Criteria 2 and 3 for assessing environmental justice impacts, no environmental justice impacts would occur with respect to noise.

Similarly, this EIS has identified no other adverse environmental or health effects that would disproportionately affect minority or low-income populations. No environmental justice impacts would occur as a result of implementation of Alternative 1.

4.3.2.6 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 1 would result in less than significant, unmitigable impacts.

4.3.3 Alternative 2 Impacts

4.3.3.1 Impacts to Displaced Residents and Businesses

There are no existing residences or businesses within the Alternative 2 proposed acquisition area boundaries that would be displaced by the proposed land acquisition under Alternative 2. As discussed in Section 3.12, *Geological Resources*, several abandoned mine properties would be acquired as part of the

proposed acquisition in the west study area. The Morris Lode Mine is an example of a patented mine whose owner has taken steps to potentially renew operations in the area.

As stated in the description of Alternative 1 impacts, given the existence of programs to assist and fairly compensate displaced property/claim owners, as well as the fact that no residences or businesses and only a few mining claims occur in the Alternative 2 acquisition study areas, Alternative 2 would have less than significant direct impacts to private property owners in the west and south study areas. A potential indirect impact from the acquisition of the Morris Lode Mine would be related to the loss of a potential local source of iron ore as a future input to local cement manufacturing; this impact was discussed in Section 4.3.2.4 but is equally relevant to Alternative 2.

4.3.3.2 Impacts from Changes in Local Spending

As in the case of Alternative 1, the primary socioeconomic impacts of Alternative 2 would derive from the displacement of specific activities that take place on public lands within the acquisition study areas, but which generate business sales, jobs, sales tax revenues, and employee income in the local communities surrounding the acquisition study areas. These displaced activities would include:

- recreational opportunities in the Johnson Valley OHV Area (and to a much lesser extent in the south study area), which bring tourism spending and sales tax revenues to the surrounding communities; and
- motion picture, television, and other types of film industry activity, which also stimulate local businesses, tax revenues, employment, and income.

The anticipated reductions in local expenditures associated with these displaced activities would be partially offset by increased spending by the new personnel that would be hired at the Combat Center under the proposed action. This section describes the analysis conducted to estimate both of these impacts and the net or combined effect of both changes in direct expenditures relative to baseline conditions.

The previous discussion of methodology and Alternative 1 impacts described the lack of reliable data pertaining to the level of use of Johnson Valley OHV Area, and the basis for estimating such use as both a baseline condition and to assess potential effects of a change in the amount of use. The same baseline conditions and assumptions apply to the analysis of impacts from Alternative 2. Assumptions used to estimate the reduction in direct spending under Alternative 2 are described below (and in more detail in Appendix K), along with the results of running the EIFS model to assess indirect and total impacts.

<u>Reduction in Direct Expenditures by Recreational Visitors and the Film Industry</u>

Under Alternative 2, approximately 113,558 acres (45,955 hectares) would be acquired within the west study area and approximately 75,912 acres (30,720 hectares) or roughly 40% of the existing Johnson Valley OHV Area would remain available for public recreation year-round. The remaining portion would be substantially larger than the largest of the regional OHV areas (i.e., Spangler Hills at 57,000 acres [23,067 hectares]). Cougar Buttes, Anderson Dry Lake, and Soggy Dry Lake are three major OHV staging and camping areas located within this area, along with several popular OHV trails. In addition, this area is frequently used for a variety of recreational activities, such as hiking, picnicking, photography, geocaching, and wildlife and wildflower viewing. Desert filming also occurs in this area, including major motion pictures filmed in the Cougar Buttes and Soggy Dry Lake areas.

Alternative 2 would remove approximately 60% of the current Johnson Valley OHV Area for exclusive military use, representing a loss of approximately 30% of the total acres available for open OHV

recreation in the region. The portions of Johnson Valley OHV Area that would be lost to public access under Alternative 2 include a major staging/camping area at Means Dry Lake and a majority of the unique and popular rock crawling trails known as the "Hammers."

The socioeconomic analysis assumed that 60% of organized race events would be displaced (along with all visitor-days associated with such use) and 25% of the dispersed use would no longer occur. Based on input from the BLM, the analysis also assumed that 90% of the total annual visitor-days displaced from the "local" area (within 50 miles [80 km] of Johnson Valley) would be transferred to the other recreational areas in the county (BLM 2010c) rather than leaving the county entirely. In the analysis of recreational spending it is assumed that none of the displaced "local" spending would occur at other "local" OHV areas (such as Stoddard Valley); this is likely a conservative assumption, and if some of the displaced recreational use from Johnson Valley were to transfer to Stoddard Valley or other "local" areas then "local" recreational spending would not decline as much as is assumed in this analysis. Other assumptions used in the analysis are described in Appendix K.

With regard to film industry expenditures, the assumed direct reduction in "local" area film activity due to implementation of Alternative 2 was assumed to be 20%. The analysis also assumed that 80% of that displaced filming would be transferred to other potential filming sites in San Bernardino County instead of leaving the region entirely.

Table 4.3-4 displays the estimated changes in direct recreational and film industry expenditures that would be associated with implementation of Alternative 2. As shown in the table, the combined recreational and film industry direct spending county-wide is estimated to decline by $300,000 to $8.4 million. Recreational and film industry sales mainly contribute to the Retail Trade and Accommodation/Food Services sectors of the economy, which in 2007 generated total county-wide revenues of $13.8 billion. The estimated $300,000 reduction would represent 0.002% of the total county-wide revenue in those sectors. The estimated reduction under Alternative 2 would represent a less than significant impact on the county economy.

In the "local" economy within 50 miles of Johnson Valley, the combined recreational and film industry direct spending under Alternative 2 would decline from a baseline estimate of $5.96 million per year to approximately $4.55 million in direct spending, a potential reduction of $1.41 million per year. In 2007, the combined revenue in the Retail Trade and Accommodation/Food Service sectors of in Victorville, Yucca Valley, and Apple Valley (the three largest communities in the "local" area; similar data for Lucerne Valley were not available) totaled $1.1 billion; the $1.41 million reduction in "local" area spending associated with Alternative 2 would represent only 0.1% of the combined sales for those sectors. This reduction in direct spending under Alternative 2 would represent a less than significant impact on the economy of the "local" area.

Table 4.3-4. Estimated[1] Change in Direct Recreational and Film Industry Expenditures[2] - Baseline to Alternative 2

	Total In-County			Local Only[3]			Outside County		
	Baseline	Alt 2	% Change	Baseline	Alt 2	% Change	Baseline	Alt 2	% Change
Expenditures	$8,251,050	$7,968,731	-3.4%	$5,656,150	$4,322,962	-23.6%	$7,077,000	$6,873,087	-2.9%
Sales Taxes	$458,278	$442,662	-3.4%	$310,694	$235,308	-24.3%	$402,504	$390,907	-2.9%
Totals	$8,709,328	$8,411,393	-3.4%	$5,966,844	$4,558,271	-23.6%	$7,479,504	$7,263,994	-2.9%

Notes: [1]See Appendix K for assumptions and detailed results of analysis.
[2]Includes recreational spending and film industry expenditures only, except "Outside County" does not include an estimate of film industry spending.
[3]The "local" area represents a subset of the total in-county expenditures within 50 miles (80 km) of Johnson Valley.

Direct Increase in Combat Center Personnel

Alternative 2 would increase the number of military (15) and civilian (50) personnel stationed at the Combat Center to meet additional requirements for security, range management, conservation, and other important functions. Average salaries were compiled according to the pay grade distribution of the required positions, and the resulting salaries were averaged independently for the military and civilian positions. The mix of required military personnel for Alternative 2 yielded an average salary of $39,098 for military and $37,408 for civilian positions (see Appendix K). All new civilian personnel would be expected to live within the 30-minute commute area surrounding the installation. The analysis assumed that 25% of new military personnel would live on the installation and 75% would live in surrounding communities. It was also assumed that 70% of all new positions would be filled by people migrating from outside the county.

Direct impacts of the new personnel on housing and community services would be the same as described for Alternative 1. The proposed personnel increase under Alternative 2 would have less than significant impacts on socioeconomic conditions in the project area.

Total Direct and Indirect Impacts from Net Changes in Spending and Personnel

Table 4.3-5 displays the results from the EIFS model based on inputs described above for estimated direct changes in spending and personnel. Details about model inputs and assumptions are provided in Appendix K. The results indicate a projected net increase in total sales volume in San Bernardino County of approximately $5.2 million. The corresponding RTV of 0.01% is well under the threshold level of significance for impacts, indicating that this level of net direct and indirect increase in sales output would be less than significant in the regional context. The modeling results indicate that the positive influence of the additional Combat Center payroll and jobs (approximately $1.8 million per year in direct income and 65 jobs) would, on a county-wide basis, offset the direct and indirect impacts of the reduction in recreational/filming expenditures. The total estimated net impact on income and employment is an increase of $3 million and 87 jobs. These net impacts would also be less than significant at a regional scale. The model estimates a net increase in county population of 124 persons, which would also be less than significant.

Table 4.3-5. Estimated[1] Direct, Indirect, and Total Net Impacts[2] of Alternative 2 Within San Bernardino County

	Direct	Indirect	Total	EIFS Model RTV	Threshold RTV	Regionally Significant?
Sales Volume	$1,461,420	$3,712,007	$5,173,427	0.01%	-5.93%	No
Income	$2,407,360	$616,850	$3,024,210	0.01%	-4.33%	No
Employment	71	16	87	0.01%	-3.85%	No
Local Population	N/A	124	124	0.01%	-2.16%	No

Notes: [1]See Appendix K for assumptions and detailed results of analysis.
[2]Includes net effects of reduced recreation spending, film industry expenditures, and increased Combat Center personnel.
EIFS = Economic Impact Forecasting System; RTV = Rational Threshold Value

The economic impact to local communities in the vicinity of the acquisition study areas would be similar to Alternative 1, except that the impact would be substantially reduced in scope and scale under Alternative 2 due to a smaller estimated reduction in local recreational and film spending. Since the impact for Alternative 1 was considered to be less than significant, the smaller Alternative 2 impact to individual communities in the area would also be less than significant.

4.3.3.3 Reduction in Property Taxes

As shown in Table 4.3-6, property taxes associated with the private property that would be acquired under Alternative 2 are an estimated $25,677 per year. This reduction would be less than significant relative to the total property tax revenues and associated funding of public services within the county.

Table 4.3-6. Reduction in County Property Taxes from Alternative 2

Alternative 2	Private Land
Number of Parcels	81
2009 Parcel Tax	$25,667
Total Value of Parcels	$2,156,887
Land Value	$2,145,041
Improvement Value	$11,846
Total Number of Improved Parcels	4
Individual	4
Business	0
Acres	8,456

Source: California State Controller's Office 2010.

4.3.3.4 Other Socioeconomic Issues

Loss of Future Mining Potential

Alternative 2 would have the same potential direct and indirect impacts with regard to loss of future mining potential as described in Section 4.3.2.4 for Alternative 1. While there would be a direct impact in terms of the loss of six potential mining jobs, and a potential for indirect impacts related to a reduction in local iron ore supplies, such impacts are not expected to be significant.

Devaluation of Surrounding Private Property

Alternative 2 would have the same potential indirect impact with regard to devaluation of private property as described in Section 4.3.2.4 for Alternative 1. Threshold noise contours of 65 dB CNEL for aircraft noise and 62 dBC CNEL for ordnance noise would only marginally extend outside the revised boundaries of the Combat Center and would not expose local homeowners or communities to a cumulative noise level that exceeds standard compatibility thresholds for residential land uses or sensitive receptors. Research also indicates that property values are influenced to a far greater extent by factors unrelated to noise, even in areas adjacent to airports. Accordingly, it is very unlikely that property values in the vicinity of the Combat Center would decrease directly or indirectly as a result of increased noise. If property values were to decline as an indirect impact from implementation of Alternative 1, the reduction would likely be marginal and less than significant.

Increased Costs to Federal, State, and Local Jurisdictions to Provide Community Services

Under the proposed action, there would be no change in the provision of community services such as law enforcement or emergency services. The acquisition study areas would continue to be served by both federal and local/regional authorities by negotiated agreement and funding arrangements and funding for such services would continue to be at federal expense. Furthermore, San Bernardino County Service Area 70 Improvement Zone M receives funding through the imposition of special taxes and would not be impacted by the land acquisition under Alternative 2. Therefore, there would be no impact associated with the cost of providing community services to the project area.

Economic Impact from Reduced Sales of OHVs

Ninety percent of the displaced recreational use is expected to shift to other recreational areas and resources within San Bernardino County, and any displaced visitors that did not return to the county would likely continue to enjoy recreational activities at other locations in the state. Visitors that travel greater distances to come to Johnson Valley probably make substantial vehicle purchases near their place of residence, so the reduction in OHV opportunities in Johnson Valley would be unlikely to change their buying decisions or desire to participate in off-road recreation. The proposed action is expected to have no significant impact on regional or statewide sales of OHVs.

Economic Impacts Related to the Loss of Land for Grazing

The loss of lands currently or potentially in use for grazing would prove economically detrimental to a region if the loss of land were to substantially restrict or reduce current or potential economic activity related to livestock ranching or farming. As described in Section 4.1.3.5, grazing in the Johnson Valley Allotment is currently prohibited and while 7.5% of the Ord Mountain Allotment would no longer be available for grazing, the remaining 92.5% would prove sufficient for continued grazing (BLM 2010b). Since sufficient grazing land would remain and economic activity associated with livestock ranching or farming would not be substantially curtailed, there would be less than significant economic impacts related to the loss of land for grazing.

Economic Impacts to Civil Aviation from Changes in Access to and Use of Airspace

The potential economic impacts to civil aviation from the proposed airspace configuration under Alternative 2 would be similar to those described under Alternative 1, and are expected to be less than significant.

4.3.3.5 Environmental Justice Impacts

As identified in Section 3.3.3.3, three locations in the vicinity of the Combat Center meet the Census Bureau definition of a "poverty area" (Homestead Valley, Lucerne Valley, and Joshua Tree). Socioeconomic impacts that are attributable to Alternative 2 would not be significantly adverse and would apply equally to any affected persons, regardless of minority or income status. Therefore, in accordance with EO 12898 Criteria 2 and 3 for assessing environmental justice impacts, no environmental justice impacts would occur with respect to socioeconomics.

As described in Section 4.9, *Noise*, no civilians residing outside the installation boundaries under Alternative 2 (including the land areas proposed for acquisition) would be exposed to average noise levels that exceed standard compatible land use thresholds (for airspace noise or ordnance noise). The area identified as having medium potential for noise complaints (refer to Figure 4.9-7 in Section 4.9) would extend just far enough under Alternative 2 to encompass the community of Homestead Valley, but this would not represent an adverse or significant health effect and it would not disproportionately affect the low-income residents of Homestead Valley. Therefore, populations in the identified "poverty areas" would not be exposed to disproportionately high or adverse human health effects or risks from noise associated with implementation of Alternative 2. In accordance with EO 12898 Criteria 2 and 3 for assessing environmental justice impacts, no environmental justice impacts would occur with respect to noise.

Similarly, this EIS has identified no other adverse environmental or health effects that would disproportionately affect minority or low-income populations. No environmental justice impacts would occur as a result of implementation of Alternative 2.

4.3.3.6 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 2 would result in less than significant, unmitigable impacts.

4.3.4 Alternative 3 Impacts

4.3.4.1 Impacts to Displaced Residents and Businesses

There are no existing residences within the boundaries of the east and south study areas that would be displaced by the proposed land acquisition under Alternative 3. As discussed in Section 3.1, *Land Use* and Section 3.12, *Geological Resources*, three operating businesses are located in the east study area (Cadiz Inc. agricultural holdings and mining operations by TETRA and National Chloride Company). Based on public records for all three companies, the analysis for Alternative 3 conservatively estimated that a total of 150 employees (100 for Cadiz Inc. and 25 each for the two mining companies) would be displaced if the acquisition of the east study area were implemented. These job losses were factored into the EIFS modeling along with the proposed increase in installation personnel.

As indicated in Section 2.6, *Disposition of Mining Claims*, individual mine properties (e.g., TETRA and National Chloride Company in the east study area) would be evaluated before implementation of any selected project alternative to determine whether the properties would be acquired or if reasonable access to the property would be afforded so that operations could continue following project implementation. In the case of mining operations on or near dry lake beds (which are not conducive to military training operations), providing reasonable access for business operations may be a realistic option. Although it is not a mining operation, similar consideration would be applicable to Cadiz Inc.'s agricultural and groundwater holdings. Given the considerations above, the existence of programs to assist and fairly compensate displaced businesses, and the fact that only three such businesses occur in the acquisition study areas, Alternative 3 would have less than significant direct impacts to private property owners in the east and south study areas.

4.3.4.2 Impacts from Changes in Local Spending

The primary socioeconomic impacts attributable to Alternative 3 would result from:

- the elimination of the limited recreational opportunities in the south and east study areas, which are assumed to generate minimal spending and sales tax revenues to the surrounding communities, and
- the net change in local employment and income/spending associated with the proposed new personnel at the Combat Center and the loss of 150 jobs from displaced businesses.

<u>Reduction in Direct Expenditures by Recreational Visitors and the Film Industry</u>

Table 4.3-7 includes estimated direct recreational and film industry spending under Alternative 3, as well as the percentage change from the estimated baseline conditions. Since the recreational and film industry activities in the west study area would not be affected under Alternative 3, the analysis assumed that the full baseline economic benefit of such activities in that area would be realized in the Alternative 3 modeling scenario. Only the minimal recreational spending in the east and south areas would be displaced under this scenario. The direct county-wide recreational and film industry spending and sales taxes associated with Alternative 3 would be approximately $8.68 million, a reduction of approximately $24,221 or -0.3% compared to the estimated baseline spending allocated to the county. In the "local" area

(within 50 miles [80 km]), the reduction in direct spending would be approximately $48,458, or about -0.8% from the baseline level.

Recreational and film industry sales mainly contribute to the Retail Trade and Accommodation/Food Services sectors. In 2007, the combined revenue generated by these sectors in Victorville, Yucca Valley, and Apple Valley (the three largest communities in the "local" area) totaled $1.1 billion; the $48,458 reduction in "local" area spending associated with Alternative 3 would represent only 0.004% of the combined sales for those sectors. The estimated reductions in recreational and film industry spending under Alternative 3 would represent a less than significant impact on the economy of the "local" area. The reduction in county-wide recreational and film industry sales of $24,221 would represent 0.0002% of the $13.8 billion in revenues in the primary sectors county-wide, also a less than significant impact.

Table 4.3-7. Estimated[1] Change in Direct Recreational and Film Industry Expenditures[2] - Baseline to Alternative 3

	Total In-County			Local Only[3]			Outside County		
	Baseline[4]	Alt 3	% Change	Baseline[4]	Alt 3	% Change	Baseline[4]	Alt 3	% Change
Expenditures	$8,251,050	$8,228,132	-0.3%	$5,656,150	$5,610,300	-0.8%	$7,077,000	$7,101,570	0.3%
Sales Taxes	$458,278	$456,975	-0.3%	$310,694	$308,086	-0.8%	$402,504	$403,902	0.3%
Totals	$8,709,328	$8,685,107	-0.3%	$5,966,844	$5,918,386	-0.8%	$7,479,504	$7,505,472	0.3%

Notes: [1]See Appendix K for assumptions and detailed results of analysis.
[2]Includes recreational spending and film industry expenditures only, except "Outside County" does not include an estimate of film industry spending.
[3]Portion of the in-county expenditures within 50 miles (80 km) of Johnson Valley.
[4]The baseline level of recreational and film industry expenditures include what is spent in the west study area; such expenditures would be unaffected by implementation of Alternative 3.

Direct Increase in Combat Center Personnel

Alternative 3 would increase the number of military (15) and civilian (44) personnel stationed at the Combat Center to meet additional requirements for security, range management, conservation, and other important functions. Average salaries were compiled according to the pay grade distribution of the required positions, and the resulting salaries were averaged independently for the military and civilian positions. The mix of required military personnel for Alternative 3 yielded an average salary of $39,098 for military and $36,226 for civilian positions (see Appendix K). All new civilian personnel would be expected to live within the 30-minute commute area surrounding the installation. The analysis assumed that 25% of new military personnel would live on the installation and 75% would live in surrounding communities. It was also assumed that 70% of all new positions would be filled by people migrating from outside the county. All 150 employees of the three companies that would be displaced under this alternative were assumed to have the same average salary as the civilian personnel at the installation.

Direct impacts of the new personnel on housing and community services would be the same as described for Alternative 1. The proposed personnel increase under Alternative 3 would have less than significant impacts on socioeconomic conditions in the project area.

Total Direct and Indirect Impacts from Net Changes in Spending and Personnel

Table 4.3-8 displays the results from the EIFS model based on inputs described above for estimated direct changes in spending and personnel. Details about model inputs and assumptions are provided in Appendix K. The results indicate that total sales volume in San Bernardino County would decrease by approximately $10 million. The corresponding RTV of -0.02% is well under the threshold level of significance for negative impacts (-5.93%), indicating that this level of net direct and indirect reduction in total sales would be less than significant in the regional context. The total estimated impact on income

and employment is a net decrease of $4.4 million and 135 jobs, respectively. These net impacts would also be less than significant. The model estimates a net decrease in county population of 147 persons, which would also be less than significant.

Table 4.3-8. Estimated[1] Direct, Indirect, and Total Net Impacts[2] of Alternative 3 Within San Bernardino County

	Direct	Indirect	Total	EIFS Model RTV	Threshold RTV	Regionally Significant?
Sales Volume	-$2,855,992	-$7,254,219	-$10,110,210	-0.02%	-5.93%	No
Income	-$3,257,511	-$1,205,484	-$4,462,996	-0.01%	-4.33%	No
Employment	-104	-32	-135	-0.02%	-3.85%	No
Local Population	N/A	-147	-147	-0.01%	-2.16%	No

Notes: [1]See Appendix K for assumptions and detailed results of analysis.
[2]Includes net effects of reduced recreation spending, film industry expenditures, and increased Combat Center personnel.
EIFS = Economic Impact Forecasting System; RTV = Rational Threshold Value

4.3.4.3 Reduction in Property Taxes

As shown in Table 4.3-9, property taxes associated with the private property that would be acquired under Alternative 3 are an estimated $160,911 per year. This reduction would be less than significant relative to the annual property tax revenues and associated funding of public services within the county ($585.6 million).

Table 4.3-9. Reduction in County Property Taxes from Alternative 3

Alternative 3	Private Land
Number of Parcels	103
2009 Parcel Tax	$160,912
Total Value of Parcels	$13,619,427
Land Value	$9,584,292
Improvement Value	$4,035,135
Total Number of Improved Parcels	19
Individual	0
Business	19
Acres	28,598

Source: California State Controller's Office 2010.

4.3.4.4 Other Socioeconomic Issues

Loss of Future Mining Potential

As it relates to mining operations by TETRA and National Chloride Company under Alternative 3, this issue is addressed in Section 4.3.4.1. Potential economic impacts related to the planned Cadiz Inc. Groundwater Conservation, Recovery, and Imported Water Storage Project are addressed under *Cumulative Impacts* in Sections 5.3.2.7 and 5.4.3.3.

Devaluation of Surrounding Private Property

Alternative 3 would have the same potential indirect impact with regard to devaluation of private property as described in Section 4.3.2.4 for Alternative 1. Threshold noise contours of 65 dB CNEL for aircraft noise and 62 dBC CNEL for ordnance noise would only marginally extend outside the revised boundaries of the Combat Center and would not expose local homeowners or communities to a cumulative noise level that exceeds standard compatibility thresholds for residential land uses or sensitive receptors. Research also indicates that property values are influenced to a far greater extent by factors unrelated to

noise, even in areas adjacent to airports. Accordingly, it is very unlikely that property values in the vicinity of the Combat Center would decrease directly or indirectly as a result of increased noise. If property values were to decline as an indirect impact from implementation of Alternative 3, the reduction would likely be marginal and less than significant.

Increased Costs to Federal, State, and Local Jurisdictions to Provide Community Services

Under the proposed action, there would be no change in the provision of community services such as law enforcement or emergency services. The acquisition study areas would continue to be served by both federal and local/regional authorities by negotiated agreement and funding arrangements and funding for such services would continue to be at federal expense. Furthermore, San Bernardino County Service Area 70 Improvement Zone M receives funding through the imposition of special taxes and would not be impacted by the land acquisition under Alternative 3. Therefore, there would be no impact associated with the cost of providing community services to the project area.

Economic Impacts to Civil Aviation from Changes in Access to and Use of Airspace

The potential economic impacts to civil aviation from the proposed airspace configuration under Alternative 3 would be similar to those described under Alternative 1, and are expected to be less than significant.

4.3.4.5 Environmental Justice Impacts

As identified in Section 3.3.3.3, three locations in the vicinity of the Combat Center meet the Census Bureau definition of a "poverty area" (Homestead Valley, Lucerne Valley, and Joshua Tree). Socioeconomic impacts that are attributable to Alternative 3 would not be significantly adverse and would apply equally to any affected persons, regardless of minority or income status. Therefore, in accordance with EO 12898 Criteria 2 and 3 for assessing environmental justice impacts, no environmental justice impacts would occur with respect to socioeconomics.

As described in Section 4.9 Noise, no civilians residing outside the installation boundaries under Alternative 3 (including the land areas proposed for acquisition) would be exposed to average noise levels that exceed standard compatible land use thresholds (for airspace noise or ordnance noise). In addition, all three of the areas that meet the criteria for "poverty area" status would remain outside the area identified as having medium potential for noise complaints under Alternative 3 (refer to Figure 4.9-10 in Section 4.9). Therefore, populations in the identified "poverty areas" would not be exposed to disproportionately high or adverse human health effects or risks from noise associated with implementation of Alternative 3. In accordance with EO 12898 Criteria 2 and 3 for assessing environmental justice impacts, no environmental justice impacts would occur with respect to noise.

Similarly, this EIS has identified no other adverse environmental or health effects that would disproportionately affect minority or low-income populations. No environmental justice impacts would occur as a result of implementation of Alternative 3.

4.3.4.6 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 3 would result in less than significant, unmitigable impacts.

4.3.5 Alternative 4 Impacts

4.3.5.1 Impacts to Displaced Residents and Businesses

Conditions regarding resident populations or businesses within the boundaries of the west and south study areas under Alternative 4 are the same as described for Alternative 1. Given the existence of programs to assist and fairly compensate displaced property owners/claimants, as well as the fact that only one occupied residence, no operating businesses, and 19 patented mining claims occur in the applicable acquisition areas, Alternative 4 would have less than significant direct impacts to private property owners in the west and south study areas. A potential indirect impact from the acquisition of the Morris Lode Mine would be related to the loss of a potential local source of iron ore as a possible future input to local cement manufacturing; this impact was discussed in Section 4.3.2.4 but is equally relevant to Alternative 4.

4.3.5.2 Impacts from Changes in Local Spending

As in the case of Alternative 1, the primary socioeconomic impacts of Alternative 4 would result from the displacement of specific activities that take place on public lands within the acquisition study areas, but which generate business sales, jobs, sales tax revenues, and employee income in the local communities surrounding the acquisition study areas. These displaced activities would include:

- recreational opportunities in the Johnson Valley OHV Area (and to a much lesser extent in the south study area), which bring tourism spending and sales tax revenues to the surrounding communities; and
- motion picture, television, and other types of film industry activity, which also stimulate local businesses, tax revenues, employment, and income.

The anticipated reductions in local expenditures associated with these displaced activities would be partially offset by increased spending by the new personnel that would be hired at the Combat Center under the proposed action. This section describes the analysis conducted to estimate both of these impacts and the net or combined effect of both changes in direct expenditures relative to baseline conditions.

The previous discussion of methodology and Alternative 1 impacts described the lack of reliable data pertaining to the level of use of Johnson Valley OHV Area, and the basis for estimating such use as both a baseline condition and to assess potential effects of a change in the volume, frequency, or intensity of use. The same baseline conditions and assumptions apply to the analysis of impacts from Alternative 4. Assumptions used to estimate the reduction in direct spending under Alternative 4 are described below, along with the results of running the EIFS model to assess indirect and total impacts.

<u>Reduction in Direct Expenditures by Recreational Visitors and the Film Industry</u>

Under Alternative 4, subject to Marine Corps permit requirements, the public would have restricted access to the Johnson Valley OHV Area for recreational activities when Marine Corps training and/or maintenance are not scheduled. Section 2.5 describes the conditions under which public use of the acquired lands would be permitted under Alternative 4. Training and/or maintenance would be scheduled twice per year for approximately 30 days each time (2 months total per year), leaving the Johnson Valley OHV Area available for restricted public access for approximately 10 months each year.

During the 2 months each year that the area would be used exclusively for military operations/clean-up, the impacts to recreational resources would be the same as discussed under Alternative 1. The direct and indirect economic benefits to the local economy associated with visitor spending would be lost during this

period. For purposes of this analysis, it was assumed that the average annual visitor-days of use would be reduced by 15% for both organized events and multi-day dispersed use. Single-day dispersed use visits were assumed to decline by 30%. These assumptions would account for the elimination of all public use during the 2 months of exclusive military use each year, as well as the likelihood that recreational visits to Johnson Valley at other times may decrease (at least initially) because the permitting requirements and management procedures necessary to enhance public safety may dissuade some users from visiting the area under the new conditions.

In addition to assuming that annual visitor-days would decline as indicated, the analysis was based on the assumption that 90% of the displaced use would still occur elsewhere in the county, outside of the "local" area (within 50 miles [80 km]) (BLM 2010c). It was also assumed that none of the displaced "local" spending would occur at other "local" OHV areas (such as Stoddard Valley); this is likely a conservative assumption, and if some of the displaced recreational use from Johnson Valley were to transfer to Stoddard Valley or other "local" areas then "local" recreational spending would not decline as much as is assumed in this analysis. Other assumptions used in the analysis are described in Appendix K.

With regard to film industry expenditures, it was assumed that "local" area film activity would be reduced an average of 25% due to implementation of Alternative 4. This assumption takes into account the 2-month exclusive use period and the generally short lead time for film location scheduling that may cause some productions to bypass Johnson Valley because of the uncertainty in scheduling. The analysis also assumed that 80% of the displaced film-related spending from the "local" economy would be spent in the vicinity of other potential filming sites elsewhere in San Bernardino County instead of leaving the region entirely.

Table 4.3-10 displays the estimated changes in direct recreational and film industry spending that would be associated with implementation of Alternative 4, as well as the percentage change from the estimated baseline conditions. The estimated direct, county-wide recreational and film spending estimated for Alternative 4 is approximately $8.4 million (including sales taxes), a reduction of approximately $320,000 or -3.7% compared to the estimated baseline spending in the county. The estimated portion of direct recreation and film spending that would be "local" (within 50 miles [80 km]) would decline by $979,046 (-16.4%).

Recreational and film industry sales mainly contribute to the Retail Trade and Accommodation/Food Services sectors of the economy, which in 2007 generated combined revenues of $1.1billion in Victorville, Yucca Valley, and Apple Valley (the three largest communities in the "local" area; similar data for Lucerne Valley were not available). The $979,046 reduction in "local" area spending associated with Alternative 4 would represent only 0.1% of the combined sales for these sectors. Estimated reductions in recreational and film industry spending under Alternative 4 would represent a less than significant impact on the economy of the "local" area.

The reduction in county-wide recreational and film industry sales of $320,000 would represent 0.002% of the $13.8 billion in Retail Trade and Accommodation/Food Service sector sales in the county, also a less than significant impact.

Table 4.3-10. Estimated[1] Change in Direct Recreational and Film Industry Expenditures[2] - Baseline to Alternative 4

	Total In-County			Local Only[3]			Outside County		
	Baseline	Alt 4	% Change	Baseline	Alt 4	% Change	Baseline	Alt 4	% Change
Expenditures	$8,251,050	$7,947,654	-3.7%	$5,656,150	$4,729,270	-16.4%	$7,077,000	$7,109,317	0.5%
Sales Taxes	$458,278	$441,573	-3.6%	$310,694	$258,527	-16.8%	$402,504	$404,342	0.5%
Totals	$8,709,328	$8,389,227	-3.7%	$5,966,844	$4,987,798	-16.4%	$7,479,504	$7,513,660	0.5%

Notes: [1]See Appendix K for assumptions and detailed results of analysis.
[2]Includes recreational spending and film industry expenditures only, except "Outside County" does not include an estimate of film industry spending.
[3]The "local" area represents a subset of the total in-county expenditures within 50 miles (80 km) of Johnson Valley.

Direct Increase in Combat Center Personnel

Alternative 4 would increase the number of military (15) and civilian (62) personnel stationed at the Combat Center to meet additional requirements for security, range management, conservation, and other important functions. Average salaries of $39,098 for military and $41,583 for civilian positions was assumed based on the pay grade distribution of the required positions and standard 2010 government pay scales (see Appendix K). Other assumptions about the distribution of these personnel were the same as for Alternative 1.

Direct impacts of the new personnel on housing and community services would be the same as described for Alternative 1. The proposed personnel increase under Alternative 4 would have less than significant impacts on socioeconomic conditions in the project area.

Total Direct and Indirect Impacts from Net Changes in Spending and Personnel

Table 4.3-11 displays the results from the EIFS model based on inputs described above for estimated direct changes in spending and personnel. Details about model inputs and assumptions are provided in Appendix K. The results indicate that Alternative 4 would yield a net increase in total sales volume in San Bernardino County of approximately $7.1 million. The corresponding RTV of 0.02% is well under the threshold level of significance for impacts, indicating that this level of net direct and indirect reduction in total sales would be less than significant in the regional context. The modeling results indicate that the positive influence of the additional Combat Center payroll and jobs (approximately $2.6 million per year in direct income and 77 jobs) would, on a county-wide basis, offset the direct and indirect impacts of the reduction in recreational/filming expenditures. The total estimated impact on income and employment is a net increase of $3.9 million and 108 jobs. These net impacts would also be less than significant at a regional scale. The model estimates a net increase in county population of 145 persons, which would also be less than significant.

Table 4.3-11. Estimated[1] Direct, Indirect, and Total Net Impacts[2] of Alternative 4 Within San Bernardino County

	Direct	Indirect	Total	EIFS Model RTV	Threshold RTV	Regionally Significant?
Sales Volume	$2,008,283	$5,101,038	$7,109,321	0.02%	-5.93%	No
Income	$3,111,422	$847,675	$3,959,098	0.01%	-4.33%	No
Employment	86	22	108	0.02%	-3.85%	No
Local Population	N/A	145	145	0.01%	-2.16%	No

Notes: [1]See Appendix K for assumptions and detailed results of analysis.
[2]Includes net effects of reduced recreation spending, film industry expenditures, and increased Combat Center personnel.
EIFS = Economic Impact Forecasting System; RTV = Rational Threshold Value

Impacts to communities in the vicinity of the acquisition study areas would be similar to those described for Alternative 1, except that such impacts would be considerably reduced in scope and scale under Alternative 4. Businesses that rely on recreational spending in Johnson Valley would need to plan ahead for reduced revenues during the two one-month periods of each year that no public use would occur and for some reduction in use compared to current levels during other times of the year. This would likely present some new challenges to individual businesses, but tourism-based businesses are often seasonal in nature, and other sources of tourism revenues in the area (travelers to Big Bear or Joshua Tree National Park for example) would not be affected by the action. Since the impact for Alternative 1 was considered to be less than significant, the smaller Alternative 4 impact to individual communities in the area would also be less than significant.

4.3.5.3 Reduction in Property Taxes

As shown in Table 4.3-12, property taxes associated with the private property that would be acquired under Alternative 4 are an estimated $34,435 per year. This reduction would be less than significant relative to the overall property tax revenues and associated funding of public services within the county.

Table 4.3-12. Reduction in County Property Taxes from Alternative 4

Alternative 4	Private Land
Number of Parcels	141
2009 Parcel Tax	$34,435
Total Value of Parcels	$2,881,891
Land Value	$2,820,525
Improvement Value	$61,366
Total Number of Improved Parcels	6
Individual	6
Business	0
Acres	10,407

Source: California State Controller's Office 2010.

4.3.5.4 Other Socioeconomic Issues

Loss of Future Mining Potential

Under Alternative 4, and in accordance with Section 2.6, *Disposition of Mining Claims*, a case-by-case real estate analysis would determine whether patented and unpatented claims would be incompatible with military operations and if reasonable access to claims could be accommodated. If access to mining claims was not permitted, Alternative 4 would have the same potential direct and indirect impacts with regard to

loss of future mining potential as described in Section 4.3.2.4 for Alternative 1. While there would be a direct impact in terms of the loss of six potential mining jobs, and a potential for indirect impacts related to a reduction in local iron ore supplies, such impacts would not be expected to be significant. If reasonable access to mining claims was permitted, there would be no impacts to future mining potential.

Devaluation of Surrounding Private Property

Alternative 4 would have the same potential indirect impact with regard to devaluation of private property as described in Section 4.3.2.4 for Alternative 1. Threshold noise contours of 65 dB CNEL for aircraft noise and 62 dBC CNEL for ordnance noise would only marginally extend outside the revised boundaries of the Combat Center and would not expose local homeowners or communities to a cumulative noise level that exceeds standard compatibility thresholds for residential land uses or sensitive receptors. Research also indicates that property values are influenced to a far greater extent by factors unrelated to noise, even in areas adjacent to airports. Accordingly, it is very unlikely that property values in the vicinity of the Combat Center would decrease directly or indirectly as a result of increased noise. If property values were to decline as an indirect impact from implementation of Alternative 4, the reduction would likely be marginal and less than significant.

Increased Costs to Federal, State, and Local Jurisdictions to Provide Community Services

Under the proposed action, there would be no change in the provision of community services such as law enforcement or emergency services. The acquisition study areas would continue to be served by both federal and local/regional authorities by negotiated agreement and funding arrangements and funding for such services would continue to be at federal expense. Furthermore, San Bernardino County Service Areas 29 and 70 Improvement Zone M receive funding through the imposition of special taxes and would not be impacted by the land acquisition under Alternative 4. Therefore, there would be no impact associated with the cost of providing community services to the project area.

Economic Impact from Reduced Sales of OHVs

Ninety percent of the displaced recreational use is expected to shift to other recreational areas and resources within San Bernardino County, and any displaced visitors that did not return to the county would likely continue to enjoy recreational activities at other locations in the state. Visitors that travel greater distances to come to Johnson Valley probably make substantial vehicle purchases near their place of residence, so the reduction in OHV opportunities in Johnson Valley would be unlikely to change their buying decisions or desire to participate in off-road recreation. The proposed action is expected to have no significant impact on regional or statewide sales of OHVs.

Economic Impacts Related to the Loss of Land for Grazing

The loss of lands currently or potentially in use for grazing would prove economically detrimental to a region if the loss of land were to substantially restrict or reduce current or potential economic activity related to livestock ranching or farming. As described in Section 4.1.2.5, grazing in the Johnson Valley Allotment is currently prohibited and while 16.3% of the Ord Mountain Allotment would no longer be available for grazing, the remaining 83.7% would prove sufficient for continued grazing (BLM 2010b). Since sufficient grazing land would remain and economic activity associated with livestock ranching or farming would not be substantially curtailed, there would be less than significant economic impacts related to the loss of land for grazing.

Economic Impacts to Civil Aviation from Changes in Access to and Use of Airspace

The potential economic impacts to civil aviation from the proposed airspace configuration under Alternative 4 would be similar to those described under Alternative 1, and are expected to be less than significant.

4.3.5.5 Environmental Justice Impacts

As identified in Section 3.3.3.3, three locations in the vicinity of the Combat Center meet the Census Bureau definition of a "poverty area" (Homestead Valley, Lucerne Valley, and Joshua Tree). Socioeconomic impacts that are attributable to Alternative 4 would not be significantly adverse and would apply equally to any affected persons, regardless of minority or income status. Therefore, in accordance with EO 12898 Criteria 2 and 3 for assessing environmental justice impacts, no environmental justice impacts would occur with respect to socioeconomics.

As described in Section 4.9, *Noise*, no civilians residing outside the installation boundaries under Alternative 4 (including the land areas proposed for acquisition) would be exposed to average noise levels that exceed standard compatible land use thresholds (for airspace noise or ordnance noise). In addition, all three of the areas that meet the criteria for "poverty area" status would remain outside the area identified as having medium potential for noise complaints under Alternative 4 (refer to Figure 4.9-13 in Section 4.9). Therefore, populations in the identified "poverty areas" would not be exposed to disproportionately high or adverse human health effects or risks from noise associated with implementation of Alternative 4. In accordance with EO 12898 Criteria 2 and 3 for assessing environmental justice impacts, no environmental justice impacts would occur with respect to noise.

Similarly, this EIS has identified no other adverse environmental or health effects that would disproportionately affect minority or low-income populations. No environmental justice impacts would occur as a result of implementation of Alternative 4.

4.3.5.6 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 4 would result in less than significant, unmitigable impacts.

4.3.6 Alternative 5 Impacts

As it relates to socioeconomic impacts, Alternative 5 is essentially the same as Alternative 4. All assumptions related to expenditures in the west study area are the same for both alternatives. Alternative 5 does not include the south study area, so the amount of property taxes on private land is slightly less than in Alternative 4 and the minimal amount of estimated business revenue that may be generated from recreational use of the south study area would continue to be realized under Alternative 5, whereas it would be eliminated under Alternative 4. This latter distinction caused a very slight variation in the direct, indirect, and total impact calculations made by the EIFS model. Appendix K includes the model results for Alternative 5 but they are not repeated here because the differences are not appreciable. All socioeconomic impacts (and environmental justice impacts) anticipated as a result of Alternative 5 are similar to those described for Alternative 4. Impacts associated with Alternative 5 would be less than significant.

4.3.6.1 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 5 would result in less than significant, unmitigable impacts.

4.3.7 Alternative 6 Impacts (Preferred Alternative)

4.3.7.1 Impacts to Displaced Residents and Businesses

Conditions regarding resident populations or businesses within the boundaries of the west and south study areas under Alternative 6 are essentially the same as described for Alternative 1. Given the existence of programs to assist and fairly compensate displaced property owners, Alternative 6 would have less than significant direct impacts to private property owners in the west and south study areas. A potential indirect impact from the acquisition of the Morris Lode Mine would be related to the loss of a potential local source of iron ore as a possible future input to local cement manufacturing; this impact was discussed in Section 4.3.2.4 but is equally relevant to Alternative 6.

4.3.7.2 Impacts from Changes in Local Spending

As in the case of Alternative 1, the primary socioeconomic impacts of Alternative 6 would result from the displacement of specific activities that take place on public lands within the acquisition study areas, but which generate business sales, jobs, sales tax revenues, and employee income in the local communities surrounding the acquisition study areas. In the west study area, these displaced activities would include:

- recreational opportunities in the Johnson Valley OHV Area (and to a much lesser extent in the south study area), which bring tourism spending and sales tax revenues to the surrounding communities; and
- motion picture, television, and other types of film industry activity, which also stimulate local businesses, tax revenues, employment, and income.

The anticipated reductions in local expenditures associated with these displaced activities would be partially offset by increased spending by the new personnel that would be hired at the Combat Center under the proposed action. This section describes the analysis conducted to estimate both of these impacts and the net or combined effect of both changes in direct expenditures relative to baseline conditions.

The previous discussion of methodology and Alternative 1 impacts described the lack of reliable data pertaining to the level of use of Johnson Valley OHV Area, and the basis for estimating such use as both a baseline condition and to assess potential effects of a change in the volume, frequency, or intensity of use. The same baseline conditions and assumptions apply for the comparison of impacts from Alternative 6. Assumptions used to estimate the reduction in direct spending under Alternative 6 are described below, along with the results of running the EIFS model to assess indirect and total impacts.

<u>Reduction in Direct Expenditures by Recreational Visitors and the Film Industry</u>

Under Alternative 6, 146,667 acres (59,354 hectares) would be acquired within the west study area. Approximately 44,665 acres (18,075 hectares) or roughly 24% of the existing Johnson Valley OHV Area would remain available for public recreation year-round. To provide context relative to other regional OHV areas, this remaining portion available for recreational activities would be larger than Rasor OHV Area (30,000 acres [12,141 hectares] but smaller than Stoddard Valley OHV Area (53,000 acres [21,448

hectares]). Cougar Buttes, Anderson Dry Lake, and Soggy Dry Lake are three major OHV staging and camping areas located within this area, along with several popular OHV trails. In addition, this area is frequently used for a variety of recreational activities, such as hiking, picnicking, photography, geocaching, and wildlife and wildflower viewing. Desert filming also occurs in this area, including major motion pictures filmed in the Cougar Buttes and Soggy Dry Lake areas.

Within the acquired land area under Alternative 6, the majority of the land would be controlled for the exclusive use of the Combat Center. The remainder (38,137 acres [15,434 hectares]) would be managed to allow restricted public access when MEB Exercises and range maintenance were not occurring, approximately 10 months of the year. When this RPAA is added to the residual OHV Area acreage remaining for public use, approximately 44% of the existing Johnson Valley OHV Area would be available for public recreation for a majority of the year (10 months per year). The RPAA available for restricted public access includes a major staging/camping area, Means Dry Lake, along with several unique and popular OHV trails, most notably the "Hammer" trails. During the 10 months of the year that this area would be available for restricted public access, the recreational opportunities would function much the same as they currently do, except that permit requirements and additional management procedures to enhance public safety would be applied, and certain race event routes would potentially be eliminated or require modification. Sections 2.5 and 2.8.1 outline proposed management procedures that the Marine Corps would implement to facilitate safe and effective use of the RPAA when MEB exercises are not occurring.

During the two one-month periods each year that the RPAA area would be used exclusively for military operations/clean-up, impacts to recreational resources would be similar to Alternative 1. The direct and indirect economic benefits to the local economy associated with visitor spending would be lost during this period. For purposes of this analysis, it was assumed that the average annual visitor-days of use in the west study area would be reduced by 60% for event-related visits and by 30% for dispersed use. This would account for the elimination of all public use in the RPAA portion during the 2 months of exclusive military use each year, as well as the likelihood that recreational visits to the RPAA at other times may decrease (at least initially), because the permitting requirements and management procedures necessary to enhance public safety may dissuade some users from visiting the area under the new conditions. In addition to assuming that annual visitor-days would be reduced, the analysis also assumed that 90% of the total annual visitor-days displaced from the "local" area (within 50 miles [80 km]) would be transferred to other recreational areas within San Bernardino County (BLM 2010c) rather than leaving the county entirely. It was also assumed that none of the displaced "local" spending would occur at other "local" OHV areas (such as Stoddard Valley); this is likely a conservative assumption, and if some of the displaced recreational use from Johnson Valley were to transfer to Stoddard Valley or other "local" areas, then "local" recreational spending would not decline as much as was assumed in this analysis. Other assumptions used in the analysis are described in Appendix K.

With regard to film industry expenditures, it was assumed that "local" area film activity would be reduced an average of 30% due to implementation of Alternative 6. This assumption takes into account the lack of access to the exclusive military use area, the partial lack of access to the RPAA, the diversity of the remaining Johnson Valley film location opportunities not affected by Alternative 6, and the generally short lead time for film location scheduling that may cause some productions to bypass the RPAA portion of Johnson Valley because of the uncertainty in scheduling. The analysis also assumed that 80% of the displaced film-related spending from the "local" economy would be spent in the vicinity of other potential filming sites in San Bernardino County instead of leaving the region entirely.

Table 4.3-13 displays the estimated changes in direct recreational and film industry expenditures that would be associated with implementation of Alternative 6, as well as the net changes from the estimated baseline conditions. The estimated direct, county-wide recreational and film industry spending estimated for Alternative 6 is approximately $8.5 million (including sales taxes), a reduction of almost $216,000 or -2.5% compared to the estimated baseline spending allocated to the county. The estimated portion of direct recreation and film spending that would be "local" (within 50 miles [80 km]) would decline by almost $1.5 million (-24.7%).

Recreational and film industry sales mainly contribute to the Retail Trade and Accommodation/Food Services sectors of the economy, which in 2007 generated a combined $1.1 billion in sales in Victorville, Yucca Valley, and Apple Valley (the three largest communities in the "local" area; similar data for Lucerne Valley were not available). The $1.5 million reduction in "local" area spending associated with Alternative 6 would represent only 0.1% of the combined sales for those sectors in those three communities. This estimated reduction in recreational and film industry spending under Alternative 6 would represent a less than significant impact on the economy of the "local" area. The estimated reduction in county-wide recreational and film industry sales of $216,000 would represent 0.002% of the $13.8 billion spent county-wide in the applicable sectors, also a less than significant impact.

Table 4.3-13. Estimated[1] Change in Direct Recreational and Film Industry Expenditures[2] - Baseline to Alternative 6

	Total In-County			Local Only[3]			Outside County		
	Baseline	**Alt 6**	**% Change**	**Baseline**	**Alt 6**	**% Change**	**Baseline**	**Alt 6**	**% Change**
Expenditures	$8,251,050	$8,046,194	-2.5%	$5,656,150	$4,262,324	-24.6%	$7,077,000	$6,706,843	-5.2%
Sales Taxes	$458,278	$447,287	-2.4%	$310,694	$232,080	-25.3%	$402,504	$381,452	-5.2%
Totals	$8,709,328	$8,493,481	-2.5%	$5,966,844	$4,494,404	-24.7%	$7,479,504	$7,088,295	-5.2%

Notes: [1]See Appendix K for assumptions and detailed results of analysis.
[2]Includes recreational spending and film industry expenditures only, except "Outside County" does not include an estimate of film industry spending.
[3]The "local" area represents a subset of the total in-county expenditures within 50 miles (80 km) of Johnson Valley.

Direct Increase in Combat Center Personnel

Alternative 6 would increase the number of military (15) and civilian (62) personnel stationed at the Combat Center to meet additional requirements for security, range management, conservation, and other important functions. Average salaries of $39,098 for military and $41,583 for civilian positions was assumed based on the pay grade distribution of the required positions and standard 2010 government pay scales (see Appendix K). Other assumptions about the distribution of these personnel were the same as for Alternative 1.

Direct impacts of the new personnel on housing and community services would be the same as described for Alternative 1. The proposed personnel increase under Alternative 6 would have less than significant impacts on socioeconomic conditions in the project area.

Total Direct and Indirect Impacts from Net Changes in Spending and Personnel

Table 4.3-14 displays the results from the EIFS model based on inputs described above for estimated direct changes in spending and personnel. Details about model inputs and assumptions are provided in Appendix K. The results indicate a net increase in sales volume in San Bernardino County of approximately $7.5 million. The corresponding RTV of 0.02% suggests that this level of net direct and indirect reduction in total sales would be less than significant in the regional context. The results indicate that the positive influence of the new Combat Center personnel and their families (approximately $2.6

million per year in direct income and 77 jobs) would, on a county-wide basis, offset the direct and indirect effects of the reduction in recreational/filming expenditures. The total estimated impact on income and employment is a net increase of $4 million and 110 jobs. These net impacts would also be less than significant at a regional scale. The model estimates a net increase in county population of 145 persons, which would also be less than significant.

Table 4.3-14. Estimated[1] Direct, Indirect, and Total Net Impacts[2] of Alternative 6 Within San Bernardino County

	Direct	Indirect	Total	EIFS Model RTV	Threshold RTV	Regionally Significant?
Sales Volume	$2,112,536	$5,365,843	$7,478,380	0.02%	-5.93%	No
Income	$3,128,747	$891,680	$4,020,427	0.01%	-4.33%	No
Employment	86	24	110	0.02%	-3.85%	No
Local Population	N/A	145	145	0.01%	-2.16%	No

Notes: [1]See Appendix K for assumptions and detailed results of analysis.
[2]Includes net effects of reduced recreation spending, film industry expenditures, and increased Combat Center personnel.
EIFS = Economic Impact Forecasting System; RTV = Rational Threshold Value

Impacts to communities in the vicinity of the acquisition study areas would be similar to those described for Alternative 1, except that such impacts would be somewhat reduced in scope and scale under Alternative 6. Businesses that rely on tourism and film industry spending would need to plan ahead for reduced revenues during the two one-month periods of each year that no public use would occur and for some reduction in use compared to current levels during other times of the year. This would likely present some new challenges to individual businesses, but tourism-based businesses are often seasonal in nature, and other sources of tourism revenues in the area (travelers to Big Bear or Joshua Tree National Park for example) would not be affected by the action. Since the impact for Alternative 1 was considered to be less than significant, the smaller Alternative 6 impact to individual communities in the area would also be less than significant.

4.3.7.3 Reduction in Property Taxes

As shown in Table 4.3-15, property taxes associated with the private property that would be acquired under Alternative 6 are an estimated $28,456 per year. This reduction would be less than significant relative to the overall property tax revenues and associated funding of public services within the county.

Table 4.3-15. Reduction in County Property Taxes from Alternative 6

Alternative 6	Private Land
Number of Parcels	105
2009 Parcel Tax	$28,456
Total Value of Parcels	$2,391,583
Land Value	$2,379,737
Improvement Value	$11,846
Total Number of Improved Parcels	4
Individual	4
Business	0
Acres	8,935

Source: California State Controller's Office 2010.

4.3.7.4 Other Socioeconomic Issues

Loss of Future Mining Potential

Because the Morris Lode Mine is located within the area proposed for acquisition as an exclusive military use area under Alternative 6, this alternative would have the same potential direct and indirect impacts with regard to loss of future mining potential as described in Section 4.3.2.4 for Alternative 1. While there would be a direct impact in terms of the loss of six potential mining jobs, and a potential for indirect impacts related to a reduction in local iron ore supplies, such impacts are not expected to be significant for the reasons noted in Section 4.3.2.4.

Devaluation of Surrounding Private Property

Alternative 6 would have the same potential indirect impact with regard to devaluation of private property as described in Section 4.3.2.4 for Alternative 1. Threshold noise contours of 65 dB CNEL for aircraft noise and 62 dBC CNEL for ordnance noise would only marginally extend outside the revised boundaries of the Combat Center and would not expose local homeowners or communities to a cumulative noise level that exceeds standard compatibility thresholds for residential land uses or sensitive receptors. Research also indicates that property values are influenced to a far greater extent by factors unrelated to noise, even in areas adjacent to airports. Accordingly, it is very unlikely that property values in the vicinity of the Combat Center would decrease directly or indirectly as a result of increased noise. If property values were to decline as an indirect impact from implementation of Alternative 6, the reduction would likely be marginal and less than significant.

Increased Costs to Federal, State, and Local Jurisdictions to Provide Community Services

Under the proposed action, there would be no change in the provision of community services such as law enforcement or emergency services. The acquisition study areas would continue to be served by both federal and local/regional authorities by negotiated agreement and funding arrangements and funding for such services would continue to be at federal expense. Furthermore, San Bernardino County Service Area 70 Improvement Zone M receives funding through the imposition of special taxes and would not be impacted by the land acquisition under Alternative 6. Therefore, there would be no impact associated with the cost of providing community services to the project area.

Economic Impact from Reduced Sales of OHVs

Ninety percent of the displaced recreational use is expected to shift to other recreational areas and resources within San Bernardino County, and any displaced visitors that did not return to the county would likely continue to enjoy recreational activities at other locations in the state. Visitors that travel greater distances to come to Johnson Valley probably make substantial vehicle purchases near their place of residence, so the reduction in OHV opportunities in Johnson Valley would be unlikely to change their buying decisions or desire to participate in off-road recreation. The proposed action is expected to have no significant impact on regional or statewide sales of OHVs.

Economic Impacts Related to the Loss of Land for Grazing

The loss of lands currently or potentially in use for grazing would prove economically detrimental to a region if the loss of land were to substantially restrict or reduce current or potential economic activity related to livestock ranching or farming. As described in Section 4.1.7.5, grazing in the Johnson Valley Allotment is currently prohibited and while 7.4% of the Ord Mountain Allotment would no longer be available for grazing, the remaining 92.6% would prove sufficient for continued grazing (BLM 2010b). Since sufficient grazing land would remain and economic activity associated with livestock ranching or

farming would not be substantially curtailed, there would be less than significant economic impacts related to the loss of land for grazing.

Economic Impacts to Civil Aviation from Changes in Access to and Use of Airspace

The potential economic impacts to civil aviation from the proposed airspace configuration under Alternative 6 would be similar to those described under Alternative 1, and are expected to be less than significant.

4.3.7.5 Environmental Justice Impacts

As identified in Section 3.3.3.3, three locations in the vicinity of the Combat Center meet the Census Bureau definition of a "poverty area" (Homestead Valley, Lucerne Valley, and Joshua Tree). Socioeconomic impacts that are attributable to Alternative 6 would not be significantly adverse and would apply equally to any affected persons, regardless of minority or income status. Therefore, in accordance with EO 12898 Criteria 2 and 3 for assessing environmental justice impacts, no environmental justice impacts would occur with respect to socioeconomics.

As described in Section 4.9, *Noise*, no civilians residing outside the installation boundaries under Alternative 6 (including the land areas proposed for acquisition) would be exposed to average noise levels that exceed standard compatible land use thresholds (for airspace noise or ordnance noise). In addition, all three of the areas that meet the criteria for "poverty area" status would remain outside the area identified as having medium potential for noise complaints under Alternative 6 (refer to Figure 4.9-19 in Section 4.9). Therefore, populations in the identified "poverty areas" would not be exposed to disproportionately high or adverse human health effects or risks from noise associated with implementation of Alternative 6. In accordance with EO 12898 Criteria 2 and 3 for assessing environmental justice impacts, no environmental justice impacts would occur with respect to noise.

Similarly, this EIS has identified no other adverse environmental or health effects that would disproportionately affect minority or low-income populations. No environmental justice impacts would occur as a result of implementation of Alternative 6.

4.3.7.6 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 6 would result in less than significant, unmitigable impacts.

4.3.8 No-Action Alternative

Under the No-Action Alternative, the Combat Center would not acquire additional lands or airspace and would not be able to satisfy at least the threshold requirements for training a MEB. The installation would continue to conduct all current training operations and exercises within the existing Combat Center boundaries, and it would continue to be a significant economic engine within both local and regional economies. Manpower requirements associated with managing a larger range area would be realized and no additional staff would be added. Potential reductions in the availability of recreational and filming opportunities would not occur and the estimated $8.7 million of direct annual sales and taxes associated with such uses (plus the associated multiplier effect on indirect sales, income, and employment) would not be reduced. Similarly, business ventures would continue to operate in the area, providing direct and indirect jobs, tax revenues, personal income, and sales. While these types of activities and sources of business revenue are important to the economic vitality of some individual small businesses that have

come to rely on the status quo, they do not represent a significant socioeconomic impact at a regional scale given the size, health, and diversity of the regional economy. Therefore, there would be no socioeconomic impacts from implementation of the No-Action Alternative.

4.3.9 Summary of Impacts

Table 4.3-16 summarizes the impacts of each action alternative and the No-Action Alternative.

Table 4.3-16. Summary of Impacts

Alternative	Impacts
Alternative 1	LSI • Direct impact from acquisition of 141 privately-owned parcels: includes one occupied residence, abandoned mines, vacant parcels, and no operating businesses. Land owners would be fairly compensated and provided relocation assistance as appropriate. • Direct regional impact from lost sales and tax revenue ($700,000 or -7.8% compared to baseline) related to reduced recreational and film industry spending. • Direct local impact from lost sales and tax revenue ($3.6 million or -60% compared to baseline) related to reduced recreational and film industry spending. • Beneficial combined impact (direct and indirect) from net gain in regional sales ($4.5 million), income ($3.1 million), and employment (90 jobs), as influence of Combat Center personnel increase would offset the loss in recreational and film industry spending. Sufficient capacity exists to absorb the added demand for housing and community services. • Direct impact on individual small businesses that are dependent on limited recreational visitor spending. May cause some smaller firms to fail as a result of reduced revenue tied to reduced recreational opportunities in Johnson Valley. • Direct impact from reduction ($34,435 or 0.006% of county total) in property tax revenues to local jurisdiction from the acquisition of private land. • Future indirect impact from acquisition of the Morris Lode Mine (and possibly other similar mines) in the west study area if the acquisition prevents/delays future development of a local source of iron ore. • Property values are not anticipated to decrease directly or indirectly as a result of increased noise. • Indirect impact (higher fuel costs) related to civil aviation impacts are expected to occur. • Less than significant economic impact to livestock ranching and farming industries due to the loss of some land for grazing. NI • No impact associated with cost of providing community services to the project area. • No impact on regional or statewide sales of OHVs. • No Environmental Justice impacts.

Continued on next page

Table 4.3-16. Summary of Impacts

Alternative	Impacts
Alternative 2	LSI • Direct impact from acquisition of private property: same as Alternative 1 but fewer private properties would be acquired (81 parcels). • Direct regional impact from lost sales and tax revenue (<$300,000 or -3.4% compared to baseline) related to reduced recreational and film industry spending. • Direct local impact from lost sales and tax revenue ($1.4 million or -24% compared to baseline) related to reduced recreational and film industry spending. • Beneficial combined impact (direct and indirect) from net gain in regional sales ($5.2 million), income ($3 million), and employment (87 jobs), as influence of Combat Center personnel increase would offset the loss in recreational and film industry spending. Sufficient capacity exists to absorb the added demand for housing and community services. • Direct impact on individual small businesses that are dependent on limited recreational visitor spending. May cause some smaller firms to fail as a result of reduced revenues tied to reduced recreational opportunities in Johnson Valley. • Direct impact from reduction ($25,677 or 0.004% of county total) in property tax revenues to local jurisdiction from the acquisition of private land. • Impacts to mining, property values, and civilian impacts are the same as Alternative 1. • Less than significant economic impact to livestock ranching and farming industries due to the loss of some land for grazing. NI • Same as Alternative 1.
Alternative 3	LSI • Direct impact from acquisition of private property (103 private parcels): includes two mining operations and one agricultural/water venture potentially purchased and displaced, resulting in a direct loss of an estimated 150 jobs. Land owners would be fairly compensated and provided relocation assistance as appropriate. • Direct regional impact from lost sales and tax revenue ($24,221 or -0.3% compared to baseline) related to reduced recreational and film industry spending. • Direct local impact from lost sales and tax revenue ($48,458 or -0.8% compared to baseline) related to reduced recreational and film industry spending. • Combined impact (direct and indirect) from net loss in regional sales ($10 million), income ($4.4 million), and employment (-135 jobs) as a result of displaced businesses (lost jobs only partially offset by new Combat Center jobs) and reduced recreational spending. • Direct impact from reduction ($161,000 or 0.027% of county total) in property tax revenues to local jurisdiction from the acquisition of private land. • Impacts to property values and civilian impacts are the same as Alternative 1. NI • No impact associated with cost of providing community services to the project area. • No Environmental Justice impacts.

Continued on next page

Table 4.3-16. Summary of Impacts

Alternative	Impacts
Alternative 4	LSI • Direct impact from acquisition of 141 privately-owned parcels: same as Alternative 1. • Direct regional impact from lost sales and tax revenue ($320,000 or -3.7% compared to baseline) related to reduced recreational and film industry spending. • Direct local impact from lost sales and tax revenue ($1 million or -16.4% compared to baseline) related to reduced recreational and film industry spending. • Beneficial combined impact (direct and indirect) from net gain in regional sales ($7.1 million), income ($3.9 million), and employment (108 jobs), as influence of Combat Center personnel increase would offset the loss in recreational and film industry spending. Sufficient capacity exists to absorb the added demand for housing and community services. • Direct impact on individual small businesses that are dependent on recreational visitor spending. May cause some smaller firms to fail as a result of reduced revenues tied to reduced recreational opportunities in Johnson Valley. • Impacts to mining, property values, and civilian impacts are the same as Alternative 1. • Less than significant economic impact to livestock ranching and farming industries due to the loss of some land for grazing. NI • Same as Alternative 1.
Alternative 5	LSI • Socioeconomic impacts of Alternative 5 would be essentially the same as Alternative 4, with very minor changes in the size of specific dollar amounts. • Beneficial combined impact (direct and indirect) from net gain in regional sales ($7.5 million), income ($4 million), and employment (110 jobs), as influence of Combat Center personnel increase would offset the loss in recreational and film industry spending. Sufficient capacity exists to absorb the added demand for housing and community services. • Direct impact on individual small businesses that are dependent on limited recreational visitor spending. May cause some smaller firms to fail as a result of reduced revenues tied to reduced recreational opportunities in Johnson Valley. • Small direct reduction ($28,456 or 0.005% of county total) in property tax revenues to local jurisdiction from the acquisition of private land. • Impacts to mining, property values, and civilian impacts are the same as Alternative 1. • Less than significant economic impact to livestock ranching and farming industries due to the loss of some land for grazing. NI • Same as Alternative 1.

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Table 4.3-16. Summary of Impacts

Alternative	Impacts
Alternative 6	LSI • Direct impact from acquisition of private property: same as Alternative 1 but fewer private properties would be acquired (105 parcels). • Direct regional impact from lost sales and tax revenue (<$216,000 or -2.5% compared to baseline) related to reduced recreational and film industry spending. • Direct local impact from lost sales and tax revenue ($1.5 million or-24.7% compared to baseline) related to reduced recreational and film industry spending. • Beneficial combined impact (direct and indirect) from net gain in regional sales ($7.5 million), income ($4 million), and employment (110 jobs), as influence of Combat Center personnel increase would offset the loss in recreational and film industry spending. Sufficient capacity exists to absorb the added demand for housing and community services. • Direct impact on individual small businesses that are dependent on limited recreational visitor spending. May cause some smaller firms to fail as a result of reduced revenues tied to reduced recreational opportunities in Johnson Valley. • Small direct reduction ($28,456 or 0.005% of county total) in property tax revenues to local jurisdiction from the acquisition of private land. • Impacts to mining, property values, and civilian impacts are the same as Alternative 1. • Less than significant economic impact to livestock ranching and farming industries due to the loss of some land for grazing. NI • Same as Alternative 1.
No-Action Alternative	NI • No impacts with regard to local sources of business revenue and associated income and jobs from recreational visits and film industry use. No impact to the economic vitality of small local businesses that rely on such spending, though such spending is not substantial at a regional economic scale.

Notes: LSI = Less than significant impact; NI = No impact; OHV = off-highway vehicle

4.4 PUBLIC HEALTH AND SAFETY

4.4.1 Approach to Analysis

4.4.1.1 Methodology

Impacts to public health and safety were assessed by evaluating the relative scope and location of proposed training activities associated with each of the project alternatives (as described in Chapter 2) and their potential to alter the existing conditions for public health and safety (Section 3.4). The analyses were also based on assessments of existing information and key findings from other relevant studies, including the *Air Installation Compatible Use Zones (AICUZ) Study* (DoN 2003a), the *Final Programmatic Environmental Assessment for Ongoing and Proposed Training Activities at the Marine Corps Air Ground Combat Center Twentynine Palms, California* (DoN 2003b), and the *Final Environmental Assessment, Permanent Facilities Bed-Down of Increased End-Strength at Marine Corps Air Ground Combat Center Twentynine Palms, California* (Marine Air Ground Task Force [MAGTF] Training Command 2009b).

The impact analyses considered the potential for aircraft, vehicle, and ordnance-related accidents to occur under each of the alternatives within the context of existing and proposed standard operating procedures for avoidance of such accidents. Similarly, the potential for uncontrolled releases of hazardous materials were evaluated within the context of spill prevention plans and hazardous materials management procedures that would be in place. Process knowledge or other available data were used to predict the type and quantity of wastes that would likely be generated, and these estimates were compared with current generation rates, waste types, capability for managing hazardous wastes, and regional landfill capacities (in the case of solid wastes). The analyses identified existing contamination sites and compared the location of these sites with the location of proposed activities and the existing and proposed avoidance procedures.

The analysis presented in this section focuses on potential health and safety impacts to the general public attendant to military training, and not on impacts to the military personnel that would engage in proposed training activities at the Combat Center. Health and safety risks to military personnel are an inherent and unavoidable aspect of military training, due largely to the nature of military missions and the need to train under realistic conditions. To reduce such risks to the extent possible during training, all Marine Corps training operations and exercises are designed and conducted in accordance with comprehensive safety procedures, rules and regulations, all of which would be followed under the proposed action. Accordingly, and for the purposes of this EIS, this section focuses on potential impacts of the training operations to the health and the safety of the general public.

The analysis presented also addresses the potential health and safety impacts to military members, civilian employees, invitees, grantees, licensees, grantors, licensors, transferees , transferors, and trespassers of acquisition and use of real property and improvements that potentially contain hazardous substances, hazardous wastes, pollutants and contaminants, in existing buildings, mines, mine wastes, soil and groundwater. While it is anticipated that much of the property acquired would be used as a bombing range, it is possible that some sites would be used for maneuvering and ground training, to include use of buildings that are present on lands slated to be acquired. In addition, the RPAA would be open to recreational use for ten months out of the year. Contact with and exposure of military members, civilian employees, invitees, grantees, licensees, grantors, licensors, transferees, transferors, and trespassers to hazardous substances, hazardous wastes, pollutants and contaminants on real property acquired and on the

RPAA would be limited through land use restrictions, such as signs, base master plan amendments, fences, and other measures and/or notices provided by the Marine Corps.

4.4.1.2 Evaluation Criteria

The evaluation of health and safety impacts relative to the project alternatives is based on two factors: the potential for an increased occurrence of accidents that may involve members of the public and the potential for an increase in risks to general public health. The significance of an adverse health and safety impact increases as either (or both) of these two factors increase. In the analyses, the issues that have a potential to affect public health and safety are evaluated relative to the degree to which the activity increases or decreases health and safety risks to the public. Impacts to public health and safety are evaluated for the following:

- Risk and frequency of aircraft mishaps.
- Increased risks of public exposure to unexploded ordnance (UXO), ordnance fragments, or other related materials and dangers.
- Vehicle accident potential from convoy crossings of public roads and/or public utility lines (e.g., vehicle-vehicle accidents, transport of hazardous materials and equipment, or potential damage to existing and future underground oil, natural gas pipelines).
- Emergency service demand changes (e.g., interference with an adopted emergency response plan or emergency evacuation plan).
- Disproportionate impacts to children from hazardous emissions or the handling of hazardous materials, substances, or waste.
- Likelihood of an uncontrolled release of hazardous materials that could contaminate soil, water, or air.
- Generation of hazardous/solid waste types or quantities that could not be accommodated by the current management system.
- Disturbance of any existing contamination sites from proposed activities resulting in exposure or remediation equipment damage.

4.4.1.3 Public Scoping Issues

The analysis of potential impacts to public health and safety addresses the following specific issues, all of which were identified during the EIS public scoping process:

<u>Aircraft Operations</u>

- accidental aircraft-related impacts off-installation;
- accidental civilian aircraft (mid-air) strikes;
- aircraft-delivered ordnance and munitions;
- UXO;
- weapons danger zones (WDZs) and accident potential zones (APZs); and
- Bird/Wildlife Aircraft Strike Hazard (BASH).

<u>Ground Training Operations</u>

- range safety and control;
- trespassers;

- convoys;
- munitions and UXO;
- explosive ordnance disposal (EOD) hazards; and
- ordnance delivery.

Hazardous Materials and Hazardous/Solid Waste

- hazardous materials;
- non-hazardous waste;
- contaminated sites (Installation Restoration, Formerly Used Defense Sites [FUDS], mines);
- increased waste disposal; and
- illegal dumping by trespassing parties.

Energy Hazards

- electromagnetic radiation (EMR), Hazards of Electromagnetic Radiation to Ordnance (HERO).

Emergency Response

- law enforcement;
- fire; and
- medical.

Protection of Children

- hazardous emissions or the handling of hazardous or acutely hazardous materials, substances, or waste (within one-quarter mile [0.4 km] of an existing or proposed school).

4.4.2 Alternative 1 Impacts

The following public health and safety SCMs would be implemented under any action alternative. Additional focused measures for management of the RPAAs would be implemented under Alternatives 4, 5, or 6 (see Sections 2.5.2 through 2.5.4.).

PHS SCM 1: The Marine Corps would initiate and maintain a persistent informational outreach program with local leaders, communities, and groups to ensure that members of the general public are aware of the change in land ownership or management and public use/access.

PHS SCM 2: Permanent signage would be staggered across the boundary lines of acquired lands (for any RPAA or exclusive military use areas) at an acceptable interval to make it difficult for anyone to enter the area without having seen a sign. Signage would be maintained.

PHS SCM 3: Barriers would be used to block access routes to reduce the possibility of unauthorized access (this would apply to both the RPAA and the exclusive military use area). Each exercise force would be required to establish manned roadblocks along all access routes, preventing any public access immediately before and throughout the training period. All barriers and roadblocks would be maintained.

PHS SCM 4: Increased military presence immediately preceding training would focus on enhancing public awareness. Military police and range personnel, along with other officials located aboard the installation, would increase presence patrols along major access routes and

known assembly points in or close to acquired lands that were formerly used for public recreation.

PHS SCM 5: Before training, overflights would be conducted on two consecutive days to document any identifiable public presence in the acquired land areas, followed by efforts to contact anyone discovered by those overflights and help them to secure their removal from the training area.

PHS SCM 6: A range sweep would be required before any training events, live-fire or otherwise, and anyone discovered by a sweep would be escorted from the training area before initiation of the training event.

PHS SCM 7: As part of the permitting process for allowing public use of the RPAA on a case-by-case basis, the Marine Corps would prioritize safety as the primary consideration in permitting decisions; permits would potentially restrict the size, scope, type of activity, and location (relative to parts of the RPAA that are more intensively used during training) of any requested activity so as to minimize risks to the public.

4.4.2.1 Aircraft Operations

Aircraft-related Accidents

Flight-related mishaps can include emergency landings, aircraft crashes, mid-air collisions with other aircraft or birds, accidental release of ordnance, etc. These types of accidents may have an increased potential for occurring due to the proposed increase in flight operations associated with MEB training, the establishment of new Special Use Airspace (SUA), and the modification of existing airspace (as discussed in Section 2.4 and Section 4.7, *Airspace Management)*. Airspace in the general vicinity of the Combat Center is considered among the busiest in the nation for both civil and military aircraft operations. Aircraft operations originating from or associated with the Combat Center have been compatible with other airspace use in the region due to segregation of airspace operations, effectiveness of the ATC system in managing the air traffic, and close cooperation between the military scheduling agencies and the FAA in coordinating airspace use (Section 4.7 contains additional details). Class A mishaps are the most severe (refer to Section 3.4.3.1). The most recent aircraft mishap was a Class A incident that occurred within the Combat Center in 1992.

Aircraft-related accidents are always a possibility. However, the risk of such accidents occurring and the potential for impacts to public health and safety under Alternative 1 would not change appreciably from baseline conditions and would remain minimal overall. This is based on the following considerations:

- Land use in the vicinity of the west and south study areas includes extensive open space areas with no permanent residents or appreciable development and only minimal very low-density residential development outside the perimeter of the proposed airspace footprint. Therefore, the likelihood that any aircraft mishaps would involve the public is very low.
- Despite an increase in aircraft operations and sorties, substantially larger airspace areas would be available for all aircraft activity, thus providing more separation between aircraft during flight operations.
- Rigorous aircraft maintenance procedures, flight safety protocols, and airspace management coordinated with the FAA would continue to be in effect at all times (as detailed in Section 3.4.3.1);

- Aircraft operations within the west and south study area would involve exclusive military use; and
- Airspace management and flight safety procedures, applicable to both Marine Corps and adjacent civilian aviation, would be in effect.

As noted in Section 3.4, while BASH can be a serious threat to aircraft in many operating environments; the Combat Center has experienced negligible BASH incidents. Under Alternative 1, no significant increases in flight operations would occur in known bird habitats. In addition, environmental conditions would be the same as in the existing airspace areas (i.e., no known problem bird populations). Based on these considerations, impacts to public health and safety associated with aircraft-related accidents under Alternative 1 would be less than significant.

Aircraft-delivered Ordnance

Under Alternative 1, ordnance use would not occur within the south study area, so no impacts associated with aircraft-delivered ordnance would occur in that area.

Ordnance use would occur in the west study area under Alternative 1, but no new procedures would need to be established for aircraft-delivered ordnance within the new and modified airspace. Existing procedures identified in Chapter 3.4.3.1 would be followed for the proposed aircraft-delivered ordnance and munitions identified in Appendix F. In addition, for any UXO that might be generated as part of aircraft-delivered ordnance operations, range clearing procedures would be followed (see Section 3.4). In addition, all target areas (and the associated WDZs) within which aircraft-delivered weapons would be fired under Alternative 1 would be located well within the boundaries of exclusive military use area; no authorized public access would be permitted near the areas subject to use of aircraft-delivered ordnance.

As noted in Section 3.4.3.1, there is no fencing to delineate the boundaries of Combat Center training areas. The acquired land areas in the west and south study areas under Alternative 1 would also be unfenced, so the potential for unauthorized public access into military operating areas would continue to exist (for a period of time the potential for unauthorized public access would likely be greater along the new boundaries than along the existing Combat Center boundary). Under Alternative 1, the west study area (part of the existing Johnson Valley OHV area) would be expected to yield the highest incidence of unauthorized public access due to the higher level of existing recreational use in the area (refer to Section 4.2, *Recreation*). Before and during training activities, real-time implementation of safety buffers and established procedures to clear the range of all unauthorized individuals would minimize potential safety impacts to informed and law-abiding members of the public. However, some amount of unauthorized public access (e.g., by trespassers and 'scrappers,' OHV and other recreational users) would likely occur in the acquisition study areas, particularly initially, as existing users of the areas may not be aware of or may choose to disregard information and warnings about the change to exclusive military use of the area.

Initially, management efforts and resources expended to prevent unauthorized access would be substantial but may decrease over time as public awareness of the new exclusive military use designation increased and became common knowledge (MAGTF Training Command 2010e). The Marine Corps has also established procedures to detect and remove unauthorized individuals from existing training areas (detailed in Section 3.4).

Under Alternative 1, implementation of such measures would be extended into the west and south study areas, and extra patrols by Conservation Law Enforcement Officers would occur. Passive measures to minimize the potential for unauthorized access would include placement of permanent signage on, around, and near the training areas, road crossings, and likely access points. Signs would be staggered

across the boundary lines at logical intervals to make it difficult for the public to enter the area without encountering a sign. The signs would inform the public that the areas are reserved for exclusive military use. They would also warn of potential dangers and against unauthorized entry. Barriers would be used to block access routes and reduce the potential for public passage into the training area. Moreover, the installation would undertake a public outreach effort to ensure that all potential regional stakeholders would be informed of access restrictions associated with the west and south areas. This effort would involve disseminating informational materials through available means, including the Internet, local community channels, and local recreational organizations similar to those described in Section 2.5.4 (e.g., OHV publication or group website).

Barriers would be used to block access routes and reduce the potential for public passage into the training area. Additionally, the installation would undertake a public outreach effort to ensure that all potential regional stakeholders would be informed of access restrictions associated with the west and south areas. This effort would involve disseminating informational materials through available means, including the Internet, local community channels, and local recreational organizations similar to those described in Section 2.5.4 (e.g., OHV publication or group website).

To further reduce the potential for adverse safety impacts, range sweeps would be conducted to detect and remove UXO (MAGTF Training Command 2010f). Areas would be initially "swept" by the training force after completion of activities, with additional clearance measures taken by appropriate EOD personnel and Base Range Safety personnel, as required. All existing plans and procedures applicable to the management of UXO and EOD would be updated to include the operations within the new training areas.

Based on these considerations, aircraft-delivered ordnance activities under Alternative 1 would be expected to have less than significant impacts to public health and safety.

Aircraft-related Noise

As described in Section 4.9.2, *Noise*, the 65 dB CNEL noise contour for airfield-related activities and the 65 dB $CNEL_{mr}$ contour for airspace-related activities in current and proposed airspace would be fully contained within the proposed boundaries of the Combat Center under Alternative 1. Therefore, no individuals outside the installation would be exposed to CNEL or $CNEL_{mr}$ greater than or equal to 65 dB from airfield-related or airspace-related noise. While single-event noise levels emitted by low flying aircraft can be very high, such overflights would not occur consistently over any one location, and would not occur where members of the public would be affected. Therefore, aircraft-related noise associated with implementation of Alternative 1 would have a less than significant impact to public health.

4.4.2.2 Ground Training Operations

Ordnance Use

Under Alternative 1, ordnance use would only occur within the west study area, so no impacts associated with use of ordnance would occur in the south study area.

There is no fencing to delineate the boundaries of Combat Center training areas, and no such fencing would be installed as part of any of the action alternatives. Accordingly, there is a potential for unauthorized public access into the proposed exclusive military use area in the west study area and for subsequent contact with UXO, munitions, debris, dropped equipment, or other dangerous materials used in military training. Under Alternative 1, no authorized public access would be permitted in the west and

south study areas. The same procedures described in the aircraft-delivered ordnance discussion above (and detailed in Section 2.5) would help to minimize unauthorized public access.

The potential for contact with UXO and other dangerous materials in the west study area would represent a potential impact to unauthorized individuals and trespassers. However, the impact would be minimized due to the implementation of public awareness and outreach efforts (e.g., signage), military patrols, range sweeps, and other proposed measures discussed above. Furthermore, if acquired lands were transferred back to public domain, the Marine Corps would be required to comply with the National Contingency Plan (NCP), 20 CFR Part 300; Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); Base Realignment and Closure Policies (BRAC); Reporting Hazardous Substance Activity When Selling or Transferring Federal Real Property (40 CFR Part 373); Defense Environmental Restoration Program (10 United States Code [USC] 2701); DoN Environmental Restoration Program Manual (August 2006); and Environmental Compliance and Protection Manual, MCO 5090.2A (July 1998). Accordingly, ordnance use associated with Alternative 1 would have less than significant impacts to public health and safety.

Ordnance-related Noise

As described in Section 4.9.2, *Noise*, the 62 dBC CNEL threshold noise contour for ordnance use would be mostly contained within the proposed boundaries of the Combat Center under Alternative 1. As shown on Figure 4.9-3, the 62 dBC CNEL contour would extend beyond the boundaries of the Combat Center Complex to the northeast and southwest. However, as noted in Section 4.1.2.7, *Sensitive Land Uses*, there are no sensitive noise receptors located within the areas where the 62 dBC CNEL contour extends outside the proposed boundaries. While some noise and vibrations associated with ordnance use under Alternative 1 may be periodically detected by residents and other members of the public from a distance, and may sometimes be an annoyance, ordnance-related noise impacts to public health associated with implementation of Alternative 1 would be less than significant.

Energy Hazards

The proposed communication towers in the west study area would be located on mountain peaks that would have no (authorized) public access (Figure 2-5a depicts the proposed tower locations). Therefore, Alternative 1 would have no impacts to public health and safety due to potential encounters with communication towers or HERO influence.

Transportation

Under Alternative 1, task force vehicles involved in MEB Exercise training (i.e., tanks and other vehicles transporting weapons, munitions, and potentially dangerous equipment) would not use public roads; however, some commercial-style government vehicles and Hummers (for instructors and range maintenance personnel to travel to and from training areas) would be used on public roads throughout the duration of the exercises. As a result, there could be a minor increase in the potential for vehicle accidents on public roads due to the additional military vehicle traffic. This minimal and infrequent increase in traffic volume would not cause a change in level of service (LOS) ratings (see Section 4.6, *Transportation and Circulation*), nor would it substantially increase the risk of accidents. The potential impacts to public health and safety would be less than significant.

During proposed MEB training, there would be some potential for task force vehicles traveling off-road or on dirt roads within the acquired lands to accidentally drop some equipment (e.g., helmets, flak jackets, individual weapons, packs, clothing, etc.). This type of incident, which would be limited to the exclusive military use areas, would not impact public safety except in the event that trespassers came into contact

with any materials that may not have been retrieved following training. As in the *Ordnance Use* discussion above, the potential impact is minimized due to the implementation of public awareness methods (e.g., signage), military patrols, range sweeps, and other proposed measures discussed above. Accordingly, transportation associated with Alternative 1 would have less than significant impacts to public health and safety.

4.4.2.3 Hazardous Materials and Hazardous/Solid Waste

Hazardous Materials and Waste

A large variety of ordnance would be used during the proposed training activities. The types of ordnance that would be employed are constructed of ferrous and non-ferrous metals and may contain explosive materials or components. No new or unique chemical hazards (e.g., radiological, biological, etc.) would occur from ordnance use and, therefore, existing hazardous materials management procedures would apply to the proposed activities. Historical data show that munitions constituents are not expected to migrate off the Combat Center (Headquarters Marine Corps 2008). (Note: potential impacts of ordnance-related contamination on water resources are discussed in Section 4.13.) In addition, the Combat Center would track and report on chemical releases from ordnance used in training activities; potential increases in chemical releases from ordnance use would be captured through this standard reporting process. Ordnance use would be limited to exclusive military use areas, thereby limiting public access and exposure. However, unauthorized public access to the acquisition study areas may occur and, as a result, some individuals may be exposed to chemical releases from ordnance use. The potential for exposure to chemical releases in the training areas presents a potential impact to unauthorized individuals and trespassers within the exclusive military use areas, but the potential impact is minimized due to the implementation of public awareness methods (e.g., signage), military patrols, range sweeps, and other proposed measures discussed in Section 4.4.2.1. Accordingly, Alternative 1 would result in less than significant impacts to public health and safety related to chemical releases from ordnance use.

Equipment maintenance and fueling operations associated with training activities would involve the use of hazardous materials such as fuels, paints, solvents, oils, and lubricants. Usage of such materials would be tracked and documented through the existing Combat Center inventory system to avoid uncontrolled hazardous material usage and disposal. Hazardous materials that are not currently in the inventory would go through an approval process to ensure that they would not pose undue health or environmental hazards before they could be used. Combat Center Order 5090.1D (MAGTF Training Command 2006) provides specific guidance for restrictions on use of hazardous materials and spill prevention, containment, and cleanup; management procedures identified in the Order would apply to all hazardous materials usage under Alternative 1. Control, cleanup, and reporting of spills are also covered by an environmental Standard Operating Procedure (SOP). Per Combat Center Order 5090.1D, no hazardous materials, hazardous waste, or solid wastes would be disposed of, left, buried, or abandoned in training areas. Therefore, unauthorized public access would result in less than significant impacts to public health and safety as a result of hazardous materials usage.

Wastes generated from maintenance operations would be consistent with those currently generated at the Combat Center, and would include both hazardous waste (e.g., waste paint) and regulated non-hazardous waste (e.g., absorbents with oil or fuel). These wastes would be managed through the existing waste management system infrastructure according to prescribed procedures already in place, which include the requirement that no hazardous waste would be disposed of, left, buried, or abandoned in the training area. No change to permits, hazardous waste generator status, or management would be required. Hazardous materials usage would be limited to military operations and would not remain in the acquisition study area

where it could be encountered by unauthorized individuals. Therefore, the generation of hazardous waste under Alternative 1 would result in less than significant impacts to public health and safety.

There are dwellings/residences (many left over from Twentynine Palms homesteading boom of the 1950s) located within the west and south study areas, mostly abandoned and in various states of disrepair (NAVFAC 2011). Because of their age, asbestos-containing materials (ACMs) may be present in these structures (MAGTF Training Command 2010d). The National Emission Standards for Hazardous Air Pollutants requires all suspect material (anything other than wood, glass, plastic, metal) to be assumed to be ACM unless sampling proves otherwise. If required, demolition of these structures would be performed according to prescribed procedures already in place (e.g., properly characterizing, storing, and disposing of ACM materials or wastes). Regulations and required procedures for safe removal and disposal of ACMs are described in Section 3.4. The potential for adverse impacts would be eliminated through removal and disposal of ACMs.

Sufficient management procedures are in place to manage hazardous materials and hazardous waste and avoid potential exposure to the public. As a result, hazardous materials and waste under Alternative 1 would result in less than significant impacts to public health and safety.

Solid Wastes

Solid wastes generated as a result of training activities would primarily include ordnance fragments and residues (primarily composed of scrap metals). These wastes would be collected by each unit at the conclusion of training, or by EOD personnel on a scheduled basis, and taken to the Range Residue Processing Center for processing and offsite recycling. The processing center has adequate capacity to accommodate the expected increase in solid waste generated under Alternative 1 (MAGTF Training Command 2009b). With the existing solid waste procedures and exclusive military use of the areas, public exposure to generated waste would not occur.

Therefore, solid waste generated under Alternative 1 would result in less than significant impacts to public health and safety.

Contaminated Sites

Contaminated sites are identified in Section 3.4.3.2. If contaminated soil or groundwater is encountered or disturbed during training activities, potential impacts to the health and safety of on-site personnel could occur. These impacts would be minimized through the establishment of internal procedures such as, but not limited to, the following:

- No shooting or bombing mine tailings, waste rock piles, mine shafts/adits, abandoned hazardous materials or hazardous waste, above-ground storage tanks, buildings with potential ACM and/or potential lead-based paint, or other sites that could result in the release of hazardous materials or hazardous waste.
- No military operations conducted inside abandoned buildings, mine shafts or mine adits, without prior consultation with the Installation Environmental Office.
- Conducting surveys for lead-based paint and ACM conducted consistent with Marine Corps requirements.
- Conducting refueling and maintenance procedures during off-road events consistent with Marine Corps hazardous materials and hazardous waste requirements.

Under Alternative 1, public access would not be permitted in either the west or south study areas (i.e., exclusive military use areas). Therefore, implementation of Alternative 1 would have beneficial impacts with regard to public safety and existing FUDS or other potentially contaminated sites by reducing or eliminating public access to these areas, thus preventing public exposure to these sites. .

4.4.2.4 Other Safety Issues

Mining

Mineral resources and locations and the known status of each mine in the Combat Center and acquisition study areas are described in Sections 3.1.3, *Land Use*, and 3.12.3, *Geological Resources*. There are several abandoned mines located in the west and south study areas (refer to Table 3.12-4 of this EIS). Under Alternative 1, all land in the acquisition study areas would be for exclusive military use. As stated in Section 2.6, *Disposition of Mines*, the Marine Corps would acquire the patented and unpatented claims associated with the Morris Lode and Bessemer Mines, which are known to coincide with areas proposed for exclusive military use and would lie within the aviation WDZs and direct and indirect fire Surface Danger Zones (SDZs) for the MEB Exercise Work-up training scenario, Final Exercise scenario, and tenant-transient 4-day training cycle. While it is possible that residual contamination and/or unknown or undocumented subsurface contamination would remain at these sites, public exposure would not occur since the acquisition study areas would be managed for exclusive military use and contact with the site and exposure of Marines, civilians, site invitees, and trespassers to potential contamination would be limited through the physical closure of mines and abandoned mine features by the Marine Corps following protocols developed by the BLM (see Section 2.6), and the internal procedures described above in Section 4.4.2.3. Any contamination from abandoned mines would be remediated in accordance with applicable federal, state, and local statutes and regulations.

Based on the history of mining in the west study area, other non-operating mines and mining facilities (such as mine shafts and tunnels) not already identified in Table 3.12-4, could also be present; these facilities would be further identified as part of the real estate survey and appraisal process. Guidance from both BLM and the Marine Corps regarding safety and mines is discussed in Section 3.4 (BLM 2010c; SOP for RTAA *2002 Environmental Areas Prohibited to Training*, Section 3[d] of Combat Center Order 3500.4h). Procedures outlined in this guidance would be followed for all mine areas within the Alternative 1 acquisition areas.

Because the acquisition study areas would be designated as exclusive military use areas, a beneficial impact would occur for public health and safety as public access to potentially dangerous mine infrastructure would be restricted.

Protection of Children

No schools, parks, residences, or other areas typically associated with aggregations of children are located near the acquisition study areas (DoN 2003b). No known environmental health or safety risks associated with Alternative 1 would occur that would disproportionately affect children. Therefore, under Alternative 1 no impacts to the public health and safety of children would occur.

Emergency Response

The ability to provide adequate emergency response is typically a function of the size and density of a community's population and the amount of land area that response personnel are required to cover. Since mutual aid agreements are in place with local emergency response agencies, increases in military personnel would potentially require the need for additional emergency response (police, fire, medical)

capabilities in the community under Alternative 1. The anticipated personnel participating in training exercises would represent a temporary population increase (i.e., limited to the duration of the training) that would potentially require emergency services, while the additional permanent personnel necessary to manage the area would be minor (70 personnel and dependents). During training activities, the Marine Corps provides additional emergency response staff and would not create additional demand on the local emergency response providers. In addition, the minor increase in permanent personnel would not exceed the existing emergency response service capacity as sufficient capabilities exist in the community.

The majority of military dependents and retirees receive medical care at the installation hospital. A variety of civilian medical facilities are also present in the region. The small increase in permanent personnel and dependents would not cause a strain on local health services (MAGTF Training Command 2009b).

The proposed increase in military training area and live-fire exercises under Alternative 1 may increase the potential for wildland fires in the west and south study areas. However, the environment within the acquisition study areas is similar to that of the existing Combat Center, where wildland fires have not posed a substantial problem due to infrequent occurrence and timely emergency response. The low incidence of wildland fires is due to low levels of fuel and strict use of Best Management Practices (BMPs). Appropriate levels of emergency response at the Combat Center and the training areas and facilities, as well as in the surrounding communities, have further minimized the impacts from wildland fires; this would be expected to continue under Alternative 1. In addition, the relative isolation and lack of population or development in the proposed areas would indicate a minimal risk to life and property. Therefore, under Alternative 1, impacts related to emergency response capabilities would be less than significant.

Displaced OHV Recreation

As described in Section 4.2, implementation of Alternative 1 would result in indirect impacts associated with displacement of OHV recreation from Johnson Valley to other designated OHV areas and open riding trails in the area (refer also to Appendix M). The displacement of recreational activities (particularly OHV use) would result in increased use of other areas, potentially resulting in periodic increases in the density of the user population and an associated marginal increase in the safety risks associated with OHV use. The displaced activity would be distributed among many different areas throughout southern California (see Appendix M for assumptions and a potential distribution of displaced use) but would be most prevalent at nearby designated OHV areas and routes within the county. OHV riding is inherently a hazardous activity, participants are typically very cognizant of the risks involved, and responsible riders would be expected to adjust their speed and other factors according to the prevailing riding conditions at any given time, including the density of other riders present. The anticipated increase in safety risk attributable to additional riders displaced from acquired portions of the west study area would be minimal at any particular point in time. Consequently, safety impacts to public safety from displaced OHV recreation would be less than significant.

4.4.2.5 Potential Mitigation Measures

With implementation of the public health and safety SCMs (detailed in Section 4.4.2 and Chapter 2) and BMPs noted in this section, no significant impacts to public health and safety would occur under Alternative 1. No further or additional mitigation measures are recommended.

4.4.3 Alternative 2 Impacts

4.4.3.1 Aircraft Operations

Impacts associated with aircraft flight activities and aircraft-delivered ordnance under Alternative 2 would be similar to those discussed for Alternative 1. As in Alternative 1, the potential for aircraft-related accidents to affect public health and safety would remain minimal because the land use within the vicinity of the acquisition study areas includes large expanses of open space and very low-density development outside the footprint of the land acquisition and airspace areas; therefore, the potential for aircraft mishaps involving the public would remain very low; the new airspace would provide greater separation between aircraft during flight operations; highly effective aircraft maintenance procedures and FAA protocols would continue to be in effect; and aircraft operations would occur in exclusive military use areas.

As described in Section 4.9.3, *Noise*, the 65 dB CNEL noise contour for airfield-related activities would be fully contained within the acquisition study areas under Alternative 2. Therefore, no individuals outside the installation would be exposed to CNEL greater than or equal to 65 dB from airfield-related noise. The 65 dB $CNEL_{mr}$ contour for airspace-related activities in current and proposed airspace would be mostly located within the proposed boundaries of the Combat Center. However, as noted in Section 4.1.3.7, *Sensitive Land Uses*, there are no sensitive noise receptors located within the areas where the 65 $CNEL_{mr}$ contour extends outside the proposed boundaries. Therefore, airspace-related noise associated with implementation of Alternative 2 would have a less than significant impact to public health.

In addition, under Alternative 2, no new procedures would need to be established for aircraft-delivered ordnance within the new and modified airspace or land acquisition areas; existing procedures identified in Section 3.4.3.1 would be followed for the proposed aircraft-delivered ordnance and munitions (identified in Appendix F). Range clearing procedures would be followed for UXO generated as a function of aircraft-delivered ordnance operations (see Section 3.4). As in Alternative 1, all target areas (and the associated WDZs) at which aircraft-delivered weapons would be fired under Alternative 2 would be located well within the boundaries of the exclusive military use area; no public access would be permitted near the areas subject to use of aircraft-delivered ordnance. In addition, while there is potential for unauthorized public access onto military property, established procedures to detect and remove unauthorized individuals from existing training areas (detailed in Section 3.4) would be applied within the proposed acquisition areas as well. As a result, under Alternative 2, potential impacts from aircraft activities would be less than significant.

4.4.3.2 Ground Training Operations

<u>Ordnance Use</u>

As noted for Alternative 1, the Marine Corps would implement standard procedures to detect and remove any unauthorized individuals that may try to illegally access the exclusive military use training area in the west study area under Alternative 2. While potential contact by unauthorized individuals with dangerous materials in the training area (e.g., UXO, munitions, debris, dropped equipment, etc.) would present a potential impact to the safety of such individuals, the potential impact would be minimized due to the implementation of public awareness methods (e.g., signage), military patrols, range sweeps, and other proposed measures previously discussed. Furthermore, if acquired lands were transferred back to public domain, the Marine Corps would be required to comply with NCP, 20 CFR Part 300; CERCLA; BRAC; Reporting Hazardous Substance Activity When Selling or Transferring Federal Real Property (40 CFR Part 373); and Defense Environmental Restoration Program (10 USC 2701). Accordingly, ordnance use associated with Alternative 2 would have less than significant impacts to public health and safety.

Ordnance-related Noise

For ordnance noise, the 62 dBC CNEL contour under Alternative 2 would be mostly contained within the proposed Combat Center boundaries. As shown on Figure 4.9-5, the 62 dBC CNEL contour would extend beyond the boundaries of the Combat Center Complex, primarily to the west (though also slightly in the northeast). However, there are no sensitive noise receptors located within the areas where the 62 dBC CNEL contour extends outside the proposed boundaries. Therefore, ordnance-related noise impacts to public health associated with implementation of Alternative 2 would be less than significant.

Energy Hazards

The proposed communication towers would be located as depicted in Figure 2-6a. All three of the proposed towers would be installed on mountain peaks in remote and rugged terrain, but under Alternative 2 one of the towers would be located just outside of the proposed acquisition area where public access would be monitored and controlled. This tower would be close enough to the west study area to contribute, as intended, to military communications capability during training exercises; however, it would be sufficiently removed from any ordnance use or storage to render it safe with respect to HERO or other public safety concerns. No impacts related to energy hazards would occur under Alternative 2.

Transportation

Under Alternative 2, impacts from ground training activities would be similar to those described for Alternative 1; vehicle traffic would be the same as under Alternative 1. Therefore, Alternative 2 would have less than significant impacts to public health and safety due to ground transportation.

4.4.3.3 Hazardous Materials and Hazardous/Solid Waste

Under Alternative 2, impacts associated with hazardous materials and hazardous/solid waste would be similar to Alternative 1. Alternative 2 would have less than significant impacts to public health and safety due to hazardous materials and hazardous/solid waste.

4.4.3.4 Other Safety Issues

Mining

As described for Alternative 1, there are no active mines in the west study area, however, a number of abandoned mines exist in both the west and south study areas (refer to Table 3.12-4). Fewer abandoned mines would be acquired under Alternative 2 because of the reduced land acquisition area as compared to Alternative 1. All land in the west and south study areas under Alternative 2 would be controlled for exclusive military use and would be withdrawn from public use and closed to public entry for mineral claims and development. As with Alternative 1, patented and unpatented claims associated with the Morris Lode and Bessemer Mine properties would be acquired. Procedures outlined for all mine areas within the Alternative 1 acquisition study areas would apply for the areas applicable to Alternative 2. Because the acquisition study areas would be designated as exclusive military use areas, a beneficial impact would occur for public health and safety as abandoned mines and other potential mine-related hazards in these areas would be restricted from public access.

Protection of Children

As in Alternative 1, no schools, parks, residences, or other areas typically associated with aggregations of children are located near the acquisition study areas (DoN 2003b). No known environmental health or safety risks associated with Alternative 2 would occur that may disproportionately affect children. Therefore, under Alternative 2 no impacts to the health and safety of children would occur.

Emergency Response

As in Alternative 1, sufficient emergency services are available to support activities under Alternative 2. Therefore, implementation of Alternative 2 would have less than significant impacts related to availability of emergency services.

Displaced OHV Recreation

As described in Section 4.2, implementation of Alternative 2 would result in indirect impacts associated with displacement of OHV recreation from the acquired portion of Johnson Valley to the remaining portion of the OHV area and to other designated OHV areas and open riding trails. The displacement of recreational activities (particularly OHV use) would result in increased use of other areas, potentially resulting in periodic increases in the density of the user population and an associated marginal increase in the safety risks associated with OHV use. The displaced activity would be distributed among many different areas throughout southern California but would be most prevalent at nearby designated OHV areas and routes within the county. OHV riding is inherently a hazardous activity, participants are typically very cognizant of the risks involved, and responsible riders would be expected to adjust their speed and other factors according to the prevailing riding conditions at any given time, including the density of other riders present. The anticipated increase in safety risk attributable to additional riders displaced from acquired portions of the west study area would be minimal at any particular point in time. Consequently, safety impacts to public safety from displaced OHV recreation would be less than significant.

4.4.3.5 Potential Mitigation Measures

With implementation of the public health and safety SCMs (detailed in Section 4.4.2 and Chapter 2) and BMPs noted in this section, no significant impacts to public health and safety would occur under Alternative 2. No further or additional mitigation measures are recommended.

4.4.4 Alternative 3 Impacts

4.4.4.1 Aircraft Operations

Under Alternative 3, aircraft operations within the east and south study areas would involve exclusive military use and rigorous airspace management procedures (applicable to both Marine Corps and civilian aviation) would apply to all proposed operations. While the proposed airspace configuration associated with Alternative 3 would extend to the east of the Combat Center instead of west over Johnson Valley, the potential for accidental impacts from aircraft-related activity would be similar to those discussed for Alternative 1.

As described in Section 4.9.4, *Noise*, the 65 dB CNEL noise contour for airfield-related activities and the 65 dB $CNEL_{mr}$ contour for airspace-related activities in current and proposed airspace, would be fully contained within the proposed boundaries of the Combat Center under Alternative 3. Therefore, no individuals outside the installation would be exposed to CNEL or $CNEL_{mr}$ greater than or equal to 65 dB from airfield-related or airspace-related noise. While single-event noise levels emitted by low flying aircraft can be very high, such overflights would not occur consistently over any one location, and would not occur where members of the public would be affected. Therefore, aircraft-related noise associated with implementation of Alternative 3 would have a less than significant impact to public health.

In addition, all existing plans and procedures applicable to the management of UXO and EOD would be updated to include the proposed ordnance operations in the east study (no ordnance use would occur in

the south study area), and procedures would be implemented to detect, control, and minimize unauthorized public access. Accordingly, impacts to public health and safety associated with Alternative 3 aircraft activities would be less than significant.

4.4.4.2 Ground Training Operations

Ordnance Use

Potential impacts to public safety under Alternative 3 would be similar to those described for Alternative 1 (despite the change to the east and south rather than the west and south study areas). While the potential for contact with UXO and other dangerous materials in the east study area presents a potential impact to unauthorized individuals and trespassers, the potential impact would be minimized by the implementation of public awareness and outreach efforts (e.g., signage), military patrols, range sweeps, and other proposed measures previously discussed. Furthermore, if acquired lands were transferred back to public domain, the Marine Corps would be required to comply with NCP, 20 CFR Part 300; CERCLA; Reporting Hazardous Substance Activity When Selling or Transferring Federal Real Property (40 CFR Part 373); and Defense Environmental Restoration Program (10 USC 2701). Accordingly, ordnance use associated with Alternative 3 would have less than significant impacts to public health and safety.

Ordnance-related Noise

For ordnance noise, the 62 dBC CNEL contour under Alternative 3 would be mostly contained within the proposed Combat Center boundaries. As shown on Figure 4.9-7, the 62 dBC CNEL contour would extend beyond the boundaries of the Combat Center Complex, primarily to the northeast. However, there are no sensitive noise receptors located within the areas where the 62 dBC CNEL contour extends outside the proposed boundaries. Therefore, ordnance-related noise impacts to public health associated with implementation of Alternative 3 would be less than significant.

Energy Hazards

The proposed new communication towers would be located in the east study area (Figure 2-7a). Under Alternative 3, both proposed towers would be installed on mountain peaks in remote and rugged terrain, but one of the towers would be located outside of the east acquisition area where public access would be monitored and controlled. This tower would be close enough to the east and south study areas to contribute as intended to military communications capability during training exercises. However, it would be sufficiently removed from any ordnance use or storage to render it safe with respect to HERO or other public safety concerns. No impacts related to energy hazards would occur under Alternative 3.

Transportation

Marine Expeditionary Brigade Exercise training under Alternative 3 would feature the same vehicles, weapons, munitions, and aircraft use as described for Alternative 1, but vehicle travel distances would be increased because of the greater distance from the Combat Center to the two battalion assembly areas in the east study area. Potential impacts related to vehicular traffic would be similar to those described for Alternative 3 in Section 4.6.4. Temporary closure of North Amboy Road during the initial phases of MEB Exercise training under Alternative 3 would require drivers to use alternate routes for access between the Twentynine Palms area and Interstate (I-) 40 to the north or to schedule their travel to avoid use of North Amboy Road during the two days per year that the road would be closed. To lessen the potential effects of closing North Amboy Road to through traffic, MAGTF Training Command would coordinate with the City of Twentynine Palms, the County of San Bernardino, and other local authorities

to provide as much advanced notice as possible for the two days per year that North Amboy Road would be closed (see Section 4.6.4.3). In addition, four concrete tank crossings over North Amboy Road would be installed to minimize impacts to the roadway from vehicles. These measures would ensure less than significant impacts to public health and safety associated with vehicle traffic.

A potential source of injuries or impacts related to ground transportation under Alternative 3 would be the Arizona/California Railroad line located in the eastern end of the east study area (MAGTF Training Command 2010c). Railroad line crossings may occur during ground training activities; these crossings may potentially disrupt rail traffic and/or result in accidents between military vehicles and train cars. In addition to the potential for rail accidents, there is also the potential hazard of ordnance striking rail cars in transit during training activities. Avoidance procedures for railroad lines are not currently included in the Combat Center Order 3500.4H, *Standard Operating Procedures for Range/Training Areas and Airspace*; however, the Order would be updated to include such procedures. With the update and implementation of avoidance procedures, Alternative 3 would have less than significant impact on public health and safety as a result of the presence of the railroad line in the east study area.

Another potential source of injuries or impacts under Alternative 3 would be the three subsurface natural gas transmission pipelines in the east study area. The pipelines and their associated surface facilities pose similar obstacles to battalion maneuvers and ordnance strike hazards as the Arizona/California Railroad line and would require similar avoidance. The SDZs in this area have a 3,281-foot (1,000-meter) buffer zone relative to the property boundary for avoidance (MAGTF Training Command 2010f). However, buffer zones for utility lines and other potential physical obstacles are not currently in effect. Under Alternative 3, the Combat Center Order 3500.4H, *Standard Operating Procedures for Range/Training Areas and Airspace* would be updated to include procedures to avoid the utility lines. Therefore, Alternative 3 would have less than significant impacts to public health and safety resulting from the presence of utility lines in the east study area.

High-pressure natural gas pipelines in the utility corridor may also represent a safety hazard if heavy military vehicles continually cross at the same points or if maneuver activities (e.g., vibration from impacting ordnance) compromise the integrity of the underground pipelines, resulting in potential impacts if an underground pipeline ruptures. The impact from this kind of incident could result in injuries if the integrity of the pipeline is compromised. The Southern California Gas Company does not anticipate any unavoidable environmental impacts associated with potential future land acquisition and airspace establishment (BLM 2010d). Natural gas pipeline facilities are located within other active military bases and training areas (BLM 2010d). For example, existing gas lines 6001 and 6002 cross through the Chocolate Mountain Aerial Gunnery Range, which was established during World War II and is currently used by the Marine Corps as an aerial gunnery and bombing training area (BLM 2010d). Procedures such as mapping the pipelines and avoidance, when possible, have provided sufficient protection of the pipelines; mapping and avoidance would also be performed as part of the ground training activities under Alternative 3. In addition, Combat Center Order 3500.4H, *Standard Operating Procedures for Range/Training Areas and Airspace* would be updated to include procedures to locate, map, and avoid all pipelines in the acquired area. Therefore, Alternative 3 would have less than significant impacts to public health and safety from vehicle traffic or ordnance use compromising underground pipelines.

4.4.4.3 Hazardous Materials and Hazardous/Solid Waste

Under Alternative 3, impacts associated with hazardous materials and hazardous/solid waste and the measures taken to reduce or avoid such impacts would be similar to those described for Alternative 1.

Therefore, Alternative 3 would have less than significant impacts to public health and safety due to hazardous materials and hazardous/solid waste.

Land that would be acquired as part of Alternative 3 is known to have operations with the potential to contaminate the environment. An example is the America Mine, an open pit gold mine in the east study area that is no longer in use and could require cleanup (MAGTF Training Command 2010e). The current Combat Center boundary was adjusted to exclude this mine site. Similar to other desert gold mines, the ore was stacked on sheets of high-density polyethylene and washed with a cyanide solution to extract the gold. Tanks that may have contained the cyanide solution, acres of tailings piles, and other debris remain at the site (MAGTF Training Command 2010e). The mining claim is patented, but the tailings piles may exceed the patented claim boundary. Contact with this type of site should be avoided until remediated. The possible impacts of ordnance striking the tailings and dispersing the material would potentially endanger health and safety. However, because Alternative 3 involves exclusive military use of the entire east study area where this mining operation is located, significant impacts to public health and safety due to exposure to contaminated sites would not occur. Therefore, implementation of Alternative 3 would have beneficial impacts with regards to public health and safety and existing FUDS or other potentially contaminated sites by designating this area as exclusive military use and restricting public access.

4.4.4.4 Other Safety Issues

Mining

Two active (operating) mines exist in the east study area and abandoned mines exist throughout the acquisition study areas (see discussion of abandoned mines in Alternative 1). As described in Section 2.6, all owners of patented or unpatented mining claims within the acquisition boundary would be offered fair market value for their claims or may be afforded reasonable access to their claims. Decisions on whether to provide access to a claim would be made on a case-by-case basis depending on the location of the claim(s) relative to proposed MEB training locations or other factors. Cleanup of any contamination associated with mine sites present within the acquisition area would be remediated in accordance with applicable federal, state, and local statues and regulations. While it is possible that residual contamination and/or unknown or undocumented subsurface contamination would remain at these sites, public exposure would not occur since the acquisition study areas would be controlled for exclusive military use. While procedures for training operations near abandoned mines, including discovery/reporting of unmapped abandoned mines, are included in Combat Center Order 3500.4H, *Standard Operating Procedures for Range/Training Areas and Airspace*, no guidance regarding active (operating) mines is in place. Under Alternative 3, the Combat Center Order 3500.4H, *Standard Operating Procedures for Range/Training Areas and Airspace* would be updated to include procedures to avoid the area near the mine itself or along designated access to the mine operations during training activities. With updates to the Order, less than significant impacts to public health and safety would occur under Alternative 3.

Protection of Children

As in Alternative 1, no schools, parks, residences, or other areas typically associated with aggregations of children are located near the acquisition study areas (DoN 2003b). No known environmental health or safety risks associated with Alternative 3 would occur that may disproportionately affect children. Therefore, under Alternative 3 no impacts to the health and safety of children would occur.

Emergency Response

As in Alternative 1, sufficient emergency services are available to support activities under Alternative 3. Therefore, implementation of Alternative 3 would have less than significant impacts related to availability of emergency services.

4.4.4.5 Potential Mitigation Measures

With implementation of the public health and safety SCMs (detailed in Section 4.4.2 and Chapter 2) and various BMPs noted in this section, no significant impacts to public health and safety would occur under Alternative 3. No further or additional mitigation measures are recommended.

4.4.5 Alternative 4 Impacts

4.4.5.1 Aircraft Operations

Aircraft-related Accidents

Alternative 4 would include the same airspace changes and land acquisition as in Alternative 1, but would permit restricted public access to the west study area approximately 10 months per year (when MEB exercises are not occurring). During such periods of restricted public access, military aircraft would continue to utilize the newly established and modified airspace (though without using any ordnance within the RPAA).

Since military aircraft would continue to utilize the newly established airspace, the potential for aircraft accidents to impact the public (during periods of restricted public access) would be greater than under Alternative 1. Public use of the RPAA would be expected to decline somewhat compared to baseline levels in the area (by approximately 15% for race events and multi-day dispersed use and 30% for single-day dispersed use, according to BLM-derived assumptions used in Section 4.2, *Recreation* and Section 4.3, *Socioeconomics*). But the potential number of visitors to the area would continue to be substantial. Public use would continue to occur predominantly on weekends (often extended to 3 days) and would normally be dispersed throughout the area, though OHV race events would be expected to attract localized crowds of spectators. While the risk of public exposure to aircraft-related accidents would increase marginally under Alternative 4 because of the increase in military flights relative to baseline conditions, such risks would remain minimal. The majority of aircraft training activities occur during weekdays, while the public use would occur predominantly on weekends. Also, the new and reconfigured airspace would provide greater separation between aircraft during all flight operations and the existing stringent aircraft maintenance procedures, flight safety measures, and airspace management protocols would continue to be in effect. Furthermore, SCMs detailed in Section 2.8.1 would be implemented; as part of the permitting process for allowing public use of the RPAA on a case-by-case basis, the Marine Corps would prioritize safety as the primary consideration in permitting decisions. Permits would potentially restrict the size, scope, type of activity, and location (relative to parts of the RPAA that are more intensively used during training) of any requested activity so as to minimize risks to the public. Therefore, implementation of Alternative 4 would result in less than significant impacts to public health and safety relative to aircraft-related accidents.

Aircraft-delivered Ordnance

Under Alternative 4, aircraft-delivered ordnance would be used only within the current Combat Center boundaries (Figures 2-8c and 2-8d in Chapter 2). Accordingly, no impacts to public health and safety would be associated with aircraft-delivered ordnance under Alternative 4.

Aircraft-related Noise

As described in Section 4.9.5, *Noise*, the 65 dB CNEL noise contour for airfield-related activities and the 65 dB $CNEL_{mr}$ contour for airspace-related activities in current and proposed airspace, would be fully contained within the proposed boundaries of the Combat Center under Alternative 4. Therefore, no individuals outside the installation would be exposed to CNEL or $CNEL_{mr}$ greater than or equal to 65 dB from airfield-related or airspace-related noise. However, because the public would be afforded restricted public access within the proposed RPAA, some visitors to the RPAA would potentially be exposed to high single-event noise levels emitted by low flying aircraft. Such overflights would not occur consistently over any one location and would be unlikely to affect the same individuals with sufficient intensity or frequency to represent anything more than a periodic annoyance. Aircraft-related noise associated with implementation of Alternative 4 would have less than significant impacts to public health.

4.4.5.2 Ground Training Operations

Ordnance Use

Under Alternative 4, ordnance use would occur only within portions of the west study area and only during the MEB Final Exercise. Because of the west-to-east direction of maneuver, the majority of ordnance use under this alternative would occur within the existing Combat Center boundaries. All ordnance intended to land within the RPAA would be non dud-producing. The eastern portions of the RPAA would be in close proximity to the existing No Access/Restricted Areas of the Combat Center and the two proposed "company objective" areas that would not be made available for restricted public access. The Marine Corps would implement the procedures outlined in Section 2.5 to clearly delineate such areas and to detect/prevent any unauthorized public access to such areas.

A variety of safety measures would be implemented to reduce the potential impact on public health and safety, particularly within the RPAA. As with Alternative 1, all existing plans and procedures applicable to the management of UXO and EOD would be updated to include the operations within the new training areas and measures to address unauthorized public access would be implemented. Operational limitations within the RPAA would be established and Combat Center Order 3500.4H, *Standard Operating Procedures for Range/Training Areas and Airspace*, would be updated to reflect the non-dud producing munitions restrictions in the west study area. In addition, implementation of SCMs detailed in Section 2.8.1 and additional focused measures detailed in Section 2.5 would reduce (but not eliminate) the potential for risks to public health and safety. Access to and use of the area by the general public would only be authorized by the Marine Corps when the land is not being utilized for training, and when the Commanding General has determined that the area has been rendered suitable for restricted activities to resume. However, inherent risks to public health and safety would remain in certain portions of the RPAA as a result of the potential presence of munitions constituents, debris, equipment, or other hazards that may have gone undetected during post-exercise range sweeps and EOD range clearance operations. During recreational activity in the RPAA, the public could potentially come in contact with such hazards undetected during UXO and EOD clearance of the RPAA. As described in Chapter 2, the education and permitting process would advise all visitors that handling of UXO if found in the RPAA is prohibited and that disturbance of ordnance would be in violation of the Federal Trespass Law and permit conditions, and would occur with full knowledge of the potential danger. Therefore, less than significant impacts to public health and safety would occur under Alternative 4.

Furthermore, if acquired lands were transferred back to public domain, the Marine Corps would be required to comply with NCP, 20 CFR Part 300; CERCLA; BRAC; Reporting Hazardous Substance Activity When Selling or Transferring Federal Real Property (40 CFR Part 373); and Defense

Environmental Restoration Program (10 USC 2701). Therefore, Alternative 4 would have less than significant impacts to public health and safety.

Ordnance-related Noise

For ordnance, the 62 dBC CNEL contour under Alternative 4 would be mostly contained within the proposed Combat Center boundaries. As shown on Figure 4.9-9, the 62 dBC CNEL contour would extend beyond the boundaries of the Combat Center Complex, slightly to the northeast. However, there are no sensitive noise receptors located within the areas where the 62 dBC CNEL contour extends outside the proposed boundaries. Therefore, ordnance-related noise impacts to public health associated with implementation of Alternative 4 would be less than significant.

Energy Hazards

The proposed communication towers would be located as depicted in Figure 2-8a. As in Alternative 1, the proposed communications towers under Alternative 4 would have no impacts to public health and safety.

Transportation

Under Alternative 4, impacts from ground transportation activities would be similar to Alternative 1. Therefore, Alternative 4 would have less than significant impacts to public health and safety due to ground transportation.

4.4.5.3 Hazardous Materials and Hazardous/Solid Waste

Impacts from hazardous materials and hazardous/solid waste under Alternative 4 would be similar to those described under Alternative 1. Cleanup of any known contamination sites present within the acquisition study areas would be completed as part of the purchase agreement and would be performed in compliance with applicable federal, state, and local statues and regulations. Since it is possible that unknown or undocumented subsurface contamination could exist, public access to contaminated sites would potentially occur under Alternative 4. Any potentially contaminated sites would be clearly marked and mapped, and information would be made available to potential users before and during permitted visits to the area. The presence of these sites would not be expected to impact the public because the sites would be clearly marked for avoidance. Therefore, Alternative 4 would have less than significant impacts to public health and safety due to hazardous materials and waste.

In addition, the following contaminated management site controls would be implemented for RPAA area where limited civilian use would occur:

1. Implementation of a designated web site would be used to support an informational awareness effort to ensure public awareness regarding the RPAA. This will include the development of a web-based education and permit process to require that any prospective user complete a free on-line safety course. The safety course would explain the policies/procedures used to ensure range clearance and safety, the rules/regulations that visitors would be expected to follow, safety risks (including possible hazards associated with potentially contaminated sites), items they could potentially find and what to do with if they find anything potentially dangerous, and what could happen to them if they don't follow the rules. Appropriate permits would then be distributed to certified users and appropriate combat center officials would be notified of public presence in the RPAA.

2. Potentially contaminated sites would be clearly identified through the use of signage and/or fencing warning of the potential hazards which would be applicable to both military personnel and the public.
3. If required, potentially contaminated sites may be demolished and/or remediated in accordance with accordance with applicable federal, state, and local regulations.

4.4.5.4 Other Safety Issues

Mining

As described for Alternative 1, there are no active mines in the west study area. Several abandoned mines and abandoned mine features are located in the west and south study areas (refer to Table 3.12-4). As in Alternative 1, non-operating mines and mining facilities such as mine shafts and tunnels, not already identified in Table 3.12-4, could also be present; these facilities would be further identified as part of the real estate survey and appraisal process. As described in Section 2.6, all owners of patented or unpatented mining claims within the acquisition boundary would be offered fair market value for their claims or may be afforded reasonable access to their claims. Decisions on whether to provide access to a claim would be made on a case-by-case basis depending on the location of the claim(s) relative to proposed MEB training locations or other factors.

Under Alternative 4, restricted public access to land within the west study area would provide an opportunity for public access to potentially hazardous mine sites; however, abandoned mines would be physically closed by the Marine Corps following protocols developed by the BLM (see Section 2.6). As in Alternative 1, cleanup of known contamination associated with mine sites present within the acquisition study areas would be completed as part of the purchase agreement and would be completed as part of the purchase agreement and would be performed in compliance with applicable federal, state, and local statues and regulations. While it is possible that residual contamination may remain in the subsurface at these locations and may be encountered during recreational or other similar activities by the public in the RPAA, incidents of this type would likely be rare. Public information measures detailed in Section 2.5 would include measures for the public to notify the Marine Corps of suspected contamination. Once notified of the potential contamination, appropriate removal and investigation procedures would be completed by the Combat Center in compliance with applicable federal, state, and local statues and regulations.

Because the south acquisition study area would be designated as exclusive military use areas, a beneficial impact would occur for public health and safety as abandoned mines and other potential mine-related hazards in these areas would be restricted from public access.

Protection of Children

No schools, parks, residences, or other areas typically associated with aggregations of children are located near the acquisition study areas (DoN 2003b). Restricted public access in the west study area when MEB exercises are not occurring would provide an opportunity for recreational activities undertaken by families with children, scout groups, clubs, etc., but health and safety impacts related to such use of the RPAA would apply to all users of the area and would not disproportionately affect children. Permit conditions for use of the RPAA would require constant parental or guardian supervision at all times and that adults take responsibility for the actions of the children under their supervision. Accordingly, health and safety impacts related to the protection of children (per EO 13045) would be less than significant.

Emergency Response

Similar to existing conditions under BLM management, emergency response in the RPAA would be provided by mutual aid agreements with regional providers. These would be supplemented by and coordinated with response capabilities associated with the Combat Center. Coordination between the Marine Corps and local emergency response agencies would occur regularly to ensure that users of the area have adequate access to emergency response capabilities. Event promoters who may be permitted to host race events within the RPAA would continue to be responsible for making sure there is adequate security and law enforcement available during their events (Sections 3.2 and 4.2, *Recreation*).

As noted in Section 3.4, sufficient capacity for emergency response exists within the surrounding community and the Marine Corps. Therefore, Alternative 4 impacts related to emergency response would be less than significant.

Displaced OHV Recreation

As described in Section 4.2, implementation of Alternative 4 would result in indirect impacts associated with displacement of OHV recreation from Johnson Valley to other designated OHV areas and open riding trails during the 2 months of the year that military training would be conducted. The displacement of recreational activities (particularly OHV use) would result in increased use of other areas, potentially resulting in periodic increases in the density of the user population and an associated marginal increase in the safety risks associated with OHV use. The displaced activity would be distributed among many different areas throughout southern California but would be most prevalent at nearby designated OHV areas and routes within the county. OHV riding is inherently a hazardous activity, participants are typically very cognizant of the risks involved, and responsible riders would be expected to adjust their speed and other factors according to the prevailing riding conditions at any given time, including the density of other riders present. The anticipated increase in safety risk attributable to additional riders displaced from acquired portions of the west study area would be minimal at any particular point in time. Consequently, safety impacts to public safety from displaced OHV recreation would be less than significant.

4.4.5.5 Potential Mitigation Measures

With implementation of the public health and safety SCMs (detailed in Section 4.4.2 and Chapter 2) and the specific RPAA management measures detailed in Section 2.5, less than significant impacts to public health and safety would occur under Alternative 4. The Marine Corps considered additional potential mitigation measures but determined that none were feasible. No further or additional mitigation measures are recommended.

4.4.6 Alternative 5 Impacts

4.4.6.1 Aircraft Operations

Impacts associated with Alternative 5 would be the same as those described for Alternative 4. Since military aircraft would continue to utilize the newly established airspace during periods of restricted public access, the potential for aircraft accidents to impact the public would be greater than under Alternative 1. Despite a projected decline in public use of the area compared to existing levels, the potential number of visitors to the area would continue to be substantial. While the risk of public exposure to aircraft-related accidents would increase marginally under Alternative 5, such risks would remain minimal because the new and reconfigured airspace would provide greater separation between aircraft during all flight operations and because the existing stringent aircraft maintenance procedures, flight safety measures, and airspace management protocols (including SCMs described in Section 2.8.1)

would continue to be in effect. Implementation of Alternative 5 would result in less than significant impacts to public health and safety relative to aircraft-related accidents.

Aircraft-delivered Ordnance

Under Alternative 5, aircraft-delivered ordnance would be used only within the current Combat Center boundaries (Figures 2-9c and 2-9d in Chapter 2). Accordingly, no impacts to public health and safety would be associated with aircraft-delivered ordnance under Alternative 5.

Aircraft-related Noise

As described in Section 4.9.6, *Noise*, the 65 dB CNEL noise contour for airfield-related activities would be fully contained within the acquisition study area under Alternative 5. Therefore, no individuals outside the installation would be exposed to CNEL greater than or equal to 65 dB from airfield-related noise. The 65 dB $CNEL_{mr}$ contour for airspace-related activities in current and proposed airspace would be mostly located within the proposed boundaries of the Combat Center. However, as noted in Section 4.1.6.7, *Sensitive Land Uses*, there are no sensitive noise receptors located within the areas where the 65 $CNEL_{mr}$ contour extends outside the proposed boundaries. However, because the public would be afforded restricted public access within the proposed RPAA, some visitors to the RPAA would potentially be exposed to high single-event noise levels emitted by low flying aircraft. Such overflights would not occur consistently over any one location and would be unlikely to affect the same individuals with sufficient intensity or frequency to represent anything more than a periodic annoyance. Aircraft-related noise associated with implementation of Alternative 5 would have less than significant impacts to public health.

4.4.6.2 Ground Training Operations

Ordnance Use

Impacts related to ordnance use under Alternative 5 would be the same as discussed for Alternative 4 for the west study area. During recreational activity in the RPAA, the public could potentially come in contact with such hazards, however, through implementation of the public health and safety SCMs (detailed in Section 4.4.2 and Chapter 2) and the specific RPAA management measures detailed in Section 2.5 less than significant impacts to public health and safety would occur under Alternative 5. Furthermore, if acquired lands were transferred back to public domain, the Marine Corps would be required to comply with NCP, 20 CFR Part 300; CERCLA; BRAC; Reporting Hazardous Substance Activity When Selling or Transferring Federal Real Property (40 CFR Part 373); and Defense Environmental Restoration Program (10 USC 2701).

Ordnance-related Noise

For ordnance, the 62 dBC CNEL contour under Alternative 5 would be mostly contained within the proposed Combat Center boundaries. As shown on Figure 4.9-11, the 62 dBC CNEL contour would extend beyond the boundaries of the Combat Center Complex, slightly to the northeast. However, there are no sensitive noise receptors located within the areas where the 62 dBC CNEL contour extends outside the proposed boundaries. Therefore, ordnance-related noise impacts to public health associated with implementation of Alternative 5 would be less than significant.

Energy Hazards

The proposed communication towers would be located as depicted in Figure 2-9a. As in the case of Alternatives 1 and 4, the communications towers proposed under Alternative 5 would have no significant impacts to public health and safety.

Transportation

Under Alternative 5, impacts from ground transportation activities would be similar to Alternative 1. Therefore, Alternative 5 would have less than significant impacts to public health and safety due to ground transportation.

4.4.6.3 Hazardous Materials and Hazardous/Solid Waste

Impacts from hazardous materials and hazardous/solid waste under Alternative 5 would be similar to those described under Alternative 1. Cleanup of any known contamination sites present within the west study area would be completed as part of the real estate acquisition process and would be performed in compliance with CERCLA. Since it is possible that unknown or undocumented subsurface contamination could exist, public access to contaminated sites would potentially occur under Alternative 5. Any potentially contaminated sites would be clearly marked and mapped, and information would be made available to potential users before and during permitted visits to the area. The presence of these sites would not be expected to impact the public because the sites would be clearly marked for avoidance. Therefore, Alternative 5 would have less than significant impacts to public health and safety due to hazardous materials and waste.

4.4.6.4 Other Safety Issues

Mining

As described for Alternative 1, there are no active mines in the west study area. Several abandoned mines and abandoned mine features are located in the west study area (refer to Table 3.12-4). As in Alternative 1, non-operating mines and mining facilities such as mine shafts and tunnels, not already identified in Table 3.12-4, could also be present; these facilities would be further identified as part of the real estate survey and appraisal process. As described in Section 2.6, all owners of patented or unpatented mining claims within the acquisition boundary would be offered fair market value for their claims or may be afforded reasonable access to their claims. Decisions on whether to provide access to a claim would be made on a case-by-case basis depending on the location of the claim(s) relative to proposed MEB training locations or other factors.

Under Alternative 5, restricted public access to land within the west study area would provide an opportunity for public access to potentially hazardous mine sites; however, abandoned mines would be physically closed by the Marine Corps following protocols developed by the BLM (see Section 2.6). As in Alternative 1, cleanup of known contamination associated with mine sites would be completed as part of the purchase agreement and would be performed in compliance with applicable federal, state, and local statues and regulations. While it is possible that residual contamination may remain in the subsurface at these locations and may be encountered during recreational or other similar activities by the public in the RPAA, incidents of this type would likely be rare. Public information measures detailed in Section 2.5 would include measures for the public to notify the Marine Corps of suspected contamination. Once notified of the potential contamination, appropriate removal and investigation procedures would be completed by the Combat Center in compliance with applicable federal, state, and local statues and regulations. Additional contaminated management site controls would be implemented for RPAA area where limited civilian use would occur as described under Alternative 4.

Protection of Children

No schools, parks, residences, or other areas typically associated with aggregations of children are located near the acquisition study area (DoN 2003b). Restricted public access in the west study area when MEB

exercises are not occurring would provide an opportunity for recreational activities undertaken by families with children, scout groups, clubs, etc., but health and safety impacts related to such use of the RPAA would apply to all users of the area and would not disproportionately affect children.

Emergency Response

Similar to existing conditions under BLM management, emergency response in the RPAA would be provided by mutual aid agreements with regional providers. These would be supplemented by and coordinated with response capabilities associated with the Combat Center. Coordination between the Marine Corps and local emergency response agencies would occur regularly to ensure that users of the area have adequate access to emergency response capabilities. Event promoters who may be permitted to host race events within the RPAA would continue to be responsible for making sure there is adequate security and law enforcement available during their events (Sections 3.2 and 4.2, *Recreation*).

As noted in Section 3.4, sufficient capacity for emergency response exists within the surrounding community and the Marine Corps. Therefore, Alternative 5 impacts related to emergency response would be less than significant.

Displaced OHV Recreation

As described in Section 4.2, implementation of Alternative 5 would result in indirect impacts associated with displacement of OHV recreation from Johnson Valley to other designated OHV areas and open riding trails during the 2 months of the year that military training would be conducted. The displacement of recreational activities (particularly OHV use) would result in increased use of other areas, potentially resulting in periodic increases in the density of the user population and an associated marginal increase in the safety risks associated with OHV use. The displaced activity would be distributed among many different areas throughout southern California but would be most prevalent at nearby designated OHV areas and routes within the county. OHV riding is inherently a hazardous activity, participants are typically very cognizant of the risks involved, and responsible riders would be expected to adjust their speed and other factors according to the prevailing riding conditions at any given time, including the density of other riders present. The anticipated increase in safety risk attributable to additional riders displaced from acquired portions of the west study area would be minimal at any particular point in time. Consequently, safety impacts to public safety from displaced OHV recreation would be less than significant.

4.4.6.5 Potential Mitigation Measures

With implementation of the public health and safety SCMs (detailed in Section 4.4.2 and Chapter 2) and the specific RPAA management measures detailed in Section 2.5, less than significant impacts to public health and safety would occur under Alternative 5. The Marine Corps considered additional potential mitigation measures but determined that none were feasible. No further or additional mitigation measures are recommended.

4.4.7 Alternative 6 Impacts (Preferred Alternative)

Alternative 6 would have elements in common with both Alternative 1 and 4, and many of the potential public health and safety impacts would be similar as well. A majority of the acquired land area under Alternative 6 would be managed for exclusive military use year-round, as in Alternative 1, and a relatively small portion of Alternative 6 would permit restricted public access when MEB exercises are not being conducted, as in Alternative 4 (and 5).

4.4.7.1 Aircraft Activities

Aircraft-related Accidents

Safety risks associated with aircraft-related accidents under Alternative 6 would be similar to those described for Alternative 1. The risk of accidents occurring and the potential for impacts to public health and safety if an accident did occur would not change appreciably from baseline conditions, based on the following considerations:

- Substantially larger airspace areas would be available for all aircraft activity, thus providing more separation between aircraft during flight operations.
- Rigorous aircraft maintenance procedures, flight safety protocols, and airspace management coordinated with the FAA would continue to be in effect at all times (as detailed in Section 3.4.3.1).
- Land use in the vicinity includes extensive open space areas with no permanent residents or appreciable development and only minimal, very low-density residential development outside the perimeter of the proposed airspace footprint. Therefore, the likelihood that any aircraft mishaps would involve the public is very low.
- Most aircraft sorties within the west study area would occur over areas designated for exclusive military use.

Since military aircraft would fly over the designated RPAA during the 10 months of the year when restricted public access would be permitted, the potential for any aircraft accidents to impact the public in this area would be greater than in the larger exclusive military use area. Public use of the RPAA would be expected to decline compared to baseline levels in the area (by approximately 60% for race events and 30% for dispersed use, according to BLM-derived assumptions used in Section 4.2, *Recreation* and Section 4.3, *Socioeconomics*), but the potential number of visitors to the area would continue to be substantial. Public use would continue to occur predominantly on weekends (often extended to 3 days) and would normally be dispersed throughout the area, though OHV race events would be expected to attract localized crowds of spectators. While the risk of public exposure to aircraft-related accidents would increase marginally in the RPAA under Alternative 6, such risks would remain minimal because stringent aircraft maintenance procedures, flight safety measures, and airspace management protocols (including SCMs described in Section 2.8.1) would continue to be in effect. Implementation of Alternative 6 would result in less than significant impacts to public health and safety relative to aircraft-related accidents.

Aircraft-delivered Ordnance

Under Alternative 6, ordnance use would not occur within the south study area, so no impacts associated with aircraft-delivered ordnance would occur in that area. Aircraft-delivered ordnance would be used only within the proposed exclusive military use area and within the current Combat Center boundaries (Figures 2-10c and 2-10d in Chapter 2). The focus of this analysis is therefore on the exclusive military use area under Alternative 6.

Impacts associated with ordnance use in the exclusive military use portion of the west study area under Alternative 6 would be similar to Alternative 1. No new procedures would need to be established for aircraft-delivered ordnance within the new and modified airspace. Existing procedures would be followed for the use and handling of all munitions (Appendix F), and for range sweeps and range clearance following the training operations (see Section 3.4). In addition, all target areas (and the

associated WDZs) within which aircraft-delivered weapons would be fired under Alternative 6 would be located well within the boundaries of the exclusive military use area; no authorized public access would be permitted near the areas subject to use of aircraft-delivered ordnance.

Consistent with current conditions, there would be no fencing under Alternative 6 to delineate the boundaries of the Marine Corps training areas; therefore, the potential exists for unauthorized public access onto military property. Despite the extensive and ongoing outreach efforts that would be undertaken to communicate the proposed changes in the status of the property, some amount of unauthorized public access (e.g., by trespassers and 'scrappers,' OHV and other recreational users) would likely occur in the acquisition study areas, particularly initially, as existing users of the areas may not be aware of or may choose to disregard information and warnings about the change. Under Alternative 6, the west study area would be expected to yield the highest incidence of unauthorized public access due to the higher level of existing recreational use in the area (refer to Section 4.2, *Recreation*). The Marine Corps has established procedures to detect and remove unauthorized individuals from existing training areas (detailed in Section 3.4). Under Alternative 6, implementation of such measures would be extended into the west and south study areas, and extra patrols by Conservation Law Enforcement Officers would occur.

The proposed measures described in Section 2.5 would reduce the likelihood that the public would be unaware of the restrictions established on public access, for both the exclusive military use area and the RPAA. To further reduce the potential for adverse safety impacts, range sweeps would be conducted to detect and remove UXO (MAGTF Training Command 2010f). Areas would be initially "swept" by the training force after completion of activities, with additional clearance measures taken by appropriate EOD personnel and Base Range Safety personnel, as required. All existing plans and procedures applicable to the management of UXO and EOD would be updated to include the operations within the new training areas.

Based on these considerations, aircraft-delivered ordnance activities under Alternative 6 would be expected to have less than significant impacts to public health and safety.

Aircraft-related Noise

As described in Section 4.9.7, *Noise*, the 65 dB CNEL noise contour for airfield-related activities and the 65 dB $CNEL_{mr}$ contour for airspace-related activities in current and proposed airspace, would be fully contained within the proposed boundaries of the Combat Center under Alternative 6. Therefore, no individuals outside the installation would be exposed to CNEL or $CNEL_{mr}$ greater than or equal to 65 dB from airfield-related or airspace-related noise. However, because the public would be afforded restricted public access within the proposed RPAA, some visitors to the RPAA would potentially be exposed to high single-event noise levels emitted by low flying aircraft. Such overflights would not occur consistently over any one location and would be unlikely to affect the same individuals with sufficient intensity or frequency to represent anything more than a periodic annoyance. Aircraft-related noise associated with implementation of Alternative 6 would have less than significant impacts to public health.

4.4.7.2 Ground Training Activities

Ordnance Use

Under Alternative 6, ordnance use would only occur within the west study area, so no impacts associated with use of ordnance would occur in the south study area.

Similar to the description of Alternative 1, the potential would exist under Alternative 6 for unauthorized public access into the exclusive military use area in the west study area and subsequent contact with UXO, munitions, debris, dropped equipment, or other dangerous materials associated with military training. While the potential for contact with such materials would represent a potential impact to unauthorized individuals and trespassers, the impact would be minimized due to the implementation of public awareness and outreach efforts (e.g., signage), military patrols, range sweeps, and other proposed measures discussed above; accordingly, ordnance use associated with Alternative 6 would have less than significant impacts to public health and safety.

All ordnance intended to land within the RPAA would be non dud-producing. Some dud-producing ordnance would be fired from the RPAA into the exclusive military use area. The eastern portions of the RPAA would be in close proximity to the existing No Access/Restricted Areas of the Combat Center and the two proposed "company objective" areas within the RPAA that would not be made available for restricted public access. The Marine Corps would implement the procedures outlined in Section 2.5 to clearly delineate such areas and to detect/prevent any unauthorized public access to such areas.

A variety of safety measures would be implemented to reduce the potential for impact on public health and safety, particularly within the RPAA. All existing plans and procedures applicable to the management of UXO and EOD would be updated to include the operations proposed within the new training areas. Combat Center Order 3500.4H, *Standard Operating Procedures for Range/Training Areas and Airspace*, would be updated to reflect the non-dud producing munitions restrictions in the RPAA. In addition, implementation of SCMs detailed in Section 2.8.1 and additional focused measures detailed in Section 2.5 would reduce the potential for risks to public health and safety. While access to and use of the RPAA by the general public would be controlled, inherent risks to public health and safety would remain in certain portions of the RPAA as a result of the potential presence of munitions constituents, debris, equipment, or other hazards that may have gone undetected during post-exercise range sweeps and EOD range clearance operations. During recreational activity in the RPAA, the public could potentially come in contact with such hazards; however, through implementation of the public health and safety SCMs (detailed in Section 4.4.2 and Chapter 2) and the specific RPAA management measures detailed in Section 2.5, less than significant impacts to public health and safety would occur under Alternative 6.

Furthermore, if acquired lands were transferred back to public domain, the Marine Corps would be required to comply with USEPA 40 CFR Part 300; CERCLA; BRAC; Reporting Hazardous Substance Activity When Selling or Transferring Federal Real Property (40 CFR Part 373); and Defense Environmental Restoration Program (10 USC 2701).

<u>Ordnance-related Noise</u>

For ordnance, the 62 dBC CNEL contour under Alternative 6 would be mostly contained within the proposed Combat Center boundaries. As shown on Figure 4.9-13, the 62 dBC CNEL contour would extend beyond the boundaries of the Combat Center Complex to the west and northeast. However, there are no sensitive noise receptors located within the areas where the 62 dBC CNEL contour extends outside the proposed boundaries. While some noise and vibrations associated with ordnance use under Alternative 6 may be periodically detected by residents and other members of the public from a distance, and may sometimes be an annoyance, ordnance-related noise impacts to public health associated with implementation of Alternative 6 would be less than significant.

Energy Hazards

The proposed communication towers would be located as depicted in Figure 2-10a. All three of the proposed towers would be installed on mountain peaks in remote and rugged terrain, but under Alternative 6 one of the towers would be located just outside of the proposed acquisition area where public access would be monitored and controlled. This tower would be close enough to the west study area to contribute, as intended, to military communications capability during training exercises. However, it would be sufficiently removed from any ordnance use or storage to render it safe with respect to HERO or other public safety concerns. No impacts related to energy hazards would occur under Alternative 6.

Transportation

Under Alternative 6, impacts from ground transportation activities would be similar to Alternative 1. Therefore, Alternative 6 would have less than significant impacts to public health and safety due to ground transportation.

4.4.7.3 Hazardous Materials and Hazardous/Solid Waste

Impacts from hazardous materials and hazardous/solid waste under Alternative 6 would be similar to those described under Alternative 1. Cleanup of contamination associated with abandoned mine sites present within the acquisition study areas would be completed as a function of the real estate acquisition and would be performed in compliance with CERCLA. Since it is possible that unknown or undocumented subsurface contamination could exist, public access to contaminated sites would potentially occur under Alternative 6. Any potentially contaminated sites would be clearly marked and mapped, and information would be made available to potential users before and during permitted visits to the area. Additional contaminated management site controls would be implemented for RPAA area where limited civilian use would occur as described under Alternative 4. The presence of these sites would not be expected to impact the public because the sites would be clearly marked for avoidance. Therefore, Alternative 6 would have less than significant impacts to public health and safety due to hazardous materials and waste.

4.4.7.4 Other Safety Issues

Under Alternative 6, impacts related to mines would be similar to those described for Alternatives 1 and 2. As described in Section 2.6, the Marine Corps would acquire the patented and unpatented claims associated with the Morris Lode and Bessemer Mines, which are known to coincide with areas proposed for exclusive military use and would lie within the aviation WDZs and direct and indirect fire Surface Danger Zones (SDZs) for the MEB Exercise Work-up training scenario, Final Exercise scenario, and tenant-transient 4-day training cycle. Cleanup of any contamination associated with the mines would be completed as part of the purchase agreement and would be performed in compliance with applicable federal, state, and local statues and regulations (see Section 2.6). While it is possible that residual contamination and/or unknown or undocumented subsurface contamination would remain at these sites, public exposure would not occur since the acquisition study areas would be managed for exclusive military use and contact with the site and exposure of Marines, civilians, site invitees, and trespassers to potential contamination would be limited through land use restrictions, including signs, base master plan amendments, patrols, and other notices provided by the Marine Corps. Abandoned mines and abandoned mine features would be physically closed by the Marine Corps following protocols developed by the BLM (see Section 2.6). Any contamination from abandoned mines would be remediated in accordance with applicable federal, state, and local statutes regulations.

Based on the history of mining in the acquisition study area, other non-operating mines and mining facilities (such as mine shafts and tunnels) not already identified in Table 3.12-4 could be present; these facilities would be further identified as part of the real estate survey and appraisal process. Cleanup of any contamination associated with mine sites present within the acquisition study areas would be performed in compliance with applicable federal, state, and local statues and regulations. While it is possible that residual contamination and/or unknown or undocumented subsurface contamination would remain at these sites, public exposure would not occur within the exclusive military use area. Because the majority of the mines occur in the exclusive military use area of Alternative 6, a beneficial impact would occur for public health and safety as public access to potentially dangerous mine infrastructure would be restricted.

Protection of Children

No schools, parks, residences, or other areas typically associated with aggregations of children are located near the acquisition study areas (DoN 2003b). Restricted public access in the west study area under Alternative 6 would provide an opportunity for recreational activities undertaken by families with children, scout groups, clubs, etc., but health and safety impacts related to such use of the RPAA would apply to all users of the area and would not disproportionately affect children.

Emergency Response

Similar to existing conditions under BLM management, emergency response in the RPAA would be provided by mutual aid agreements with regional providers. These would be supplemented by and coordinated with response capabilities associated with the Combat Center. Event promoters who may be permitted to host race events within the RPAA would continue to be responsible for making sure there is adequate security and law enforcement available during their events (Sections 3.2 and 4.2, *Recreation*).

As noted in Section 3.4, sufficient capacity for emergency response exists within the surrounding community and the Marine Corps. Therefore, Alternative 6 impacts related to emergency response would be less than significant.

Displaced OHV Recreation

As described in Section 4.2, implementation of Alternative 6 would result in indirect impacts associated with displacement of OHV recreation from the acquired portion of Johnson Valley when military training is being conducted to other designated OHV areas and open riding trails in the area (refer also to Appendix M). The displacement of recreational activities (particularly OHV use) would result in increased use of other areas, potentially resulting in periodic increases in the density of the user population and an associated marginal increase in the safety risks associated with OHV use. The displaced activity would be distributed among many different areas throughout southern California (see Appendix M for assumptions and a potential distribution of displaced use) but would be most prevalent at nearby designated OHV areas and routes within the county. OHV riding is inherently a hazardous activity, participants are typically very cognizant of the risks involved, and responsible riders would be expected to adjust their speed and other factors according to the prevailing riding conditions at any given time, including the density of other riders present. The anticipated increase in safety risk attributable to additional riders displaced from acquired portions of the west study area would be minimal at any particular point in time. Consequently, safety impacts to public safety from displaced OHV recreation would be less than significant.

4.4.7.5 Potential Mitigation Measures

With implementation of the public health and safety SCMs (detailed in Section 4.4.2 and Chapter 2) and the specific RPAA management measures detailed in Section 2.5, less than significant impacts to public health and safety would occur under Alternative 6. The Marine Corps considered additional potential mitigation measures but determined that none were feasible. No further or additional mitigation measures are recommended.

4.4.8 No-Action Alternative

Under the No-Action Alternative, the Marine Corps would not acquire the acquisition study area lands and would not establish a large-scale training facility to accommodate sustained, combined-arms, live-fire and maneuver training exercises for a MEB-sized MAGTF. The Combat Center at Twentynine Palms would continue to support other ongoing combined arms exercises and training for single battalion and smaller units and individual Marines, as it is currently doing. The Marine Corps would also continue to implement all current regulations, guidelines, and BMPs to prevent health and safety impacts to the public. Existing safety risks from pursuit of recreational activities in the acquisition study areas would remain the same. Consequently, the No-Action Alternative would have no impact to public health and safety.

4.4.9 Summary of Impacts

Table 4.4-1 summarizes the impacts of each action alternative and the No-Action Alternative.

Table 4.4-1. Summary of Impacts

Alternative	Impacts
Alternative 1	LSI • Aircraft Activities – Current procedures regarding prevention/response to aircraft-related accidents would continue. Existing plans and procedures related to aircraft-delivered ordnance would be updated to include the new training areas. No off-base receptors would be exposed to aircraft noise greater than or equal to 65 dB CNEL. • Ground Training Activities – Range clearance procedures associated with ordnance use would be updated to include the new training areas. Vehicle accidents associated with training operations would be minor. No off-base receptors would be exposed to ordnance noise greater than or equal to 62 dBC CNEL. • Emergency Response – Sufficient capacity is present to serve the actions associated with Alternative 1; as a result, no significant impacts would occur. • Displaced Recreation – Indirect impacts associated with the displacement of recreational activities (particularly OHV use) would result in increased use of certain other recreational areas and designated routes, potentially resulting in periodic increases in the density of the riding population and an associated marginal increase in the safety risks associated with OHV use. OHV activities are inherently hazardous, participants are typically very cognizant of the risks involved, and responsible riders would be expected to adjust their speed and other factors according to the prevailing riding conditions at any given time, including the density of other riders present. The anticipated increase in safety risk attributable to additional riders displaced from Johnson Valley would be minimal at any particular point in time. • Hazardous Materials and Hazardous/Solid Waste – No change to permits, hazardous waste generator status would occur. Adequate solid waste capacity is present to accommodate new activities. Public access to contaminated sites would be restricted due to the exclusive military use resulting in a positive impact. No significant impacts would occur.

Continued on next page

Table 4.4-1. Summary of Impacts

Alternative	Impacts
Alternative 1 (continued)	NI • Ground Training (Energy Hazards), Other Safety Issues (Protection of Children) – No impacts due to energy hazards or protection of children would occur. BI • Other Safety Issues (Mines/Contaminated Sites) – Physical closure of mines would further limit potential unauthorized access by the public. Public access to contaminated sites would be reduced or eliminated through land use restrictions, including signs, base master plan amendments, patrols, and other notices provided by the Marine Corps.
Alternative 2	LSI • Aircraft Activities, Ground Training Activities, Other Safety Issues, Ground Transportation, Emergency Response, Displaced Recreation, and Hazardous Materials and Hazardous/Solid Waste – Impacts would be similar to those described for Alternative 1. NI • Ground Training (Energy Hazards), Other Safety Issues (Protection of Children) – Impacts would be the same as for Alternative 1. BI • Other Safety Issues (Mines/Contaminated Sites) – Impacts would be the same as for Alternative 1.
Alternative 3	LSI • Aircraft Activities, Ground Training Activities, Other Safety Issues, Emergency Response, and Hazardous Materials and Hazardous/Solid Waste – Impacts would be similar to those described for Alternative 1. • Temporary road closures for training would be coordinated with local jurisdictions and authorities and tank crossings would be installed to ensure less than significant impacts. • Mapping and avoiding high-pressure natural gas pipelines would be performed as part of the ground training activities. NI • Ground Training (Energy Hazards), Other Safety Issues (Protection of Children) – Impacts would be the same as for Alternative 1. BI • Other Safety Issues (Contaminated Sites) – Impacts would be the same as for Alternative 1.
Alternative 4	LSI • Aircraft Accidents – Current procedures regarding prevention/response to aircraft-related accidents would continue. Existing plans and procedures related to aircraft-delivered ordnance would be updated to include the new training areas and public use would be permitted on a case-by-case basis, resulting in less than significant impacts. • Aircraft-related Noise – The 65 dB CNEL noise contours for airfield and airspace-related activities would be fully contained within the proposed boundaries, resulting in less than significant impacts to public health. • Ground Training Activities – Vehicle accidents associated with training operations would be minor. No off-base receptors would be exposed to ordnance noise greater than or equal to 62 dBC CNEL. • Ground Transportation – Impacts would be similar to Alternative 1. • Emergency Response – Sufficient capacity is present to serve the actions associated with Alternative 4; as a result, no significant impacts would occur.

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Table 4.4-1. Summary of Impacts

Alternative	Impacts
Alternative 4 (continued)	• Displaced Recreation – Indirect impacts associated with the displacement of recreational activities (particularly OHV use) to other recreational areas and designated routes would potentially result in a minimal increase in safety risks associated with OHV use at these other areas. • Other Safety Issues – Physical closure of mines would further limit potential unauthorized access by the public. Contaminated sites would be clearly marked/mapped to minimize public access. Public access would be limited and eliminated through land use restrictions, including signs, base master plan amendments, patrols, and other notices provided by the Marine Corps. No known environmental health or safety risk would occur that may disproportionately affect children. • Hazardous Materials and Hazardous/Solid Waste – Impacts would be the same as for Alternative 1. • Ground-delivered Ordnance – During recreational activity in the RPAA, the public could potentially come in contact with remaining munitions undetected during UXO and EOD clearance operations. Implementation of project SCMs related to public health and safety (e.g., range sweeps, public education and permitting) would reduce risk to public health and safety to a less than significant level in the RPAA. NI • Aircraft-delivered Ordnance – Ordnance would be used only within the current Combat Center boundaries, so no impacts to public health and safety would occur. • Ground Training (Energy Hazards) – Impacts would be the same as for Alternative 1.
Alternative 5	LSI • Aircraft Accidents, Aircraft-related Noise, Ground Training Activities, Emergency Response, Other Safety Issues, Hazardous Materials and Hazardous/Solid Waste – Impacts would be the same as Alternative 4. • Ground Transportation – Impacts would be the same as Alternative 1. • Ground-delivered Ordnance – Impacts would be the same as Alternative 4 for ground-delivered ordnance. • Displaced Recreation – Indirect impacts associated with the displacement of recreational activities (particularly OHV use) to other recreational areas and designated routes would potentially result in a minimal increase in safety risks associated with OHV use at these other areas. NI • Aircraft-delivered Ordnance – Ordnance would be used only within the current Combat Center boundaries, so no impacts to public health and safety would occur. • Ground Training (Energy Hazards) – Impacts would be the same as for Alternative 1. BI • Other Safety Issues (Mines/Contaminated Sites) – Physical closure of mines would further limit potential unauthorized access by the public. Public access to contaminated sites would be reduced or eliminated through land use restrictions, including signs, base master plan amendments, patrols, and other notices provided by the Marine Corps.

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Table 4.4-1. Summary of Impacts

Alternative	Impacts
Alternative 6	LSI • Aircraft Accidents, Aircraft-delivered Ordnance, Aircraft-related Noise, Emergency Response, Transportation, Other Safety Issues, Hazardous Materials and Hazardous/Solid Waste – Impacts would be the same as Alternative 1 (exclusive military use areas) and Alternative 4 (RPAA). • Ground-delivered Ordnance – Impacts would be the same as Alternative 4. • Displaced Recreation - Indirect impacts associated with the displacement of recreational activities (particularly OHV use) to other recreational areas and designated routes would potentially result in a minimal increase in safety risks associated with OHV use at these other areas. NI • Ground Training (Energy Hazards) – Impacts would be the same as for Alternative 1. BI • Other Safety Issues (Mines/Contaminated Sites) – Physical closure of mines would further limit potential unauthorized access by the public. Public access to contaminated sites would be reduced or eliminated through land use restrictions, including signs, base master plan amendments, patrols, and other notices provided by the Marine Corps.
No-Action Alternative	NI • Aircraft Accidents, Aircraft and Ground-delivered Ordnance, Emergency Response, Other Safety Issues, Hazardous Materials and Hazardous/Solid Waste – Regular training activities (vehicle use, aircraft use, firing of ammunition, UXO and munitions, generation of hazardous and non-hazardous wastes, and resource use) within the boundaries of the Combat Center would remain the same. • Existing safety risks from pursuit of recreational activities in the acquisition study areas would remain the same.

Notes: ACM = asbestos-containing material; BI = Beneficial impact; CNEL = Community Noise Equivalent Level; dB = decibel; dBC = C-weighted decibel; EOD = explosive ordnance disposal; FUDS = formerly used defense sites; HERO = Hazards of Electromagnetic Radiation to Ordnance; LSI = Less than significant impact; NI = No impact; RPAA = Restricted Public Access Area; UXO = unexploded ordnance

4.5 VISUAL RESOURCES

4.5.1 Approach to Analysis

4.5.1.1 Methodology

The factors considered in determining impacts on visual resources typically include: 1) scenic quality of the project site and vicinity; 2) available visual access and visibility, frequency and duration that the landscape is viewed; 3) viewing distance and degree to which project components would dominate the view of the observer; 4) resulting contrast of the proposed facilities or activities with existing landscape characteristics; 5) the extent to which project features or activities would block views of higher value landscape features; and 6) the level of public interest in the existing landscape characteristics and concern over potential changes.

An overall visual sensitivity approach was employed to analyze the existing landscape visual quality, viewer concern, and overall viewer exposure to the project (see Section 3.5). To assess possible visual changes resulting from the project, this analysis considers the contrasts of the project in relation to the existing landscape including an assessment of visual contrast, project dominance, and view blockage for each of the key viewpoints (KVPs) (see Figure 4.5-1 through 4.5-3 for location of KVPs in each acquisition study area). A visual simulation was also prepared with which to further evaluate the preliminary impact determination. Each of these key factors considered in the evaluation of visual change is generally expressed as low, low-to-moderate, moderate, moderate-to-high, or high and is described below.

Visual Contrast describes the degree to which a project's visual characteristics or elements (consisting of form, line, color, and texture) differ from the same visual elements established in the existing landscape. The degree of contrast can range from low to high. The presence of forms, lines, colors, and textures in the landscape similar to those of a proposed project indicates a landscape more capable of accepting those project characteristics than a landscape where those elements are absent. This ability to accept alteration is often referred to as visual absorption capability and typically is inversely proportional to visual contrast.

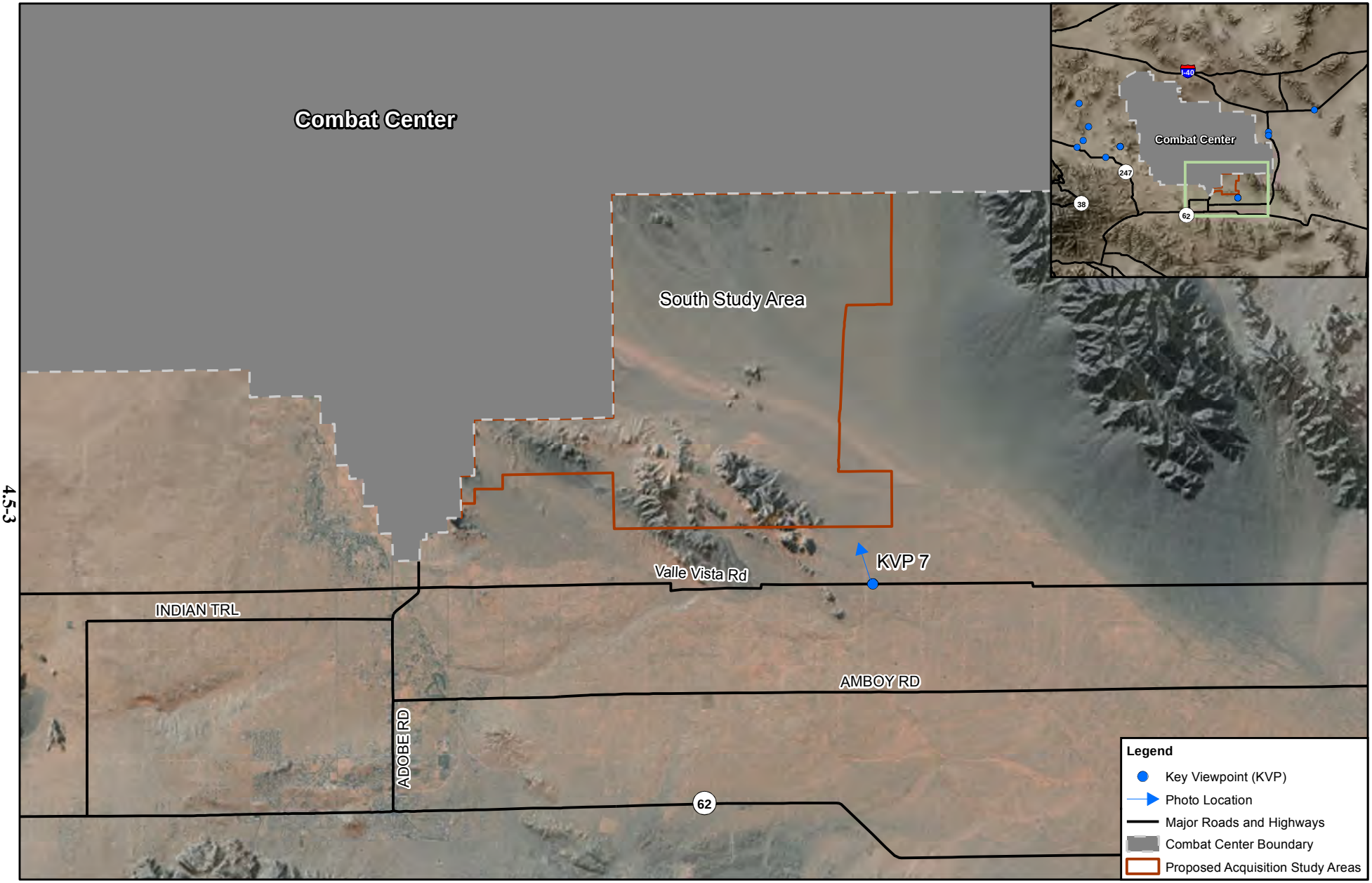
Project Dominance is a measure of a feature's apparent size relative to other visible landscape features and the total field of view. A feature's dominance is affected by its relative location in the field of view and the distance between the viewer and the feature. The level of dominance can range from subordinate to dominant.

View Blockage *or* ***Impairment*** describes the extent to which any previously visible landscape features are blocked from view as a result of the project's scale and/or position. Blockage of higher quality landscape features by lower quality project features causes adverse visual impacts. The degree of view blockage can range from none to high.

Overall Visual Change is a concluding assessment as to the degree of change that would be caused by a project. Overall visual change is derived from a comparison of resulting visual contrast, project dominance, and view blockage.

Kilometers
0 1.5 3 6
0 1.5 3
Miles
Source: MAGTF Training Command 2009a

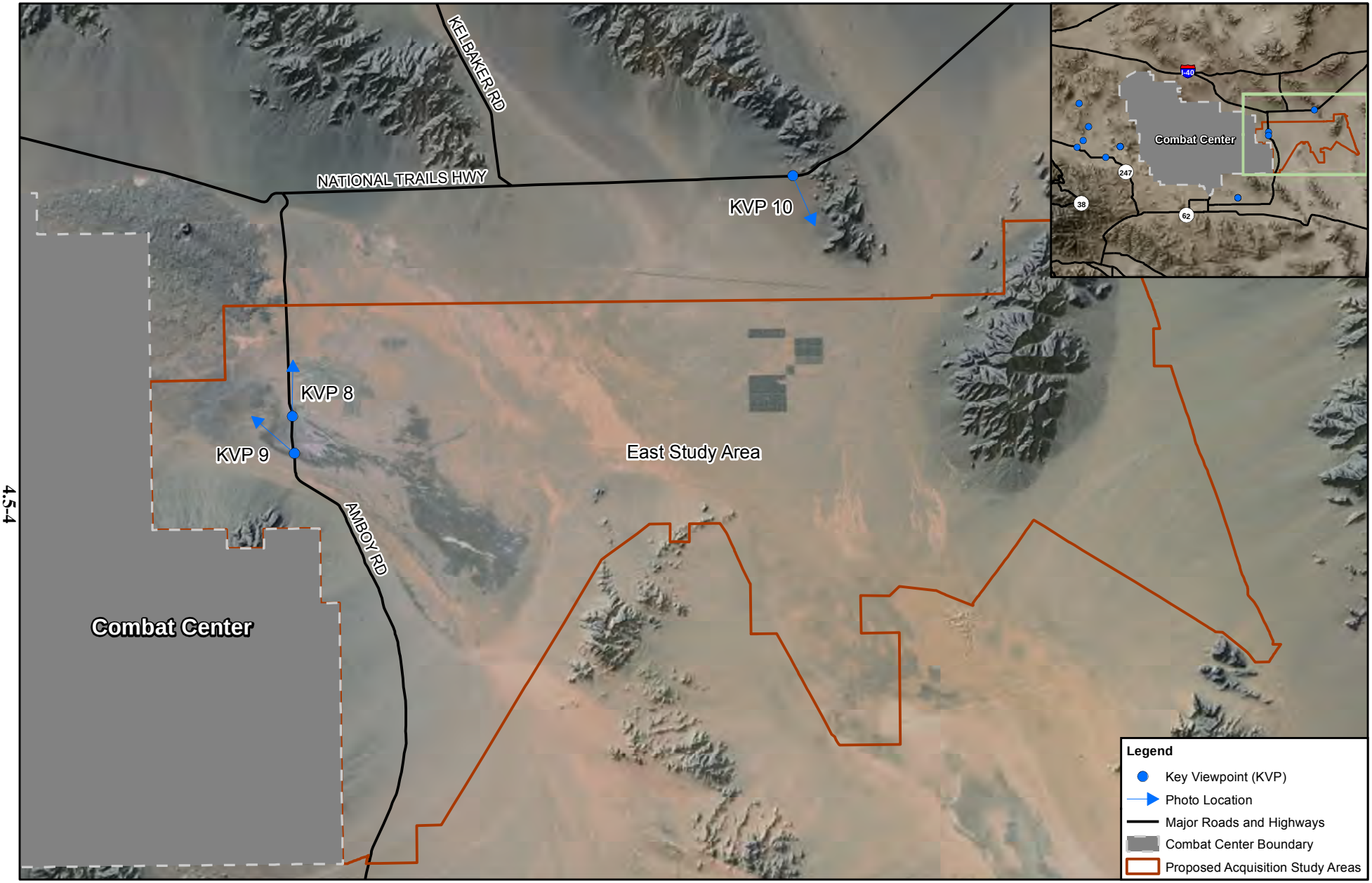
Figure 4.5-1
Key Viewpoints and Photo Locations in West Study Area



Kilometers
0 1.5 3 6
0 1.5 3
Miles
Source: MAGTF Training Command 2009a

Figure 4.5-2
Key Viewpoints and Photo Locations in South Study Area

N



Kilometers
0 1.5 3 6
0 1.5 3
Miles
Source: MAGTF Training Command 2009a

Figure 4.5-3
Key Viewpoints and Photo Locations in East Study Area

Subsequently, a conclusion was made regarding the extent of overall visual change, and taken together with the existing landscape's visual sensitivity, the level of probable visual impact significance was determined. Table 4.5-1 illustrates the general interrelationship between visual sensitivity and visual change and is used primarily as a consistency check between individual KVP evaluations. Implicit in this rating methodology is the acknowledgment that, for a visual impact to be considered significant, two conditions generally exist: 1) the existing landscape is of reasonably high quality and is relatively valued by viewers; and 2) the perceived incompatibility of one or more proposed action elements or characteristics tends toward the high extreme, leading to a substantial reduction in visual quality.

Table 4.5-1. Visual Sensitivity – Visual Change Guidance for Review of Impact Significance

Overall Visual Sensitivity	Overall Visual Change				
	Low	**Low to Moderate**	**Moderate**	**Moderate to High**	**High**
Low	Not Significant[1]	Not Significant	Adverse but Less Than Significant	Adverse but Less Than Significant	Adverse but Less Than Significant
Low to Moderate	Not Significant	Adverse but Less Than Significant	Adverse but Less Than Significant	Adverse but Less Than Significant	Adverse and Potentially Significant
Moderate	Adverse but Less Than Significant[2]	Adverse but Less Than Significant	Adverse but Less Than Significant	Adverse and Potentially Significant	Adverse and Potentially Significant
Moderate to High	Adverse but Less Than Significant	Adverse but Less Than Significant	Adverse and Potentially Significant	Adverse and Potentially Significant	Significant
High	Adverse but Less Than Significant	Adverse and Potentially Significant[3]	Adverse and Potentially Significant	Significant[4]	Significant

Notes: [1]Not Significant impacts may or may not be perceptible but are considered minor in the context of existing landscape characteristics and view opportunity.
[2]Adverse but Less Than Significant impacts are perceived as negative but do not exceed environmental thresholds.
[3]Adverse and Potentially Significant impacts are perceived as negative and may exceed environmental thresholds depending on project and site-specific circumstances.
[4]Significant impacts with feasible mitigation may be reduced to levels that are less than significant or avoided all together. Without mitigation, significant impacts would exceed environmental thresholds.

4.5.1.2 Evaluation Criteria

An adverse visual impact occurs within public view when: 1) an action perceptibly changes existing features of the physical environment so that they no longer appear to be characteristic of the subject locality or region; 2) an action introduces new features to the physical environment that are perceptibly uncharacteristic of the region and/or locale; or 3) aesthetic features of the landscape become less visible (e.g., partially or totally blocked from view) or are removed. Changes that seem uncharacteristic are those that appear out of place, discordant, or distracting. The degree of the visual impact depends upon how noticeable the adverse change may be. The noticeability of a visual impact is a function of project features, context, and viewing conditions (angle of view, distance, primary viewing directions, and duration of view).

Impacts on visual resources under the proposed action could result from various components including: training activities on land and in the air and construction and presence of the communication towers and company objective targets.

4.5.1.3 Public Scoping Issues

Concerns that were raised by the public during the 90-day scoping period (October 30, 2008 through January 31, 2009) are addressed in this analysis. These visual resources concerns include, but are not limited to:

- loss of natural vistas, major visual resources, and open desert habitat, and
- visual impacts from equipment and support structures used during training exercises.

4.5.2 Alternative 1 Impacts

4.5.2.1 Key Viewpoint 4

A simulation of proposed training activities that would be visible from KVP 4 is shown in Figure 4.5-4.

Visual Contrast. Low to Moderate. Proposed training activities would occur on land area and in airspace adjacent to the Combat Center. Viewers in the area (e.g., those traveling on State Route [SR] 247) are accustomed to military training in the area; therefore, the visual absorption capability is moderate to high. The proposed training activities on land would produce temporary dust clouds that would have low visual contrast with the existing landscape color. Aircraft travel is common in the area due to the presence of existing air traffic corridors. Clear, blue skies are characteristic of the desert climate in the area; therefore, aircraft associated with training activities would have low to moderate visual contrast. New signage, access gates, and barriers would be visible from the roadway, but would not be an uncommon visual element of the area. Consequently, visual contrast for KVP 4 would be low to moderate.

Project Dominance. Low. Signs of proposed training activities (e.g., dust clouds, aircraft, etc.) would occur in the middle ground, low on the horizon, and would comprise a small portion of the total field of view. Any visible elements would be short-term in duration. New signage, access gates, and barriers would comprise a small portion of the visual field. Consequently, the project dominance would be low.

View Blockage or Impairment. Low. Signs of proposed training activities would occur in the middle ground; therefore, little to no visible landscape would be blocked by the project components. New signage, access gates, and barriers would block little to no visible landscape. Consequently, view blockage or impairment for KVP 4 would be low.

Overall Visual Change. Low to Moderate. For visual receptors in the vicinity of KVP 4, the low to moderate visual contrast, low project dominance, and low view blockage or impairment lead to a low to moderate overall visual change of the visual setting and viewing characteristics.

Key Viewpoint 4 Existing Conditions: Viewing northeast from SR 247/Bessemer Mine Road into the west study area.

Key Viewpoint 4 Simulation: Proposed training activities.

Figure 4.5-4. Visual Simulation of Proposed Training Activities for KVP 4

4.5.2.2 Key Viewpoint 5

A simulation of proposed training activities that would be visible from KVP 5 is shown in Figure 4.5-5.

Visual Contrast. Low to Moderate. Proposed training activities would occur on land area adjacent to the Combat Center. Viewers in the area (e.g., those traveling on SR 247) are accustomed to military training in the area; therefore, the visual absorption capability is moderate to high. The proposed training activities on the land would produce temporary dust clouds that would have low visual contrast with the existing landscape color. Aircraft travel is common in the area due to the presence of existing air traffic corridors. Clear, blue skies are characteristic of the desert climate in the area; therefore, aircraft associated with training activities would have low to moderate visual contrast. New signage, access gates, and barriers would be visible from the roadway, but would not be an uncommon visual element of the area. Consequently, visual contrast for KVP 5 would be low to moderate.

Project Dominance. Low. Signs of proposed training activities (e.g., dust clouds, aircraft, etc.) would occur in the middle ground, low on the horizon, and would comprise a small portion of the total field of view. Any visible elements would be short-term in duration. New signage, access gates, and barriers would comprise a small portion of the visual field. Consequently, the project dominance would be low.

View Blockage or Impairment. Low. Signs of proposed training activities would occur in the middle ground; therefore, little to no visible landscape would be blocked by the project components. New signage, access gates, and barriers would block little to no visible landscape. Consequently, view blockage or impairment for KVP 5 would be low.

Overall Visual Change. Low to Moderate. For visual receptors in the vicinity of KVP 5, the low to moderate visual contrast, low project dominance, and low view blockage or impairment lead to a low to moderate overall visual change of the visual setting and viewing characteristics.

Key Viewpoint 5 Existing Conditions: Viewing northeast from SR 247 near Boone Road into the west study area.

Key Viewpoint 5 Simulation: Proposed training activities.

Figure 4.5-5. Visual Simulation of Proposed Training Activities for KVP 5

4.5.2.3 Key Viewpoint 7

A simulation of proposed training activities that would be visible from KVP 7 is shown in Figure 4.5-6.

Visual Contrast. Low. Proposed training activities would occur on land area adjacent to the Combat Center. Viewers in the area (e.g., residences) are accustomed to military training in the area; therefore, the visual absorption capability is moderate to high. The proposed training activities on the land would produce few if any temporary dust clouds, which would have low visual contrast with the existing landscape color.

Project Dominance. Low. Signs of proposed training activities (e.g., dust clouds, etc.) would occur in the middle ground, occurring low on the horizon and would comprise a small portion of the total field of view. Any visible elements would be short-term in duration. Consequently, the project dominance would be low.

View Blockage or Impairment. Low. Signs of proposed training activities would occur in the middle ground; therefore, little to no visible landscape would be blocked by the project components.

Overall Visual Change. Low. For visual receptors in the vicinity of KVP 7, the low visual contrast, low project dominance, and low view blockage or impairment lead to a low overall visual change of the visual setting and viewing characteristics.

4.5.2.4 Impact from Night Operations

A majority of the night sky illumination under Alternative 1 would be similar to existing, occurring either in the same location or in a slightly different location, in some instances farther away from public view than currently. Associated with the proposed action, there would be a shift of current night operations and an increase from new operations in the west study area. The most noticeable illumination would occur from ordnance, with flares lasting approximately 30 seconds to 5 minutes, and would be most visible from the Johnson Valley area. Overall, night illumination would be similar to existing conditions and would impact an area that is sparsely developed; therefore, impacts would be less than significant.

4.5.2.5 Impact Significance

Under Alternative 1, there would be no significant visual impacts for KVPs 4, 5, and 7 (Table 4.5-2). The proposed acquisition study areas under Alternative 1 would be used exclusively by the military; therefore, any land disturbance from the proposed training activities would not be visible. Any visible signs of the proposed training activities would be short-term and would occur over a specified timeframe. According to the California Off-Road Vehicle Association, the combination of vast open space, large variety of desert views and scenic vistas, and unique geologic formations found in the Johnson Valley OHV area is not found within any other single OHV area in the country (California Off-Road Vehicle Association 2010). However, portions of the Johnson Valley OHV area would remain completely open to the public under Alternative 1; therefore, there would be a less than significant impact to viewsheds. In addition, there would be a less than significant impact from night sky illumination.

Consequently, implementation of Alternative 1 would result in less than significant impacts to visual resources.

Table 4.5-2. Visual Change Impact Significance Under Alternative 1

KVP	Overall Visual Change	Overall Visual Sensitivity	Impact Significance
KVP 4: SR 247/ Bessemer Mine Road	Low to Moderate	Low	Not Significant
KVP 5: SR 247/Boone Road	Low to Moderate	Low	Not Significant
KVP 7: Valley Vista Road	Low	Low	Not Significant

Notes: KVP = Key viewpoint; SR = State Route

4.5.2.6 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 1 would result in less than significant, unmitigable impacts.

Key Viewpoint 7 Existing Conditions: Viewing northwest from Valle Vista Road into the south study area.

Key Viewpoint 7 Simulation: Proposed training activities.

Figure 4.5-6. Visual Simulation of Proposed Training Activities for KVP 7

4.5.3 Alternative 2 Impacts

4.5.3.1 Key Viewpoint 2

A simulation of proposed training activities that would be visible from KVP 2 is shown in Figure 4.5-7.

Visual Contrast. Low to Moderate. Proposed training activities would occur on land area adjacent to the Combat Center. Viewers in the area (e.g., users of the Rock Pile camping/staging area and those recreating in the area) are accustomed to military training in the area; therefore, the visual absorption capability is moderate to high. The proposed training activities on the land would produce temporary dust clouds that would have low visual contrast with the existing landscape color. Aircraft travel is common in the area due to the presence of existing air traffic corridors. Clear, blue skies are characteristic of the desert climate in the area; therefore, aircraft associated with training activities would have low to moderate visual contrast.

Key Viewpoint 2 Existing Conditions: Viewing northeast from the Rock Pile camping/staging area into the west study area.

Key Viewpoint 2 Simulation: Proposed training activities.

Figure 4.5-7. Visual Simulation of Proposed Training Activities for KVP 2

Project Dominance. Low. Signs of proposed training activities (e.g., dust clouds, aircraft, etc.) would occur in the middle ground, low on the horizon, and would comprise a small portion of the total field of view. Any visible elements would be short-term in duration. Consequently, the project dominance would be low.

View Blockage or Impairment. Low. Signs of proposed training activities would occur in the middle ground; therefore, little to no visible landscape would be blocked by the project components.

Overall Visual Change. Low to Moderate. For visual receptors in the vicinity of KVP 2, the low to moderate visual contrast, low project dominance, and low view blockage or impairment lead to a low to moderate overall visual change of the visual setting and viewing characteristics.

4.5.3.2 Key Viewpoint 7

Under Alternative 2, the visual contrast, project dominance, view blockage or impairment, and overall visual change for KVP 7 would be the same as described under Alternative 1 (see Figure 4.5-6). Therefore, the overall visual change of the visual setting and viewing characteristics would be low.

4.5.3.3 Impact from Night Operations

Night sky illumination from the proposed action would be similar to Alternative 1 (see Section 4.5.2.4); however, new illumination sources would be further from the public due to the reduced land area proposed for acquisition. Consequently, impacts would be less than significant.

4.5.3.4 Impact Significance

Under Alternative 2, there would be no significant visual impacts for KVP 7 and adverse, but less than significant, impacts for KVP 2 (Table 4.5-3). The areas proposed for acquisition under Alternative 2 would be used exclusively by the military; therefore, any land disturbance from the proposed training activities may only be visible from land areas adjacent to the acquired areas (i.e., the remaining portion of the Johnson Valley OHV area and residential area located adjacent to the south study area). Any visible signs of the proposed training activities would be short-term and would occur over a specified timeframe.

According to the California Off-Road Vehicle Association, the combination of vast open space, large variety of desert views and scenic vistas, and unique geologic formations found in the Johnson Valley OHV area is not found within any other single OHV area in the country (California Off-Road Vehicle Association 2010). However, portions of the Johnson Valley OHV area would remain completely open to the public under Alternative 2; therefore, there would be a less than significant impact to viewsheds. In addition, there would be a less than significant impact from night sky illumination.

Consequently, implementation of Alternative 2 would result in less than significant visual impacts.

Table 4.5-3. Visual Change Impact Significance Under Alternative 2

KVP	Overall Visual Change	Overall Visual Sensitivity	Impact Significance
KVP 2: The Rock Pile	Low to Moderate	Low to Moderate	Adverse but less than significant
KVP 7: Valley Vista Road	Low	Low	Not Significant

Notes: KVP = Key viewpoint

4.5.3.5 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 2 would result in less than significant, unmitigable impacts.

4.5.4 Alternative 3 Impacts

4.5.4.1 Key Viewpoint 7

Under Alternative 3, the visual contrast, project dominance, view blockage or impairment, and overall visual change for KVP 7 would be the same as described under Alternative 1 (see Figure 4.5-6). Therefore, the overall visual change of the visual setting and viewing characteristics would be low.

4.5.4.2 Key Viewpoint 8

A simulation of proposed training activities that would be visible from KVP 8 is shown in Figure 4.5-8.

Visual Contrast. Moderate. Road work and road improvements are routine and usual; therefore, there is a moderate to high absorption capability for the proposed tank crossings on Amboy Road. The proposed tank crossing would be constructed from metal and concrete and, therefore, would have a moderate visual contrast to the existing asphalt surface. New signage, access gates, and barriers would be visible from the roadway, but would not be an uncommon visual element of the area. Consequently, visual contrast for KVP 8 would be low to moderate.

Project Dominance. Low. The proposed tank crossings would span the roadway and would have a relatively small width. The tank crossing would be visible only on approach and would comprise a small portion of the total field of view. New signage, access gates, and barriers would comprise a small portion of the visual field as well. Therefore, the project dominance would be low.

View Blockage or Impairment. Low. The proposed tank crossings would not block visible landscape. New signage, access gates, and barriers would block little to no visible landscape. Consequently, view blockage or impairment for KVP 8 would be low.

Overall Visual Change. Low to Moderate. For visual receptors in the vicinity of KVP 8, the moderate visual contrast, low project dominance, and low view blockage or impairment lead to a low to moderate overall visual change of the visual setting and viewing characteristics.

4.5.4.3 Key Viewpoint 9

A simulation of proposed training activities that would be visible from KVP 9 is shown in Figure 4.5-9.

Visual Contrast. Low to Moderate. Proposed training activities would occur on the Combat Center; therefore, viewers in the area (e.g., those traveling on Amboy Road) are accustomed to visible signs of military training on the installation. Consequently, the visual absorption capability is moderate to high. The proposed training activities on the land would produce temporary dust clouds that would have low visual contrast with the existing landscape color. Aircraft travel is common in the area due to the presence of existing air traffic corridors and aircraft currently flown over the Combat Center. Clear, blue skies are characteristic of the desert climate in the area; therefore, aircraft associated with training activities would have low to moderate visual contrast. New signage, access gates, and barriers would be visible from the roadway, but would not be an uncommon visual element of the area. Consequently, visual contrast for KVP 9 would be low to moderate.

Existing Conditions: Viewing north along Amboy Road.

Simulation: Proposed tank crossing on Amboy Road.

Figure 4.5-8. Visual Simulation of Proposed Training Activities for KVP 8

Project Dominance. Low. Signs of proposed training activities (e.g., dust clouds, aircraft, etc.) would occur in the middle ground, low on the horizon, and would comprise a small portion of the total field of view. New signage, access gates, and barriers would comprise a small portion of the visual field. Consequently, the project dominance would be low.

View Blockage or Impairment. Low. Signs of proposed training activities would occur in the middle ground; therefore, little to no visible landscape would be blocked by the project components. New signage, access gates, and barriers would block little to no visible landscape. Consequently, view blockage or impairment for KVP 9 would be low.

Overall Visual Change. Low to Moderate. For visual receptors in the vicinity of KVP 9, the low to moderate visual contrast, low project dominance, and low view blockage or impairment lead to a low to moderate overall visual change of the visual setting and viewing characteristics.

Key Viewpoint 9 Existing Conditions: Viewing northwest from Amboy Road into the Combat Center.

Key Viewpoint 9 Simulation: Proposed training activities.

Figure 4.5-9. Visual Simulation of Proposed Training Activities for KVP 9

4.5.4.4 Key Viewpoint 10

A simulation of proposed training activities that would be visible from KVP 10 is shown in Figure 4.5-10.

Visual Contrast. Low to Moderate. The east study area currently has little to no development. Railroad tracks cross the area and there are several mining operations. The proposed training activities on the land would produce temporary dust clouds that would have low visual contrast with the existing landscape color. Aircraft travel is common in the area due to the presence of existing air traffic corridors. Clear, blue skies are characteristic of the desert climate in the area; therefore, aircraft associated with training activities would have low to moderate visual contrast. The proposed communication tower would have low visibility in the distant background, and would only be visible from isolated locations. New signage, access gates, and barriers would be visible from the roadway, but would not be an uncommon visual element of the area. Consequently, visual contrast would be low to moderate.

Project Dominance. Low. Signs of proposed training activities (e.g., dust clouds, aircraft, etc.) would occur in the middle ground, low on the horizon, and would comprise a small portion of the total field of view. The proposed communication tower would occur in the background and would appear very small in the total field of view and in contrast to the landscape. New signage, access gates, and barriers would comprise a small portion of the visual field. Consequently, the project dominance would be low.

View Blockage or Impairment. Low. Signs of proposed training activities would occur in the middle ground; therefore, little to no visible landscape would be blocked by the project components. The proposed communication tower would not block or impair viewing of the landscape. New signage, access gates, and barriers would block little to no visible landscape. Consequently, view blockage or impairment for KVP 10 would be low.

Overall Visual Change. Low to Moderate. For visual receptors in the vicinity of KVP 10, the low to moderate visual contrast, low project dominance, and low view blockage or impairment lead to a low to moderate overall visual change of the visual setting and viewing characteristics.

4.5.4.5 Impact from Night Operations

A majority of the night sky illumination under Alternative 3 would be similar to existing, occurring either in the same location or in a slightly different location, in some instances farther away from public view than currently. Associated with the proposed action, there would be a shift of current night operations and an increase from new operations in the east study area. The most noticeable illumination would occur from ordnance, with flares lasting approximately 30 seconds to 5 minutes, and would be most visible from travelers on National Trails Highway. Overall, night illumination would impact an area that is sparsely developed and would comprise a small portion of the total field of view for travelers on National Trails Highway; therefore, impacts would be less than significant.

4.5.4.6 Impact Significance

Under Alternative 3, there would be no significant visual impacts for KVPs 7 and 10, and adverse, but less than significant, impacts for KVP 8 and 9 (Table 4.5-4). The areas proposed for acquisition under Alternative 3 would be used exclusively by the military; therefore, any land disturbance from the proposed training activities would not be visible. Any visible signs of the proposed training activities would be short-term and would occur over a specified timeframe. In addition, there would be a less than significant impact from night sky illumination. Consequently, implementation of Alternative 3 would result in less than significant visual impacts.

Existing Conditions: Viewing south-southeast from National Trails Highway into the east study area

Simulation: Proposed communication tower and training activities in the east study area.

Figure 4.5-10. Visual Simulation of Proposed Training Activities for KVP 10

Table 4.5-4. Visual Change Impact Significance Under Alternative 3

KVP	Overall Visual Change	Overall Visual Sensitivity	Impact Significance
KVP 7: Valley Vista Road	Low	Low	Not Significant
KVP 8: Amboy Road/Bristol Dry Lake	Low to Moderate	Low to Moderate	Adverse but less than significant
KVP 9: Amboy Road	Low to Moderate	Low to Moderate	Adverse but less than significant
KVP 10: National Trails Highway	Low to Moderate	Low	Not Significant

Notes: KVP = Key viewpoint

4.5.4.7 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 3 would result in less than significant, unmitigable impacts.

4.5.5 Alternative 4 Impacts

4.5.5.1 Key Viewpoint 6

A simulation of proposed training activities that would be visible from KVP 6 is shown in Figure 4.5-11.

Visual Contrast. Moderate to High. There is currently no construction in the Means Dry Lake camping/staging area. Construction of the proposed communication tower and company training objective located northwest and north of Means Dry Lake, respectively, would result in a moderate to high visual contrast from the existing landscape.

Project Dominance. Moderate. The proposed communication tower and company training objective would be visible in the middle ground. These objects would represent a small portion of the total field of view and would be relatively small in proportion to other landscape features. Therefore, the project dominance would be moderate.

View Blockage or Impairment. Moderate. The proposed communication tower would have little to no blockage or impairment to viewing the landscape. The proposed company training objective would remove a small portion of open landscape from view. Therefore, the view blockage and impairment would be moderate.

Overall Visual Change. Moderate to High. For visual receptors in the vicinity of KVP 6, the moderate to high visual contrast, moderate project dominance, and moderate view blockage or impairment lead to a moderate to high overall visual change of the visual setting and viewing characteristics.

Existing Conditions: Viewing northwest from Means Dry Lake into the west study area.

Simulation: Proposed communication tower and training activities near Means Dry Lake.

Figure 4.5-11. Visual Simulation of Proposed Training Activities for KVP 6

4.5.5.2 Key Viewpoint 7

Under Alternative 4, the visual contrast, project dominance, view blockage or impairment, and overall visual change for KVP 7 would be the same as described under Alternative 1 (see Figure 4.5-6). Therefore, the overall visual change of the visual setting and viewing characteristics would be low.

4.5.5.3 Key Viewpoint 9

Under Alternative 4, the visual contrast, project dominance, view blockage or impairment, and overall visual change for KVP 9 would be the same as described under Alternative 3 (see Figure 4.5-9). Therefore, the overall visual change of the visual setting and viewing characteristics would be low to moderate.

4.5.5.4 Impact from Night Operations

Night sky illumination from the proposed action would be similar to Alternative 1 (see Section 4.5.2.4); however, impacts would be slightly less since night sky illumination from the proposed action would occur in the proposed land acquisition areas only 60 days per year. Consequently, impacts would be less than significant.

4.5.5.5 Impact Significance

Under Alternative 4, there would be no significant visual impacts for KVP 7, and adverse, but less than significant, impacts for KVP 6 and 9 (Table 4.5-5). The south study area proposed for acquisition under Alternative 4 would be used exclusively by the military; therefore, any land disturbance from the

proposed training activities would not be visible. Any visible signs of the proposed training activities would be short-term and would occur over a specified timeframe. The proposed west study area would be used for military training purposes approximately 2 months per year and available for OHV use for 10 months per year. As discussed in Section 4.12, *Geology*, there would be adverse, but not significant impacts, to soils resulting from training including infantry maneuvers and ordnance delivery. The degraded soils would result in adverse, but not significant, visual impact for users of the Johnson Valley OHV area.

According to the California Off-Road Vehicle Association, the combination of vast open space, large variety of desert views and scenic vistas, and unique geologic formations found in the Johnson Valley OHV area is not found within any other single OHV area in the country (California Off-Road Vehicle Association 2010). However, under Alternative 4 portions of the Johnson Valley OHV area would remain completely open, while other areas would be available for a majority of the year; therefore, there would be a less than significant impact to viewsheds. In addition, there would be a less than significant impact from night sky illumination.

Consequently, implementation of Alternative 4 would result in less than significant visual impacts.

Table 4.5-5. Visual Change Impact Significance Under Alternative 4

KVP	Overall Visual Change	Overall Visual Sensitivity	Impact Significance
KVP 6: Means Dry Lake	Moderate to High	Low to Moderate	Adverse but less than significant
KVP 7: Valley Vista Road	Low	Low	Not Significant
KVP 9: Amboy Road	Low to Moderate	Low to Moderate	Adverse but less than significant

Notes: KVP = Key viewpoint

4.5.5.6 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 4 would result in less than significant, unmitigable impacts.

4.5.6 Alternative 5 Impacts

4.5.6.1 Key Viewpoint 6

Under Alternative 5, the visual contrast, project dominance, view blockage or impairment, and overall visual change for KVP 6 would be the same as described under Alternative 4 (see Figure 4.5-11). Therefore, the overall visual change of the visual setting and viewing characteristics would be moderate to high.

4.5.6.2 Key Viewpoint 9

Under Alternative 4, the visual contrast, project dominance, view blockage or impairment, and overall visual change for KVP 9 would be the same as described under Alternative 3 (see Figure 4.5-9). Therefore, the overall visual change of the visual setting and viewing characteristics would be low to moderate.

4.5.6.3 Impact from Night Operations

Night sky illumination from the proposed action would be similar to Alternative 1 (see Section 4.5.2.4); however, new illumination sources would be further from the public due to the reduced land area proposed for acquisition since the south study area would not be acquired. In addition, night sky illumination would occur in the proposed land acquisition areas only 60 days per year. Consequently, impacts would be less than significant.

4.5.6.4 Impact Significance

Under Alternative 5, there would be adverse, but less than significant, impacts for KVPs 6 and 9 (Table 4.5-6). Any visible signs of the proposed training activities would be short-term and would occur over a specified timeframe. The west study area proposed for acquisition under Alternative 5 would be used for military training purposes approximately 2 months per year and available for OHV use for 10 months per year. As discussed in Section 4.12, *Geology*, there would be adverse, but not significant, impacts to soils resulting from training including infantry maneuvers and ordnance delivery. The degraded soils would result in adverse, but not significant, visual impact for users of the Johnson Valley OHV area.

According to the California Off-Road Vehicle Association, the combination of vast open space, large variety of desert views and scenic vistas, and unique geologic formations found in the Johnson Valley OHV area is not found within any other single OHV area in the country (California Off-Road Vehicle Association 2010). However, under Alternative 5 portions of the Johnson Valley OHV area would remain completely open, while other areas would be available for a majority of the year; therefore, there would be a less than significant impact to viewsheds. In addition, there would be a less than significant impact from night sky illumination.

Consequently, implementation of Alternative 5 would result in less than significant visual impacts.

Table 4.5-6. Visual Change Impact Significance Under Alternative 5

KVP	Overall Visual Change	Overall Visual Sensitivity	Impact Significance
KVP 6: Means Dry Lake	Moderate to High	Low to Moderate	Adverse but less than significant
KVP 9: Amboy Road	Low to Moderate	Low to Moderate	Adverse but less than significant

Notes: KVP = Key viewpoint

4.5.6.5 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 5 would result in less than significant, unmitigable impacts.

4.5.7 Alternative 6 Impacts (Preferred Alternative)

4.5.7.1 Key Viewpoint 1

A simulation of proposed training activities that would be visible from KVP 1 is shown in Figure 4.5-12.

Visual Contrast. Moderate. Proposed training activities would occur on land area that is currently designated as an open space recreational area, located adjacent to the Combat Center. Although, users of the Johnson Valley OHV area are accustomed to military presence in the area, training activities currently occur a large distance from North Anderson Dry Lake. Consequently, the visual absorption capability is

moderate. The proposed training activities on the land would produce temporary dust clouds that would have low visual contrast with the existing landscape color. Aircraft travel is common in the area due to the presence of existing air traffic corridors. Clear, blue skies are characteristic of the desert climate in the area; therefore, aircraft associated with training activities would have low to moderate visual contrast.

Project Dominance. Low. Signs of proposed training activities (e.g., dust clouds, aircraft, etc.) would occur in the middle ground, low on the horizon, and would comprise a small portion of the total field of view.

View Blockage or Impairment. Low. Signs of proposed training activities would occur in the middle ground and behind mountain formations; therefore, little to no visible landscape would be blocked by the project components.

Overall Visual Change. Low to Moderate. For visual receptors in the vicinity of KVP 1, the moderate visual contrast, low project dominance, and low view blockage or impairment lead to a low to moderate overall visual change of the visual setting and viewing characteristics.

Key Viewpoint 1 Existing Conditions: Viewing northeast from SR 247 into the west study area.

Key Viewpoint 1 Simulation: Proposed training activities.

Figure 4.5-12. Visual Simulation of Proposed Training Activities for KVP 1

4.5.7.2 Key Viewpoint 3

A simulation of proposed training activities that would be visible from KVP 3 is shown in Figure 4.5-13.

Visual Contrast. Moderate. Proposed training activities would occur on land area that is currently designated as an open space recreational area, located adjacent to the Combat Center. Although, users of the Johnson Valley OHV area are accustomed to military presence in the area, training activities currently occur a large distance from Soggy Dry Lake. Consequently, the visual absorption capability is moderate. The proposed training activities on the land would produce temporary dust clouds that would have low visual contrast with the existing landscape color. Aircraft travel is common in the area due to the presence of existing air traffic corridors. Clear, blue skies are characteristic of the desert climate in the area; therefore, aircraft associated with training activities would have low to moderate visual contrast. New signage, access gates, and barriers would be visible from Bessemer Mine Road, but would not be unexpected in the area. Consequently, visual contrast for KVP 3 would be moderate.

Project Dominance. Low. Signs of proposed training activities (e.g., dust clouds, airplanes, etc.) would occur in the middle ground, low on the horizon, and would comprise a small portion of the total field of view. Any visible elements would be short-term in duration. New signage, access gates, and barriers would comprise a small portion of the visual field. Consequently, the project dominance would be low.

View Blockage or Impairment. Low. Signs of proposed training activities would occur in the middle ground; therefore, little to no visible landscape would be blocked by the project components. New signage, access gates, and barriers would block little to no visible landscape. Consequently, view blockage or impairment for KVP 4 would be low.

Overall Visual Change. Low to Moderate. For visual receptors in the vicinity of KVP 3, the moderate visual contrast, low project dominance, and low view blockage or impairment lead to a low to moderate overall visual change of the visual setting and viewing characteristics.

4.5.7.3 Key Viewpoint 4

Under Alternative 6, the visual contrast, project dominance, view blockage or impairment, and overall visual change for KVP 4 would be the same as described under Alternative 1 (see Figure 4.5-4). Therefore, the overall visual change of the visual setting and viewing characteristics would be low to moderate.

4.5.7.4 Key Viewpoint 5

Under Alternative 6, the visual contrast, project dominance, view blockage or impairment, and overall visual change for KVP 5 would be the same as described under Alternative 1 (see Figure 4.5-5). Therefore, the overall visual change of the visual setting and viewing characteristics would be low to moderate.

4.5.7.5 Key Viewpoint 6

Under Alternative 6, the visual contrast, project dominance, view blockage or impairment, and overall visual change for KVP 6 would be the same as described under Alternative 4 (see Figure 4.5-11). Therefore, the overall visual change of the visual setting and viewing characteristics would be moderate to high.

Key Viewpoint 3 Existing Conditions: Viewing northeast from SR 247 into the west study area.

Key Viewpoint 3 Simulation: Proposed training activities.

Figure 4.5-13. Visual Simulation of Proposed Training Activities for KVP 3

4.5.7.6 Key Viewpoint 7

Under Alternative 6, the visual contrast, project dominance, view blockage or impairment, and overall visual change for KVP 7 would be the same as described under Alternative 1 (see Figure 4.5-6). Therefore, the overall visual change of the visual setting and viewing characteristics would be low.

4.5.7.7 Impact from Night Operations

Night sky illumination from the proposed action would be similar to Alternative 1 (see Section 4.5.2.4); however, new illumination sources would be further from the public due to the reduced land area proposed for exclusive military use. In addition, night sky illumination would occur within the proposed RPAA, which is closer to public view, would occur only 60 days per year. Consequently, impacts would be less than significant.

4.5.7.8 Impact Significance

Under Alternative 6, there would be no significant visual impacts for KVPs 1, 3, 5, and 7, and adverse, but less than significant, impacts for KVP 6 (Table 4.5-7). The south study area proposed for acquisition under Alternative 6 would be used exclusively by the military; therefore, any land disturbance from the proposed training activities would not be visible. Any visible signs of the proposed training activities would be short-term and would occur over a specified timeframe. The proposed west study area would be used for military training purposes approximately 2 months per year and available for OHV use for 10 months per year. As discussed in Chapter 4.12, *Geology*, there would be adverse, but not significant, impacts to soils resulting from training. The degraded soils would result in adverse, but not significant, visual impact for users of the Johnson Valley OHV area.

According to the California Off-Road Vehicle Association, the combination of vast open space, large variety of desert views and scenic vistas, and unique geologic formations found in the Johnson Valley OHV area is not found within any other single OHV area in the country (California Off-Road Vehicle Association 2010). However, under Alternative 6 portions of the Johnson Valley OHV area would remain completely open, while other areas would be available for a majority of the year; therefore, there would be a less than significant impact to viewsheds. In addition, there would be a less than significant impact from night sky illumination.

Consequently, implementation of Alternative 6 would result in less than significant visual impacts.

Table 4.5-7. Visual Change Impact Significance Under Alternative 6

KVP	Overall Visual Change	Overall Visual Sensitivity	Impact Significance
KVP 1: North Anderson Dry Lake	Low to Moderate	Low	Not Significant
KVP 3: Western Soggy Dry Lake	Low to Moderate	Low	Not Significant
KVP 4: SR 247/ Bessemer Mine Road	Low to Moderate	Low	Not Significant
KVP 5: SR 247/Boone Road	Low to Moderate	Low	Not Significant
KVP 6: Means Dry Lake	Moderate to High	Low to Moderate	Adverse but less than significant
KVP 7: Valley Vista Road	Low	Low	Not Significant

Notes: KVP = Key viewpoint; SR = State Route

4.5.7.9 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 6 would result in less than significant, unmitigable impacts.

4.5.8 No-Action Alternative

Under the No-Action Alternative, the Marine Corps would not establish a large-scale training facility to accommodate sustained, combined-arms, live-fire, and maneuver training exercises and the Marine Corps would not acquire land in any of the proposed acquisition study areas. Therefore, implementation of the No-Action Alternative would maintain existing conditions and there would be no impacts to visual resources. However, implementation of the No-Action Alternative would not meet the purpose of and need for the Proposed Action.

4.5.9 Summary of Impacts

Table 4.5-8 summarizes the impacts of each action alternative and the no-action alternative. A text summary is provided below.

Table 4.5-8. Summary of Impacts

Alternative	Impacts
Alternative 1	LSI • There would be no significant visual impacts at the selected KVPs. • The proposed acquisition study areas under Alternative 1 would be used exclusively by the military; therefore, any land disturbance from the proposed training activities would not be visible. • Any visible signs of the proposed training activities would be short-term and would occur over a specified timeframe. • There would be a less than significant impact to viewsheds due to loss of scenic and unique vistas in the Johnson Valley OHV area. • There would be a less than significant impact from night sky illumination.
Alternative 2	LSI • There would be no significant visual impacts for KVP 7 and adverse, but less than significant, impacts for KVP 2. • The areas proposed for acquisition under Alternative 2 would be used exclusively by the military; therefore, any land disturbance from the proposed training activities would not be visible. • Any visible signs of the proposed training activities would be short-term and would occur over a specified timeframe. • There would be a less than significant impact to viewsheds due to loss of scenic and unique vistas in the Johnson Valley OHV area. • There would be a less than significant impact from night sky illumination.
Alternative 3	LSI • There would be no significant visual impacts for KVPs 7 and 10, and adverse, but less than significant, impacts for KVP 8 and 9. • The areas proposed for acquisition under Alternative 3 would be used exclusively by the military; therefore, any land disturbance from the proposed training activities would not be visible. • Any visible signs of the proposed training activities would be short-term and would occur over a specified timeframe. • There would be a less than significant impact from night sky illumination.
Alternative 4	LSI • There would be no significant visual impacts for KVP 7, and adverse, but less than significant, impacts for KVP 6 and 9. • The south study area proposed for acquisition under Alternative 4 would be used exclusively by the military; therefore, any land disturbance from the proposed training activities would not be visible. Any visible signs of the proposed training activities would be short-term and would occur over a specified timeframe. • The proposed west study area would be used for military training purposes approximately 2 months per year and available for OHV use for 10 months per year. There would be adverse, but not significant, impacts to soils resulting from training including infantry maneuvers and ordnance delivery. The degraded soils would result in adverse, but not significant, visual impact for users of the Johnson Valley OHV area. • There would be a less than significant impact to viewsheds due to loss of scenic and unique vistas in the Johnson Valley OHV area. • There would be a less than significant impact from night sky illumination.

Continued on next page.

Table 4.5-8. Summary of Impacts

Alternative	Impacts
Alternative 5	LSI • There would be adverse, but less than significant, impacts for KVPs 6 and 9. • Any visible signs of the proposed training activities would be short-term and would occur over a specified timeframe. The west study area proposed for acquisition under Alternative 5 would be used for military training purposes approximately 2 months per year and available for OHV use for 10 months per year. There would be adverse, but not significant, impacts to soils resulting from training including infantry maneuvers and ordnance delivery. The degraded soils would result in adverse but not significant visual impact for users of the Johnson Valley OHV area. • There would be a less than significant impact to viewsheds due to loss of scenic and unique vistas in the Johnson Valley OHV area. • There would be a less than significant impact from night sky illumination.
Alternative 6	LSI • There would be no significant visual impacts for KVPs 1, 3, 5, and 7, and adverse, but less than significant, impacts for KVP 6. • The south study area proposed for acquisition under Alternative 6 would be used exclusively by the military; therefore, any land disturbance from the proposed training activities would not be visible. Any visible signs of the proposed training activities would be short-term and would occur over a specified timeframe. • The proposed west study area would be used for military training purposes approximately 2 months per year and available for OHV use for 10 months per year. There would be adverse, but not significant, impacts to soils resulting from training. The degraded soils would result in adverse, but not significant, visual impact for users of the Johnson Valley OHV area. • There would be a less than significant impact to viewsheds due to loss of scenic and unique vistas in the Johnson Valley OHV area. • There would be a less than significant impact from night sky illumination.
No-Action Alternative	NI • Implementation of the No-Action Alternative would maintain existing conditions and there would be no impacts to visual resources.

Notes: KVP = key viewpoint; LSI = Less than significant impacts; NI = No impact; OHV = off-highway vehicle

4.6 TRANSPORTATION AND CIRCULATION

4.6.1 Approach to Analysis

4.6.1.1 Methodology

This section evaluates potential impacts to vehicle transportation and circulation associated with the project alternatives both within and in the immediate vicinity of the Combat Center and the proposed acquisition study areas. Only impacts pertaining to land acquisition and increased use of on-base and public roadways associated with expanded training are addressed in this analysis.

As discussed in Section 2.1, development and use of new unpaved access roads within the installation would occur under all of the project alternatives (no more than approximately 25 to 35 miles (40 to 56 km) of new unpaved roads, depending on the alternative). Proposed use of new unpaved roads for access to training areas would be similar to current military practices. Therefore, analysis of transportation and circulation impacts within the Combat Center will only focus on the roadway network of Mainside.

4.6.1.2 Evaluation Criteria

For the purpose of this analysis, the direct effects of the project alternatives would cause significant impacts to transportation and circulation if they would:

- change accessibility of current public roadway systems;
- substantially increase traffic volumes (average daily traffic [ADT]) and flow; and/or
- decrease intersection or roadway LOS ratings (e.g., from a LOS-B to LOS-C).

For the purpose of this analysis, the critical threshold for determining a decrease in roadway LOS is based on the volume-to-capacity ratio Quick Estimation Method as defined by the Federal Highway Administration (2004). This method is based on the fact that the more degraded the LOS is for a given intersection, the smaller the increase in traffic volume required to decrease that LOS. For instance, it takes the greatest traffic volume increase to change a LOS A to LOS B, whereas it takes the smallest traffic volume increase to change a LOS E to LOS F. A decline in LOS to level F is not meaningful, however, because flow becomes unstable as the capacity of the intersection is exceeded. Therefore, the most conservative applicable criterion for volume increase is the shift from LOS D to LOS E, because the last margin of capacity is consumed.

An approximate 12% increase in traffic volume at a signalized intersection is required to degrade a LOS D (volume-to-capacity ratio of 0.85) to a LOS E (volume-to-capacity ratio of 0.95) (Federal Highway Administration 2004). A 12% increase in traffic volume that degrades LOS D to E is smaller than all higher LOS increment shifts; any increase in volume that does not fully degrade LOS D to E will not degrade A to B, B to C, or C to D. Therefore, a 12% increase in traffic volume was used in this analysis as a critical threshold for roadway and/or intersection capacity.

Implementation of the project alternatives would potentially include changes in accessibility of public roads and traffic volumes, constituting direct effects to transportation and circulation. Indirect effects to transportation and circulation are not expected to occur under any of the project alternatives. The following evaluation is based on past traffic analyses and available traffic data (see Section 3.6); no quantitative studies of vehicle activity have been conducted for this EIS.

4.6.1.3 Public Scoping Issues

Concerns that were raised by the public during the 90-day scoping period (October 30, 2008 through January 31, 2009) are addressed in this analysis. These transportation and circulation concerns include, but are not limited to:

- increased usage of utility and infrastructure may impact current systems (e.g., disruption to traffic circulation, impacts to existing communications and energy transmission lines and pipelines, damage to utilities/infrastructure from vehicle movements), and
- impacts on roadways, railroads, and airspace from movement of equipment and personnel to/from the installation for training events.

4.6.2 Alternative 1 Impacts

4.6.2.1 Land Acquisition and Construction Impacts

Land acquisition under Alternative 1 would include the west and south study areas. The west study area does not contain any paved public roadways. All roads within the west study area are unpaved and primarily used for OHV recreation and access to OHV staging areas. The two unpaved roads commonly used to access Johnson Valley OHV Area from SR 247 are Boone Road and Bessemer Mine Road. Under all alternatives in which the west study area (or a portion of the west study area) is acquired, proper signage along SR 247 would provide the public with advance notice that these roads are closed. Gates would be installed at the entrances to these dirt roads to prohibit access into the west study area. These roads are not used as thoroughfares for regular vehicle traffic; therefore, loss of access to them would not substantiate a significant impact to transportation (see Section 4.2 for impacts to recreation). The south study area does not contain any public roadways; therefore, traffic would not be affected by acquisition of the area.

Construction activities associated with the installation of three communications towers under Alternative 1 would have no effect on transportation and circulation. These activities would take place in remote areas, on Combat Center lands, where traffic would not be affected. Therefore, land acquisition and construction activities under Alternative 1 would have less than significant impacts to transportation and circulation.

4.6.2.2 Training Impacts

Table 4.6-1 depicts maximum traffic volume increases for MEB Exercise training under all project alternatives.

An increase of up to 77 permanent military and civilian jobs/personnel would be required to manage the land/airspace areas and expanded training capabilities under each of the project alternatives. The current manpower associated with the Combat Center is estimated to be more than 13,000. This increase in personnel and the potential effect it would incur on traffic volumes, both on-base and off-base, would be very low (an increase of less than 1%). Therefore, permanent increases in personnel under all action alternatives would have less than significant impacts to transportation and circulation.

Marine Expeditionary Brigade Exercise training under all project alternatives would require that battalion task forces establish themselves and conduct exercises both within existing Combat Center boundaries and on newly acquired lands. Under all project alternatives, task force Marines and force vehicles involved in MEB Exercise training would use Combat Center main supply routes (MSRs) and secondary

roads for ingress to and egress from training areas and would not use the Mainside roadway network surrounding Del Valle Road and Adobe Road (MAGTF Training Command 2010).

Marine Expeditionary Brigade Exercise training, under Alternative 1, would require a maximum of 40 instructor vehicles (commercial style government vehicles [e.g., commercial sport utility vehicles] and Hummers) that would use public roads for access to and from training areas (specific areas vary by alternative). This would occur a maximum of 15 days per MEB Exercise (two per year), for a total of 30 days per year (MAGTF Training Command 2010). Also, under Alternative 1, maintenance personnel would use public roads to access certain training areas (specific areas vary by alternative) for target resets and route maintenance for the duration of MEB Exercise training. This would require, on average, two maintenance vehicles and the occasional trailer, at a maximum of 10 days per MEB Exercise (two per year), for a total of 20 days per year (MAGTF Training Command 2010). Instructor and maintenance vehicle routes that would be used under all alternatives for access to the current east and west training areas, as well as the east and west study areas, are shown in Figure 4.6-1. Under all project alternatives, a maximum of 84 vehicle trips (40 instructor and 2 maintenance vehicles going to and from the training areas) could occur per day on any given road within the region of influence (ROI) during MEB Exercise training (Table 4.6-1).

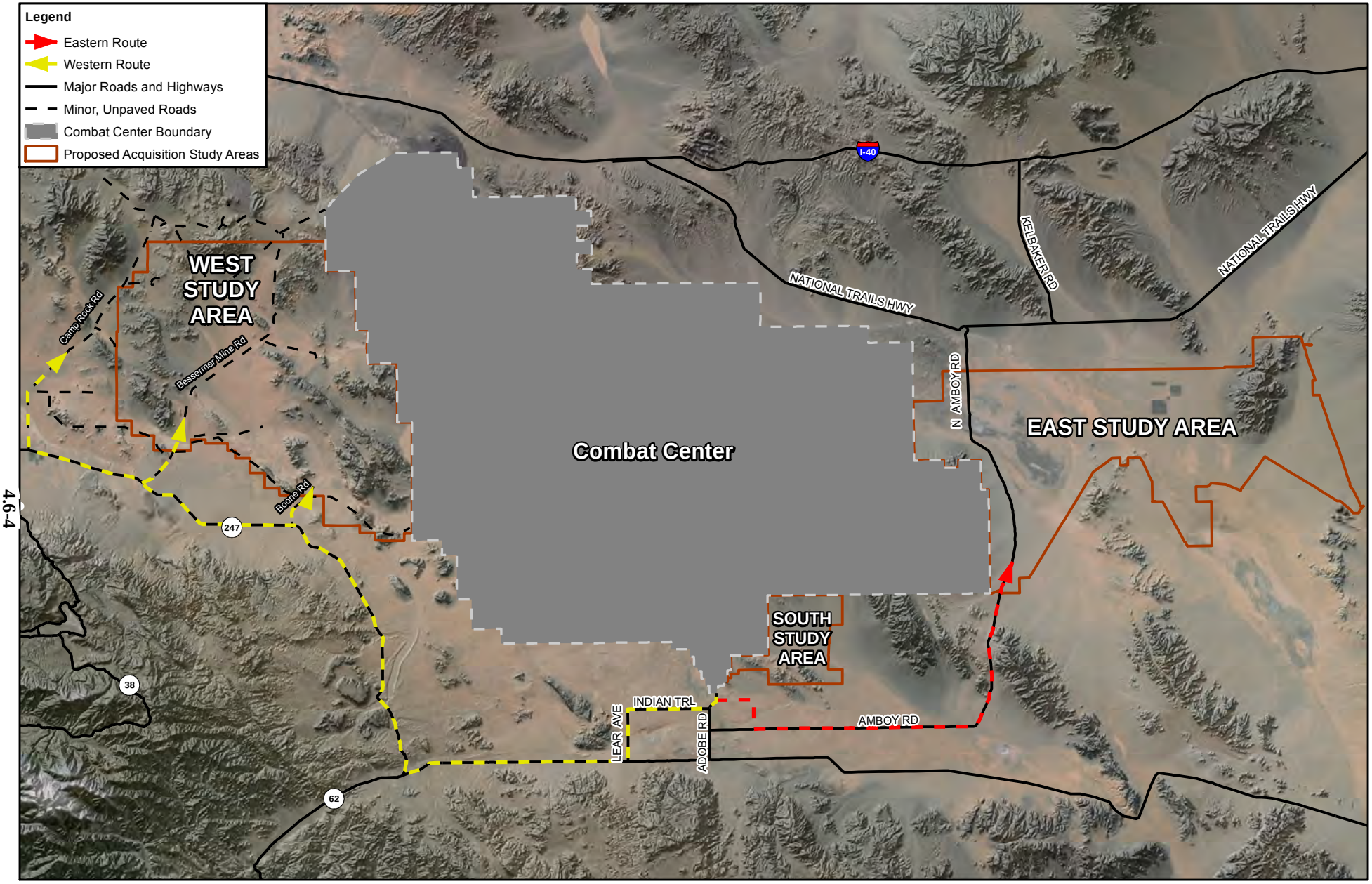
Under Alternative 1, MEB Exercise-related instructor and maintenance vehicles would use public roads to access training areas near the current eastern boundary of the Combat Center and training areas in the west study area. All vehicles accessing the south study area would use Combat Center routes. The potential increases in daily traffic would be 1% or less for major roadways. For minor roads, where the potential increases in traffic would be substantial (e.g., Bullion Mountain Road and Valle Vista Road), traffic would not be adversely affected as these are roads in rural areas that are devoid of any traffic flow issues. Also, because there is no need for convoy transportation under Alternative 1, instructor and maintenance vehicle travel would be intermittent and increases to roadway traffic would be negligible. Such minimal increase in vehicle circulation would not cause a change in LOS ratings.

Table 4.6-1. MEB Exercise Related Maximum Traffic Volume Increases for All Alternatives

Road/Highway	ADT	Maximum Potential Increase in Daily Traffic Volume* (% change)
On-base		
Adobe Road (Combat Center)	13,500[1]	+84 vehicle trips (< 1%)
Del Valle Road	14,425[1]	+84 vehicle trips (< 1%)
Off-base		
Adobe Road (Twentynine Palms)	just under 15,000[2]	+84 vehicle trips (< 1%)
Amboy Road	1,019[3]	+84 vehicle trips (~8%)
North Amboy Road	672[3]	+84 vehicle trips (~13%)
Bullion Mountain Road	< 100[3]	+84 vehicle trips (~84%)
Camp Rock Road	355[3]	+84 vehicle trips (~24%)
Indian Trail	4,345[3]	+84 vehicle trips (~2%)
Lear Avenue	3,461[3]	+84 vehicle trips (~2%)
Valle Vista Road	< 100[3]	+84 vehicle trips (~84%)
SR 62	just under 15,000[2]	+84 vehicle trips (< 1%)
SR 247	12,000[4]	+84 vehicle trips (~1%)

Notes: *This includes 40 instructor vehicles and 2 maintenance vehicles going to and coming from training areas. Instructor vehicles would only use roads up to 30 days per year and maintenance vehicles would use roads up to 20 days per year.
ADT = Average Daily Traffic; SR = State Route

Sources: [1]NAVFAC Southwest 2005; [2]City of Twentynine Palms 2009; [3]County of San Bernardino 2010; [4]Caltrans 2008



Kilometers
0 5 10 20
0 5 10
Miles
Source: MAGTF Training Command 2009a

Figure 4.6-1
MEB Exercise Related Instructor and Maintenance Vehicle Routes

N

Under Alternative 1, approximately 6,000-10,000 Marines (up to two-thirds of the Marines participating in a MEB exercise) would arrive at the Combat Center from external locations to participate in the MEB exercise. As described in Section 2.1, these Marines would be transported by various methods and would arrive over the course of approximately 10 days. The majority of these Marines (roughly 8,000 personnel) would arrive via bus along the following route: SR 62 to Lear Avenue, to Indian Trail, to Adobe Road. For the purpose of this analysis, a worst-case scenario is assumed, whereby all 8,000 Marines would arrive by bus on the same day (though this would never likely be the case). This would equate to roughly 200 buses (40 passengers per bus) arriving at the Combat Center on the same day. The greatest percent increase in traffic volume would therefore occur on Lear Avenue (an approximate 6% increase in traffic volume [3,461 vehicles per day to 3,661 vehicles per day]). Such an increase would not meet the threshold of significance (12%) as described in Section 4.6.1.2, and therefore, would not substantiate a significant shift in LOS.

It should be noted that the frequency with which the Marines would arrive at the Combat Center is unknown and would likely vary substantially from one mobilization to the next; however, it is assumed that the additional traffic would be randomly dispersed throughout any given travel day and throughout the overall 10-day period. Increases in daily traffic volumes associated with these mobilizations would also be temporary (at most 10 days immediately before and following each of the two MEB exercises per year). During the mobilization period, brief traffic delays and increased traffic congestion would occur on local roads and intersections, including Lear Avenue, Indian Trail, and Adobe Road primarily during high traffic periods (i.e., rush hour); however, larger regional highways and freeways have sufficient capacity to absorb any minor increase in traffic volumes. Traffic levels would not rise substantially relative to baseline conditions during each mobilization and would return to baseline conditions following the four mobilization events each year. The marginal temporary increase in traffic associated with MEB mobilization would, therefore, not result in significant impacts to transportation and circulation.

Consequently, enhanced training under Alternative 1 would have less than significant impacts to transportation and circulation.

4.6.2.3 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 1 would result in less than significant, unmitigable impacts.

4.6.3 Alternative 2 Impacts

4.6.3.1 Land Acquisition and Construction Impacts

Land acquisition under Alternative 2 would include a portion of the west study area (approximately 113,558 acres [45,955 hectares]) and the south study area. Impacts would be nearly identical to Alternative 1, but with less land acquired in the west study area. As with Alternative 1, there would be no loss of public access to any paved roads used as thoroughfares for traffic. Construction impacts would be identical to Alternative 1. Therefore, land acquisition and construction activities under Alternative 2 would have less than significant impacts to transportation and circulation.

4.6.3.2 Training Impacts

Marine Expeditionary Brigade Exercise training, mobilization, and associated impacts under Alternative 2 would be nearly identical to Alternative 1. Instructor and maintenance vehicles would use public roads

(see Figure 4.6-1) to access training areas near the current eastern boundary of the Combat Center and training areas in the reduced west study area. The south study area would be accessed via on-base MSRs and secondary roads, and would not require off-base use of roadways for military access. Therefore, enhanced training under Alternative 2 would have less than significant impacts to transportation and circulation.

4.6.3.3 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 2 would result in less than significant, unmitigable impacts.

4.6.4 Alternative 3 Impacts

4.6.4.1 Land Acquisition and Construction Impacts

Land acquisition under Alternative 3 would include the east and south study areas. The east study area contains a large portion of North Amboy Road that connects National Trails Highway to the City of Twentynine Palms and SR 62. Under this alternative, four tank crossings would need to be constructed on North Amboy Road as discussed in Section 2.4.3.3. Construction activities associated with installing the tank crossings would be minimal so as to not substantially affect traffic and circulation. Construction impacts associated with installation of two communications towers would be identical to Alternative 1. Therefore, land acquisition and construction activities under Alternative 3 would have less than significant impacts to transportation and circulation.

4.6.4.2 Training Impacts

Under Alternative 3, MEB Exercise-related instructor and maintenance vehicles would use public roads (see Figure 4.6-1) to access training areas in the east study area and near the current western boundary of the Combat Center. The south study area would be accessed via on-base MSRs and secondary roads, and would not require off-base use of roadways for military access. Increases in vehicular traffic would be similar to Alternative 1, as instructor and maintenance vehicles would need to utilize the same roadways.

During the initial phases of MEB Exercise training under Alternative 3 North Amboy Road would be temporarily closed while task forces and vehicles are crossing. These closures would occur two days per year and would potentially last up to 24 hours. During closures of North Amboy Road, the Marine Corps would coordinate with local authorities to ensure that signage and detour routes are posted along primary access roads that lead to North Amboy Road. Drivers would have to use alternate routes for access between the Twentynine Palms area and I-40 to the north. Because the next nearest paved roads that provide this access (U.S. 95 to the east and Camp Rock Road to the west) are more than 30 miles away, effects on traffic circulation would be substantial. In the event of an emergency that requires an emergency vehicle passage on North Amboy Road, the emergency vehicle would be immediately allowed to proceed through the area. Therefore, enhanced training under Alternative 3 would have significant impacts to transportation and circulation.

Another potential source of impacts related to ground transportation under Alternative 3 would be the Arizona/California Railroad line located in the eastern end of the east study area (MAGTF Training Command 2010c). Railroad line crossings may occur during ground training activities; these crossings may potentially disrupt rail traffic. Avoidance procedures for railroad lines are not currently included in the Combat Center Order 3500.4H, *Standard Operating Procedures for Range/Training Areas and Airspace*; however, the Order would be updated to include such procedures. During the initial phases of

MEB Exercise training under Alternative 3, rail traffic disruption could occur up to two days per year and would potentially last up to 24 hours. Since any potential disruptions would be infrequent and relatively short in duration, the Combat Center Order 3500.4H would be updated accordingly, and avoidance procedures would be implemented, Alternative 3 would have less than significant impacts to transportation on the railroad line in the east study area.

4.6.4.3 Potential Mitigation Measures

The following potential mitigation measure was identified to lessen the potential effects of closing North Amboy Road to through traffic:

TRAN-1 Marine Air Ground Task Force Training Command would coordinate with the City of Twentynine Palms, the County of San Bernardino, and other local authorities to provide as much advance notice as possible for the two days per year that North Amboy Road would be closed. Notices of exact dates and approximate times would be provided to city and county transportation officials weeks in advance so as to prepare for altered circulation patterns. Proper signage and warnings would be placed along I-40 and National Trails Highway to the north, and in the City of Twentynine Palms to the south to alert drivers of the road closures.

Although impacts would be lessened with implementation of the above mitigation measure, since there are no other paved roads in the vicinity of North Amboy Road, it is expected that impacts to transportation and circulation would still be significant. There are no other mitigation measures that the Marine Corps would be able to implement unilaterally to compensate for the impacts to transportation and circulation during the required road closure. Therefore, significant impacts to transportation and circulation would occur with implementation of Alternative 3.

4.6.5 Alternative 4 Impacts

4.6.5.1 Land Acquisition and Construction Impacts

Land acquisition under Alternative 4 would include the west and south study areas. Under this alternative, public use of land within the current Johnson Valley OHV Area would be allowed when MEB Exercise training-related activities are not occurring (see Section 4.2 for impacts to recreation). Impacts would be similar to Alternative 1, but would allow for restricted public access to the west study area. As with Alternative 1, there would be no loss of public access to any paved roads used as thoroughfares for traffic. Construction impacts would be identical to Alternative 1. Therefore, land acquisition and construction activities under Alternative 4 would have less than significant impacts to transportation and circulation.

4.6.5.2 Training Impacts

Though MEB Exercise maneuvering would be west to east under Alternative 4 (opposite that of Alternative 1), instructor and maintenance vehicles would still require use of public roads (see Figure 4.6-1) to access training areas near the current eastern boundary of the Combat Center and training areas in the west study area. The south study area would be accessed via Combat Center MSRs and secondary roads, and would not require off-base use of roadways for military access. Marine Expeditionary Brigade Exercise mobilization would be nearly identical to Alternative 1. Therefore, enhanced training under Alternative 4 would have less than significant impacts to transportation and circulation.

4.6.5.3 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 4 would result in less than significant, unmitigable impacts.

4.6.6 Alternative 5 Impacts

4.6.6.1 Land Acquisition and Construction Impacts

Land acquisition under Alternative 5 would only include the west study area. The south study area would not be acquired under this alternative. Similar to Alternative 4, public use of land within the current Johnson Valley OHV Area would be allowed when MEB Exercise training-related activities are not occurring. Impacts would be similar to Alternative 1, but would allow for restricted public access to the west study area. As with Alternative 1, there would be no loss of public access to any paved roads used as thoroughfares for traffic. Construction impacts would be identical to Alternative 1. Therefore, land acquisition and construction activities under Alternative 5 would have less than significant impacts to transportation and circulation.

4.6.6.2 Training Impacts

Though MEB Exercise maneuvering would be west to east under Alternative 5 (opposite that of Alternative 1), instructor and maintenance vehicles would still require use of public roads (see Figure 4.6-1) to access training areas near the current eastern boundary of the Combat Center and training areas in the west study area. Marine Expeditionary Brigade Exercise mobilization would be nearly identical to Alternative 1. Therefore, enhanced training under Alternative 5 would have less than significant impacts to transportation and circulation.

4.6.6.3 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 5 would result in less than significant, unmitigable impacts.

4.6.7 Alternative 6 Impacts (Preferred Alternative)

4.6.7.1 Land Acquisition and Construction Impacts

Land acquisition under Alternative 6 would include the west and south study areas. The west study area would be divided into two areas: an RPAA (approximately 38,137 acres [15,434 hectares]), that would be open for public use when MEB Exercise training-related activities are not occurring, and an exclusive military use area (approximately 108,530 acres [43,921 hectares]). Impacts would be similar to Alternative 1 in that there would be no loss of public access to any paved roads used as thoroughfares for traffic. The circulation network surrounding the RPAAs within the west study area would not be affected (for impacts to OHV use and access to OHV areas see Section 4.2). Construction impacts would be identical to Alternative 1. Therefore, land acquisition and construction activities under Alternative 6 would have less than significant impacts to transportation and circulation.

4.6.7.2 Training Impacts

Marine Expeditionary Brigade Exercise training under Alternative 6 would require identical use of public roads by instructor and maintenance vehicles as Alternative 1 (see Figure 4.6-1). Instructor and maintenance vehicles would use public roads to access training areas near the current eastern boundary of

the Combat Center and training areas in the west study area. The south study area would be accessed via Combat Center MSRs and secondary roads, and would not require off-base use of roadways for military access. Effects on traffic flow during MEB Exercise training and mobilization would be identical to Alternative 1. Therefore, enhanced training under Alternative 6 would have less than significant impacts to transportation and circulation.

4.6.7.3 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 6 would result in less than significant, unmitigable impacts.

4.6.8 No-Action Alternative

Under the No-Action Alternative, land acquisition would not occur and training exercises would remain unchanged. Transportation and circulation both within and in the immediate vicinity of the Combat Center and the proposed acquisition study areas would not be affected. Therefore, the No-Action Alternative would have no impacts to transportation and circulation.

4.6.9 Summary of Impacts

Table 4.6-2 summarizes the impacts of each action alternative and the No-Action Alternative. A text summary is provided below.

Table 4.6-2. Summary of Impacts

Alternative	Impacts
Alternative 1	LSI • Acquisition of the south and west study areas would not result in the loss of any major public roads. • Traffic volume(s) could potentially increase by 84 vehicle trips per day (40 instructor vehicles and 2 maintenance vehicles going to and coming from training areas) on certain public roads during MEB Exercise training. This would only occur at a maximum of 30 days per year (instructor vehicles) and 20 days per year (maintenance vehicles). • The marginal temporary traffic increase due to MEB mobilization would not create significant impacts.
Alternative 2	LSI • Impacts would be the same as under Alternative 1 (though a smaller portion of the west study area would be acquired).
Alternative 3	SI • Public access to North Amboy Road would be lost during initial phases of MEB Exercise training (2 days per year/up to 24 hours per day). Potential mitigation measure TRAN-1 was identified to lessen the potential effects of closing North Amboy Road to through traffic. However, it is expected that impacts to transportation and circulation would still be significant since there are no other paved roads in the vicinity of North Amboy Road. LSI • Construction activities associated with installation of tank crossings on North Amboy Road would be short-term and minimal.
Alternative 4	LSI • Impacts would be nearly identical to Alternative 1, but would allow for restricted public access to the west study area approximately 10 months per year.

Continued on next page

Table 4.6-2. Summary of Impacts

Alternative	Impacts
Alternative 5	LSI • Impacts would be identical to Alternative 4; with the exception that the south study area would not be acquired under this alternative.
Alternative 6	LSI • Impacts would be nearly identical to Alternative 1, but would allow for restricted public access to the southern portion of the west study area approximately 10 months per year.
No-Action Alternative	NI • Implementation of the No-Action Alternative would maintain existing conditions and there would be no impacts to transportation and circulation.

Notes: LSI = Less than significant impacts; MEB = Marine Expeditionary Brigade; NI = No impact; SI = Significant impact

4.7 AIRSPACE MANAGEMENT

Each of the six action alternatives addresses the need to modify the existing SUA and establish new SUA, as described in Chapter 2, to fully meet the exercise and training requirements for the proposed Combat Center activities. The proposed SUA configurations would provide the lateral and vertical airspace considered essential to support the varying air-to-air and air-to-ground flight maneuvers as well as surface-to-surface and other weapons system use during those mission activities.

The region in which the new SUA is proposed is considered to be among the busiest in the nation for both civil and military aircraft operations. Historically and on a continuing basis, these operations have been reasonably compatible considering the airspace structure segregating these operations, effectiveness of the ATC system in managing the air traffic, and close cooperation between the military scheduling agencies and the FAA in coordinating airspace use. This section examines the proposed SUA actions and any potential impacts these actions would have on the current airspace and air traffic environment.

4.7.1 Approach to Analysis

Modifications to the existing MOA airspace and establishment of new MOA and Restricted Area airspace would require rulemaking and non-rulemaking actions, as applicable, in each case per requirements in FAA Orders JO 7400.2h and 1050.1E (as amended on March 20, 2006). This would require the FAA to complete an aeronautical study to identify the impact of any SUA proposals on the safe and efficient use of airspace and ATC procedures. This type of study typically requires an overview of the existing airspace structure and use, such as described in Section 3.7.3, and an impact analysis that considers the potential impacts of the alternative actions on civil aviation. These considerations include: 1) Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) enroute operations; 2) public airports and charted private airfields; 3) ATC services, 4) other airspace proposals and cumulative impacts in the region; and 5) measures to mitigate or lessen any impacts. These five considerations were used as a basis for evaluating potential impacts on airspace use and management in the affected ROI.

4.7.1.1 Methodology

The potential consequences of the Combat Center SUA proposals on all airspace uses were assessed by overlaying the proposed airspace on the current airspace environment described in Section 3.7. This analysis considered other competing aviation interests and requirements in the surrounding region, Appendix D contains estimates of the number of aircraft sortie-operations that would be conducted in the existing and proposed airspace for MEB Exercises, Enhanced Mojave Viper (EMV) exercises, and other home station and external units training missions, including MEB Building Block training. This appendix also includes estimates of the daily and annual timeframes within which this airspace and the different altitude blocks may be scheduled to support all flight activities throughout the year. As emphasized in the appendix and this airspace analysis, individual MOAs/Air Traffic Control Assigned Airspace (ATCAAs) and Restricted Areas would frequently be used in conjunction with each other, therefore, the number of sorties and hours shown are not cumulative and only represent use of the individual areas. These estimates, which provide the framework for the airspace analysis, are based on the optimum number of mission events required by air and ground forces to maintain combat readiness proficiency levels. Both existing and proposed SUA are included in the analysis since most mission requirements could be met more effectively within this expanded airspace structure.

The MEB Exercises are projected to generate the highest daily use of the proposed SUA; therefore, the airspace analysis focused primarily on those projected sortie-operations and airspace use periods.

Although MEB Building Block training and other training/exercise activities would generate fewer daily operations throughout the year when MEB Exercises are not scheduled, activation of the existing/proposed SUA for those operations would also affect regional airspace use. The extent of any potential airspace impacts would depend on the timing, frequency, and altitudes of military operations.

Sortie estimates are identified for each SUA area and altitude block typically used by each participating aircraft type during MEB Exercise and Building Block training activities. The number of sortie-operations was assumed to be equally accounted for in multiple SUA areas since the proposed SUA would allow all sortie operations to be more widely dispersed throughout the entire airspace complex. However, the portion of the overall sortie duration time would differ for each area, depending on the type of missions and flight profiles flown on a daily basis. Appendix D provides estimated percentages of the sortie time that various aircraft types would normally operate within each airspace area while performing MEB Exercise mission activities. These proportions are based on the MAGTF Training Command projected total annual hours of use for each proposed SUA area.

The FAA data presented in Section 3.7.3.3 depicts radar tracks for the routes flown by IFR civil air aviation air traffic through the Combat Center ROI and the number of flights transiting these routes within the altitudes and time periods shown in Tables 3.7-7 and 3.7-8.This data provides a general basis for examining the potential effects of the proposed SUA configuration and projected operations on the overall air traffic and airspace environment in this region.

Economic impacts resulting from the acquisition of airspace under each alternative is discussed in Chapter 4.3, *Socioeconomics and Environmental Justice*.

4.7.1.2 Evaluation Criteria

The evaluation criteria considered the extent to which the different alternative SUA proposals would have impacts on the safe, orderly, and expeditious flow of all air traffic within the ROI. Any effects on airway or jet route use, general aviation activities, airports/airfields, or ATC system capabilities that may affect air traffic flows in the region could be considered a potential significant impact. Each airspace proposal and its potential impacts on LA ARTCC's air traffic flows shown in Section 3.7.3.3 will be examined in greater depth by the FAA in their aeronautical study.

The impact of the proposed airspace actions on the other airspace uses in the region are qualified as minimal, moderate, or significant. Pending further review of the airspace proposals by the FAA, a minimal impact was noted where there should be few adverse effects on all airspace uses; moderate where there may be noticeable and measurable adverse effects potentially causing some flight delays or diversions; and significant where adverse impacts are highly probable and could greatly limit or restrict airspace availability for other uses.

Any potential effect an alternative action would have on flight safety and operations was considered to be a direct impact, regardless of the level of significance. While also important, indirect impacts considered such factors as any increased time, attention, fuel/maintenance costs, etc., that a pilot may experience if necessary to plan and conduct any flights around active SUA.

The airspace discussions make reference to potential direct impacts on civil and military air traffic when the SUA is activated. Activation of SUA refers to those designated time periods the Marine Corps has coordinated and scheduled use of this airspace with the FAA LA ARTCC. Scheduled SUA activation periods are publicized in Notices to Airmen (NOTAMs) and provided as real-time ATC and Flight Service Station advisories to ensure public awareness of military activities in this airspace.

Los Angeles Air Route Traffic Control Center manages and controls joint use of the Combat Center SUA, when activated, through standard ATC separation practices and the processes stipulated in a Letter of Agreement (LOA) or Memorandum of Understanding (MOU) with the Marine Corps. Any actions considered necessary aside from standard ATC procedures and practices to mitigate the potential impacts of an airspace proposal on all airspace uses would be examined by the FAA, Marine Corps, and other affected interests, as appropriate, as part of the EIS and aeronautical study review processes.

4.7.1.3 Public Scoping Issues

Concerns that were raised by the public during the 90-day scoping period (October 30, 2008 through January 31, 2009) are addressed in this analysis. Concerns regarding airspace include, but are not limited to:

- loss of use of a dirt runway in the Johnson Valley OHV area;
- potential impacts to the SUA for private and commercial pilots; and
- impacts on future development potential for local and regional airports.

The airspace impact analyses address the potential effects of the proposed airspace actions on all charted public airports and private airfields. Any impacts on the use of uncharted private airstrips, such as was noted in the scoping session, would be addressed separately by the Marine Corps on a case by case basis with the responsible entity.

4.7.2 Alternative 1 Impacts

Figure 3.7-2 (see Chapter 3) depicts the proposed SUA configuration for this alternative overlaid on the FAA Los Angeles Sectional Aeronautical Chart and the IFR Enroute High Altitude Flight Information Publication for this region. This configuration would increase the Combat Center airspace by nearly 85%. The following sections describe how the proposed Combat Center SUA would be used by participating MEB Exercise aircraft under the different alternative scenarios. This description is followed by an analysis of how each scenario would impact civil aviation airspace use.

4.7.2.1 Military Airspace Use

<u>Proposed SUA</u>

Table 4.7-1 lists the estimated cumulative number of annual aircraft sortie missions that would be conducted by all aircraft types participating in Combat Center exercises and other training activities. These annual projections are based on all combat training and pilot qualification requirements and would apply to all alternative airspace proposals.

Table 4.7-1. Projected Annual Sortie Missions for All Combat Center Activities

Aircraft Type	MEB Exercise		EMV		Home Station/External Units[2] and Other Military Training	Cumulative Annual Total
	Single Exercise	Total Annual	Single Exercise	Total Annual		
AV-8B	150	300	90	720	608	1628
FA-18	242	484	150	1200	1001	2685
F-35	76	152	46	368	321	841
Joint Fixed-Wing	2	4	16	128	0	132
AH/UH-1	546	1092	336	2688	2241	6021
CH-53	116	232	114	912	682	1826
MV-22	134	268	100	800	637	1705
Joint Rotary-Wing	160	320	84	672	0	992
EA-6B	37	74	19	152	134	360
KC-130	68	136	40	320	270	726
Joint AR	18	36	4	32	0	68
UAS	120	240	54	432	401	1073
Total	**1669**	**3338**	**1053**	**8424**	**6295**	**18057**

Notes: [1] Cumulative Annual Total is summation of total annual MEB, EMV, and other training mission activities.
[2] Including MEB Building Block training.
AR = Aerial Refueling; EMV =Enhanced Mojave Viper Exercise; MEB = Marine Expeditionary Brigade; UAS = Unmanned Aerial System
Source: Combat Center 2009.

Table 4.7-2 provides greater detail on the estimated number of sortie-operations that would occur within each of the existing and proposed SUA areas during single MEB Exercise Work-up and Final Exercise periods. The totals shown in both tables do not correlate since Table 4.7-1 is the cumulative number of aircraft sortie missions conducted while Table 4.7-2 is a compilation of individual activities (sortie-operations) conducted within each MOA and Restricted Area during each sortie mission. Therefore, an aircraft conducting one sortie mission (Table 4.7-1) and performing maneuvers in one or more airspace areas (Table 4.7-2) would count as a sortie-operation for each area within which it operates during the course of that one sortie mission. Table 4.7-2 represents the manner in which both Department of Defense (DoD) and FAA account for SUA airspace.

Actual scheduled use of the existing/proposed SUA would vary with each MOA/ATCAA or Restricted Area being activated either by itself or in conjunction with other existing and/or proposed areas to meet specific mission requirements. The planned activation of each proposed SUA area would be as described in Chapter 2 for each alternative. Also noted in these descriptions, planned use of some areas (Sundance and CAX Corridor MOAs/ATCAAs) and the higher altitudes of all SUA areas would be limited in most cases to 40 hours per year. Approximately 70% of the MEB Exercise Work-up sorties would occur within the daytime period (7:00 a.m. to 7:00 p.m. local time), 25% within the evening period (7:00 to 10:00 p.m. local time), and 5% within the night period (10:00 p.m. to 7:00 a.m. local time). Final Exercise operations would be more dispersed within limited timeframes over a 24-hour period with approximately 50% occurring during the day, 12% in the evening, and 38% at night. These operations would occur within a daily flight window of 8-12 hours. The number of hours and sortie-operations would vary within those daily flight windows depending on the mission types and launch and recovery times for those daily mission activities. All activation times would be contingent upon coordination with the FAA and the timeframes this airspace could be made available relative to higher density air traffic periods.

Table 4.7-2. Sortie Estimates for Single MEB Exercise Work-up and Final Exercise Periods Within Existing and Proposed SUA Areas

Aircraft Type	MEB Exercise Work-up Period (16 flying days)			MEB Final Exercise Period (4 flying days)	
	R-2501, proposed R-XXXX, and Johnson Valley MOA/ATCAA	Bristol MOA/ATCAA	Sundance, CAX Low/High and Turtle A/B/C MOA/ATCAAs	R-2501, proposed R-XXXX and Johnson Valley MOA/ATCAA and Sundance, Bristol, and CAX MOA/ATCAAs	Turtle A/B/C MOA/ATCAAs
AV-8B	114	114	-	36	36
FA-18	155	155	-	86	86
F-35	55	55	-	22	22
Joint Fixed-Wing	2	2	-	18	-
AH/UH-1	426	-	-	120	-
CH-53	104	-	-	12	-
MV-22	116	-	-	18	-
Joint Rotary-Wing	136	-	-	24	-
EA-6B	28	28	-	9	9
KC-130	50	50	-	18	18
Joint AR	0	-	-	18	18
UAS	84	84	-	36	36
Total	**1270**	**488**	**-**	**399**	**225**

Notes: The same aircraft sorties would typically operate throughout the different SUA groups shown in this table and are therefore reflected in each airspace column.
AR = Aerial Refueling; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; EMV=Enhanced Mojave Viper; MEB = Marine Expeditionary Brigade; MOA = Military Operations Area; UAS = Unmanned Aerial System

Source: Combat Center 2009.

Table 4.7-3 shows the representative baseline average daily use of the existing SUA compared to the projected average daily sorties for the proposed MEB Exercise and other training operations (e.g., R-2501, EMV). As shown, R-2501 average daily sortie operations would increase from 19 to 79 and 100, respectively, during each MEB Work-up and Final Exercise period. However, these increased daily operations would be more widely dispersed over the larger airspace areas proposed for this alternative. No EMV or other training activities would occur during the MEB periods due to the higher level of operations conducted during that period. However, such training activities may be scheduled to a limited extent during the EMV work-up periods since they involve a lesser level of operations.

Table 4.7-3. Comparison of All Combat Center Baseline and Projected Average Daily Sorties

Representative Baseline Average Daily Sortie Operations					
Aviation Events	**R-2501 N/S/E/W**	**Bristol MOA/ATCAA**	**Sundance MOA**	**CAX Corridor**	**Turtle MOA/ATCAA**
EMV/Other Training[1]	19	3	1	-	-
Projected MEB Exercise and Ongoing EMV/Other Training Average Daily Sortie Operations					
Aviation Events	**R-2501, Proposed R-XXXX and Johnson Valley MOA/ATCAA**	**Modified Bristol MOA/ATCAA**	**Modified Sundance MOA/ATCAA**	**CAX Low/High MOA/ATCAA**	**Modified Turtle A/B/C MOA/ATCAA**
MEB Exercise Work-up[2]	79	30	-	-	-
MEB Final Exercise[3]	100	100	100	100	56
EMV Work-up[4]	48	48	48	-	-
EMV Final Exercise[5]	96	96	96	96	41
Other Training[1]	20	9	-	-	-

Notes: [1]Based on 310 annual aviation training days.
[2]Based on 16-day single MEB Exercise Work-up period.
[3]Based on 4-day single MEB Final Exercise period.
[4]Based on 17-day EMV Work-up period.
[5]Based on 2-day EMV Final Exercise period.
The same aircraft sorties would typically maneuver throughout the three SUA areas shown in the first column.
ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; EMV=Enhanced Mojave Viper; MEB = Marine Expeditionary Brigade; MOA = Military Operations Area

Table 4.7-4 provides an estimated percentage of the time an aircraft sortie would be expected to operate within each SUA area. These estimates are based on the annual total hours of use MAGTF Training Command projected for each area and were assumed to apply to all Combat Center activities requiring use of this airspace. These estimates indicate that approximately 59% of the Work-up and 51% of the Final Exercise sortie duration times would occur within restricted airspace (R-2501 and the proposed Restricted Area R-XXXX). In response to public and FAA concerns, the airspace proposals for Restricted Area R-XXXX, CAX MOA/ATCAA, and modified Turtle MOA/ATCAA were subdivided into vertical and/or lateral sectors, as shown in Figure 3.7-2 and described in Table 3.7-2, to provide greater options for scheduling and activating only that airspace needed for specific mission activities.

The altitude blocks within which aircraft typically operate during the course of a mission activity vary by aircraft type and their respective performance capabilities, combat mission roles, and training requirements. Appendix D indicates the percentage of a sortie mission for which each aircraft type would typically operate within each altitude block and proposed SUA areas for the MEB Exercise, EMV, and other training activities. Table 4.7-5 reflects the percentage of sortie duration time each of the MEB Exercise participants would typically operate within the different SUA altitude blocks shown during a sortie mission. The manner in which these altitude distributions occur within and across the different SUA areas will always total 100% in any one block. These distributions provide a basis for consideration in examining altitude use by other airspace users in the region. This table indicates that most low-altitude operations would occur in R-2501 and the proposed Restricted Area R-XXXX and Johnson Valley MOA/ATCAA during the 16-day Work-up period, with higher altitudes flown in the modified Bristol and Turtle A/B/C MOAs/ATCAAs. Final Exercise operations would be more widely dispersed at all altitudes within all the Combat Center SUA areas.

Table 4.7-4. Proportion of Sortie Duration for Alternative 1 Proposed SUA

Existing/Proposed Airspace	Percentage of Sortie Duration in SUA		Annual Total Hours of Use[1]
	Work-up	Final Exercise	All Events
R-2501	40%	27%	4,110
Proposed Restricted Area R-XXXX	19%	24%	3,767
Proposed Johnson Valley MOA/ATCAA	19%	24%	3,767
Bristol MOA/ATCAA Mod.	22%	15%	2,235
Sundance MOA/ATCAA Mod.	Not used	4%	568
Proposed CAX Low/High MOA/ATCAA	Not used	3%	528
Turtle A/B/C MOAs/ATCAAs	Not used	3%	528
Total	**100%**	**100%**	**N/A**

Notes: [1]Total listed for each SUA reflects highest number of hours shown for altitude block use in the MAGTF Training Command projections for each area.
ATCAA = Air Traffic Control Assigned Airspace; MOA = Military Operations Area; SUA = Special Use Airspace;

Table 4.7-5. Typical Aircraft Altitude Distributions for MEB Exercise Periods

Aircraft Type	MEB Exercise Work-up Altitude Use (feet MSL)[1]		
	R-2501, and proposed R-XXXX and Johnson Valley MOA/ATCAA	**Bristol MOA/ATCAA**	**Sundance, CAX Low/High, and Turtle A/B/C MOA/ATCAAs**
AV-8, F/A-18, F-35, and Joint Fixed-Wing	SUA floor - 8,000 (5%) 8,000 - 14,000 (30%) 14,000 - FL270 (60%) FL270 - FL400 (5%)	14,000 - FL270 (60%)	-
AH/UH-1, CH-53, and Joint Rotary-Wing	SUA floor - 8,000 (100%)	-	-
MV-22	SUA floor - 8,000 MSL (60%) 8,000 – 14,000 (40%)	-	-
EA-6B	FL180 - FL270 (100%)	FL180 - FL270 (100%)	-
KC-130	SUA floor - 8,000 (5%) 14,000 – FL180 (95%)	14,000 – FL180 (95%)	-
Joint AR	-	-	-
UAS	SUA floor – 8,000 (80%) 8,000 – FL180 (20%)	8,000 – FL180 (20%)	-
Aircraft Type	**MEB Final Exercise Altitude Use (feet MSL)[1]**		
	R-2501, proposed R-XXXX and Johnson Valley MOA/ATCAA Bristol & Sundance MOA/ATCAAs	**CAX Low/High MOA/ATCAA**	**Turtle A/B/C MOA/ATCAAs**
AV-8, F/A-18, F-35	SUA floor - 8,000 (5%) 8,000 - 14,000 (30%) 14,000 - FL270 (60%) FL270 - FL400 (5%)	SUA floor - 8,000 (5%) FL180 - FL270 (90%) FL270 - FL400 (5%)	8,000 - 14,000 (30%) 14,000 - FL270 (60%) FL270 - FL400 (5%)
Joint Fixed-Wing	-	-	-
AH/UH-1, CH-53, and Joint Rotary-Wing	SUA floor - 8,000 (100%)	SUA floor - 8,000 (100%)	-
MV-22	SUA floor - 8,000 (60%) 8,000 – 14,000 (40%)	SUA floor - 8,000 (60%) 8,000 – 14,000 (40%)	-
EA-6B	FL180 - FL270 (100%)	FL180 - FL270 (100%)	FL180 - FL270 (100%)
KC-130	SUA floor - 8,000 (5%) 14,000 – FL180 (95%)	SUA floor - 8,000 (5%) 14,000 – FL180 (95%)	14,000 – FL180 (95%)
Joint AR	FL180 – FL270 (100%)	FL180 – FL270 (100%)	FL180 – FL270 (100%)
UAS	SUA floor - 8,000 (80%) 8,000 – FL180 (20%)	8,000 – FL180 (20%)	8,000 – FL180 (20%)

Notes: [1]Percentages represent the portion of a sortie mission that each aircraft type would typically maneuver within each designated SUA area and altitude block during that mission activity. Altitude use will differ with the different SUA areas used by an aircraft during a sortie mission, therefore, some areas (i.e., CAX and Turtle MOAs) may not account for 100% altitude use by some aircraft types.
AR = Aerial Refueling; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Exercise; EMV = Enhanced Mojave Viper; FL = Flight Level; MEB = Marine Expeditionary Brigade; MOA = Military Operations Area; MSL = mean sea level; SUA = Special Use Airspace; UAS = Unmanned Aerial System

Expeditionary Airfield Use

Many of the ongoing Combat Center operations are staged out of the Expeditionary Airfield (EAF), as described in Section 3.7.3.1, and it is assumed MEB Exercise aircraft would also operate from this airfield. This would add nearly 6,700 operations to the baseline levels based on annual MEB Exercise mission sorties (3,338) counting as two operations (one take-off and one landing). This is nearly double (76% increase) the current baseline levels shown in Table 4.7-6 and would be about a 42% increase over the higher 2001 operational levels (16,000). Close air support aircraft (i.e., rotary-wing and MV-22) would conduct operations at the Drop Zone (DZ) and Assault Landing Zone (ALZ) locations within the Restricted Areas on a 2:1 ratio to those conducted at the EAF.

Table 4.7-6. Representative Annual Baseline and Projected EAF Operations

Aircraft	EAF[1] Baseline	Projected MEB Exercise	Total Projected EAF
FA-18	32	968	1,000
F-35	-	304	304
AV-8B	35	600	635
UC-35	43	-	43
C-20	43	-	43
C-17	12	-	12
C-12	341	-	341
UAS	0	480	480
E-2/C-2	10	-	10
C-130	10	-	10
CH-53E	432	464	896
MV-22B	1,742	536	2,278
AH-1	392	-	392
UH-1	392	-	392
AH/UH-1		2,184	2,184
SAR	262	-	262
H-60	44	-	44
Joint Fixed-Wing		8	8
Joint Rotary-Wing		640	640
EA-6B		148	148
KC-130		272	272
Joint AR		72	72
Total	**3,790**	**6,676**	**10,466**

Notes: [1]Includes aircraft arrival, departure, and touch and go operations.
AR = Aerial Refueling; EAF = Expeditionary Airfield; MEB = Marine Expeditionary Brigade; UAS = Unmanned Aerial System
Source: For baseline operations DoN 2009.

4.7.2.2 Civil Aviation Airspace Use

There is a significant amount of civil aviation air traffic in the ROI operating from the regional airports and along the airway/jet route system. There is also an undetermined amount of VFR general aviation aircraft operating throughout this area. The extent to which the Alternative 1 airspace proposal may affect these activities would vary with the SUA, altitudes, and times of day in which military flight activities are scheduled relative to those timeframes and routes in which the FAA's higher-density air traffic normally occur. As discussed in Section 3.7.3.3, FAA timeframes and routes may be affected depending on the SUA, altitudes, and times of day in which military flight activities are scheduled.

The following describes how each civil aviation activity may be affected by this alternative.

Victor Airways

Victor airways potentially affected by this alternative are described in Section 3.7.3.2 and shown in Figure 3.7-2. IFR air traffic along these airways generally operates from 8,000 feet mean sea level (MSL) up to, but not including, Flight Level (FL) 180. Tables 3.7-7 and 3.7-8 provide FAA data for the average daily number of flights that transit the proposed SUA areas within those altitudes and during the different daily time periods. Table 4.7-5 indicates approximately 60% of fighter aircraft and 20% of MV-22 and Unmanned Aerial System (UAS) aircraft sorties would normally operate within those altitudes. Other Combat Center aircraft types would typically operate below 8,000 feet MSL, beneath the airway IFR traffic.

The following describes the potential direct impacts of the proposed SUA and projected MEB Exercise operations on each airway, taking into consideration the lateral 4-mile route width and 3-mile safety buffer distance that would separate airway traffic and SUA operations. In each case, any impacts and mitigation measures to be considered will be addressed by the FAA and Marine Corps during formal review of the proposed airspace actions.

- V 8-21 V 283-587 extends approximately 10 miles inside the northwest portion of the proposed Restricted Area R-XXXX West sector and 4 miles inside the northwest portion of the proposed Johnson Valley MOA. Table 3.7-7 indicates that approximately 20 IFR flights typically transit this proposed SUA between 5,000 and 13,000 feet MSL and 35 transit between 13,000 feet MSL and FL180. This represents about 3% to 6% of the cumulative radar flight tracks shown in Figure 3.7-6 (Chapter 3) for this proposed airspace. When activated, this SUA would have a minimum to moderate impact on this airway.
- V 386 extends nearly midway within both the proposed Restricted Area R-XXXX West sector and Johnson Valley MOA. As noted previously for this proposed SUA, the 20 and 35 flights transiting the respective two altitude strata represent about 3 to 6% of the cumulative radar flight tracks shown in Figure 3.7-6 (Chapter 3) for this proposed SUA. When activated, this proposed SUA may also have a minimum to moderate impact on this airway. Activation of the R-XXXX East sector only should not impact this airway.
- V 264 runs parallel to the southern boundary of the proposed MOA, the modified Sundance MOA, and the proposed CAX MOA. The collective airway width and safety buffer for this airway would overlap these MOA southern boundaries. Table 3.7-7 indicates the number of flights in this airspace as 20 (Johnson Valley), 39 (Sundance), and 12 (CAX) between 8,000 and 13,000 feet MSL and 35, 59, and 11 flights, respectively, for these MOAs within the 13,000 feet MSL to FL180 stratum. Flights within the lower altitude stratum represent 3 to 7% of the flight tracks shown in Figures 3.7-6, 3.7-8, and 3.7-10 for the three MOAs and the higher altitude flights represent 6% to 10% of those flight tracks. The Sundance and CAX MOAs are projected for use primarily during the 4-day Final Exercise periods; therefore, activation of those MOAs would have minimal impact on this airway while activation of the Johnson Valley MOA would have a moderate impact on this airway.
- V 514-538 bisects the proposed CAX Low MOA and its collective route width and safety buffer would also overlap the adjacent Bristol and Turtle MOA boundaries by 2 to 4 miles. Table 3.7-7 data indicates the number of flights occurring within the 8,000 to 13,000 feet MSL stratum as 6 (Bristol), 12 (CAX), and 26 (Turtle), representing 3% to 8% of the flight tracks shown in Figures 3.7-9 through 3.7-11 for each of these areas. Flights within the upper stratum (13,000 feet MSL

to FL180) are 0, 11, and 9, respectively for each area, representing up to 6% of the cumulative flight tracks shown in those figures. With the proposed CAX Low MOA only extending up to 8,000 feet MSL and the High sector beginning at FL180, activation of this Low MOA and adjacent Bristol and Turtle MOAs would have minimal impact on this airway.

- V 12 V 442 runs parallel to the northern boundaries of the proposed Restricted Area R-XXXX, R-2501, the Bristol MOA, the proposed CAX Low MOA, and the modified Turtle MOA with the collective route width/safety buffer overlapping these boundaries by approximately 2 to 3 miles. Table 3.7-7 indicates the number of flights transiting these areas is 20 (Johnson Valley), 6 (R-2501/Bristol), 12 (CAX), and 26 (Turtle) within the 8,000 feet to 13,000 feet MSL stratum. These flights represent 3% to 8% of the cumulative flight tracks shown in Figures 3.7-6 and 3.7-9 through 3.7-11 for these airspace areas. The number of flights transiting the higher 13,000 feet MSL to FL180 stratum is 35, 0, 11, and 9, respectively, for each area, representing up to 6% of the flight tracks in those figures. Activation of this existing and proposed SUA would have minimal impacts on the lower density air traffic on this airway.
- V 208 crosses the southern portion of the proposed CAX Low MOA and through the middle of the modified Turtle A/B/C MOA/ATCAA. As noted previously, the number of flights transiting these two MOAs in the lower altitude stratum (12 and 26, respectively) and the upper stratum (11 and 9, respectively) represents 3% to 8% of the cumulative flight tracks shown in Figures 3.7-10 and 3.7-11. With the proposed CAX Low MOA only extending up to 8,000 feet MSL and the options available for scheduling only the proposed Turtle A/B/C subdivisions needed for MEB flight activities, activation of these two MOAs would have a minimum impact on this airway.
- V 442 transits through separate portions of the proposed Turtle A/B/C MOA. The proposed lowering of the Turtle C MOA (western portion) floor from 11,000 feet MSL to 1,500 feet above ground level (AGL) would further encompass those altitudes at 8,000 feet MSL and above used by IFR aircraft along that route. Federal Aviation Administration data indicates the number of flights transiting this MOA within the lower (5,000-13,000 feet MSL) and upper (13,000 feet MSL to FL180) altitude stratum being 26 and 9, respectively, this air traffic represents 3% to 8% of the cumulative flight tracks transiting the Turtle MOA airspace shown in Figure 3.7-11. With the options available for scheduling the proposed Turtle A/B/C subdivisions, activation of the A and/or B and/or C MOA/ATCAA altitudes, as needed, may have a minimum impact on this airway.
- V 135 transits the eastern portion of the Turtle MOA (proposed A MOA/ATCAA) which has the same altitudes as currently exists for this SUA (11,000 feet MSL to FL220). Although MEB training exercises may increase use of the Turtle MOA/ATCAA, the proposed subdivision of this MOA/ATCAA into lateral/vertical sectors would provide greater options for scheduling only the sector(s) needed for MEB flights so as to have minimum impact on this airway.

Overall, this alternative and the subdivisions proposed for R-XXXX and the CAX and Turtle MOA/ATCAAs would have minimal to moderate impacts on those airways transiting near or within the proposed SUA. The potential for any air traffic impacts would depend on the timeframes the individual SUA vertical/lateral sectors are scheduled for MEB operations relative to the higher air traffic densities/peak periods within those areas transited by the different airways. Modifications to the airspace proposals for the CAX Low/High MOA/ATCAAs and the Turtle A/B/C MOA/ATCAAs would provide the greater airspace/altitudes needed by the FAA to transit airway traffic through these areas. As previously noted, the FAA and Marine Corps will address any impacts of this alternative on LA ARTCC

air traffic and what measures can be considered to mitigate any impacts. This may include advanced coordination between military scheduling agencies and the LA ARTCC, as currently occurs, to schedule those SUA sectors outside of those time periods and altitudes that are most problematic for the FAA. Any measures that can be implemented to minimize direct impacts would also preclude any indirect impacts on this air traffic.

Jet Routes

Jet routes potentially affected by this alternative are described in Section 3.7.3.2 and shown in Figure 3.7-2. These routes are heavily used by IFR traffic transiting between the major airports serving the Los Angeles area and other airports across the country. Jet routes extend from FL180 to FL450 and much of the route traffic in the Combat Center region is climbing or descending through those altitudes while approaching or departing the Los Angeles area airports. The need to conduct military flight activities at FL180 and above would have the greater potential for impacts on jet route traffic at those altitudes. Table 4.7-5 indicates up to 60% of fighter aircraft and 100% of EA-6B sortie durations would occur between FL180 and FL270 with about 5% of fighter aircraft missions occurring above FL270. Most other military aircraft types would operate below FL180 and not be a factor for the jet route traffic operating at those higher altitudes.

The following describes the potential direct impacts of the proposed SUA and projected MEB Exercise operations on each jet route, considering the lateral distances and safety buffers typically applied between these routes and SUA. Where noted below, LA ARTCC currently employs those ATC standards and practices providing separation between jet route traffic and military operations when the existing SUA is active. However, in each case, any additional impacts on a jet route, and any appropriate mitigation measures, would be addressed by the FAA and Marine Corps before implementation of any proposed airspace actions.

- J60-64-107 lateral distances would extend air traffic within both the proposed Restricted Area R-XXXX East and West subdivisions and possibly within portions of the proposed Johnson Valley MOA/ATCAA. Federal Aviation Administration data in Table 3.7-7 indicates that 250 flights transit this airspace within the FL180 to FL270 altitude stratum while 299 flights are within the FL270 to FL400 stratum, collectively representing about 90% of the flight tracks shown in Figure 3.7-6 as crossing this area. Data in Table 3.7-8 indicates this high level traffic starts around 8:00 a.m. and continues into the later evening hours. Therefore, this alternative would have a significant impact on the timeframes and lower altitudes in which jet route traffic typically operates along this route. Impacts on jet route traffic above FL270 may be minimal since projected military use of those higher altitudes would only occur about 5% of the time and would be coordinated in advance with the LA ARTCC.
- J6 runs parallel to the northern boundaries of the proposed and existing SUA with the lateral distances that may be used by air traffic along this route extending into this SUA. Table 3.7-7 indicates the number of flights operating across these airspace areas within the FL180 to FL270 stratum is 250 (Johnson Valley), 44 (Bristol), 53 (CAX), and 65 (Turtle), representing 20 to 40% of the cumulative flights shown in Figures 3.7-6 and 3.7-9 through 3.7-11 for these individual SUA areas. The number of flights in the FL270 to FL400 stratum is 299, 185, 109, and 237, respectively, for these airspace areas, representing 50 to 80% of the cumulative flight tracks shown in those figures. This higher density traffic also occurs along this route between 8:00 a.m. and the later evening hours. Therefore, activation of these SUA areas would have a moderate to significant impact on this jet route in the FL180 to FL270 stratum and minimal impact at the

higher altitudes due to infrequent military use of those altitudes. Impacts may be minimized through those ATC practices that currently provide required separation between this higher altitude jet route traffic and military flight activities within the existing SUA.

- J128 currently crosses R-2501 and the Bristol ATCAA and would also transit the proposed Restricted Area R-XXXX and Johnson Valley MOA/ATCAA. Table 3.7-7 indicates 250 and 44 flights transit, respectively, through the Johnson Valley SUA and R-2501/Bristol airspace within the FL180 to FL270 stratum, representing 20 to 40% of the flight tracks shown in Figures 3.7-6 and 3.7-9 for these areas. The 299 and 185 flights transiting these areas, respectively, within the FL270 to FL400 stratum represent 50 to 80% of the flight tracks shown in those figures. The need to schedule use of the proposed R-XXXX and Johnson Valley MOA/ATCAA airspace within those lower altitudes and during the high density timeframes shown in Table 3.7-8 could have moderate to significant impacts on this jet route. Impacts within the upper stratum may be minimal.
- J65 and its lateral distance would extend into the southwest portion of the proposed Johnson Valley MOA/ATCAA. The 250 flights transiting this airspace within the FL180 to FL270 stratum represent about 40% of the flight tracks in Figure 3.7-6; the 299 flights within the FL270 to FL400 stratum represent about 50% of those tracks. Activation of this SUA would have a moderate to significant impact on the lower jet route altitudes and a minimal impact on those higher altitudes less frequently required for military operations. Military flights would be more concentrated in the northern portions of this MOA/ATCAA while maneuvering into the proposed Restricted Area R-XXXX East and/or West sectors.
- J4-10-104 runs parallel to the southern boundary of the proposed Johnson Valley MOA/ATCAA, modified Sundance MOA/ATCAA, and the proposed CAX MOA/ATCAA. Table 3.7-7 indicates the number of flights transiting these areas within the FL180 to FL270 stratum is 250 (Johnson Valley), 149 (Sundance), and 53 (CAX), representing 28 to 40% of the flight tracks crossing those areas (Figures 3.7-7, 3.7-8, and 3.7-10). The number of flights transiting those three areas within the FL270 to FL400 stratum is 299, 321, and 109, respectively, representing 50 to 60% of the flight tracks shown in those figures. It is projected that use of these ATCAAs by fighter and EA-6B aircraft would occur primarily during the 4-day MEB Final Exercise periods while transiting to and from the Restricted Areas. Weekly air traffic levels provided by the FAA and discussed in Section 3.7.3.3 indicate lower densities occur in the Sundance MOA/ATCAA area than experienced in the Johnson Valley region. Therefore, activation of the existing and proposed MOA/ATCAAs would have a minimal to moderate impact on this jet route during those scheduled periods of use.
- J236 and J10-231 both transit the proposed Turtle A and B MOA/ATCAAs where the Turtle B ATCAA would extend from the existing FL220 ceiling to FL400 in the western portion of the existing MOA/ATCAA. Federal Aviation Administration data indicates that 65 flights transit the FL180 to FL270 stratum and 237 transit the FL270 to FL400 stratum. These flights represent 20% and 70%, respectively, of the cumulative tracks shown in Figure 3.7-11 for this airspace. Data indicates the average daily air traffic levels through the Turtle MOA/ATCAA of medium density throughout the day and evening hours. Depending on the altitudes required to support MEB operations and the Turtle A and/or B MOA/ATCAA sectors to be scheduled for use, activation of this airspace would have a minimum to moderate impact on these two jet routes.

Overall, this alternative would have a moderate to significant impact on the jet routes transiting through the proposed SUA. The extent of these impacts would depend on the airspace, altitudes, and timeframes needed to conduct MEB operations relative to those daily times in which high density traffic typically occurs through each area. As described in Section 3.7.3.3 and noted above, the highest density traffic occurs in the Johnson Valley region throughout the day and into the later evening hours while high but somewhat lesser densities occur within the other existing/proposed SUA areas. For that reason, the R-XXXX, CAX, and Turtle MOA/ATCAA proposals were modified, as described and shown in Chapters 2 and 3, to subdivide this airspace into lateral and/or vertical sectors to provide greater flexibility in scheduling this SUA around those higher density air traffic periods and airspace/altitude uses. These modifications, coupled with standing Marine Corps procedures for planning/scheduling SUA needs with the FAA, and FAA practices for ensuring separation between military and IFR aircraft, may not fully address respective Marine Corps and FAA needs for this airspace. The Marine Corps would continue to work with the FAA as a cooperating agency in resolving mutual concerns over the airspace proposals. The FAA will examine the potential impacts and resolutions in an in-depth study of the proposal.

General Aviation VFR Routes

Visual Flight Rules general aviation aircraft operating in the region typically fly at altitudes below 10,000 feet MSL along those routes providing the most direct routing between airports/airfields while remaining clear of high terrain, obstacles, and congested air traffic areas. Those areas where VFR flights are most prevalent are generally north, west, and south of R-2501, within the "CAX corridor," and beneath the eastern portions of the Turtle MOA.

When activated, the Restricted Area R-XXXX East/West sectors proposed under this alternative would limit the airspace in which VFR general aviation could operate in that region, depending upon the sector(s) being activated. In response to public comments, the CAX and Turtle MOA/ATCAA proposals were modified so as to subdivide this airspace laterally and vertically in the manner described in Chapter 2 and Section 3.7 to provide greater flexibility in scheduling and minimizing use of those areas/altitudes having the greater potential to impact both IFR and VFR air traffic. When the R-XXXX sectors are active, VFR aircraft would have to avoid this airspace, potentially increasing flight distances. Visual Flight Rules aircraft could operate within those areas proposed for the new or modified MOAs using those standard see-and-avoid procedures exercised in all MOA airspace. Likewise, military pilots are also responsible for seeing and avoiding general aviation aircraft and using airborne radar systems to "see" civil aircraft equipped with transponders well beyond visual range and initiate actions to avoid those aircraft. It is acknowledged that the MOA proposals may affect those pilots who generally elect to fly below or around an active MOA.

Visual Flight Rules pilots can track the active status of SUA through ATC and Flight Service Station advisories and NOTAMs. They can also file VFR flight plans and make use of VFR flight following services, as radar and radio capabilities and controller workload permit, to enhance their flight safety while operating through all airspace, to include the SUA areas. The Marine Corps outreach program would continue to inform general aviation pilots of the flight training activities to help maximize the joint and safe use of the SUA.

Overall, this alternative would have minimal to moderate direct impacts on general aviation pilots who currently fly unrestricted through those areas proposed for the new SUA. This may result in increased travel distances when this SUA is active and pilots either cannot enter restricted airspace or elect not to transit the MOAs. This could result in indirect impacts such as inconvenience, increased time and fuel

costs associated with avoiding active SUA, and any expended efforts in tracking the SUA status through available advisory services.

Public Airports

Table 3.7-5 identifies the public airports located beneath or in close proximity to the existing and proposed SUA and notes their location on the aeronautical maps serving as a background for each of the proposed alternative airspace configurations. Several of these airports were visited by Marine Corps representatives who briefed both Fixed Base Operators and pilot groups on the purpose and need for the proposed airspace actions. The main concerns expressed at these meetings related to potential encroachment of the proposed new Johnson Valley airspace on instrument approach procedures at some airports. There may also be indirect effects on airport instrument departures such as Palm Springs where those routes intersect an airway or jet route that transits within the proposed airspace. Table 4.7-7 identifies those public airports in the ROI, notes those with instrument approach or departure procedures where mitigation measures may need to be considered, as necessary, between the Marine Corps, airport operators, and the FAA. The proposed SUA would not affect the local airport traffic patterns.

Direct impacts may occur if pilots operating to and from those airports closest to the proposed SUA must divert their flight routes to any great extent to avoid this active airspace and military activities, to include flying any instrument procedures at these airports. Indirect impacts may include any other conditions such as inconvenience, fuel costs, etc. that may be involved with avoiding the SUA during those time periods this airspace is active.

The Marine Corps will continue to keep Fixed Base Operators, aviation groups, and other concerned stakeholders, as appropriate, informed of Combat Center airspace and aviation activities and seek means to minimize any effects these activities would have on airport operations. Department of Navy Office of the Chief of Naval Operations Instruction (OPNAVINST) Naval Air Training and Operating Procedures Standardization General Flight and Operating Instructions 3710.7U (March 1, 2004), stipulates that aircraft shall avoid charted, uncontrolled airports by 3 nautical miles (NM) or 1,500 feet. Federal Aviation Administration Order 7400.2 also states that restricted areas shall exclude the airspace 1,500 feet and below within a 3-NM radius of airports available for public use. Where necessary, such avoidance requirements would help ensure military aircraft remain clear of all airports regardless of their proximity to the proposed SUA boundaries.

Table 4.7-7. Potential Effects on Public Airports

Airport	Potential Effects
Palm Springs	Potential for indirect impacts – initial approach /holding for RNAV runway 13R is 6,000 feet MSL, 17 miles northwest of airport within close proximity to Johnson Valley MOA boundary. Two airport departure routes intersect V 386 airway which transits proposed Johnson Valley MOA and R-XXXX West.
Jacqueline Cochran	Indirect impacts – Airport use of Palm Springs departure routes intersect V 386 airway which transits proposed Johnson Valley MOA and R-XXXX West.
Bermuda Dunes	Indirect impacts – Airport use of Palm Springs departure routes merge with V 386 airway which transits proposed Johnson Valley MOA and R-XXXX West.
Barstow-Daggett	No direct impacts – initial approach/holding for RNAV runways 22/26 is up to 4,700 feet MSL, 12 NM east/northeast of airport clear of proposed SUA.
Roy Williams	Potential for impacts – within close proximity to Johnson Valley MOA.
Yucca Valley	Potential for impacts – within close proximity to Johnson Valley MOA.
Twentynine Palms	Potential for impacts – initial approach/holding for VOR and GPS runway 26 approaches are up to 6,000 feet MSL, 16 NM east of airport in close proximity to the Sundance/CAX MOA boundaries.
Chiriaco Summit	No direct impacts – approximately 30 NM southeast of proposed SUA.
Lake Havasu City	Minimal impacts with the modified Turtle A/B/C MOA/ATCAA proposal.
Chemehuevi Valley	Minimal impacts with the modified Turtle A/B/C MOA/ATCAA proposal.
Needles	Potential for impacts – initial approach /holding for RNAV runway 29 approach is 3,800 feet MSL, 11 NM southeast of airport. Lowered Turtle MOA floor may affect approaches.
Eagle Airpark	No direct impacts – located sufficient distance from Turtle MOA boundary.
Avi Suquilla	No direct impacts – located sufficient distance from Turtle MOA boundary.
Big Bear City	Potential for impacts - initial approach/holding for the RNAV runway 26 approach is 11,000 feet MSL, 13 NM due east of the airport, within the Johnson Valley MOA boundary.
Hemet-Ryan	No direct impacts – Initial approach/holding for the RNAV runway 5 approach is 5,500 feet MSL, 14 NM southwest of airport and clear of proposed SUA.
Victorville Logistics	No direct impacts – initial approach/holding for VOR/RNAV runway 17 approaches is up to 5,200 feet MSL, 11 NM north of airport, clear of proposed SUA.
Apple Valley	No direct impacts – initial approach/holding for RNAV runway 18 approaches is up to 6,000 feet MSL, 14 NM north of airport, clear of proposed SUA.
Riverside Municipal	No direct impacts – initial approach/holding for RNAV runway 9 is 3,300 feet MSL, 13 NM west of airport, clear of proposed SUA.
Hesperia	No direct impacts – located sufficient distance from proposed SUA.

Notes: CAX = Combined Arms Exercise; DME = Distance-Measuring Equipment; GPS = Global Positioning System; MOA = Military Operations Area; MSL = mean sea level; NM = nautical mile; RNAV = Area Navigation; SUA = Special Use Airspace; VOR = VHF Omni-Directional Radio-Range

Private Airfields

Section 3.7.3.2 identifies the private airfields located within the Combat Center ROI. These airfields are all unattended, not for public use, and have limited operations. However, the proposed SUA could potentially affect unrestricted access to those airfields beneath or bordering the proposed SUA, as described below. Department of Navy OPNAVINST 3710.7 stipulates that aircraft shall avoid charted, uncontrolled airports by 3 NM or 1,500 feet.

Dale Airpark is located inside the boundary of the current Sundance MOA and, therefore, would be situated further within the boundary of the proposed MOA modification. Depending on the frequency of

use for this airfield, activation of this MOA would have minimal effects without considering any additional exclusionary measures.

The Bauer and Crosswinds airfields are within close proximity to the southern boundary proposed for the Sundance MOA modification. Depending on the use of these airfields, there may be limited effects when this MOA is activated.

The Hi Desert airfield is within close proximity to the southern boundary proposed for the Johnson Valley MOA. There may be impacts on use of this medical airfield when this MOA is activated and consideration would need to be given to ensuring unrestricted access for this airfield.

The Kelly, B&E, and Abraham airfields are within the southern boundary proposed for the Restricted Area R-XXXX West sector. The floor of this proposed restricted airspace would be 1,500 feet AGL over those land areas not controlled by MAGTF Training Command, to include these three airfields. There are no private airfields within the west study area that would need to be acquired and those three airfields within the restricted airspace would be permitted to continue their use.

The proposed Johnson Valley MOA would overlie the Valley Vista airfield. Depending on the use of this airfield, there may be limited effects when this MOA is activated.

The Cadiz airfield is located beneath the eastern Bristol MOA boundary and would also underlie the proposed CAX MOA. The Danby airfield is located beneath the area proposed for the CAX MOA. Depending on the use of these two airfields, there may be limited effects when the Bristol and CAX MOAs are activated.

Direct impacts may occur when aircraft are operating at those private airfields within or in proximity to the proposed SUA, and must use increased vigilance when this airspace is in use for military training activities. Indirect impacts may include any inconvenience the activated SUA would have on the owner's times and frequency of use for these airfields. The Marine Corps would coordinate with each airfield owner affected by the proposed airspace actions, as needed, to address those measures that would be taken by the Marine Corps to provide for the safe and restricted use of those private airfields when SUA flight activities are in progress. Flight activities would be immediately halted, as necessary, to avoid and ensure the safety of any non-participating aircraft observed flying into an active MOA or Restricted Area where mission activities are taking place. Flight safety is always a priority.

All other private airfields described in Section 3.7 are sufficiently distant from the proposed SUA boundaries that significant effects would be unlikely from activation of the proposed airspace.

4.7.2.3 Potential Mitigation Measures

The following potential mitigation measure was identified to lessen the potential effects of the proposed airspace acquisition:

AM-1 Potential mitigation measures to minimize the impacts of this alternative airspace configuration would be determined by the FAA and Marine Corps in conjunction with an aeronautical study to be completed by the FAA on the preferred alternative. Continued Marine Corps outreach to airport operators and general aviation pilot groups would seek means of minimizing impacts on this aviation community.

Although impacts would be lessened with implementation of the above mitigation measure, it is expected that impacts to airspace management would still be significant. There are no other mitigation measures that the Marine Corps would be able to implement unilaterally to compensate for the impacts to airspace

management during MEB Building Block training or MEB Exercise training periods. Therefore, significant impacts to airspace management would occur with implementation of Alternative 1.

4.7.3 Alternative 2 Impacts

The proposed SUA configuration for Alternative 2 is depicted in Figure 3.7-3. As shown, the areas proposed for Restricted Area R-XXXX and Johnson Valley MOA are reduced in size from the proposed Alternative 1 configuration. The following sections address any differences in potential impacts this alternative would have on civil aviation airspace use from what were discussed for Alternative 1.

4.7.3.1 Military Airspace Use

Use of the proposed SUA would be the same as described for Alternative 1, both in terms of the projected sortie operations and the manner in which they would be dispersed throughout the SUA areas, altitudes, and time periods. Flight activities under this alternative would be more concentrated within the proposed Restricted Area R-XXXX/Johnson Valley MOA/ATCAA configuration. Operations at the EAF on the DZ and ALZ locations would also be the same as discussed for Alternative 1.

4.7.3.2 Civilian Aviation Airspace Use

<u>Victor Airways</u>

Potential impacts on the affected airways in the ROI would be similar to those described for Alternative 1 with the following differences:

The V 8-21 V 283-587 centerline would be outside the boundary of the proposed Restricted Area R-XXXX, however, its lateral width and safety buffer would extend into the northern portion of this Restricted Area. Activation of this Restricted Area would have a moderate impact on this airway and the flights described previously as transiting through this airspace.

The V 386 lateral width and safety buffer would extend primarily only into the western portion of the proposed Johnson Valley MOA. Activation of this MOA would have a moderate impact on this airway and the flights described previously as transiting through this airspace.

The extent of any impacts on these two airways and the others described above for Alternative 1 would depend on the overall air traffic densities/peak periods relative to the scheduled use of the proposed SUA. As previously noted, the FAA and Marine Corps will address any impacts and mitigation measures to be taken before implementation of any airspace proposals. Impacts could be minimized through advanced coordination between military scheduling agencies and LA ARTCC, as currently occurs, to avoid the more problematic time periods and altitudes.

<u>Jet Routes</u>

Potential impacts of this alternative on jet routes would be similar to those described for Alternative 1. Although the consolidated jet route J-60-64-107 transits outside the boundary of the proposed Restricted Area R-XXXX for this alternative, its lateral buffer would extend within this airspace. Activation of this Restricted Area would have a significant impact on the previously described air traffic within the FL180 to FL270 altitude stratum. Impacts on the route traffic above FL270 would be minimal with the limited military operations projected to operate in those higher altitudes.

The extent of any potential impacts this alternative would have on jet routes in the ROI would depend on the overall air traffic densities/peak periods and scheduled use of the proposed SUA. As noted above for

the Victor airways, the FAA and Marine Corps will address any impacts and mitigation measures this alternative would have on these routes.

General Aviation VFR Routes

This alternative would have similar effects on routes used by general aviation VFR air traffic as discussed for Alternative 1 except that the reduced size of the proposed Restricted Area R-XXXX would be less restrictive for VFR aircraft transiting that area. The availability of Marine Corps outreach programs, VFR flight planning opportunities, ATC/Flight Service Station advisory services, NOTAM information, and see-and-avoid procedures would continue to provide information and assistance that would help minimize any impacts the proposed SUA would have on the general aviation community.

Public Airports

No public airports are located beneath the SUA proposed for this alternative; therefore, there may be fewer impacts than discussed for Alternative 1. The increased distance between the Big Bear airport and the western boundary of the proposed Restricted Area R-XXXX/Johnson Valley MOA would reduce the potential effects of this alternative on the instrument approaches noted in Table 4.7-8 for this airport.

Private Airfields

The proposed Restricted Area R-XXXX and Johnson Valley MOA configuration under this alternative would not directly overlie the B&E, Abraham, and Kelly private airfields, thus reducing potential effects of this SUA on these locations. Because of their proximity to the proposed SUA boundaries, the Marine Corps would address any actions to be taken with the airfield owners to provide for the safe and unrestricted use of these private airfields.

4.7.3.3 Potential Mitigation Measures

Potential mitigation measures under Alternative 2 are the same as described under Alternative 1. Consequently, significant impacts to airspace management would occur with implementation of Alternative 2.

4.7.4 Alternative 3 Impacts

The proposed SUA configuration for Alternative 3, as depicted in Figure 3.7-4, is oriented to the east to encompass the acquisition study areas associated with this alternative. The restricted airspace proposed for this alternative would include the proposed Restricted Area R-XXXXB and reclassification of the Bristol MOA/ATCAA as Restricted Area R-XXXXA. These Restricted Areas would extend from 5,000 feet MSL up to FL400. The internal boundaries of the proposed Sundance MOA and R-XXXXB would be aligned differently from what is presented for the other alternatives. This airspace configuration would be less than proposed for Alternative 1; however, the restricted airspace would encompass a larger area. The Turtle MOA/ATCAA would not be subdivided as described for the other alternatives due to the greater need for this airspace to support the Alternative 3 proposed actions.

4.7.4.1 Military Airspace Use

Proposed SUA Use

The sortie projections and their general distribution among the altitudes and daily time periods would be the same as described in Chapter 2 and Section 4.7.2.1 for all Combat Center flight operations. Table 4.7-8 indicates how these sorties would be dispersed within the Alternative 3 proposed SUA configuration for the single MEB Exercise Work-up and Final Exercise periods.

As discussed for Alternative 1, most aircraft would operate throughout multiple SUA areas during the course of a sortie mission with the amount of time spent in each varying with the daily training scenarios. Based on MAGTF Training Command sortie projections, Table 4.7-9 indicates the sortie durations in each SUA area would be the same for both the MEB Exercise Work-up and Final Exercise periods. These percentages are considered representative of all other Combat Center training activities conducted within the Alternative 3 proposed configuration. As noted, 65% of the sortie duration times would occur within restricted airspace.

Table 4.7-8. Sortie Estimates for Single MEB Exercise Work-up and Final Exercise Periods

Aircraft Type	MEB Exercise Work-up Period (16 flying days)	MEB Final Exercise Period (4 flying days)	
	R-2501 Modified Sundance MOA/ATCAA Bristol Restricted Area (R-XXXXA) New CAX Restricted Area (R-XXXXB) Modified Turtle MOA/ATCAA	R-2501 Modified Sundance MOA/ATCAA R-XXXXA/B (Bristol and CAX Restricted Areas)	Modified Turtle MOA/ATCAA
AV-8B	114	36	36
FA-18	155	86	86
F-35	55	22	22
Joint Fixed-Wing	2	18	-
AH/UH-1	426	120	-
CH-53	104	12	-
MV-22	116	18	-
Joint Rotary-Wing	136	24	-
EA-6B	28	9	9
KC-130	50	18	18
Joint AR	0	18	18
UAS	84	36	36
Total	1270	399	225
Daily Average	79	100	56

Notes: The same aircraft sorties would typically maneuver throughout the different SUA groups shown in this table. AR = Aerial Refueling; ATCAA = Air Traffic Control Assigned Airspace; MEB = Marine Expeditionary Brigade; MOA = Military Operations Area; UAS = Unmanned Aerial System

Source: Combat Center 2009.

Table 4.7-9. Proportion of Sortie Duration for Alternative 3 SUA

Existing/Proposed Airspace	Percentage of Sortie Duration in SUA		Annual Total Hours of Use[1]
	Work-up	Final Exercise	All Events
R-2501	25%	25%	4,120
Bristol (R-XXXXA) Restricted Area	23%	23%	3,723
CAX (R-XXXXB) Restricted Area	17%	17%	2,716
Sundance MOA/ATCAA	19%	19%	3,161
Turtle MOA/ATCAA	16%	16%	2,518
Total	100%	100%	N/A

Notes: [1]Total listed for each SUA reflects highest projected hours for given altitude block use in each area.
ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; MOA = Military Operations Area; SUA = Special Use Airspace;

Source: Combat Center 2009.

Appendix D tables indicate the SUA areas and altitude blocks within which each aircraft type would typically maneuver during MEB Exercise activities under this alternative. Table 4.7-10 summarizes these altitude estimates and notes, in parentheses, the percent of sortie duration time each aircraft would typically operate within these altitudes. The areas and altitudes flown under this alternative would be the same for both periods, except that higher altitudes would be flown by fighter aircraft in the proposed Restricted Area R-XXXXA (Bristol) during the Final Exercise period, and Joint Aerial Refueling (AR) would only be required for Final Exercise operations.

Table 4.7-10. Typical Aircraft Altitude Distributions for MEB Exercise Periods

Aircraft Type	MEB Exercise Work-up and Final Exercise Altitude Use(feet MSL)[1]		
	R-2501, R-XXXXB (CAX), and Sundance MOA/ATCAA	R-XXXXA (Bristol)	Turtle MOA/ATCAA
AV-8, F/A-18, F-35, and Joint Fixed-Wing	SUA floor - 8,000 (5%) 8,000 - 14,000 (30%) 14,000 - FL270 (60%)	SUA floor - 8,000 (5%) 8,000 - 14,000 (30%) 14,000 - FL270 (60%) FL270 - FL400 (5%) (Final Exercise)	SUA floor - 8,000 (5%) 8,000 - 14,000 (30%) 14,000 – FL180 (60%)
AH/UH-1, CH-53, and Joint Rotary-Wing	SUA floor - 8,000 (100%)	SUA floor - 8,000 (100%)	SUA floor - 8,000 (100%)
MV-22	SUA floor - 8,000 (60%) 8,000 – 14,000 (40%)	SUA floor - 8,000 (60%) 8,000 – 14,000 (40%)	SUA floor - 8,000 (60%) 8,000 – 14,000 (40%)
EA-6B	FL180 - FL270 (100%)	FL180 - FL270 (100%)	-
KC-130	SUA floor - 8,000 (5%) 14,000 – FL180 (95%)	SUA floor - 8,000 (5%) 14,000 – FL180 (95%)	SUA floor - 8,000 (5%) 14,000 – FL180 (95%)
Joint AR (Final Exercise)	FL180 – FL270 (100%)	FL180 – FL270 (100%)	-
UAS	SUA floor – 8,000 (80%) 8,000 – FL180 (20%)	SUA floor – 8,000 (80%) 8,000 – FL180 (20%)	SUA floor – 8,000 (80%) 8,000 – FL180 (20%)

Notes: [1]Percentages represent the portion of a sortie mission that each aircraft type would typically operate within each designated SUA area and altitude block during that mission activity. Altitude use will differ with the different SUA areas used by an aircraft during a sortie mission.
AR = Aerial Refueling; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; FL = Flight Level; MEB = Marine Expeditionary Brigade; MOA = Military Operations Area; MSL = mean sea level; SUA = Special Use Airspace; UAS = Unmanned Aerial System

Expeditionary Airfield Use

Use of the EAF and other DZ/ALZ locations under this alternative would be the same as described for Alternative 1. Expeditionary Airfield departure and recovery routes may differ somewhat while transiting to the range training area locations associated with this alternative.

4.7.4.2 Civil Aviation Airspace Use

Victor Airways

Victor airways potentially affected by this alternative are described in Sections 3.7.3.2 and depicted in Figure 3.7-4. Potential impacts of the proposed SUA on these airways to be addressed by the FAA and Marine Corps are similar to those described for Alternative 1 with the following differences:

V 386 and consolidated airway V 8-21 V 283-587 would not be located within the proposed SUA for this alternative. Therefore, this configuration would not directly affect the current use of these routes and the flights described in Section 3.7.3.3 transiting this airspace below FL180. The projected increased use of

R-2501 at altitudes below FL180 during the higher density MEB Exercise periods would have minimal impacts on these airways without imposing any time or altitude restrictions during peak traffic periods.

V 514 V 538, which bisects the CAX corridor, would be affected by the proposed Bristol and CAX Restricted Areas R-XXXXA/B. Activation of this SUA and the increased MEB Exercise flight activities that may occur in this airspace under this alternative would have a significant impact on this airway traffic.

Jet Routes

The jet routes potentially affected by this alternative are described in Section 3.7.3.2 and depicted in Figure 3.7-4. Potential impacts on these jet routes that would be addressed by the FAA and Marine Corps are similar to those discussed for Alternative 1 with the following differences:

J60-64-107 and J65 would not be located within the proposed SUA for this alternative. Therefore, configuration would not directly affect the current use of this route and the flights described in Section 3.7.3.3 transiting this airspace within the FL180 to FL270 and FL270 to FL400 strata. The projected increased use of R-2501 at altitudes above FL180 during the higher density MEB Exercise periods would have minimal impacts on this jet route during peak traffic periods.

J128 and those flights described in Section 3.7.3.3 within the FL180 to FL270 and FL270 to FL400 altitude strata may be affected by the reclassification of the Bristol MOA to a Restricted Area. Activation of this SUA and the increased MEB Exercise flight operations that may occur within this area would have a moderate to significant impact on this route traffic during the higher density traffic periods.

General Aviation VFR Routes

The proposed SUA configuration for this alternative would have minimal to moderate impacts on those routes flown by general aviation VFR aircraft in this ROI. The absence of the proposed Restricted Area R-XXXX and Johnson Valley MOA from Alternative 3 would provide the same VFR flight opportunities through the area west of R-2501 as currently exist without any restrictions or limitations. Conversely, the proposed restricted airspace within the existing Bristol MOA and CAX corridor would restrict access through those areas when this airspace is activated. This restricted airspace coupled with the proposed Sundance MOA modification and lowering of the Turtle MOA floor may also limit those options general aviation pilots currently have for operating throughout this area while remaining clear of MOA activities.

As discussed for Alternative 1, VFR pilots can check the active status of all SUA through ATC and Flight Service Station advisories and NOTAMs to determine the availability of this airspace for flight planning purposes. Use of VFR flight plans and flight following services also enhance flight safety within all areas flown, to include the current and proposed SUA configurations. In all cases, the Marine Corps would continue to use outreach programs to inform the general aviation community of the Combat Center's flight training activities to help maximize the joint and safe use of the SUA.

Public Airports

The Alternative 3 airspace configuration would have less impact on those public airports potentially affected by the proposed Restricted Area R-XXXX and Johnson Valley MOA included in the other alternatives. This would essentially provide an airspace environment similar to what currently exists in that region.

This alternative would have the same potential effects on the Twentynine Palms, Yucca Valley, and Williams airports as discussed for Alternative 1 due to their proximity to the southern boundary of the

proposed Sundance MOA modification and the R-XXXXB (CAX) Restricted Area. Activation of this airspace would have minimal impact on the Twentynine Palms airport and the instrument procedure that approaches this airport from the east.

Potential effects of the Turtle MOA on the Lake Havasu and Chemehuevi Valley airports, and the other airports located outside the MOA boundaries, would be the same as discussed for Alternative 1. The proposed lowering of the Turtle MOA floor would have a minimal to moderate impact on Lake Havasu airport operations and instrument approach procedures for this airport when the Turtle MOA is activated and the lower altitudes are being used. Means for mitigating impacts on any airport operations in this area would be addressed by the Marine Corps, airport operators, and the FAA.

Private Airfields

Section 3.7.3.2 identified the private, unattended airfields within the Combat Center ROI. Potential effects of this alternative on these airfields would be essentially the same as discussed for Alternative 1, with the following differences:

The Hi Desert, Vista Valley, Kelly, B&E, and Abraham airfields would be less affected based on the proposed Restricted Area R-XXXX and MOA not being included as part of this SUA configuration. These airfields are located sufficiently distant from R-2501 and the proposed Sundance MOA boundary such that they should not be affected by flight activities in this airspace, when activated.

The Cadiz and Danby airfields are located within the boundaries of the proposed Bristol and CAX Restricted Areas R-XXXXA/B. Activation of these restricted areas would have a minimal impact on the limited use of these airfields. Department of Navy requirements stipulate that aircraft shall avoid charted, uncontrolled airports by 3 NM or 1,500 feet. Means for accommodating unrestricted access to these airfields would be coordinated between the Marine Corps and the airfield owners.

All other private airfields described in Section 3.7 are sufficiently distant from the proposed SUA boundaries and would not be affected by activation of the proposed Combat Center SUA.

4.7.4.3 Potential Mitigation Measures

Potential mitigation measures under Alternative 3 are the same as described under Alternative 1. Consequently, significant impacts to airspace management would occur with implementation of Alternative 3.

4.7.5 Alternative 4 Impacts

The proposed SUA configuration for this alternative is the same as depicted in Figure 3.7-2 to include changes to the airspace proposals that now establish lateral and/or vertical subdivisions for R-XXXX and the CAX and Turtle MOA/ATCAAs. Flight profiles may differ somewhat with aircraft maneuvering in a west-to-east direction; however, there would be little difference in the overall use of this SUA configuration. Only those lateral/vertical SUA sectors would be scheduled, as needed, to support specific MEB mission requirements and use of this airspace under this alternative. The potential impacts of this configuration and the projected MEB Exercise operations on civil airspace use would be the same as described in Section 4.7.2 for Alternative 1.

4.7.5.1 Potential Mitigation Measures

Potential mitigation measures under Alternative 4 are the same as described under Alternative 1. Consequently, significant impacts to airspace management would occur with implementation of Alternative 4.

4.7.6 Alternative 5 Impacts

The proposed SUA configuration for this alternative is the same as depicted in Figure 3.7-2 to also include changes to the airspace proposals that now establish lateral and/or vertical subdivisions for R-XXXX and the CAX and Turtle MOA/ATCAAs.. Flight profiles may differ somewhat with aircraft maneuvering in a west-to-east direction; however, there would be little difference in the overall use of this SUA configuration. Only those lateral/vertical SUA sectors would be scheduled, as needed, to support specific MEB mission requirements and use of this airspace under this alternative. The potential impacts of this configuration and the projected MEB Exercise operations on civil airspace use would be the same as described in Section 4.7.2 for Alternative 1.

4.7.6.1 Potential Mitigation Measures

Potential mitigation measures under Alternative 5 are the same as described under Alternative 1. Consequently, significant impacts to airspace management would occur with implementation of Alternative 5.

4.7.7 Alternative 6 Impacts (Preferred Alternative)

The proposed SUA configuration for this alternative is the same as depicted in Figure 3.7-2 to include the lateral/vertical sectors that have been established for R-XXXX and the CAX and Turtle MOA/ATCAAs to provide greater flexibility for scheduling use of this airspace. Under this alternative, R-XXXX only goes down to 1,500 feet AGL in the areas where it is not above the new installation land base. The potential impacts of this configuration and the projected MEB Exercise operations on civil airspace use would be the same as described in Section 4.7.2 for Alternative 1.

4.7.7.1 Potential Mitigation Measures

Potential mitigation measures under Alternative 6 are the same as described under Alternative 1. Consequently, significant impacts to airspace management would occur with implementation of Alternative 6.

4.7.8 No-Action Alternative

No changes would occur to the existing Combat Center airspace environment under the No-Action alternative. The baseline aircraft operations described in Section 3.7 would be representative of the ongoing aviation activities conducted at the Combat Center complex. These baseline operations would continue to have minimal effect on other military or civil aviation airspace uses in the region. Coordination between LA ARTCC and military scheduling agencies would continue to ensure the compatible use of all airspace in this region under any alternative.

4.7.9 Summary of Impacts

Table 4.7-11 summarizes the impacts of each action alternative and the No-Action alternative.

Table 4.7-11. Summary of Impacts

Alternative	Impacts
Alternative 1	SI • Proposed new and modified SUA with projected increase in military flight operations would have minimal to moderate impacts on Victor airways and moderate to significant impacts on jet route IFR air traffic within or adjacent to this airspace. • Proposed new and modified SUA and lower MOA floors would have minimal to moderate impacts on routes used by general aviation VFR aircraft to transit this region. • Proposed new and modified SUA would have minimal to moderate impacts on public airports and instrument approach procedures within close proximity to the SUA boundaries. • Proposed new and modified SUA would have minimal to moderate impacts on private airfields within, beneath, or bordering this SUA. • Extent of impacts would vary with use of only those proposed lateral/vertical SUA sectors required to support differing mission activities.
Alternative 2	SI • Impacts for the reduced airspace configuration proposed for this alternative would be generally the same as described for Alternative 1.
Alternative 3	SI • Impacts for the airspace configuration proposed for this alternative would be generally the same as discussed for Alternative 1 with the impacts occurring in the eastern areas where MOA/ATCAAs would be converted to restricted airspace.
Alternative 4	SI • Impacts would be the same as discussed for Alternative 1.
Alternative 5	SI • Impacts would be the same as discussed for Alternative 1.
Alternative 6	SI • Impacts would be the same as discussed for Alternative 1.
No-Action Alternative	NI • Current measures would continue to be used to mitigate any impacts on civil aviation.

Notes: ATCAA = Air Traffic Control Assigned Airspace; IFR = Instrument Flight Rules; MOA = Military Operations Area; NI = No impact; SI = Significant impact; SUA = Special Use Airspace; VFR = Visual Flight Rules

4.8 AIR QUALITY

4.8.1 Approach to Analysis

The project air quality analysis estimated the magnitude of emissions that would occur from proposed construction and operational activities for each project alternative. In the case of proposed operations, existing emissions displaced out of the Mojave Desert Air Basin (MDAB) from acquired lands due to the project alternatives were subtracted from operational emissions associated with each project alternative to determine their net change in emissions. The analysis compared emissions from proposed construction and operations to the criteria identified below in Section 4.8.1.2 to determine their significance. The potential for proposed emissions to exceed a national ambient air quality standard was evaluated on the basis of how these emissions would affect public lands outside of the Combat Center boundary. The analysis also evaluated how proposed emissions would affect air quality within the Joshua Tree National Park, which is the nearest federal Class I area to the Combat Center. The nearest border of this area to proposed activities is approximately 10 miles (16 km) to the south-southwest.

The potential effects of greenhouse gas (GHG) emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have any appreciable effect on climate changes. Therefore, the impacts of GHG emissions associated with the project alternatives to climate change is discussed in the context of cumulative impacts in Section 5.4.8 of this EIS.

4.8.1.1 Methodology

Construction

Air quality impacts from construction activities proposed under each project alternative would occur from 1) combustive emissions due to the use of fossil fuel-powered equipment and 2) fugitive dust emissions (particulate matter less than 10 microns in diameter [PM_{10}]/particulate matter less than 2.5 microns in diameter [$PM_{2.5}$]) due to the operation of equipment on exposed soil. Construction activity data associated with each project alternative were used to estimate proposed combustive and fugitive dust emissions (Combat Center 2010a). Proposed construction would occur in year 2013, before the initiation of proposed training exercises in year 2015.

Factors needed to derive construction source emission rates were obtained from *Compilation of Air Pollution Emission Factors, AP-42, Volume I* (USEPA 1995), the *OFFROAD2007 Model* for off-road construction equipment (Air Resources Board [ARB] 2006a), the *EMFAC2007 Model* for on-road vehicles (ARB 2006b), and the Navy Aircraft Environmental Support Office (AESO) for helicopter emission rates (AESO 2000a, 2000b). Appendix G includes data and assumptions used to calculate proposed construction emissions.

Operations

Air quality impacts associated with proposed operational activities under each project alternative would occur from 1) combustive emissions due to the use of fossil fuel-powered equipment and 2) fugitive dust emissions (PM_{10}/$PM_{2.5}$) due to the operation of vehicles and equipment on exposed soil. Combustive emission sources associated with proposed operations would include: 1) aircraft during landing and take-off and cruising modes below 3,000 feet AGL; 2) tactical vehicles; 3) tactical support equipment; and 4) use of ordnance. Proposed aircraft landing and take-off activities and the operation of tactical vehicles and tactical support equipment on exposed soils would generate fugitive dust.

Operational data used to calculate proposed emissions under each project alternative were obtained from the Marine Corps (as presented in Section 2.4) and the airspace analyses (Sections 3.7 and 4.7). Factors used to calculate combustive emissions for proposed sources were obtained from the AESO (AESO 1999, 2000a, 2000b, 2001a, 2001b, and 2002); the Air Force Institute for Environment, Safety and Occupational Health Risk Analysis (Air Force Institute for Environment, Safety and Occupational Health Risk Analysis 2002); *OFFROAD2007 Model*, the *Calendar Year 2007 Comprehensive Emissions Inventory Plan for Marine Corps Air Ground Combat Center Twentynine Palms* (USACE Sacramento District and Combat Center 2008); and the *Compilation of Air Pollution Emission Factors, AP-42, Volume I* (USEPA 2006). Details of the emission source data and calculations used to estimate operational emissions are included in Appendix G of this EIS.

The west, east, and south study areas proposed for acquisition under the project alternatives currently generate emissions from recreational activities and the use of OHVs, as shown in Table 3.8-3.

For project alternatives that affect the east and south study areas, the analysis assumed that these actions would displace all of the existing recreational activities and their associated emissions from these areas, but that 90% of these activities and emissions would relocate elsewhere in the MDAB. Therefore, the analysis subtracted 10% of the existing emissions generated in these areas from the emission increases associated with these project alternatives to estimate proposed air quality impacts.

For project alternatives that affect the west study area, the analysis assumed that these actions would displace existing recreational activities according to the following factors: 1) the type of visitor usage (events vs. dispersed), 2) the amount of the west area affected by a project alternative, and 3) the amount of time per year that a project alternative would close this area to the public. These factors determined that from 77% to 96% of the existing activities and associated emissions would relocate elsewhere in the MDAB, depending upon the project alternative. Therefore, the analysis subtracted from 4% to 23% of the emissions generated in the west area from the emission increases associated with these project alternatives to estimate proposed air quality impacts. Since the proposed training exercises would not occur until year 2015, the analysis took into consideration the usages expected for Johnson Valley in the west area at this time (BLM 2010). This future baseline equates to a 16% increase in usage and associated emissions for the west area in 2015, compared to 2010 levels.

In addition to 48 days of MEB Exercises, the proposed action includes 160 days of MEB Building Block training. It is expected that the high levels of existing training exercises at the Combat Center would revert back to pre-war levels (before 2003) by the time the proposed action would be implemented. This reduction in existing training activities would offset the increase in proposed MEB Building Block training activities, such that their net effect would not exceed existing 2009 levels of training activities or their associated air emissions. Therefore the air quality analysis of this EIS focuses on the net increase in training activities that would occur from the proposed MEB Exercises.

To demonstrate this emissions analysis, Table 4.8-1 presents an estimate of the annual air emissions that occurred from operations at the Combat Center in year 2002. These conservatively represent pre-war emission levels, as they are the highest that occurred at the Combat Center during the 2001 through 2008 period. The bottom of Table 4.8-1 also summarizes the annual air emissions that occurred from operations at the Combat Center in 2009. These data show that for other than volatile organic compounds (VOC), the 2002 emission levels are 18 to 34% lower for all pollutants. The difference between the 2009 and 2002 emissions represents the level of emissions that the proposed MEB Building Block training activities would not exceed in future years. While VOC emissions are higher in 2002 than 2009, this is due to an unusually high amount of F/A-18 C/D aircraft operations that occurred in 2002. This aircraft has a very

high VOC emission rate and future operations and resulting VOC emissions from this aircraft are expected to remain substantially below these levels at the Combat Center. Therefore, existing Combat Center plus proposed MEB Building Block training VOC emissions would not exceed 2009 levels at the Combat Center in future years.

Table 4.8-1. Annual Emissions from Operations at the Combat Center in Year 2002

Activity Type	Air Pollutant Emissions (Tons per Year)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Aircraft	60.69	202.43	34.86	2.69	30.21	30.21
Aluminum Sweat Furnace	0.00	0.01	0.05	0.00	0.04	0.04
Boilers	0.86	7.51	10.10	0.09	1.19	1.19
Coatings and Solvents	1.07	--	--	--	0.00	0.00
Explosives	2.38	136.83	0.91	--	0.67	0.04
Fire Training	0.00	0.00	0.00	0.00	0.00	0.00
Internal Combustion Engines	3.99	1.61	7.22	0.08	0.50	0.50
Landfill Gas	0.35	0.07	--	--	--	--
Motor Vehicles, Diesel	1.88	7.97	13.33	0.43	1.84	1.84
Motor Vehicles, Gasoline	2.33	16.40	2.02	0.10	0.18	0.18
Motor Vehicles, JP-8	19.45	86.04	241.63	27.26	8.74	8.74
Paint Spray Booth	0.00	--	--	--	0.00	0.00
Road Dust - Paved	--	--	--	--	44.54	17.95
Road Dust - Unpaved	--	--	--	--	5,100.70	510.07
Smoke Munitions	--	--	--	--	5.53	0.31
Smoke Training	0.01	0.47	0.01	--	0.04	0.04
Soil Remediation	0.18	0.03	0.21	0.00	0.01	0.01
Storage Tanks – Fuels	0.09	--	--	--	--	--
Tactical Support Equipment - JP-8	4.34	10.85	50.36	0.59	3.40	3.40
Wind Erosion – Dust	--	--	--	--	0.39	0.16
Total Year 2002 Emissions	**97.62**	**471.23**	**360.70**	**31.25**	**5,197.97**	**574.68**
Total Year 2009 Emissions	**95.71**	**575.02**	**481.92**	**49.69**	**6,603.71**	**726.31**
2009 minus 2002 Emissions	**-1.91**	**103.79**	**121.22**	**18.44**	**1405.74**	**151.63**

Notes: These data do not include emissions for aircraft range operations, as presented for 2009 operations at the Combat Center in Table 3.8-3 of this EIS.
CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_x = sulfur oxides; VOC = volatile organic compound

Sources: Metcalf and Eddy, Inc. 2003; NAVFAC Southwest and Combat Center 2010a.

4.8.1.2 Evaluation Criteria

For the purposes of this air quality analysis, and for air pollutants designated as nonattainment with the National Ambient Air Quality Standards (NAAQS) and therefore subject to general conformity requirements, if the estimated total of direct and indirect emissions caused by a project alternative exceed a conformity *de minimis* threshold requiring a conformity determination in the MDAB project region (25 tons per year of VOCs or nitrogen oxides [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 State Implementation Plan (SIP), then proposed impacts would be determined to be less than significant.

For those air pollutants in MDAB which are in attainment of the NAAQS (CO, SO2, and PM2.5), the general conformity requirements and thresholds do not apply. For these air pollutants, the analysis used thresholds from the USEPA Prevention of Significant Deterioration (PSD) permitting program that define

major stationary sources of emissions as the evaluation criteria for determining the potential for significance of air quality impacts for the project alternatives. Although the PSD permitting program is not applicable to mobile sources, PSD thresholds are being used as criteria for measuring air quality impacts under NEPA.

In regard to the potential for proposed emissions to impact air quality within the Joshua Tree National Park Class I area, a project alternative would significantly impact visibility within this pristine area if project emissions would represent a substantial increase (greater than a 5%) to 1) PSD Class I NO_2 increment levels in this area or, 2) existing emissions generated by the San Bernardino and Riverside counties region.

4.8.1.3 Public Scoping Issues

The following air quality concerns were raised during the 90-day scoping period (October 30, 2008 through January 31, 2009) conducted for the proposed NEPA action:

- increased air emissions;
- ground disturbing activities contributing to existing air quality problems;
- increase in dust and other particulate matter from increased military activity;
- potential for increased regional haze, particularly at Joshua Tree National Park;
- increased carbon footprint;
- greenhouse gas emissions that may contribute to global warming; and
- cumulative impacts in concert with localized droughts and global climate change.

The air quality analyses presented in this EIS considered these issues for each of the project alternatives.

4.8.2 Alternative 1 Impacts

4.8.2.1 Construction

The following provides an estimate of the emissions that would occur from the construction of 1) about 30 miles (48 km) of unpaved roads and 2) three communications towers in the west study area, as proposed under Alternative 1. Table 4.8-2 summarizes the total emissions that would occur from construction activities proposed under Alternative 1. The project schedule estimates that construction activities would occur in calendar year 2013, before initiation of the proposed training exercises in 2015. The data in Table 4.8-2 show that annual VOC, NO_x, and PM10 emissions from proposed construction activities would not exceed the conformity *de minimis* thresholds. The MDAB is in attainment of the CO, SO_2, and $PM_{2.5}$ NAAQS. When compared to the PSD threshold of 250 tons per year, the estimated construction emissions of these criteria pollutants would be well below these levels.

The following SCMs were incorporated into the analysis, reducing fugitive dust emissions generated from the use of construction equipment on exposed soil by 50% from uncontrolled levels:

AQ SCM-1: Use water trucks to keep areas of vehicle movement damp enough to minimize the generation of fugitive dust.

AQ SCM-2: Minimize the amount of disturbed ground area at a given time.

AQ SCM-3: Minimize ground disturbing activities in proximity to the Combat Center boundary.

AQ SCM-4: Discontinue proposed ground disturbing activities within 3 miles upwind of the Combat Center boundary when winds exceed 25 miles per hour or when visible dust plumes emanate from the site and then stabilize all disturbed areas with water application.

AQ SCM-5: Designate personnel to monitor the dust control program and to increase dust suppression measures (e.g., watering), as necessary, to minimize the generation of dust.

Consequently, proposed construction emissions from Alternative 1 would produce less than significant air quality impacts. The main sources of $PM_{10}/PM_{2.5}$ emissions would occur as fugitive dust from the operation of equipment on unpaved surfaces.

Table 4.8-2. Total Construction Emissions Resulting from Implementation of Alternative 1

Construction Activity	Air Pollutant Emissions (tons)					
	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
Development of Unpaved Roads	0.08	0.30	0.83	0.00	0.45	0.11
Installation of Communication Towers	0.09	0.40	0.12	0.01	0.53	0.18
Total Annual Emissions (1)	**0.17**	**0.71**	**0.96**	**0.01**	**0.98**	**0.25**
Conformity *de minimis* Level	**25**	**N/A**	**25**	**N/A**	**100**	**N/A**
Exceeds *de minimis* Level?	No	N/A	No	N/A	No	N/A

Notes: All emissions are assumed to occur in calendar year 2013.
N/A = not applicable; CO = carbon monoxide; NO_x = nitrogen oxides; SO_2 = sulfur dioxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; VOC = volatile organic compound

Project construction equipment would emit toxic air contaminants that present a heightened risk to human health compared to criteria pollutants. The main source of toxic air contaminants would occur in the form of particulates from the combustion of diesel fuel. However, toxic air contaminants from proposed construction activities would produce minimal ambient impacts to public lands, due to the intermittent operation of proposed diesel-powered construction equipment that would occur over a large portion of the west study area. In addition, the substantial transport time of these emissions to the nearest locations of public lands (the revised Combat Center boundary) would dilute ambient concentrations of toxic air contaminants to well below levels of concern. As a result, construction of Alternative 1 would produce less than significant impacts to public health.

4.8.2.2 Operations

Table 4.8-3 presents an estimate of the annual operational emissions that would occur with implementation of Alternative 1. The main sources of $PM_{10}/PM_{2.5}$ emissions would occur as fugitive dust from the operation of tactical vehicles on unpaved surfaces. Implementation of Alternative 1 would eliminate 23%/10% of the visitor activities and their associated emissions from the west/south study areas. Therefore, these emissions are subtracted from proposed emissions to determine the residual (net) emissions and impacts associated with the operation of Alternative 1. The data in Table 4.8-3 show that the residual (net) VOC, NO_x, and PM_{10} emissions from the operation of Alternative 1 would exceed their applicable conformity *de minimis* thresholds. Given that the project region does not attain the NAAQS for ozone (O_3) (VOCs and NO_x are precursors to the formation of O_3) or PM_{10}, a conformity determination was prepared to further analyze whether these emission increases would produce significant impacts to ambient O_3 and PM_{10} levels within the MDAB. The results of the conformity determination analysis are presented below.

Table 4.8-3. Annual Operational Emissions Resulting from Implementation of Alternative 1

Activity	Air Pollutant Emissions (Tons)[1]					
	VOC	**CO**	**NO_x**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Aircraft Operations	25.55	72.87	39.77	1.91	17.25	17.25
Tactical Vehicles	5.29	23.73	64.39	7.35	2.33	2.33
Tactical Support Equipment	1.50	6.75	17.20	2.09	0.66	0.66
Ordnance	1.82	132.88	0.28	-	-	-
Fugitive Dust – Aircraft	-	-	-	-	42.36	16.94
Fugitive Dust – Tactical Vehicles/Tactical Support Equipment	-	-	-	-	565.25	86.56
Fugitive Dust – Ordnance	-	-	-	-	2.49	1.30
Personnel On-road Commutes	0.05	0.60	1.84	0.00	0.02	0.02
Proposed Emission Increases	**34.21**	**236.83**	**123.48**	**11.36**	**630.36**	**125.06**
Reduction of West Area Emissions[2]	**(2.95)**	**(24.27)**	**(1.45)**	**(0.03)**	**(258.47)**	**(26.87)**
Reduction of South Area Emissions[3]	**(0.00)**	**(0.02)**	**(0.00)**	**(0.00)**	**(0.36)**	**(0.04)**
Total Net Change	**31.25**	**212.54**	**122.03**	**11.33**	**371.53**	**98.15**
Conformity *De Minimis* Level	**25**	**N/A**	**25**	**N/A**	**100**	**N/A**
Exceeds Conformity *de minimis Level*?	**Yes**	**N/A**	**Yes**	**N/A**	**Yes**	**N/A**

Notes: [1]Proposed emissions would be the same for each year of operation.
[2]Equal to 23% of the total west area emissions.
[3]Equal to 10% of the total south area emissions.
N/A = not applicable; CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

The MDAB is in attainment of the CO, SO_2, and $PM_{2.5}$ NAAQS. The data in Table 4.8-3 show that the net increase in proposed operational emissions of these criteria pollutants from Alternative 1 would not exceed the PSD threshold of 250 tons per year. Therefore, CO, SO_2, and $PM_{2.5}$ emissions produced from the operation of Alternative 1 would result in less than significant air quality impacts.

Impacts to Ambient O_3 and PM_{10}

A conformity determination was prepared to demonstrate that the net increase in VOC, NO_x, and PM_{10} emissions from Alternative 6 (preferred alternative) would conform to the SIP. A summary of this evaluation is presented in Section 4.8.7 of this EIS. Proposed VOC, NO_x, and PM_{10} emissions from Alternative 1 are nearly identical to those estimated for Alternative 6. Therefore, the conclusions from the conformity determination for Alternative 6 also would apply to Alternative 1.

Regarding proposed VOC and NO_x emissions, the Mojave Desert Air Quality Management District (MDAQMD) and ARB propose to, include these emissions from Alternative 6 into the next O_3 SIP revision for the MDAB (MDAQMD 2010a and ARB 2011). Therefore, Alternative 6, and equivalently Alternative 1, would conform to the SIP. Therefore, VOC and NO_x emissions from Alternative 1 would produce less than significant air quality impacts.

Regarding proposed PM_{10} emissions, an air dispersion analysis was performed with the use of the USEPA American Meteorological Society/USEPA Regulatory Model (AERMOD). The results of this analysis demonstrates that the ambient impact of PM_{10} emissions from Alternative 6 would not contribute to an exceedance of the PM_{10} NAAQS. Therefore, PM_{10} emissions from Alternative 1 would produce less than significant air quality impacts.

Impacts to Joshua Tree National Park

Due to the proximity of the Joshua Tree National Park Class I area to the project site, proposed emission sources have the potential to impair visibility within this pristine area. Visibility impairment could occur

from proposed primary emissions of NO_2 and PM_{10} or secondary formation of visibility reducing particulate matter in the atmosphere due to precursor emissions of VOCs, NO_2, or SO_2. Visibility impairment from primary NO_2 emissions would occur as a brown-colored haze in the lower layer of the atmosphere. This situation usually would occur during the colder months of the year, when a lack of insolation prevents the conversion of this pollutant to NO_2 and oxygen. Visibility impairment due to primary PM_{10} emissions would usually occur from sources of fugitive dust, such as vehicles operating on unpaved surfaces. Visibility impairment due to the secondary formation of nitrate or sulfate particulates in the atmosphere due to emissions of NO_x or SO_2 usually would occur in the warmer months of the year. This effect would take the form of regional haze, which would reduce regional visual range.

To quantify the impact of proposed emissions on air quality related values in the nearby Joshua Tree National Park Class I area, this EIS provides the following analyses: 1) a dispersion modeling analysis that evaluates impacts of proposed emissions to this area and compares these impacts to the PSD Class I NO_2 increment (2.5 micrograms per cubic meter [$\mu g/m^3$] annual average), and 2) an evaluation of the relative increase in proposed emissions in comparison to existing emissions generated by the San Bernardino and Riverside counties region.

An air dispersion analysis was performed with the use of the AERMOD to estimate the ambient annual impact of proposed NO_x emissions to the Joshua Tree National Park. The AERMOD is a guideline model required by the USEPA for use in regulatory air quality impact evaluations (USEPA 2010). The AERMOD has the ability to simulate the various physical characteristics of proposed stationary and mobile sources of emissions. Surface and upper air meteorological data needed for use in the model were obtained from conditions recorded at the Mainside monitoring station and Desert Rock, Nevada, respectively. Each proposed training exercise would occur for about 1 month and typically would be separated in time by 6 months. Therefore, to ensure evaluation of all possible seasonal conditions, six scenarios were evaluated: 2 months of activity per year, separated by a period of 6 months, and then this scenario was shifted forward in time by 1 month to create the next scenario. In other words, the first and sixth scenarios evaluated were for the periods of January/July and June/December, respectively. The analysis assumed that 75% of proposed NO_x emissions would convert to NO_2, per USEPA Tier 2 recommendations (USEPA 2005). Appendix G of this EIS provides documentation of the project dispersion modeling analyses.

The results of the AERMOD analyses determined that the maximum annual NO_2 impact of proposed emissions from Alternative 1 to the Joshua Tree National Park was 0.09 $\mu g/m^3$. This impact amounts to 3.6% of the PSD Class I NO_2 increment of 2.5 $\mu g/m^3$. Existing and approved emission sources within the project region have consumed a portion of this PSD Class I increment and therefore the amount of increment available to new sources is something less than 2.5 $\mu g/m^3$. Additionally, the proposed training exercises are not required to comply with the PSD Class I increment, since proposed emissions mainly would occur from mobile sources. Nevertheless, since proposed emissions would consume such a small portion of this increment, this relatively small increase in NO_2 levels demonstrates that Alternative 1 would produce less than significant impacts to air quality values in the Joshua Tree National Park Class I area.

To evaluate potential impacts on visibility in Joshua Tree National Park, emissions from Alternative 1 were compared to the most recent emissions inventory for the San Bernardino and Riverside counties region (year 2008) to determine the relative magnitude of proposed emissions, and therefore their potential to combine with baseline emissions and contribute to visibility impairment within the project region, which includes Joshua Tree National Park. This region is used for comparative purposes, as

Joshua Tree National Park is located within both of these counties. In reality, contributors to regional haze within the project region occur from a much larger areal source of emissions than these two counties, most notably the Los Angeles metropolitan area (ARB 2009c).

Table 4.8-4 shows that net annual average daily emissions from Alternative 1 would range from 0.04 to 0.4% of the annual average daily emissions for the combined San Bernardino and Riverside counties region in 2008, depending on the pollutant (ARB 2009d). The pollutants of greatest concern that would degrade visibility in the Joshua Tree National Park are NO_x (as a precursor to ammonium nitrate) and VOCs. Table 4.8-4 shows that annual average daily emissions of VOC and NO_x from Alternative 1 would equate to 0.04%/0.1% of the total emissions of these pollutants from both counties. As a result, these relatively minimal levels of emissions would not substantially contribute to an increase in visibility impairment within the project region, which represents a less than significant impact. In addition, review of wind conditions for the project region show that on an annual average, the winds blow only 23% of the time from the direction that would transport emissions from the proposed Combat Center to a portion of the Joshua Tree National Park (see the wind rose for Twentynine Palms in Figure 1 in Appendix G).

Table 4.8-4. Daily Operational Emissions in Comparison to Regional Emissions - Alternative 1

Scenario	Air Pollutant Emissions (Tons per Day)[1]					
	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
Alternative 1	0.09	0.58	0.33	0.03	1.02	0.27
San Bernardino County[2]	128	610	257	6	157	50
Riverside County[2]	85	447	153	1	72	18
Combined Counties[2]	**213**	**1,057**	**410**	**7**	**229**	**68**
Project Percent of Counties Emissions	**0.04**	**0.1**	**0.1**	**0.4**	**0.4**	**0.4**

Notes: [1]Annual average based on 365 days/year.
[2]Year 2008 emissions (ARB 2009d).
CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

Impacts to Sensitive Receptors

Due to the proximity of sensitive receptors to the proposed training areas, project emission sources would have the potential to impact these locations. Fugitive dust (PM_{10}) generated by the proposed training exercises would represent the greatest risk of exposure to sensitive receptors, due to its magnitude of emission rate and toxicity in comparison to other criteria pollutants emitted by the project. The results of the PM_{10} dispersion modeling analysis for Alternative 1 determined that the maximum ambient impact of PM_{10} emissions from the proposed training activities would not contribute to an exceedance of the PM_{10} NAAQS. This analysis also showed that PM_{10} concentrations would quickly decrease with distance from the proposed training areas and that relatively low PM_{10} impacts would occur at the nearest locations of sensitive receptors in the communities of Johnson Valley and Mainside (see Figure G-2 in Appendix G.1 of this EIS). Correspondingly lower PM_{10} impacts would occur at the more distant locations of sensitive receptors on public lands. Proposed emissions from Alternative 1 would not expose sensitive receptors within the project region to substantial pollutant concentrations.

4.8.2.3 Potential Mitigation Measures

Implementation of the SCMs for air quality (see Section 4.8.2.1) would reduce air quality impacts from proposed construction and operations. The Marine Corps considered potential mitigation measures but determined that none were feasible for proposed operations.

4.8.3 Alternative 2 Impacts

Construction activities from Alternative 2 would result in the same air quality impacts as those described for Alternative 1, as both alternatives propose identical activities. The SCMs described under Alternative 1 would also be implemented under this alternative. Therefore, proposed construction emissions from Alternative 2 would produce less than significant air quality impacts.

Table 4.8-5 presents an estimate of the annual operational emissions that would occur with implementation of Alternative 2. Operation of Alternative 2 would eliminate 12%/10% of the visitor activities and their associated emissions from the west/south study areas. Therefore, these emissions were subtracted from proposed emissions to determine the residual (net) emissions and impacts associated with the operation of Alternative 2. The data in Table 4.8-5 show that operation of the alternative would result in a net increase in VOC, NO_x, and PM_{10} emissions that would exceed their applicable conformity *de minimis* thresholds. Given that the project region does not attain the NAAQS for O_3 (VOCs and NO_x are precursors to the formation of O_3) or PM_{10}, a conformity determination was prepared to further analyze whether these emission increases would produce significant impacts to ambient O_3 and PM_{10} levels within the MDAB. The results of the conformity determination are presented below.

The MDAB is in attainment of the CO, SO_2, and $PM_{2.5}$ NAAQS. The data in Table 4.8-5 show that the net increase in proposed operational emissions of these criteria pollutants from Alternative 2 would not exceed the PSD threshold of 250 tons per year. Therefore, CO, SO_2, and $PM_{2.5}$ emissions produced from the operation of Alternative 2 would result in less than significant air quality impacts.

Table 4.8-5. Annual Operational Emissions Resulting from Implementation of Alternative 2

Activity	Air Pollutant Emissions (Tons)[1]					
	VOC	**CO**	**NO_x**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Aircraft Operations	25.55	72.87	39.77	1.91	17.25	17.25
Tactical Vehicles	5.29	23.73	64.39	7.35	2.33	2.33
Tactical Support Equipment	1.50	6.75	17.20	2.09	0.66	0.66
Ordnance	1.82	132.88	0.28	-	-	-
Fugitive Dust – Aircraft	-	-	-	-	42.36	16.94
Fugitive Dust – Tactical Vehicles/Tactical Support Equipment	-	-	-	-	565.25	86.56
Fugitive Dust – Ordnance	-	-	-	-	2.49	1.30
Personnel On-road Commutes	0.05	0.60	1.84	0.00	0.02	0.02
Proposed Emission Increases	**34.21**	**236.83**	**123.48**	**11.36**	**630.36**	**125.06**
Reduction of West Area Emissions[2]	**(1.56)**	**(12.83)**	**(0.77)**	**(0.01)**	**(136.61)**	**(14.20)**
Reduction of South Area Emissions[3]	**(0.00)**	**(0.02)**	**(0.00)**	**(0.00)**	**(0.36)**	**(0.04)**
Total Net Change	**32.65**	**223.98**	**122.72**	**11.34**	**493.39**	**110.82**
Conformity *De Minimis* Level	**25**	**N/A**	**25**	**N/A**	**100**	**N/A**
Exceeds Conformity *de minimis Level*?	**Yes**	**N/A**	**Yes**	**N/A**	**Yes**	**N/A**

Notes: [1]Proposed emissions would be the same for each year of operation.
[2]Equal to 12% of the total west area existing emissions.
[3]Equal to 10% of the total south area existing emissions.
CO = carbon monoxide; N/A = not applicable NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

Impacts to Ambient O_3 and PM_{10}

A conformity determination was prepared to demonstrate that the net increase in VOC, NO_x, and PM_{10} emissions from Alternative 6 (preferred alternative) would conform to the SIP. A summary of this evaluation is presented in Section 4.8.7 of this EIS. Proposed VOC, NO_x, and PM_{10} emissions from

Alternative 2 are nearly identical in strength and location of operation to those estimated for Alternative 6. Therefore, the conclusions from the conformity determination for Alternative 6 also would apply to Alternative 2.

Regarding proposed VOC and NOx emissions, the MDAQMD and ARB propose to include these emissions from Alternative 6 into the next O_3 SIP revision for the MDAB (MDAQMD 2010a and ARB 2011). Therefore, Alternative 6, and equivalently Alternative 2, would conform to the SIP. Therefore, VOC and NO_x emissions from Alternative 2 would produce less than significant air quality impacts.

Regarding proposed PM_{10} emissions, the results of the AERMOD air dispersion analysis showed that the ambient impact of PM_{10} emissions from Alternative 6 would not contribute to an exceedance of the PM_{10} NAAQS. Therefore, PM_{10} emissions from Alternative 2 would produce less than significant air quality impacts.

Impacts to Joshua Tree National Park

The increase in NO_x emissions from the operation of Alternative 2 and their resulting impacts to the Joshua Tree National Park would be nearly identical to those estimated for Alternative 1. Therefore, NO_x emissions from Alternative 2 would produce less than significant impacts to air quality values in the Joshua Tree National Park Class I area.

Table 4.8-6 shows that net annual average daily emissions from Alternative 2 would range from 0.04% to 0.6% of the annual average daily emissions for the combined San Bernardino and Riverside counties region in 2008, depending on the pollutant. The pollutants of greatest concern that would degrade visibility in the Joshua Tree National Park are NO_x (as a precursor to ammonium nitrate) and VOCs. Table 4.8-6 shows that annual average daily emissions of VOC and NO_x from Alternative 2 would range from 0.04% to 0.1% of the total emissions of these pollutants from both counties. As a result, these relatively minimal levels of emissions would not substantially contribute to an increase in visibility impairment within the project region and would produce less than significant impacts.

Table 4.8-6. Daily Operational Emissions in Comparison to Regional Emissions - Alternative 2

Scenario	Air Pollutant Emissions (Tons per Day) [1]					
	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
Alternative 2	0.09	0.61	0.34	0.03	1.35	0.30
San Bernardino County[2]	128	610	257	6	157	50
Riverside County[2]	85	447	153	1	72	18
Combined Counties[2]	**213**	**1,057**	**410**	**7**	**229**	**68**
Project Percent of Counties Emissions	**0.04**	**0.1**	**0.1**	**0.4**	**0.6**	**0.4**

Notes: [1]Annual average based on 365 days/year.
[2]Year 2008 emissions (ARB 2009d).
CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

Impacts to Sensitive Receptors

The impact of emissions from Alternative 2 to sensitive receptors would be similar to those estimated for Alternative 1. As a result, proposed emissions from Alternative 2 would not expose sensitive receptors within the project region to substantial pollutant concentrations.

4.8.3.1 Potential Mitigation Measures

Implementation of the SCMs for air quality (see Section 4.8.2.1) would reduce air quality impacts from proposed construction and operations. The Marine Corps considered potential mitigation measures but determined that none were feasible for proposed operations.

4.8.4 Alternative 3 Impacts

Construction activities from Alternative 3 would result in similar air quality impacts as those described for Alternative 1. The SCMs described under Alternative 1 would also be implemented under this alternative. Alternative 3 would install 2, rather than 3 communication towers compared to Alternative 1, but it would construct tank crossings in the east study area, which are not proposed under Alternative 1. Emissions from construction of the tank crossings would approximate those produced from construction of one communication tower. Therefore, proposed construction emissions from Alternative 3 would produce less than significant air quality impacts.

Operation of Alternative 3 would generate more combustive and fugitive dust emissions from tactical vehicles/tactical support equipment compared to Alternative 1, due to the need for vehicles to travel greater distances to proposed assembly areas. In addition, localized impacts would shift somewhat towards the east study area under Alternative 3, rather than the west study area as proposed for Alternative 1. Operation of Alternative 3 would eliminate 10% of the visitor activities and their associated emissions from the east and south study areas, compared to 23%/10% within the west and south areas under Alternative 1. Therefore, these emissions were subtracted from proposed emissions to determine the residual (net) emissions and impacts associated with the operation of Alternative 3.

Table 4.8-7 presents an estimate of the annual operational emissions that would occur from the implementation of Alternative 3. These data show that the net increase in VOC, NO_x, and PM_{10} emissions from the operation of the alternative would exceed the applicable conformity *de minimis* thresholds. Given that the project region does not attain the NAAQS for O_3 or PM_{10}, this EIS further analyzes whether these emission increases would produce significant impacts to ambient O_3 and PM_{10} levels within the MDAB. The results of the conformity determination are presented below.

The MDAB is in attainment of the CO, SO_2, and $PM_{2.5}$ NAAQS. The data in Table 4.8-7 show that the net increase in proposed operational emissions of these criteria pollutants from Alternative 3 would not exceed the PSD threshold of 250 tons per year. Therefore, CO, SO_2, and $PM_{2.5}$ emissions produced from the operation of Alternative 3 would result in less than significant air quality impacts.

Table 4.8-7. Annual Operational Emissions Resulting from Implementation of Alternative 3

Activity	Air Pollutant Emissions (Tons)[1]					
	VOC	**CO**	**NO_x**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Aircraft Operations	25.55	72.87	39.77	1.91	17.25	17.25
Tactical Vehicles	6.30	28.25	76.86	8.76	2.79	2.78
Tactical Support Equipment	1.50	6.75	17.20	2.09	0.67	0.66
Ordnance	1.82	132.88	0.28	-	-	-
Fugitive Dust – Aircraft	-	-	-	-	42.36	16.94
Fugitive Dust – Tactical Vehicles/Tactical Support Equipment	-	-	-	-	670.95	102.76
Fugitive Dust – Ordnance	-	-	-	-	2.49	1.30
Personnel On-road Commutes	0.05	0.60	1.84	0.00	0.02	0.02
Annual Emissions	**35.22**	**241.35**	**135.95**	**12.77**	**736.52**	**141.71**
Reduction of East Area Emissions[2]	**(0.00)**	**(0.01)**	**(0.00)**	**(0.00)**	**(0.23)**	**(0.02)**
Reduction of South Area Emissions[2]	**(0.00)**	**(0.02)**	**(0.00)**	**(0.00)**	**(0.36)**	**(0.04)**
Total Net Change	**35.22**	**241.32**	**135.95**	**12.77**	**735.92**	**141.65**
Conformity *De Minimis* Level	**25**	**N/A**	**25**	**N/A**	**100**	**N/A**
Exceeds Conformity *de minimis Level*?	**Yes**	**N/A**	**Yes**	**N/A**	**Yes**	**N/A**

Notes: [1]Proposed emissions would be the same for each year of operation.
[2]Equal to 10% of the total west/south areas existing emissions.
CO = carbon monoxide; N/A = not applicable; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

Impacts to Ambient O_3 and PM_{10}

A conformity determination was prepared to demonstrate that the net increase in VOC, NO_x, and PM_{10} emissions from Alternative 6 (preferred alternative) would conform to the SIP. A summary of this evaluation is presented in Section 4.8.7 of this EIS. Proposed VOC and NO_x emissions from Alternative 3 would be nearly identical to those estimated for Alternative 6. Therefore, the conclusions from the O_3 conformity determination for Alternative 6 also would apply to Alternative 3. Proposed PM_{10} emissions from Alternative 3 would exceed those estimated for Alternative 6 and they would occur in somewhat different locations. Therefore, an air dispersion analysis was performed to estimate the ambient impact of PM_{10} emissions from operations specific to Alternative 3.

Regarding proposed VOC and NOx emissions, the MDAQMD and ARB propose to include these emissions from Alternative 6 into the next O_3 SIP revision for the MDAB (MDAQMD 2010a and ARB 2011). Therefore, Alternative 6, and equivalently Alternative 3, would conform to the SIP. Therefore, VOC and NO_x emissions from Alternative 3 would produce less than significant air quality impacts.

The AERMOD air dispersion analysis predicted that the maximum 24-hour PM_{10} impact due to Alternative 3 operations was 102 µg/m^3. Addition of the background PM_{10} value of 52 µg/m^3 would produce a total project PM_{10} impact of 154 µg/m^3. The AERMOD PM_{10} analysis presented for Alternative 6 in Section 4.8.7 of this EIS concludes that the total project PM_{10} impact would be somewhat less than predicted by this analysis. This is the case, as 1) the analysis uses a conservatively high PM_{10} background concentration and 2) the project PM_{10} impact would quickly decrease with distance from the Combat Center boundary. These arguments also would apply to PM_{10} impacts due to the operation of Alternative 3. However, since the prediction for the total PM_{10} impact from Alternative 3 is somewhat above the PM_{10} 24-hour NAAQS of 150 µg/m^3, it is concluded that the residual (net) PM_{10} emissions from the operation of Alternative 3 would contribute to an exceedance of this standard. Therefore, PM_{10} emissions from Alternative 3 would produce significant air quality impacts.

Impacts to Joshua Tree National Park

The results of the AERMOD analyses determined that the maximum annual NO_2 impact of proposed emissions from Alternative 3 to the Joshua Tree National Park was 0.08 µg/m^3. This impact amounts to 3.2% of the PSD Class I NO_2 increment of 2.5 µg/m^3. Existing and approved emission sources within the project region have consumed a portion of this PSD Class I increment and therefore the amount of increment available to new sources is something less than 2.5 µg/m^3. Additionally, the proposed training exercises are not required to comply with the PSD Class I increment, since proposed emissions mainly would occur from mobile sources. Nevertheless, since proposed emissions would consume such small portion of this increment, this relatively small increase in NO_2 levels demonstrates that Alternative 3 would produce less than significant impacts to air quality values in the Joshua Tree National Park Class I area.

Table 4.8-8 shows that net annual average daily emissions from Alternative 3 would range from 0.05% to 0.9% of the daily emissions for the combined San Bernardino and Riverside counties region in 2008, depending on the pollutant. The pollutants of greatest concern that would degrade visibility in the Joshua Tree National Park are NO_x (as a precursor to ammonium nitrate) and VOCs. Table 4.8-8 shows that annual average daily emissions of VOC and NO_x from Alternative 3 would range from 0.05% to 0.1% of the total emissions of these pollutants from both counties. As a result, these relatively minimal levels of emissions would not substantially contribute to an increase in visibility impairment within the project region and would produce less than significant impacts.

Table 4.8-8. Daily Operational Emissions in Comparison to Regional Emissions - Alternative 3

Scenario	Air Pollutant Emissions (Tons per Day) [1]					
	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
Alternative 3	0.10	0.66	0.37	0.03	2.02	0.39
San Bernardino County[2]	128	610	257	6	157	50
Riverside County[2]	85	447	153	1	72	18
Combined Counties[2]	213	1,057	410	7	229	68
Project % of Counties Emissions	**0.05**	**0.1**	**0.1**	**0.5**	**0.9**	**0.6**

Notes: [1]Annual average based on 365 days/year.
[2]Year 2008 emissions (ARB 2009d).
CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

Impacts to Sensitive Receptors

The impact of emissions from Alternative 3 to sensitive receptors would be similar to or slightly lower than those estimated for Alternative 1. This is the case, as emissions generated by training exercises under Alternative 3 would occur more in the east study area and northern portions of the existing Combat Center. Therefore, these emissions would occur at further distances from sensitive receptors compared to those evaluated under Alternative 1. As a result, proposed emissions from Alternative 3 would not expose sensitive receptors within the project region to substantial pollutant concentrations.

4.8.4.1 Potential Mitigation Measures

Implementation of the SCMs for air quality (see Section 4.8.2.1) would reduce air quality impacts from proposed construction and operations. The Marine Corps considered potential mitigation measures but determined that none were feasible for proposed operations. Therefore, residual effects from the operation of Alternative 3 would produce significant, unmitigable impacts to $PM_{2.5}$ CAAQS levels.

4.8.5 Alternative 4 Impacts

Construction activities from Alternative 4 would result in the same air quality impacts as those described for Alternative 1, as both alternatives propose identical activities. The SCMs described under Alternative 1 would also be implemented under this alternative.

Table 4.8-9 presents an estimate of the annual operational emissions that would occur with implementation of Alternative 4. Operation of Alternative 4 would eliminate 4%/10% of the visitor activities and their associated emissions from the west/south study areas. Therefore, these emissions were subtracted from proposed emissions to determine the residual (net) emissions and impacts associated with the operation of Alternative 4. The data in Table 4.8-9 show that the net increase in VOC, NO_x, and PM_{10} emissions from the operation of the alternative would exceed their applicable conformity *de minimis* thresholds. Given that the project region does not attain the NAAQS for O_3 (VOCs and NO_x are precursors to the formation of O_3) or PM_{10}, a conformity determination was prepared to further analyze whether these emission increases would produce significant impacts to ambient O_3 and PM_{10} levels within the MDAB. The results of the conformity determination are presented below.

The MDAB is in attainment of the CO, SO_2, and $PM_{2.5}$ NAAQS. The data in Table 4.8-9 show that the net increase in proposed operational emissions of these criteria pollutants from Alternative 4 would not exceed the PSD threshold of 250 tons per year. Therefore, CO, SO_2, and $PM_{2.5}$ emissions produced from the operation of Alternative 4 would result in less than significant air quality impacts.

Table 4.8-9. Annual Operational Emissions Resulting from Implementation of Alternative 4

Activity	Air Pollutant Emissions (Tons)[1]					
	VOC	**CO**	**NO_x**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Aircraft Operations	25.55	72.87	39.77	1.91	17.25	17.25
Tactical Vehicles	5.29	23.73	64.39	7.35	2.33	2.33
Tactical Support Equipment	1.50	6.75	17.20	2.09	0.66	0.66
Ordnance	1.82	132.88	0.28	-	-	-
Fugitive Dust – Aircraft	-	-	-	-	42.36	16.94
Fugitive Dust – Tactical Vehicles/Tactical Support Equipment	-	-	-	-	565.25	86.56
Fugitive Dust – Ordnance	-	-	-	-	2.49	1.30
Personnel On-road Commutes	0.05	0.60	1.84	0.00	0.02	0.02
Proposed Emission Increases	**34.21**	**236.56**	**122.71**	**11.33**	**630.40**	**125.10**
Reduction of West Area Emissions[2]	**(0.51)**	**(4.23)**	**(0.25)**	**(0.00)**	**(45.01)**	**(4.68)**
Reduction of South Area Emissions[3]	**(0.00)**	**(0.02)**	**(0.00)**	**(0.00)**	**(0.36)**	**(0.04)**
Total Net Change	**33.69**	**232.59**	**123.23**	**11.35**	**585.00**	**120.34**
Conformity *De Minimis* Level	**25**	**N/A**	**25**	**N/A**	**100**	**N/A**
Exceeds Conformity *de minimis Level*?	**Yes**	**N/A**	**Yes**	**N/A**	**Yes**	**N/A**

Notes: [1]Proposed emissions would be the same for each year of operation.
[2]Equal to 4% of the total west area existing emissions.
[3]Equal to 10% of the total south area existing emissions.
CO = carbon monoxide; N/A = not applicable; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

Impacts to Ambient O_3 and PM_{10}

A conformity determination was prepared to demonstrate that the net increase in VOC, NO_x, and PM_{10} emissions from Alternative 6 (preferred alternative) would conform to the SIP. A summary of this evaluation is presented in Section 4.8.7 of this EIS. Proposed VOC, NO_x, and PM_{10} emissions from Alternative 4 are nearly identical in strength and location of operation to those estimated for Alternative 6.

Therefore, the conclusions from the conformity determination for Alternative 6 also would apply to Alternative 4.

Regarding proposed VOC and NOx emissions, the MDAQMD and ARB propose to include these emissions from Alternative 6 into the next O_3 SIP revision for the MDAB (MDAQMD 2010a and ARB 2011). Therefore, Alternative 6, and equivalently Alternative 4, would conform to the SIP. Therefore, VOC and NO_x emissions from Alternative 4 would produce less than significant air quality impacts.

Regarding proposed PM_{10} emissions, the results of the AERMOD air dispersion analysis showed that the ambient impact of PM_{10} emissions from Alternative 6 would not contribute to an exceedance of the PM_{10} NAAQS. Therefore, PM_{10} emissions from Alternative 4 would produce less than significant air quality impacts.

Impacts to Joshua Tree National Park

The increase in NO_x emissions from the operation of Alternative 4 and their resulting impacts to the Joshua Tree National Park would be nearly identical to those estimated for Alternative 1. Therefore, NO_x emissions from Alternative 4 would produce less than significant impacts to air quality values in the Joshua Tree National Park Class I area.

Table 4.8-10 shows that net annual average daily emissions from Alternative 4 would range from 0.04% to 0.7% of the annual average daily emissions for the combined San Bernardino and Riverside counties region in 2008, depending on the pollutant. The pollutants of greatest concern that would degrade visibility in the Joshua Tree National Park are NO_x (as a precursor to ammonium nitrate) and VOCs. Table 4.8-10 shows that annual average daily emissions of VOC and NO_x from Alternative 4 would range from 0.04% to 0.1% of the total emissions of these pollutants from both counties. As a result, these relatively minimal levels of emissions would not substantially contribute to an increase in visibility impairment within the project region and would produce less than significant impacts.

Table 4.8-10. Daily Operational Emissions in Comparison to Regional Emissions - Alternative 4

Scenario	Air Pollutant Emissions (Tons per Day) [1]					
	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
Alternative 4	0.09	0.64	0.34	0.03	1.60	0.33
San Bernardino County[2]	128	610	257	6	157	50
Riverside County[2]	85	447	153	1	72	18
Combined Counties[2]	**213**	**1,057**	**410**	**7**	**229**	**68**
Project Percent of Counties Emissions	**0.04**	**0.1**	**0.1**	**0.4**	**0.7**	**0.5**

Notes: [1]Annual average based on 365 days/year.
[2]Year 2008 emissions (ARB 2009d).
CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

Impacts to Sensitive Receptors

The impact of emissions from Alternative 4 to sensitive receptors would be similar to those estimated for Alternative 1. As a result, proposed emissions from Alternative 4 would not expose sensitive receptors within the project region to substantial pollutant concentrations.

4.8.5.1 Potential Mitigation Measures

Implementation of the SCMs for air quality (see Section 4.8.2.1) would reduce air quality impacts from proposed construction and operations. The Marine Corps considered potential mitigation measures but determined that none were feasible for proposed operations.

4.8.6 Alternative 5 Impacts

Construction activities from Alternative 5 would result in the same air quality impacts as those described for Alternative 1, as both alternatives propose identical activities. The SCMs described under Alternative 1 would also be implemented under this alternative. Therefore, proposed construction emissions from Alternative 5 would produce less than significant air quality impacts.

Table 4.8-11 presents an estimate of the annual operational emissions that would occur with implementation of Alternative 5. Operation of Alternative 5 would eliminate 4% of the visitor activities and their associated emissions from the west study area. Therefore, these emissions were subtracted from proposed emissions to determine the residual (net) emissions and impacts associated with the operation of Alternative 5. The data in Table 4.8-11 show that the net increase in VOC, NO_x, and PM_{10} emissions from the operation of the alternative would exceed their applicable conformity *de minimis* thresholds. Given that the project region does not attain the NAAQS for O_3 (VOCs and NO_x are precursors to the formation of O_3) or PM_{10}, a conformity determination was prepared to further analyze whether these emission increases would produce significant impacts to ambient O_3 and PM_{10} levels within the MDAB. The results of the conformity determination are presented below.

The MDAB is in attainment of the CO, SO_2, and $PM_{2.5}$ NAAQS. The data in Table 4.8-11 show that the net increase in proposed operational emissions of these criteria pollutants from Alternative 5 would not exceed the PSD threshold of 250 tons per year. Therefore, CO, SO_2, and $PM_{2.5}$ emissions produced from the operation of Alternative 5 would result in less than significant air quality impacts.

Impacts to Ambient O_3 and PM_{10}

A conformity determination was prepared to demonstrate that the net increase in VOC, NO_x, and PM_{10} emissions from Alternative 6 (preferred alternative) would conform to the SIP. A summary of this evaluation is presented in Section 4.8.7 of this EIS. Proposed VOC, NO_x, and PM_{10} emissions from Alternative 5 are nearly identical in strength and location of operation to those estimated for Alternative 6. Therefore, the conclusions from the conformity determination for Alternative 6 also would apply to Alternative 5.

Regarding proposed VOC and NOx emissions, the MDAQMD and ARB propose to include these emissions from Alternative 6 into the next O_3 SIP revision for the MDAB (MDAQMD 2010a and ARB 2011). Therefore, Alternative 6, and equivalently Alternative 5, would conform to the SIP. Therefore, VOC and NO_x emissions from Alternative 5 would produce less than significant air quality impacts.

Regarding proposed PM_{10} emissions, the results of the AERMOD air dispersion analysis showed that the ambient impact of PM_{10} emissions from Alternative 6 would not contribute to an exceedance of the PM_{10} NAAQS. Therefore, PM_{10} emissions from Alternative 5 would produce less than significant air quality impacts.

Impacts to Joshua Tree National Park

The increase in NO_x emissions from the operation of Alternative 5 and their resulting impacts to the Joshua Tree National Park would be nearly identical to those estimated for Alternative 1. Therefore, NO_x emissions from Alternative 5 would produce less than significant impacts to air quality values in the Joshua Tree National Park Class I area.

Table 4.8-12 shows that net annual average daily emissions from Alternative 5 would range from 0.04% to 0.7% of the annual average daily emissions for the combined San Bernardino and Riverside counties region in 2008, depending on the pollutant. The pollutants of greatest concern that would degrade

visibility in the Joshua Tree National Park are NO_x (as a precursor to ammonium nitrate) and VOCs. Table 4.8-12 shows that annual average daily emissions of VOC and NO_x from Alternative 5 would range from 0.04% to 0.1% of the total emissions of these pollutants from both counties. As a result, these relatively minimal levels of emissions would not substantially contribute to an increase in visibility impairment within the project region and would produce less than significant impacts.

Table 4.8-11. Annual Operational Emissions Resulting from Implementation of Alternative 5

Activity	Air Pollutant Emissions (Tons)[1]					
	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
Aircraft Operations	25.55	72.87	39.77	1.91	17.25	17.25
Tactical Vehicles	5.29	23.73	64.39	7.35	2.33	2.33
Tactical Support Equipment	1.50	6.75	17.20	2.09	0.66	0.66
Ordnance	1.82	132.88	0.28	-	-	-
Fugitive Dust – Aircraft	-	-	-	-	42.36	16.94
Fugitive Dust – Tactical Vehicles/Tactical Support Equipment	-	-	-	-	565.25	86.56
Fugitive Dust – Ordnance	-	-	-	-	2.49	1.30
Personnel On-road Commutes	0.05	0.60	1.84	0.00	0.02	0.02
Proposed Emission Increases	**34.21**	**236.83**	**123.48**	**11.36**	**630.36**	**125.06**
Reduction of West Area Emissions[2]	**(0.51)**	**(4.23)**	**(0.25)**	**(0.00)**	**(45.01)**	**(4.68)**
Total Net Change	**33.70**	**232.61**	**123.12**	**11.35**	**585.36**	**120.38**
Conformity *De Minimis* Level	**25**	**N/A**	**25**	**N/A**	**100**	**N/A**
Exceeds Conformity *de minimis Level*?	**Yes**	**N/A**	**Yes**	**N/A**	**Yes**	**N/A**

Notes: [1]Proposed emissions would be the same for each year of operation.
[2]Equal to 4% of the total west area existing emissions.
CO = carbon monoxide; N/A = not applicable; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter ; PM_{10} = particulate matter less than 10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

Table 4.8-12. Daily Operational Emissions in Comparison to Regional Emissions - Alternative 5

Scenario	Air Pollutant Emissions (Tons per Day) [1]					
	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
Alternative 5	0.09	0.64	0.34	0.03	1.60	0.33
San Bernardino County[2]	128	610	257	6	157	50
Riverside County[2]	85	447	153	1	72	18
Combined Counties[2]	**213**	**1,057**	**410**	**7**	**229**	**68**
Project Percent of Counties Emissions	**0.04**	**0.1**	**0.1**	**0.4**	**0.7**	**0.5**

Notes: [1]Annual average based on 365 days/year.
[2]Year 2008 emissions (ARB 2009d).
CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

Impacts to Sensitive Receptors

The impact of emissions from Alternative 5 to sensitive receptors would be similar to those estimated for Alternative 1. As a result, proposed emissions from Alternative 5 would not expose sensitive receptors within the project region to substantial pollutant concentrations.

4.8.6.1 Potential Mitigation Measures

Implementation of the SCMs for air quality (see Section 4.8.2.1) would reduce air quality impacts from proposed construction and operations. The Marine Corps considered potential mitigation measures but determined that none were feasible for proposed operations.

4.8.7 Alternative 6 Impacts (Preferred Alternative)

Construction activities from Alternative 6 would result in the same air quality impacts as those described for Alternative 1, as both alternatives propose identical activities. The SCMs described under Alternative 1 would also be implemented under this alternative. Therefore, proposed construction emissions from Alternative 6 would produce less than significant air quality impacts.

Table 4.8-13 presents an estimate of the annual operational emissions that would occur with implementation of Alternative 6. Operation of Alternative 6 would eliminate 13%/10% of the visitor activities and their associated emissions from the west/south study areas. Therefore, these emissions were subtracted from proposed emissions to determine the residual (net) emissions and impacts associated with the operation of Alternative 6. The data in Table 4.8-13 show that the net increase in VOC, NO_x, and PM_{10} emissions from the operation of the alternative would exceed their applicable conformity *de minimis* thresholds. Given that the project region does not attain the NAAQS for O_3 (VOCs and NO_x are precursors to the formation of O_3) or PM_{10}, a conformity determination was prepared to further analyze whether these emission increases would produce significant impacts to ambient O_3 and PM_{10} levels within the MDAB. The results of the conformity determination are presented below.

The MDAB is in attainment of the CO, SO_2, and $PM_{2.5}$ NAAQS. The data in Table 4.8-13 show that the net increase in proposed operational emissions of these criteria pollutants from Alternative 6 would not exceed the PSD threshold of 250 tons per year. Therefore, CO, SO_2, and $PM_{2.5}$ emissions produced from the operation of Alternative 6 would result in less than significant air quality impacts.

Table 4.8-13. Annual Operational Emissions Resulting from Implementation of Alternative 6

Activity	Air Pollutant Emissions (Tons)[1]					
	VOC	**CO**	**NO_x**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Aircraft Operations	25.55	72.87	39.77	1.91	17.25	17.25
Tactical Vehicles	5.29	23.73	64.39	7.35	2.33	2.33
Tactical Support Equipment	1.50	6.75	17.20	2.09	0.66	0.66
Ordnance	1.82	132.88	0.28	-	-	-
Fugitive Dust – Aircraft	-	-	-	-	42.36	16.94
Fugitive Dust – Tactical Vehicles/Tactical Support Equipment	-	-	-	-	565.25	86.56
Fugitive Dust – Ordnance	-	-	-	-	2.49	1.30
Personnel On-road Commutes	0.05	0.60	1.84	0.00	0.02	0.02
Proposed Emission Increases	**34.21**	**236.83**	**123.48**	**11.36**	**630.36**	**125.06**
Reduction of West Area Emissions[2]	**(1.61)**	**(13.26)**	**(0.79)**	**(0.01)**	**(141.23)**	**(14.68)**
Reduction of South Area Emissions[3]	**(0.00)**	**(0.02)**	**(0.00)**	**(0.00)**	**(0.36)**	**(0.04)**
Total Net Change	**32.59**	**223.55**	**122.69**	**11.34**	**488.77**	**110.34**
Conformity *De Minimis* Level	**25**	**N/A**	**25**	**N/A**	**100**	**N/A**
Exceeds Conformity *de minimis Level*?	**Yes**	**N/A**	**Yes**	**N/A**	**Yes**	**N/A**

Notes: [1]Proposed emissions would be the same for each year of operation.
[2]Equal to 13% of the total west area existing emissions.
[3]Equal to 10% of the total south area existing emissions.
CO = carbon monoxide; N/A = not applicable; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

Summary of Project Conformity Determination for VOC, NO_x, and PM_{10}

A conformity determination was prepared to demonstrate that the net increase in VOC, NO_x, and PM_{10} emissions from Alternative 6 would conform to the SIP. The following presents a summary of these analyses. Appendix G.1 of this EIS provides documentation of the project conformity determination.

Ozone Conformity Determination

The method to demonstrate conformity of VOC and NO_x emissions from Alternative 6 was based upon 1) a review of historical emissions estimated for the Combat Center, 2) a review of recent MDAB O_3 attainment plans, and 3) consultation with the MDAQMD. This evaluation determined that a SIP revision is the only option available to demonstrate conformity of proposed VOC and NO_x emissions, per MDAQMD Rule 2202(H)(1)(e)(i).

To satisfy the requirements of MDAQMD Rule 2202(H)(1)(e)(i), the Marine Corps has requested the MDAQMD to include the VOC and NO_x increase emissions from Alternative 6 into the next O_3 SIP revision for the MDAB (MCAGCC 2010). The MDAQMD and ARB propose to include these emissions from Alternative 6 into the next O_3 SIP revision for the MDAB (MDAQMD 2010a and ARB 2011). Therefore, Alternative 6 would conform to the SIP and VOC and NO_x emissions from Alternative 6 would produce less than significant air quality impacts.

PM_{10} Conformity Determination

The method to demonstrate conformity of PM_{10} emissions from Alternative 6 was based upon 1) a review of historical emissions estimated for the Combat Center, 2) a review of the MDAB PM_{10} attainment plans, and 3) consultation with the MDAQMD. This evaluation determined that use of dispersion modeling is the only option available to demonstrate conformity of proposed PM_{10} emissions, per MDAQMD Rule 2202(H)(1)(d)(i).

An air dispersion analysis was performed with the use of the AERMOD to estimate the ambient impact of PM_{10} emissions from Alternative 6. The analysis used methods that are consistent with the guidelines of the USEPA, ARB, and generally approved practices to assess proposed air pollutant concentrations.

The analysis evaluated a scenario of peak daily PM_{10} emissions that would reasonably occur from the MEB exercises under Alternative 6. This scenario would correspond to the final three days of the 24-day MEB exercise (the Final Exercise). The Final Exercise would converge on a single objective point in the proposed west study area and therefore would produce the densest amount of PM_{10} emissions during the entire MEB exercise. The Final Exercise also would occur in close proximity to the boundary of the Combat Center. For these reasons, the Final Exercise would produce the highest off-site ambient PM_{10} impacts from the MEB exercises.

The maximum PM_{10} concentration predicted by AERMOD was added to a background PM_{10} concentration to produce a total project impact for use in comparison to the 24-hour PM_{10} NAAQS. The Combat Center operated a PM_{10} sampling network from 1996 through 2005 and restarted this program in 2008. Data collected from the Emerson station, just northwest of Emerson Dry Lake and along the western boundary of the Combat Center, were used to define the background PM_{10} concentration for the PM_{10} impact analysis. This station was chosen over other stations operated at the Combat Center, as it is the closest station to the maximum PM_{10} impact location predicted by AERMOD for Alternative 6.

To determine compliance with the NAAQS, USEPA guidance recommends use of the highest pollutant value monitored in the area of analysis during the most recent 3-year period to define the background pollutant level (USEPA 2003). The most recent 3-year period of monitoring occurred at the Emerson stations from 2002 through 2005. The maximum 24-hour PM_{10} value recorded during this period was 52 $\mu g/m^3$, excluding any PM_{10} samples recorded when winds exceeded 15 miles per hour averaged over an hour, or instantaneous gusts of 25 miles per hour, per MDAQMD Rule 403 guidelines. The background 24-hour PM_{10} value of 52 µg/m3 defined for the analysis domain is deemed to be overly conservative for the following reasons:

1. PM_{10} concentrations collected at the Emerson air monitoring station often contain PM_{10} emissions generated from existing activities within the 1) Johnson Valley OHV Area, and 2) Combat Center. Operation of the proposed MEB exercises would eliminate any concurrent activities and associated PM_{10} emissions from these areas.
2. The top 10 project PM_{10} impacts predicted by AERMOD occurred during days of relatively low wind speeds (maximum daily average wind speed of 5.2 miles per hour recorded at the Combat Center Mainside monitoring station). The maximum 24-hour PM_{10} value recorded at the Mainside continuous PM_{10} sampler on these 10 days was 23 $\mu g/m^3$. In addition, analysis of PM_{10} values recorded at the Emerson station from 2003 through 2005 also determined that no 24-hour PM_{10} concentration exceeded 23 $\mu g/m^3$ when the average daily wind speed was 5.2 miles per hour or less.

Therefore, use of a 24-hour PM_{10} background value that is lower than 52 $\mu g/m^3$ is deemed reasonable for this impact analysis.

The AERMOD analysis predicted that operation of Alternative 6 would produce a maximum 24-hour PM_{10} impact of 97 $\mu g/m^3$ on the boundary line of the proposed Combat Center west study area. Addition of the background PM_{10} value of 52 $\mu g/m^3$ would produce a total project PM_{10} impact of 149 $\mu g/m^3$. This impact would not exceed the 24-hour PM_{10} NAAQS of 150 $\mu g/m^3$.

Figure A-2 in Appendix G.1 of this EIS shows the PM_{10} concentrations predicted for Alternative 6 by AERMOD for locations beyond the Combat Center boundary. These data show that PM_{10} concentrations quickly decrease with distance from the Combat Center boundary. In addition, the impact value of 90 $\mu g/m^3$ extends only slightly beyond the Combat Center boundary and covers roughly 0.5 km^2. Taking this into consideration and the reasoning that the analysis uses an overly conservative PM_{10} background value, it is reasonable to conclude that Alternative 6 would produce a total project 24-hour PM_{10} impact beyond the Combat Center boundary of no more than 140 $\mu g/m^3$. Therefore, PM_{10} emissions from Alternative 6 would comply with the PM_{10} NAAQS and they would produce less than significant air quality impacts.

Impacts to Joshua Tree National Park

The increase in NO_x emissions from the operation of Alternative 6 and their resulting impacts to the Joshua Tree National Park would be nearly identical to those estimated for Alternative 1. Therefore, NO_x emissions from Alternative 6 would produce less than significant impacts to air quality values in the Joshua Tree National Park Class I area.

Table 4.8-14 shows that net annual average daily emissions from Alternative 6 would range from 0.04% to 0.6% of the annual average daily emissions for the combined San Bernardino and Riverside counties region in 2008, depending on the pollutant. The pollutants of greatest concern that would degrade visibility in the Joshua Tree National Park are NO_x (as a precursor to ammonium nitrate) and VOCs. Table 4.8-14 shows that annual average daily emissions of VOC and NO_x from Alternative 6 would range from 0.04% to 0.1% of the total emissions of these pollutants from both counties. As a result, these relatively minimal levels of emissions would not substantially contribute to an increase in visibility impairment within the project region and would produce less than significant impacts.

Table 4.8-14. Daily Operational Emissions in Comparison to Regional Emissions - Alternative 6

Scenario	Air Pollutant Emissions (Tons per Day) [1]					
	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
Alternative 6	0.09	0.61	0.34	0.03	1.34	0.30
San Bernardino County[2]	128	610	257	6	157	50
Riverside County[2]	85	447	153	1	72	18
Combined Counties[2]	**213**	**1,057**	**410**	**7**	**229**	**68**
Project % of Counties Emissions	**0.04**	**0.1**	**0.1**	**0.4**	**0.6**	**0.4**

Notes: [1]Annual average based on 365 days/year.
[2]Year 2008 emissions (ARB 2009d).
CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

Impacts to Sensitive Receptors

The impact of emissions from Alternative 6 to sensitive receptors would be similar to those estimated for Alternative 1. Therefore, proposed emissions from Alternative 6 would not expose sensitive receptors within the project region to substantial pollutant concentrations.

4.8.7.1 Potential Mitigation Measures

Implementation of the SCMs for air quality (see Section 4.8.2.1) would reduce air quality impacts from proposed construction and operations. The Marine Corps considered potential mitigation measures but determined that none were feasible for proposed operations.

4.8.8 No-Action Alternative

Air quality impacts under the No-Action Alternative would not differ from air quality impacts generated by existing Combat Center operations. Therefore, the No-Action Alternative would not result in any new air quality impacts compared to existing conditions.

4.8.9 Summary of Impacts

Table 4.8-15 summarizes the impacts of each action alternative and the No-Action Alternative. A text summary is provided below.

For all action alternatives, proposed activities would increase VOC, NO_x, and PM_{10} emissions to above the applicable conformity *de minimis* thresholds. However, these emission increases would produce less than significant impacts to ambient O_3 and PM_{10} levels within the MDAB, except that Alternative 3 would produce significant impacts to PM_{10} NAAQS levels within the MDAB.

For all action alternatives, the increase in proposed CO, SO_2, and $PM_{2.5}$ emissions would produce less than significant air quality impacts.

For all action alternatives, proposed emissions would produce less than significant impacts to 1) air quality values and 2) visibility impairment within the Joshua Tree National Park pristine Class I area.

The No-Action Alternative would result in no new impacts compared to existing conditions.

Table 4.8-15. Summary of Impacts

Alternative	Impacts
Alternative 1	LSI • The increase in VOC, CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$ emissions would produce less than significant impacts. • Air emissions from the alternative would produce less than significant impacts to 1) air quality values, and 2) visibility impairment within the Joshua Tree National Park pristine Class I area.
Alternative 2	LSI • Impacts would be the same as Alternative 1.
Alternative 3	SI • The increase in operational emissions of PM_{10} would produce significant impacts due to exceeding NAAQS levels. LSI • All other impacts would be the same as Alternative 1.
Alternative 4	LSI • Impacts would be the same as Alternative 1.
Alternative 5	LSI • Impacts would be the same as Alternative 1.
Alternative 6	LSI • Impacts would be the same as Alternative 1.
No-Action Alternative	NI • No new impacts compared to existing conditions.

Notes: CO = carbon monoxide; LSI = Less than significant impacts; NO_x = nitrogen oxides; O_3 = ozone; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SI = Significant impact; SO_2 = sulfur dioxide; VOC = volatile organic compound; NAAQS = national ambient air quality standards.

4.9 NOISE

4.9.1 Approach to Analysis

4.9.1.1 Methodology

This section of the EIS identifies potential changes in the noise environment in and around the Combat Center that would result from each of the action alternatives. The analysis applied noise models to estimate and compare projected noise levels under baseline operating conditions and for each action alternative as described in Section 2.4. The number of acres of land (particularly outside the projected boundaries of the Combat Center) and the affected population that would be encompassed within key noise contours were calculated for each action alternative and then compared to baseline conditions. Acreages within noise contours were calculated based on GIS data and estimated 2010 population numbers were derived from calculating the area of each census block that overlaps the noise contours and multiplying the resulting number by the population density for each census block. Areas designated as undeveloped by the San Bernardino County General Plan were excluded from the calculations.

The noise models used in the analysis included the NOISEMAP suite of programs (including the Rotorcraft Noise Model [RNM]) to evaluate the EAF environment; the Military Operating Area and Range Noise Model (MR_NMAP) suite of programs to evaluate the noise from flight activity in SUA; and the BNOISE2 program to evaluate the blast noise environment.

Although all three noise environments (airfield, airspace, and ordnance) use the CNEL metric, they cannot be combined because the airfield and airspace noise environments express CNEL on an A-weighted decibel (dBA) scale whereas the ordnance noise environment expresses CNEL on a C-weighted scale. As discussed in Appendix H, A-weighting simulates the sensitivity of the human ear to flight activity (and other similar sounds), whereas C-weighting is applied to impulsive sounds such as ordnance noise to predict the potential for secondary effects such as shaking of a structure, window rattling and inducing vibrations. Other reasons why these environments cannot be combined is because they each have different averaging times and evaluation criteria. See the subsections below for additional information.

In addition to deriving representative noise contours that depict noise levels at various distances from noise sources on a map, the analysis also identified changes in noise levels at sample POIs in the acquisition study areas, as described in Sections 3.1 and 4.1, *Land Use*, and as shown in Figure 3.1-8. These points represent sensitive land uses including communities, rural residential areas, wilderness areas, farmed areas, and other selected points.

<u>Airfield Environment</u>

Analyses of aircraft noise exposure and compatible land uses around DoD airfield facilities are normally accomplished using a group of computer-based programs, collectively called NOISEMAP (Wyle 1998, 2008; Wasmer Consulting 2006a, 2006b). The NOISEMAP suite of computer programs was primarily developed by the Air Force, which serves as the lead DoD agency for aircraft noise modeling. The NOISEMAP suite of computer programs primarily includes BaseOps, NMAP, RNM, and NMPlot. The BaseOps program allows entry of runway coordinates, airfield information, flight tracks, flight profiles (engine thrust settings, altitudes, and speeds) along each flight track for each aircraft, numbers of daily flight operations, run-up coordinates, run-up profiles, and run-up operations. At this stage, closed-pattern operations, which are counted by ATC as two operations (one departure and one arrival), are entered in the program as one noise event (one departure followed by one arrival with the aircraft remaining in the

vicinity of the airfield). Consistent with MCO for airfield analyses (MCO 11010.16), modeled daily events are specifically annual average daily events, i.e., annual events divided by 365.

The core programs called NMAP and RNM incorporate the number of daily events by time period, single-event noise levels, flight tracks and profiles of the aircraft to primarily calculate CNEL at many points on the ground, accounting for the effects of ground elevation and impedance in the propagation of sound. From calculations of CNEL for many points on the ground, the NMPlot program draws contours of equal CNEL for overlay onto land-use maps. In this EIS, NOISEMAP Version 7.2 was used to analyze fixed-wing aircraft/operations and RNM Version 7.2.4.0 was used to analyze rotary-wing aircraft/operations.

The RNM is a computer program developed by Wyle Laboratories, Inc. for the National Aeronautics and Space Administration-Langley Research Center. The RNM, as part of Langley Research Center's Tilt Rotor Aeroacoustic Code suite of computer programs, is aimed at the prediction of far-field sound levels from tilt rotor aircraft and helicopters. The DoD and the North Atlantic Treaty Organization have adopted RNM for the environmental impact assessment of rotorcraft noise.

The RNM simulates vehicle flight in a time-based manner along a prescribed flight track and the sound is analytically propagated through the atmosphere to specified receiver locations. The RNM accounts for spherical spreading, atmospheric absorption, ground reflection and attenuation, Doppler shifts, the difference in phase between direct and reflected rays, varying terrain and ground impedance between the vehicle and the receiver. The RNM has the ability to account for horizontally stratified atmospheres with winds and curved ray paths but this particular ability was not utilized for this study. The RNM's acoustic algorithms are more robust than NOISEMAP's algorithms, partially due to RNM's more detailed noise database of one-third octave band sound hemispheres for each vehicle in its inventory. In addition to altitude and speed, RNM accounts for roll, angle of attack (similar to pitch), yaw, and nacelle angles, if applicable, along each flight track for each aircraft. In this report, RNM Version 7 was used to analyze all of the modeled rotary-wing aircraft operations.

For each of the action alternatives, it was generally assumed that each airspace sortie would generate an arrival and departure at the EAF and no run-ups. The exception would include F-35B aircraft because the EAF matting surface is currently not designed to withstand the temperatures caused by an F-35B performing a rolling vertical landing or a purely vertical landing. No F-35 flight or run-up operations were modeled at the EAF for any alternative. This is consistent with the F-35B West Coast Basing EIS (DoN 2010).

As detailed in Appendix H, the airfield would support approximately 22,500 annual flight operations for any action alternative. Approximately one-third of the modeled flight operations are by jet fighter/attack aircraft such as the F/A-18 Hornet and AV-8B Harrier. Approximately 58% of the modeled flight operations are by helicopters such as the CH-46E Sea Knight (twin engine, twin rotor, medium lift helicopter) and CH-53E Super Stallion (three-engine, single rotor heavy lift helicopter). CNEL evening (7:00 p.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) flight operations account for 25% and 5% of the total modeled flight operations, respectively.

Airspace Environment

MR_NMAP (Wyle 1997) is a model based on NOISEMAP technology for predicting aircraft noise from aircraft operating in three types of SUA: MOAs, Range/Restricted Areas, and Military Training Routes (MTRs). A description of these types of airspace is presented in Section 3.7, *Airspace Management*.

The MR_NMAP suite of computer programs consists of MR_OPS Version 1.0, OMEGA10R, MR_NMAP Version 2.20, NMPlot, and NOISEFILE Version 6.4. The MR_OPS program allows for entry of airspace information, the horizontal distribution of operations, flight profiles (average power settings, altitude distributions, and speeds), and numbers of sorties. "Horizontal distribution of operations" refers to the modeling of lateral airspace utilization via three general representations: broadly distributed operations for modeling of MOA and Range events, operations distributed among parallel tracks for modeling of MTR events, and operations on specific tracks for modeling of unique MOA, Range, MTR, or target area activity.

OMEGA10R, like OMEGA10 for NOISEMAP, extrapolates/interpolates the reference SELs for each model of aircraft from the NOISEFILE database, taking into consideration the specified speeds, engine thrust settings, and environmental conditions appropriate to each flight operation and generates tables of SEL for increasing altitude. The core program called MR_NMAP incorporates the number of monthly operations by time period, specified horizontal distributions, volume of the airspaces, and profiles of the aircraft to primarily calculate: a) Onset-Rate Adjusted Monthly variant of CNEL (denoted $CNEL_{mr}$) at many points on the ground, b) average $CNEL_{mr}$ for entire airspaces, or c) maximum $CNEL_{mr}$ under MTRs or specific tracks. From calculations of $CNEL_{mr}$ for many points on the ground, the NMPlot program draws contours of equal $CNEL_{mr}$ for overlay onto land-use maps.

For any action alternative, airspace activity would include the baseline operations (existing conditions projected to occur at the time of project implementation) and the operations associated with two MEB Exercise/Final Exercise periods per year. As MEB Exercise/Final Exercise would dominate the busiest month out of any year, it was sufficient to limit the *additional* airspace noise modeling to the MEB Exercise/Final Exercise activity. An estimated 40% of baseline activity in R-2501N and R-2501W would be distributed to the proposed SUA to the west for any action alternative, reducing the modeled baseline operations in R-2501N by 40%. Similarly, 10% of baseline activity in R-2501E would be distributed to proposed SUA to the east for any action alternative, reducing the modeled baseline operations in R-2501E by 10% (Frederick 2010).

As detailed in Appendix H, approximately 3,400 annual MEB Exercise/Final Exercise sorties were modeled. Of the total sorties, 75% would be from the MEB Exercise Work-up and 25% would be due to the Final Exercise. Overall, 22% of the sorties would be during the CNEL evening period (7:00 p.m. to 10:00 p.m.) and 13% would be during the CNEL nighttime period (10:00 p.m. to 7:00 a.m.). Fixed-wing aircraft would comprise 36% of the overall sorties, rotary-wing (helicopters) would comprise 57%, and 7% would be from UAS. Fixed-wing aircraft include AV-8B, F/A-18C/D, F/A-18E/F, and F-35B. Except for the UAS sorties, the MEB Exercise/Final Exercise sorties were modeled as area-type sorties with flight areas provided by Combat Center personnel (Frederick 2009).

The modeled flight areas are shown in Appendix H. For MEB Exercise Work-up, the modeled flight areas consist of the following types: Holding, Transit, and Fight. The sorties in the Holding areas would be at relatively high altitudes, i.e., 16,000 to 24,000 feet AGL. The sorties in the Transit areas would be at medium altitudes, i.e., 10,000 to 16,000 feet AGL while the sorties in the Fight areas would be at relatively low altitudes, i.e., 500 feet to 10,000 feet AGL. The MEB Exercise Work-up flight areas for Alternative 5 would be the same as those for Alternative 4. The MEB Exercise Work-up flight areas for Alternative 6 would be the same as those for Alternative 1. For Final Exercise, the modeled flight areas would have the same types as for MEB Exercise Work-up but the Fight areas would be split into areas for Days 1, 2, and 3 of the Final Exercise. Final Exercise flight areas for Alternative 6 would be the same as those for Alternative 1.

As MEB Exercise/Final Exercise aircraft would egress the Fight areas and circle back to the Holding areas for the next ingress, the aircraft (same numbers of sorties as for MEB Exercise/Final Exercise) would fly in the proposed MOAs/ ATCAAs of Johnson Valley, Sundance, Bristol, CAX, and Turtle and associated Restricted Areas as applicable for each alternative (Frederick 2010). These sorties are herein referred to as "transit-back" sorties. The proposed MOAs/ATCAAs were modeled as one contiguous area for Alternatives 1, 4, 5, and 6 and a separate contiguous area for Alternative 2. For Alternative 3, a third contiguous area consisting of the proposed Sundance and Turtle MOA/ATCAAs was modeled. Transit-back sorties were distributed between the proposed floor of each airspace unit and 24,000 feet AGL for modeling purposes.

Modeled airspace flight profiles are detailed in Appendix H.

Ordnance Environment

Noise from ordnance delivery (blast noise) is impulsive in nature. Blast noise may be a source of discomfort for persons. Vibrations of structures due to blast noise may result in increased annoyance. Annual average daily ordnance noise contours for blasting activities and military operations with impulsive noise are modeled using the DoD Blast Noise Prediction (BNOISE2) suite of programs. The resulting ordnance noise contours are in terms of C-weighted Community Noise Equivalent Level (CCNEL) or dBC CNEL, and are used to determine incompatible land use areas in the vicinity of the range. Noise contours for individual ordnance events are also modeled with BNOISE2 and are characterized in terms of the instantaneous unweighted Peak Sound Level Exceeded by 15% of Events (PK 15[met]). As described in Section 3.9 and Appendix H, PK 15(met) is utilized by the DoD to correlate with potential for receiving public complaints about large caliber impulsive noise from armor, artillery, mortars and demolition activities, and noise from small arms ranges. Noise complaints from ordnance can be a function of noise-induced vibration (e.g., rattling of windows), audible noise or both..

The BNOISE2 suite includes the core BNOISE2 program and NMPlot. Similar to other DoD models, the core program calculates CCNEL at many points on the ground, accounting for ground impedance, terrain effects and the propagation of sound. NMPlot is used to draw contours of equal CCNEL or PK 15(met) for overlay onto land-use maps.

Although BNOISE2 includes a database of various ordnance types, not all ordnance types are included. For ordnance not included in the BNOISE2, Trinitrotoluene (TNT) equivalent was provided by the Combat Center or U.S. Army Public Health Command.

As described in Chapter 2, the Marine Corps provided proposed ground-to-ground and air-to-ground ordnance expenditures. Ground-to-ground ordnance operations totaled approximately 1 million annual rounds for the MEB Exercise activity, 21% and 16% of which are during the CCNEL evening (7:00 p.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) periods, respectively. Approximately 65,000 annual rounds (6%) of the overall considered ground-to-ground rounds were modeled for MEB Exercise and Final Exercise as these would comprise the high explosive (HE) component of the overall rounds. Appendix H lists additional details about the modeled ordnance.

Air-to-ground ordnance operations totaled approximately 1.5 million annual rounds for MEB Exercise activity, 22% and 13% of which are during the CCNEL evening (7:00 p.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) periods. Approximately 390,000 annual rounds (25%) of the overall considered air-to-ground rounds were modeled as these would comprise the HE component of the overall rounds.

Firing and target locations were estimated from the SDZs and WDZs as provided by the Marine Corps, shown in Chapter 2. Appendix H provides further detail on the modeling of these locations. Ordnance operations were assumed to be distributed uniformly across all firing/target locations.

For alternatives with ordnance activity in the west (Alternatives 1, 2 and 6) and east study areas (Alternative 3), it was assumed that 25% of baseline ordnance activity was shifted to West or East MEB Building Block training SDZ's and WDZ's. For Alternatives 4 and 5, all MEB Building Block training activity was assumed to occur within the existing range boundary in keeping with the No-Action Alternative firing/target areas.

Probability of Structural Damage

Vibrations of buildings and structures induced by blast noise may potentially result in increased annoyance and discomfort of residents, or structural damages. The probability of damage to structures from sonic blast loading was estimated using a method developed by Sutherland (2009), based on the blast pressure loading on a structure, the vibration and stress response to this loading, and the thresholds for damage or failure stress to such loading. The highest PK 15(met) level of 121 dB was initially selected as the one potentially damaging blast, with only 15% of other events possibly exceeding this level. See Appendix H, Section H.4.5 for the assessment of the probability of structural damage for the Combat Center and Par. H.1.2.8 for the description of the single event peak level exceeded by 15% of events (PK15[met]) metric.

4.9.1.2 Evaluation Criteria

For airfields, the Navy AICUZ Instruction has a land-use compatibility criterion of 65 dBA CNEL for the lower bound of its Noise Zone I. Noise Zone II is defined as 65 to 75 dBA CNEL (exclusive of the upper bound) and Noise Zone III as greater than or equal to 75 dBA CNEL (DoN 2008a).For airspace, the Navy Range AICUZ Instruction has a land-use compatibility criterion of 65 dBA $CNEL_{mr}$ for the lower bound of its Noise Zone I. Noise Zone II is defined as 65 to 75 dBA $CNEL_{mr}$ (exclusive of the upper bound) and Noise Zone III as greater than or equal to 75 dBA $CNEL_{mr}$ (DoN 2008b).

The Navy Range AICUZ Instruction is expressed in terms of A-weighted noise levels. To compare blast noise which is in terms of C-weighted noise levels to A-weighted noise levels, the criterion level is adjusted on the principle of equal annoyance. The 62 and 70 dBC CNEL correspond to 65 and 75 dBA $CNEL_{mr}$ criterion, respectively (DoN 2008b; Wyle 2003b). Therefore ordnance noise levels below 62, 62 to 70, and above 70 dBC CNEL correspond to Noise Zones I, II, and III, respectively.

To evaluate impacts of ordnance noise, a PK 15(met) less than 115 dB is considered to have low potential for noise complaints from large caliber weapons (U.S. Department of the Army 2007). Noise-sensitive land uses would be discouraged in areas where PK 15(met) is between 115 and 130 dB with medium potential for complaints. Noise-sensitive land uses would be strongly discouraged in areas where PK 15(met) would be equal to or greater than 130 dB with high potential for noise complaints. For large caliber weapons PK 15(met) exceeding 140 dB, there would be a potential for physiological damage to unprotected human ears and structural damage claims.

4.9.1.3 Public Scoping Issues

Concerns that were raised by the public, including recreation stakeholders and organizations, during the 90-day scoping period (October 30, 2008 through January 31, 2009), and during subsequent interviews with a sampling of recreation stakeholders (January - February 2010) are addressed in this analysis. These noise concerns include, but are not limited to noise impacts from additional training exercises and military activities.

4.9.2 Alternative 1 Impacts

4.9.2.1 Airfield Noise

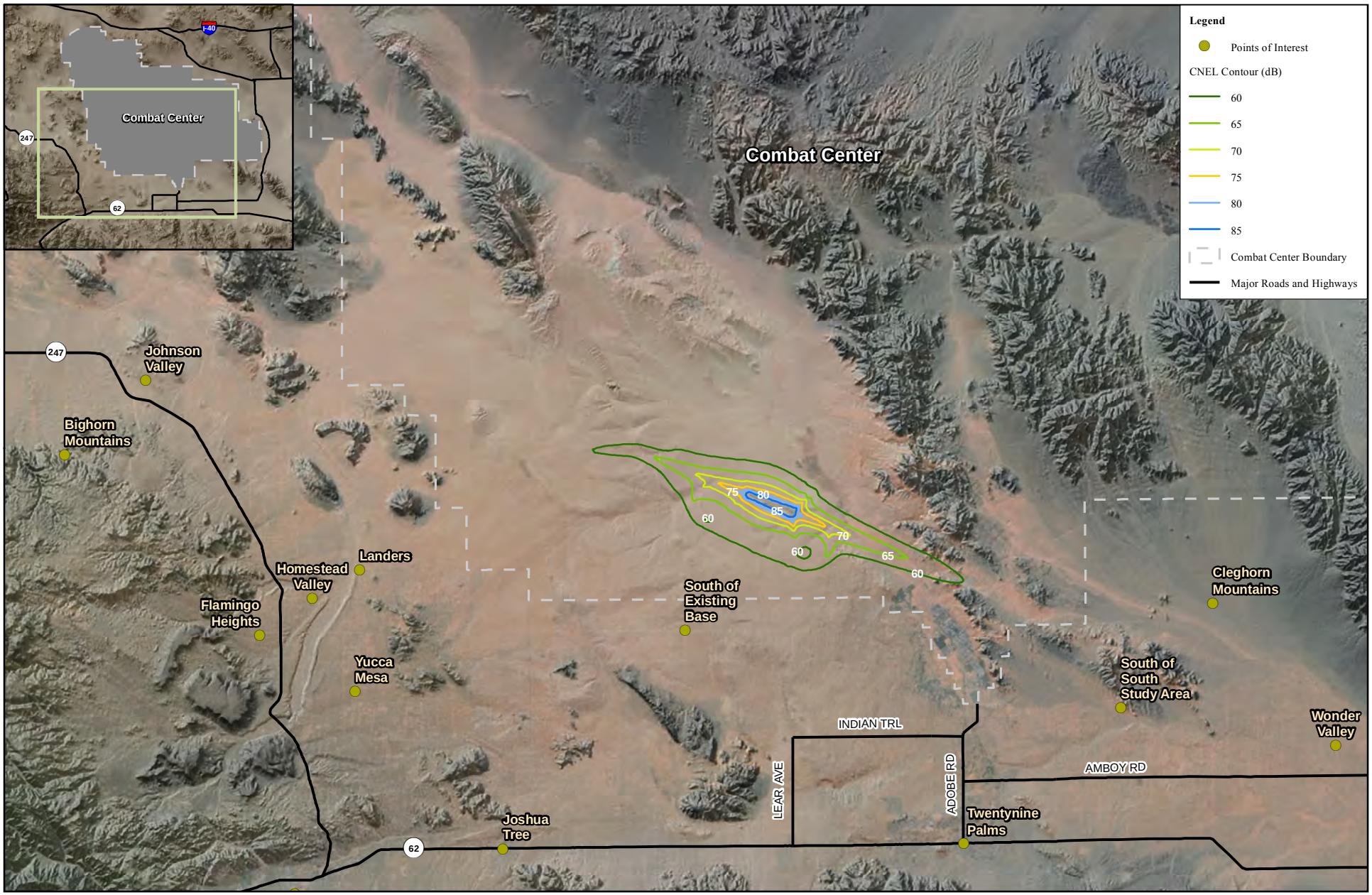
As shown in Figure 4.9-1, the 65 dB CNEL contour for the airfield environment would be fully contained within the Combat Center's boundary. Therefore, no persons outside the installation would be exposed to CNEL greater than or equal to 65 dB. None of the 50 applicable POIs would be affected by CNEL greater than or equal to 65 dB. Noise impacts to POIs, public health and safety, and wildlife are discussed in Section 4.1, *Land Use*; Section 4.4, *Public Health and Safety*; and Section 4.10, *Biological Resources*, respectively.

4.9.2.2 Airspace Noise

Figure 4.9-2 shows the airspace-related noise contours associated with Alternative 1. Table 4.9-1 shows the estimated amount of acreage and population outside the Combat Center's proposed boundaries that would be encompassed by the 65, 70, and 75+ dB noise contours for airspace activities under all six action alternatives. Under Alternative 1, the 65 dB $CNEL_{mr}$ contours for the airspace environment would be fully contained within the Combat Center's proposed boundary. Therefore, no civilians outside the installation would be exposed to $CNEL_{mr}$ greater than or equal to 65 dB.

None of the 50 applicable POIs for Alternative 1 would be exposed to $CNEL_{mr}$ greater than or equal to 65 dB. Relative to baseline conditions, Alternative 1 would represent no change to the number of POIs affected by $CNEL_{mr}$ greater than or equal to 65 dB. Noise impacts to POIs, public health and safety, and wildlife are discussed in Section 4.1, *Land Use*, Section 4.4, *Public Health and Safety*, and Section 4.10, *Biological Resources*, respectively.

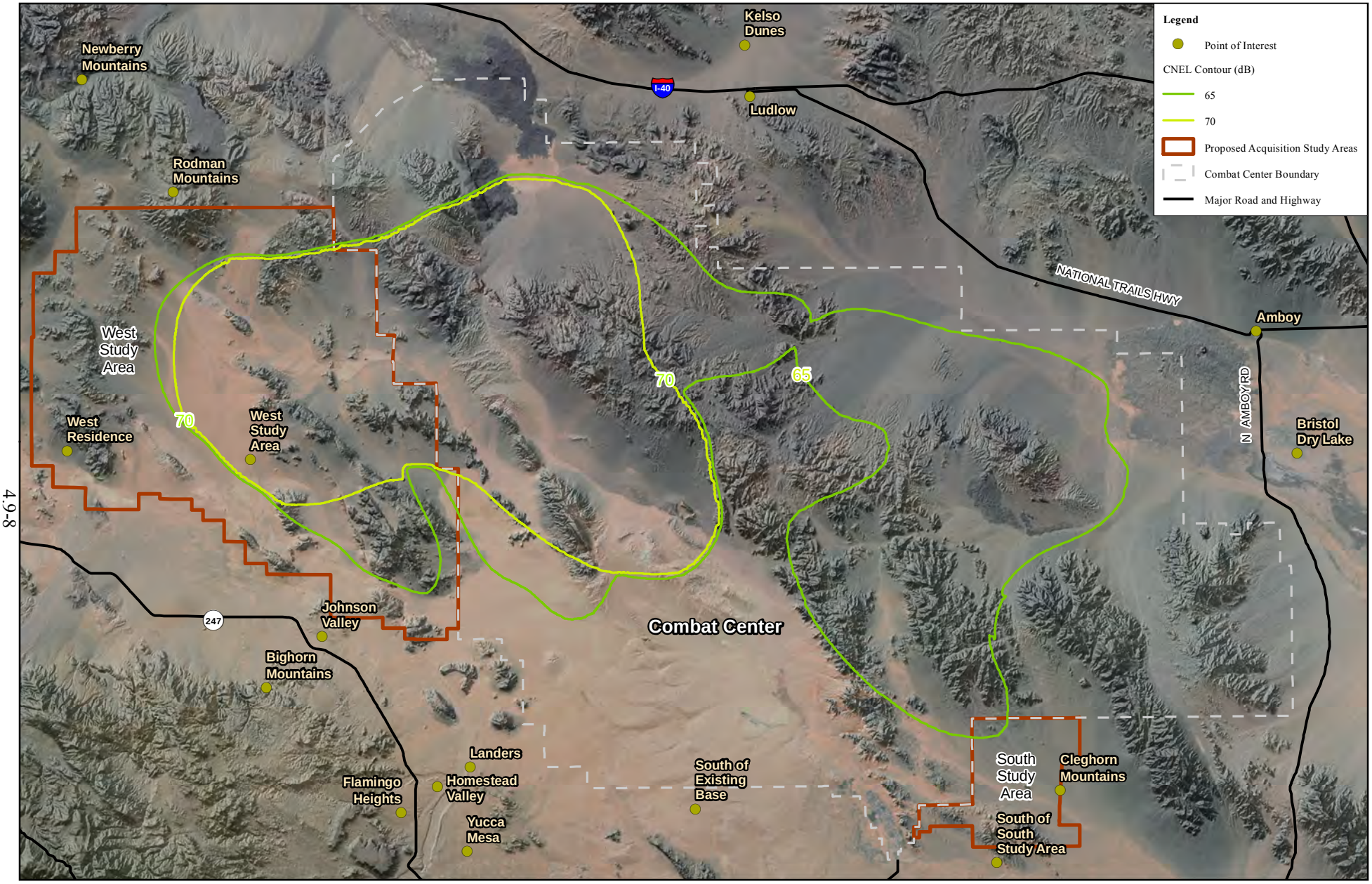
Supplementing the $CNEL_{mr}$ metric, Table 4.9-2 shows maximum A-weighted (single-event) sound levels (L_{max}) of aircraft utilizing the Combat Center at average speeds, power settings, and frequent altitudes during the modeled MEB Exercise and MEB Final Exercise activity (refer to Section 2.2.3 for a description of the MEB training components). The altitudes reported in this table reflect the lowest altitude of the most frequently used bands during the modeled exercises. The altitude chosen for fighter/attack aircraft is mostly 4,000 feet AGL with the EA-6B mission requiring primarily higher altitudes around 14,000 feet AGL and the C-130 flying around 2,000 feet AGL. The L_{max} values not only apply to those altitudes but also pertain to the closest (approximate) horizontal distance aircraft would achieve to the range boundary during a MEB Exercise based on the modeling for this EIS. Most fighter/attack aircraft would remain approximately 2 NM horizontally from the range boundary (see modeled flight areas in Appendix H) while it is anticipated helicopters and tiltrotors would fly closer to the range boundary, i.e., a horizontal distance of 1 NM from the range boundary. Most fighter/attack aircraft at 4,000 feet AGL and 2 NM from the range boundary would exhibit an L_{max} of 46 dB to 64 dB. The F-35B/C at 4,000 feet AGL and 2 NM from the range boundary would produce approximately 76 dB L_{max}. Helicopters and tiltrotors at 200-500 feet AGL would produce L_{max} of between 47 and 61 dB, 1 NM from the range boundary. Fighter/attack aircraft would fly at lower (read noisier) altitudes than 4,000 feet AGL but flying closer to the range boundary is not anticipated and noise dissipates more as altitude decreases and horizontal distance stays constant or increases. To put these noise levels in context, a rule of thumb for nearly 100% speech intelligibility of two people approximately 5 feet apart is to keep ambient sound levels below approximately 60 dB. Therefore, single events of aircraft during a MEB Exercise or a MEB Final Exercise may interrupt speech of two people standing at the range's property line but only for brief moments.



Kilometers
0 1.5 3 6
0 1.5 3 6
Miles

Source: MAGTF Training Command 2009a

Figure 4.9-1
Noise Exposure from Airfield Operations– All Alternatives



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 4.9-2
Noise Exposure from Alternative 1 Airspace Operations

N

Table 4.9-1. Acreage and Population within Airspace Noise Contours and Outside Combat Center Boundary

Case	Band of $CNEL_{mr}$ (dBA)	Area Outside Combat Center Boundaries[1]			Estimated 2010 Population in Affected Area
		Acreage	Change re Baseline		
			Net Change	Percent Change	
Baseline	65-70	327	N/A	N/A	0
	70-75	0	N/A	N/A	0
	75+	0	N/A	N/A	0
Alternative 1	65-70	0	-327	-100%	0
	70-75	0	0	0	0
	75+	0	0	0	0
Alternative 2	65-70	399	72	22%	0
	70-75	0	0	0	0
	75+	0	0	0	0
Alternative 3	65-70	0	-327	-100%	0
	70-75	0	0	0	0
	75+	0	0	0	0
Alternative 4	65-70	0	-327	-100%	0
	70-75	0	0	0	0
	75+	0	0	0	0
Alternative 5	65-70	128	-199	-61%	0
	70-75	0	0	0	0
	75+	0	0	0	0
Alternative 6	65-70	0	-327	-100%	0
	70-75	0	0	0	0
	75+	0	0	0	0

Notes: [1]Proposed Combat Center boundaries differ by alternative
$CNEL_{mr}$ = Onset-Rate Adjusted Monthly Community Noise Equivalent Level
dBA = A-weighted decibel
N/A = Not Applicable

Table 4.9-2. Maximum Sound Levels for Modeled Single Airspace Events at 29 Palms Range

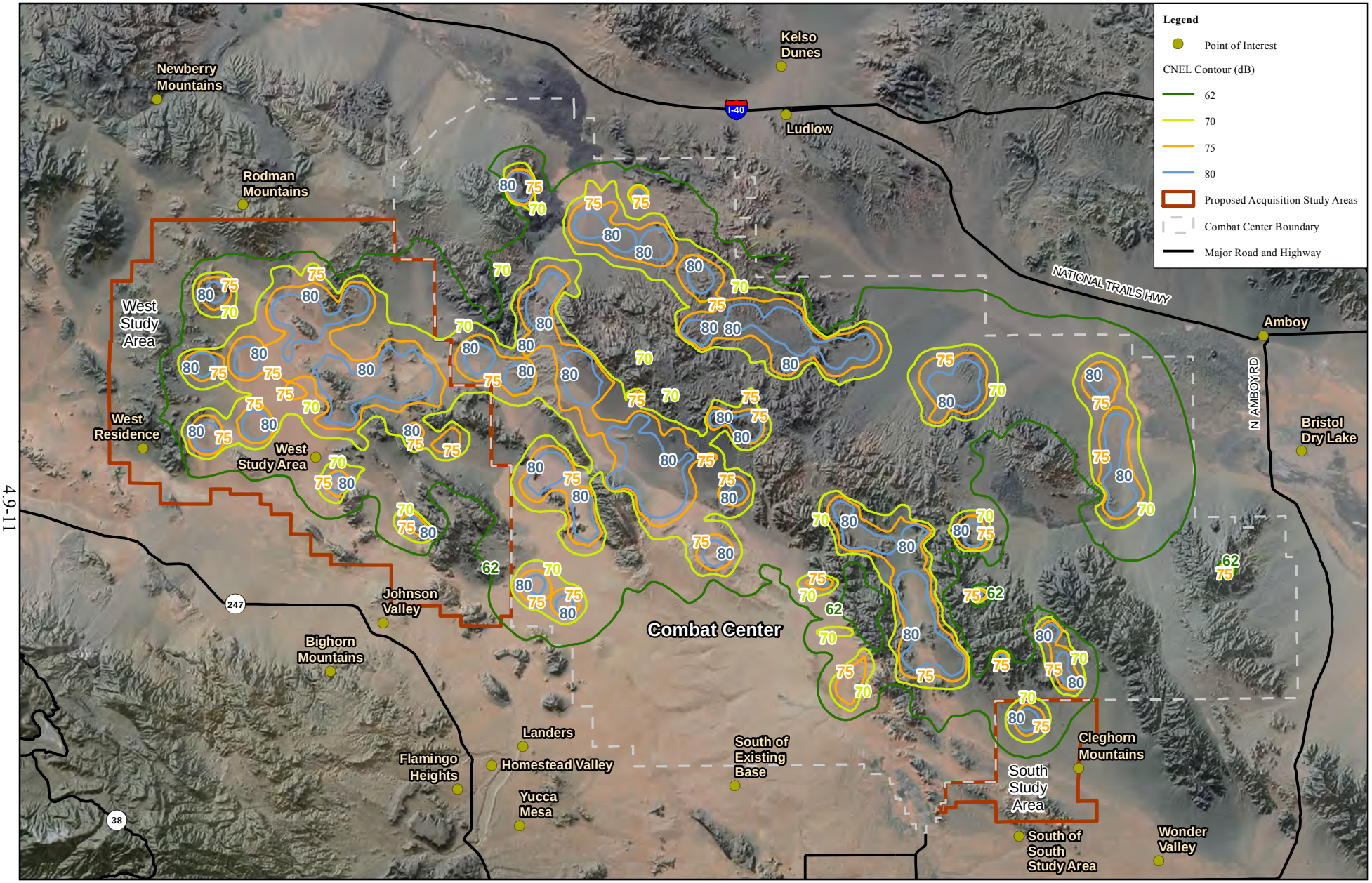
Aircraft Type	Average Speed (KIAS)	Average Power Setting[7]	Frequent Altitude[1] Feet (AGL)	Maximum A-weighted Sound Level[2]	
				1 NM Away	2 NM Away
F-35B/C[3]	350	85% ETR	4,000		76
F/A-18C/D	400	88% NC	4,000		58
F/A-18E/F	400	84.5% NC	4,000		61
F-16C	400	87% NC	4,000		61
AV-8B	300	85% RPM	4,000		64
F-5E	325	86% RPM	4,000		46
EA-6B	300	80% RPM	14,000		51
C-130[4]	250	850 C TIT	2,000		55
MV-22B	85		500	52	
AH-1W[5]	100		200	52	
CH-53E	120		200	61	
CH-46E	110		200	57	
H-60[6]	100		200	47	

Notes: [1]Lowest altitude of most frequently used/modeled bands of altitudes
[2]Horizontal distances were based on modeled training areas; 2 NM minimum for fixed-wing aircraft and 1 NM minimum for rotary-wing aircraft
[3]Modeled as F-35A; measurements for F-35B/C are not yet available.
[4]Modeled as C-130H&N&P
[5]UH-1 modeled as AH-1W
[6]Modeled as SH-60B
AGL = above ground level; C TIT = turbine inlet temperature in Celsius; ETR = engine throttle ratio; NC = percent core RPM; NM = nautical mile; KIAS = knots indicated airspeed; RPM = rotations per Minute

4.9.2.3 Ordnance Noise

Figure 4.9-3 shows the ordnance noise contours associated with Alternative 1. Table 4.9-3 identifies the estimated acreage and population outside the Combat Center's proposed boundaries that would be encompassed by the 62 dBC and greater ordnance noise contours for all alternatives. Under Alternative 1, the 62 dBC CNEL contours for the ordnance environment would extend beyond the boundaries of the proposed Combat Center complex to the northeast and southwest. The total area impacted by the CNEL 62 dBC contour beyond the Alternative 1 range boundary is estimated to be 7,391 acres (2,991 hectares), an increase of 194 % above baseline conditions. Despite the increase in acreage affected, there are no persons residing within the affected areas outside the proposed boundary. The CNEL 70 dBC noise contour would not extend outside the Alternative 1 boundaries of the Combat Center.

None of the 50 applicable POIs under Alternative 1 would be exposed to CNEL greater than or equal to 62 dBC. Relative to baseline conditions, Alternative 1 would represent no change to the number of POIs affected by CNEL greater than or equal to 62 dBC. Noise impacts to POIs, public health and safety, and wildlife are discussed in Section 4.1, *Land Use*, Section 4.4, *Public Health and Safety*, and Section 4.10, *Biological Resources*, respectively.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

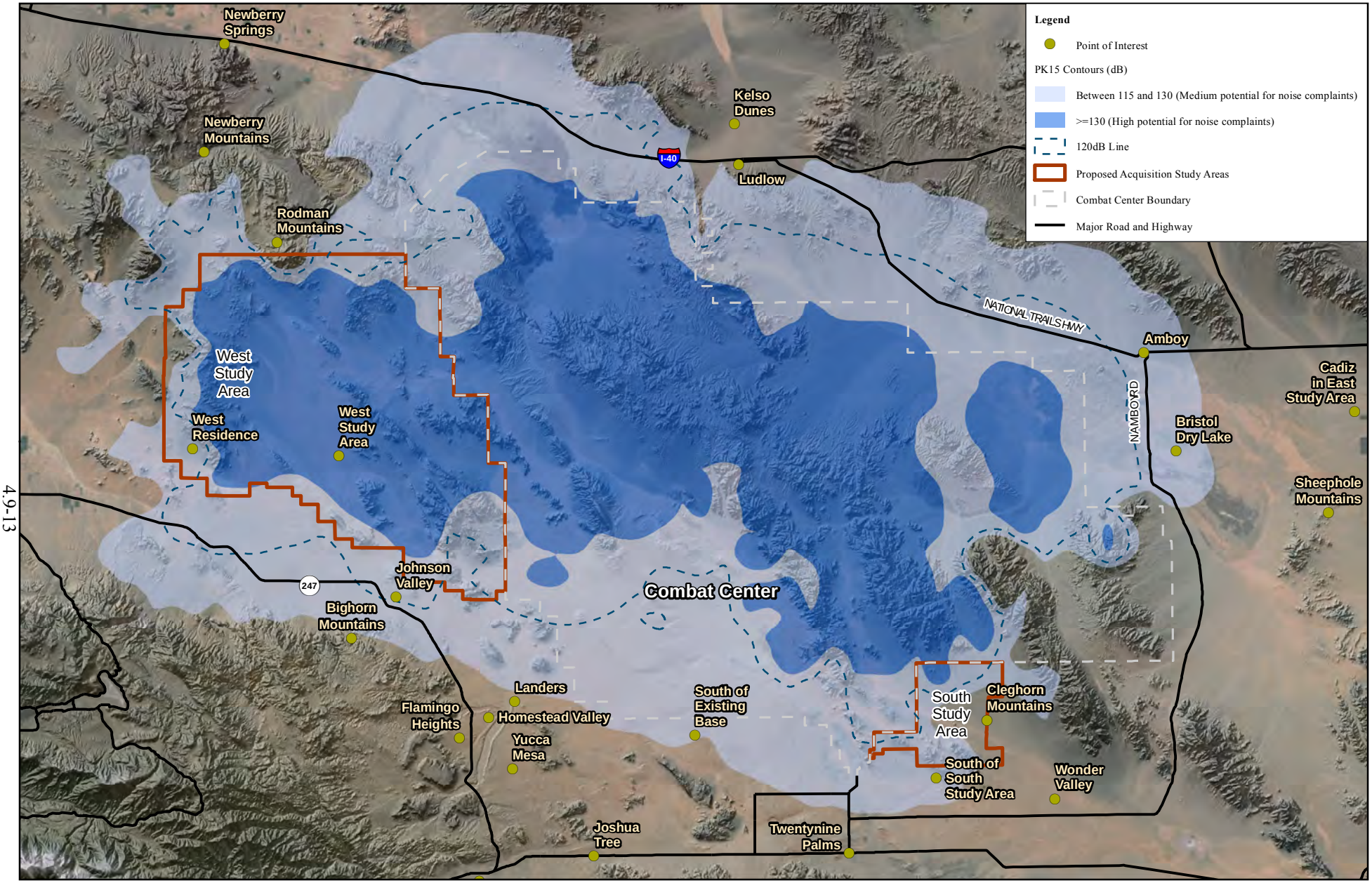
Figure 4.9-3
Noise Exposure from Alternative 1 Ordnance Activity

Table 4.9-3. Acreage and Population within Ordnance Noise Contours and Outside Combat Center Boundary

Case	Band of CNEL (dBC)	Area Outside Combat Center Boundaries [1]			Estimated 2010 Population in Affected Area
		Acreage	Change re Baseline		
			Net Change	Percent Change	
Baseline	62-70	2,514	N/A	N/A	0
	70-75	0	N/A	N/A	0
	75+	0	N/A	N/A	0
Alternative 1	62-70	7,391	+4,877	+194%	0
	70-75	0	0	0	0
	75+	0	0	0	0
Alternative 2	62-70	7,003	+4,489	+179%	0
	70-75	0	0	0	0
	75+	0	0	0	0
Alternative 3	62-70	10,861	+8,347	+332%	0
	70-75	0	0	0	0
	75+	0	0	0	0
Alternative 4	62-70	4,572	+2,058	+82%	0
	70-75	0	0	0	0
	75+	0	0	0	0
Alternative 5	62-70	5,150	+2,636	+105%	0
	70-75	0	0	0	0
	75+	0	0	0	0
Alternative 6	62-70	2,106	-408	-16%	0
	70-75	0	0	0	0
	75+	0	0	0	0

Notes: [1]Proposed Combat Center boundaries differ by alternative
CNEL = Community Noise Equivalent Level; dBC = C-weighted decibel; N/A = Not Applicable

Figure 4.9-4 shows the areas of medium and high potential for noise complaints associated with ordnance activity under Alternative 1. Table 4.9-4 shows the estimated acreage and population outside the proposed Combat Center boundary that would be included within the medium and high complaint potential areas for each alternative and for the baseline condition. Under Alternative 1, the area subject to medium potential for generating noise complaints would increase by 35% compared to baseline and would include an estimated 3,391 people (compared to 2,293 persons for the baseline). As shown in Table 4.9-4, the area with high potential for generating noise complaints would be reduced under Alternative 1 by 11.7% compared to the baseline condition. As with the baseline, the area of high complaint potential under Alternative 1 would also not include any resident population. Areas adjacent to the west study area and areas south of the south study area would experience a change in potential for noise complaints from low to medium. An area immediately to the west of the west study area (within approximately 2 miles of its western boundary) would also experience a change in potential for noise complaints from low to high. Although it is not associated with any specific degree of complaint potential, a 120 dB PK 15(met) line is shown in Figure 4.9-4 as a reference point within the band of medium complaint potential. The nearest community to the proposed Alternative 1 boundary (Johnson Valley), for example, is shown touching the 120 dB PK 15 line on Figure 4.9-4, and the specific PK 15 level modeled at that location was 121 dB PK 15(met).



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 4.9-4
Noise Complaint Potential from Alternative 1 Ordnance Activity

N

Table 4.9-4. Acreage and Population Outside Applicable Combat Center Boundary and within Areas of Medium and High Potential for Generating Noise Complaints

Case	Potential for Noise Complaints[2] (PK 15[met])[3]	Affected Area Outside Applicable Combat Center Boundary [1]			Estimated 2010 Population in Affected Area
		Acres in Affected Area	Change re Baseline		
			Net Change	Percent Change	
Baseline	Medium	324,774	N/A	N/A	2,293
	High	3,511	N/A	N/A	0
Alternative 1	Medium	438,582	+113,808	+35%	3,391
	High	3,100	-411	-11.7%	0
Alternative 2	Medium	*430,828*	*+106,054*	*+32.6%*	*3,072*
	High	*10,755*	*+7,244*	*+206.4%*	*0*
Alternative 3	Medium	536,931	+212,157	+65.3%	2,874
	High	7,681	+4,170	+118.8%	0
Alternative 4	Medium	350,088	+25,314	+7.8%	3,727
	High	4,564	+1,053	+30%	0
Alternative 5	Medium	344,028	+19,254	+5.9%	3,135
	High	4,627	+1,116	+31.8%	0
Alternative 6	Medium	393,763	+68,989	+21.2%	3,771
	High	5,583	+2,072	+59%	0

Notes: [1]For Baseline condition, the boundary used in this analysis is the existing Combat Center boundary; for each Alternative, the boundary used in the acreage and population calculations includes both the existing Combat Center property and the proposed acquisition area(s) for that alternative.

[2]See Figure 3.9-4 for a depiction of the medium and high complaint potential areas under Baseline conditions; see Figures 4.9-4, 4.9-7, 4.9-10, 4.9-13, 4.9-16, and 4.9-19 for maps showing the complaint potential areas under each project alternative.

[3]PK 15(met) = Peak Sound Level exceeded by 15% of ordnance events, accounting for variable meteorological conditions.

N/A = Not Applicable

Seven of the 50 applicable POIs would have a medium potential for ordnance noise complaints: #3 Amboy, #13 Landers, #14 Johnson Valley, #48 South of Existing Base, #49 South of south study area, #52 Bristol Dry Lake, and #17 Bighorn Mountains (wilderness). Relative to Baseline, three POIs, i.e., #14 Johnson Valley, #49 South of south study area and #17 Bighorn Mountains (wilderness) would be newly affected by Alternative 1.

The probability of damage to any brick-walled structures at POIs #14, #22, and #48 would be less than 0.0001%. Other hard structure types and windows at these POIs would have an even lower probability of damage from blasts. These values indicate extremely low probability of structural damage.

4.9.2.4 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures to address noise impacts but determined that none were feasible for Alternative 1. No mitigation measures are recommended.

4.9.3 Alternative 2 Impacts

4.9.3.1 Airfield Noise

As shown in Figure 4.9-1, the 65 dB CNEL contour for the airfield environment would be fully contained within the Combat Center's boundary. Therefore, no persons outside the installation would be exposed to CNEL greater than or equal to 65 dB. None of the 51 POIs applicable to Alternative 2 would be affected by CNEL greater than or equal to 65 dB. Airfield-related noise impacts to POIs, public health and safety, and wildlife are discussed in Section 4.1, *Land Use*, Section 4.4, *Public Health and Safety*, and Section 4.10, *Biological Resources*, respectively.

4.9.3.2 Airspace Noise

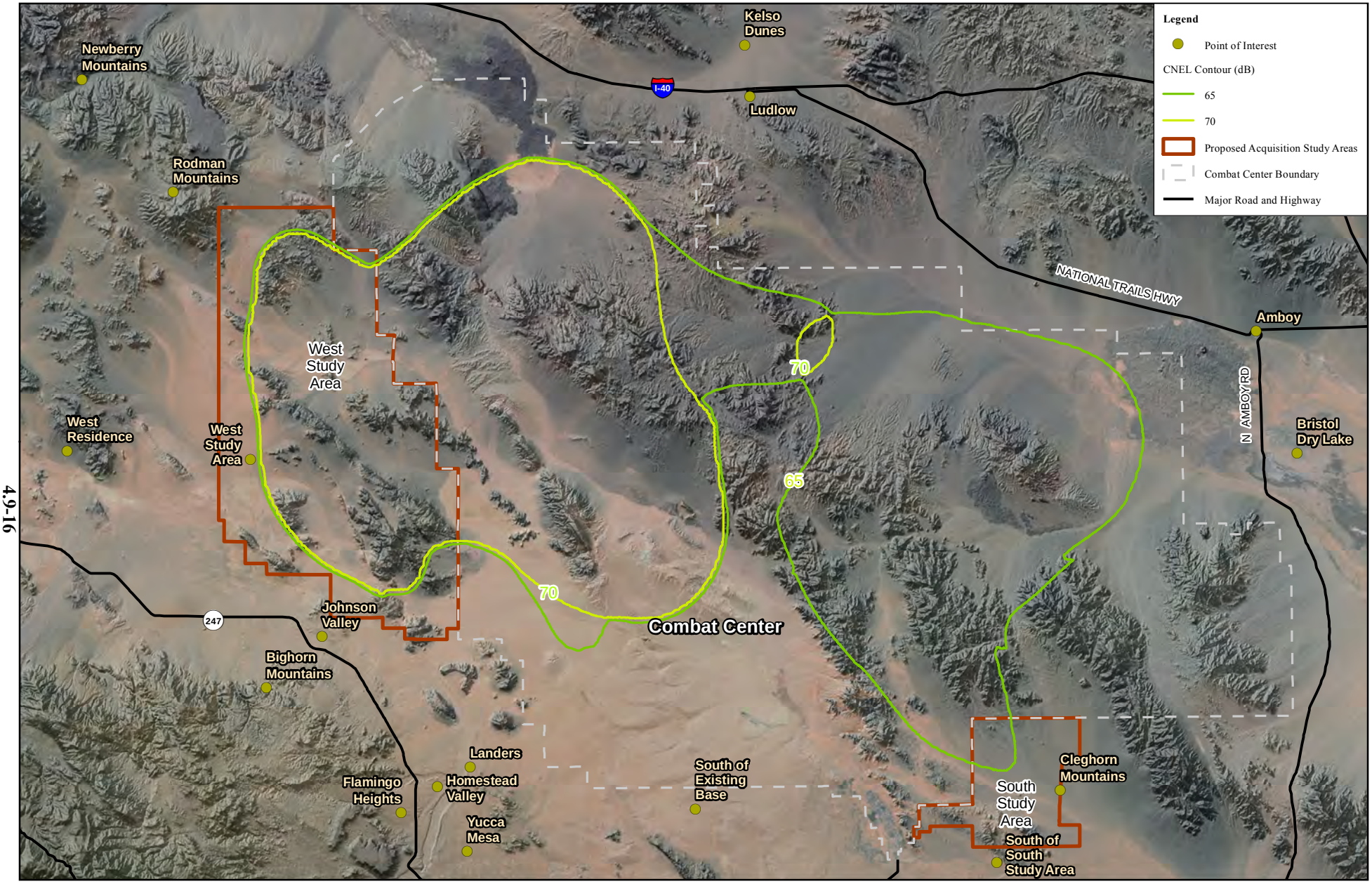
As shown in Figure 4.9-5 and Table 4.9-1, almost 400 uninhabited acres (162 hectares) outside the proposed boundaries of the Combat Center would be exposed to noise levels between 65 and 70 dB $CNEL_{mr}$ under Alternative 2. No sensitive receptors are located within this area and no resident population would be exposed to $CNEL_{mr}$ greater than or equal to 65 dB.

None of the 51 applicable POIs for Alternative 2 would be exposed to $CNEL_{mr}$ of 65 dB or greater. Relative to baseline conditions, Alternative 2 would represent no change in the number of POIs affected by $CNEL_{mr}$ greater than or equal to 65 dB. Noise impacts to POIs, public health and safety, and wildlife are discussed in Section 4.1, *Land Use*, Section 4.4, *Public Health and Safety*, and Section 4.10, *Biological Resources*, respectively.

Maximum single-event sound levels (L_{max}) of aircraft utilizing the Combat Center at average speeds, power settings and frequent altitudes were shown in Table 4.9-2; these maximum single-event sound levels also apply to Alternative 2 flight operations. Most fighter/attack aircraft at 4,000 feet AGL and 2 NM from the Alternative 2 range boundaries would exhibit an L_{max} of 46 dB to 64 dB. The F-35B/C at 4,000 feet AGL and 2 NM from the range boundary would produce approximately 76 dB L_{max}. Helicopters and tiltrotors at 200-500 feet AGL would produce L_{max} of between 47 and 61 dB, 1 NM from the Alternative 2 range boundary. Fighter/attack aircraft would fly at lower (read noisier) altitudes than 4,000 feet AGL but flying closer to the range boundary is not anticipated and noise dissipates more as altitude decreases and horizontal distance stays constant or increases. Therefore, single event noise from aircraft activity during Alternative 2 operations may interrupt speech of two people standing at the proposed range property line but only for brief moments.

4.9.3.3 Ordnance Noise

As shown in Figure 4.9-6, the 62 dBC CNEL contour associated with ordnance activity under Alternative 2 would extend beyond the boundaries of the Combat Center complex, primarily to the west (though also slightly in the northeast). As shown in Table 4.9-3, the total area outside the proposed installation boundary that would be potentially impacted by the CNEL 62 dBC ordnance noise contour under Alternative 2 is estimated to be 7,003 acres (2,834 hectares), an increase of 179% compared to baseline conditions. Despite the increase in acreage affected, there are no persons residing within the affected areas outside the proposed boundary. The CNEL 70 dBC noise contour would not extend outside the Alternative 2 boundaries of the Combat Center.

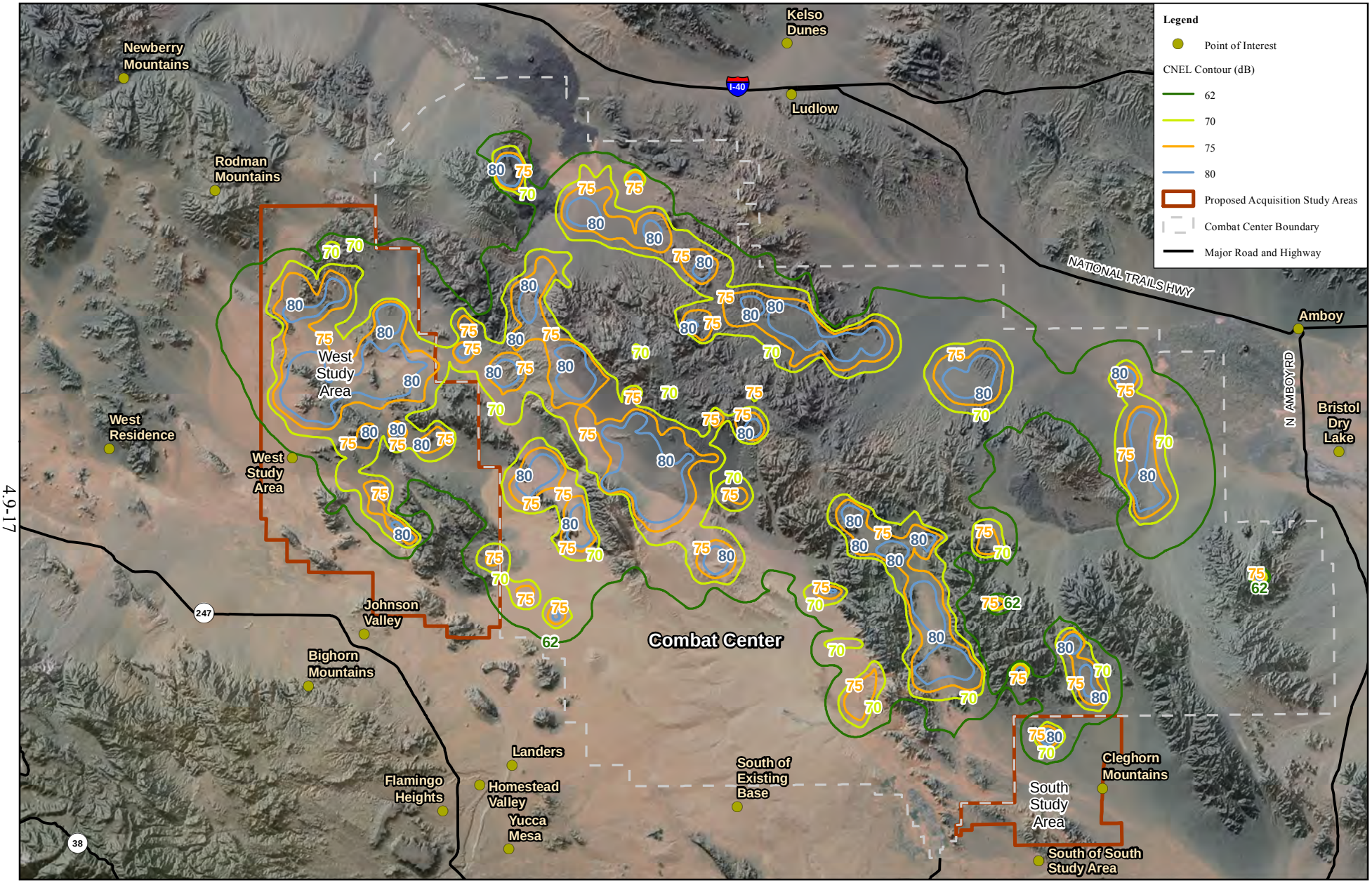


Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 4.9-5
Noise Exposure from Alternative 2 Airspace Operations

N



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 4.9-6
Noise Exposure from Alternative 2 Ordnance Activity

Of the 51 applicable POIs, none would have CNEL greater than or equal to 62 dBC. Relative to baseline conditions, Alternative 2 would represent no change regarding counts of POIs affected by CNEL greater than or equal to 62 dBC. Noise impacts to POIs, public health and safety, and wildlife are discussed in Section 4.1, *Land Use*, Section 4.4, *Public Health and Safety*, and Section 4.10, *Biological Resources*, respectively.

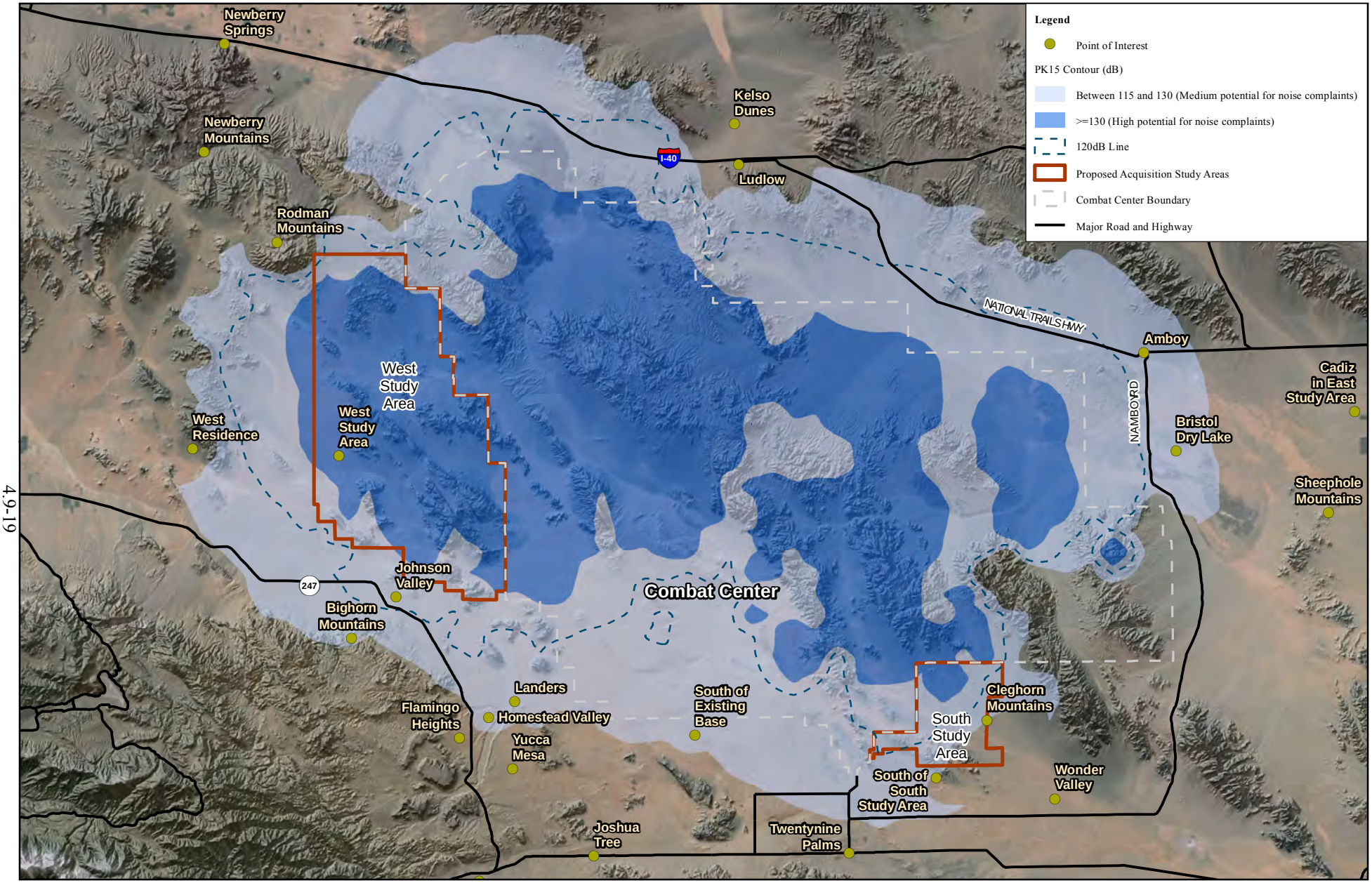
Figure 4.9-7 shows the areas of medium and high potential for noise complaints associated with ordnance activity under Alternative 2. Table 4.9-4 shows the estimated acreage and population outside the proposed Combat Center boundary that would be included within the medium and high complaint potential areas for each alternative and for the baseline condition. Under Alternative 2, the area subject to medium potential for generating noise complaints would increase by 32.6% compared to baseline and would include an estimated 3,072 people (compared to 2,293 persons for the baseline). As shown in Table 4.9-4, the area with high potential for generating noise complaints would increase by 206.4% under Alternative 2 relative to the baseline condition. As under the baseline scenario, the area of high complaint potential under Alternative 2 would also not include any resident population. Areas to the west and south of the west study area (including the communities of Johnson Valley, Homestead Valley, and Landers) and portions of the area south of the south study area would experience a change in potential for noise complaints from low to medium (compare Figure 4.9-7 to baseline Figure 3.9-4 in Section 3.9). Areas adjacent to the west side of the west study area (within approximately 2 miles of the western boundary) would also experience a change in potential for noise complaints from low to high. Although it is not associated with any specific degree of complaint potential, a 120 dB PK 15(met) line is shown in Figure 4.9-7 as a reference point within the band of medium complaint potential.

Seven of the 51 applicable POIs would have a medium potential for ordnance noise complaints under Alternative 2: #3 Amboy, #12 Homestead Valley, #13 Landers, #14 Johnson Valley, #48 South of Existing Base, #52 Bristol Dry Lake, and #17 Bighorn Mountains (wilderness). Relative to baseline conditions, three POIs, i.e., #12 Homestead Valley, #14 Johnson Valley, and #17 Bighorn Mountains (wilderness) would be newly affected by Alternative 2.

The probability of damage to structures at POIs #14, #22, and #48 having brick walls would be less than 0.0001%. Other hard structures types and windows at these POIs would have an even lower probability of damage from blasts. These values indicate extremely low probability of structural damage.

4.9.3.4 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures to address noise impacts but determined that none were feasible for Alternative 2. No mitigation measures are recommended.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 4.9-7
Noise Complaint Potential from Alternative 2 Ordnance Activity

N

4.9.4 Alternative 3 Impacts

4.9.4.1 Airfield Noise

As shown in Figure 4.9-1, the 65 dB CNEL contour for the airfield environment would be fully contained within the Combat Center's boundary. Therefore, no persons outside the installation would be exposed to CNEL greater than or equal to 65 dB. None of the 50 applicable POIs for Alternative 3 would be affected by CNEL greater than or equal to 65 dB. Noise impacts to POIs, public health and safety, and wildlife are discussed in Section 4.1, *Land Use*, Section 4.4, *Public Health and Safety*, and Section 4.10, *Biological Resources*, respectively.

4.9.4.2 Airspace Noise

As shown in Figure 4.9-8 and Table 4.9-1, the 65 dB $CNEL_{mr}$ contours for the airspace environment would be fully contained within the Combat Center's proposed boundary. Therefore, no persons outside the installation boundaries would be exposed to $CNEL_{mr}$ greater than or equal to 65 dB.

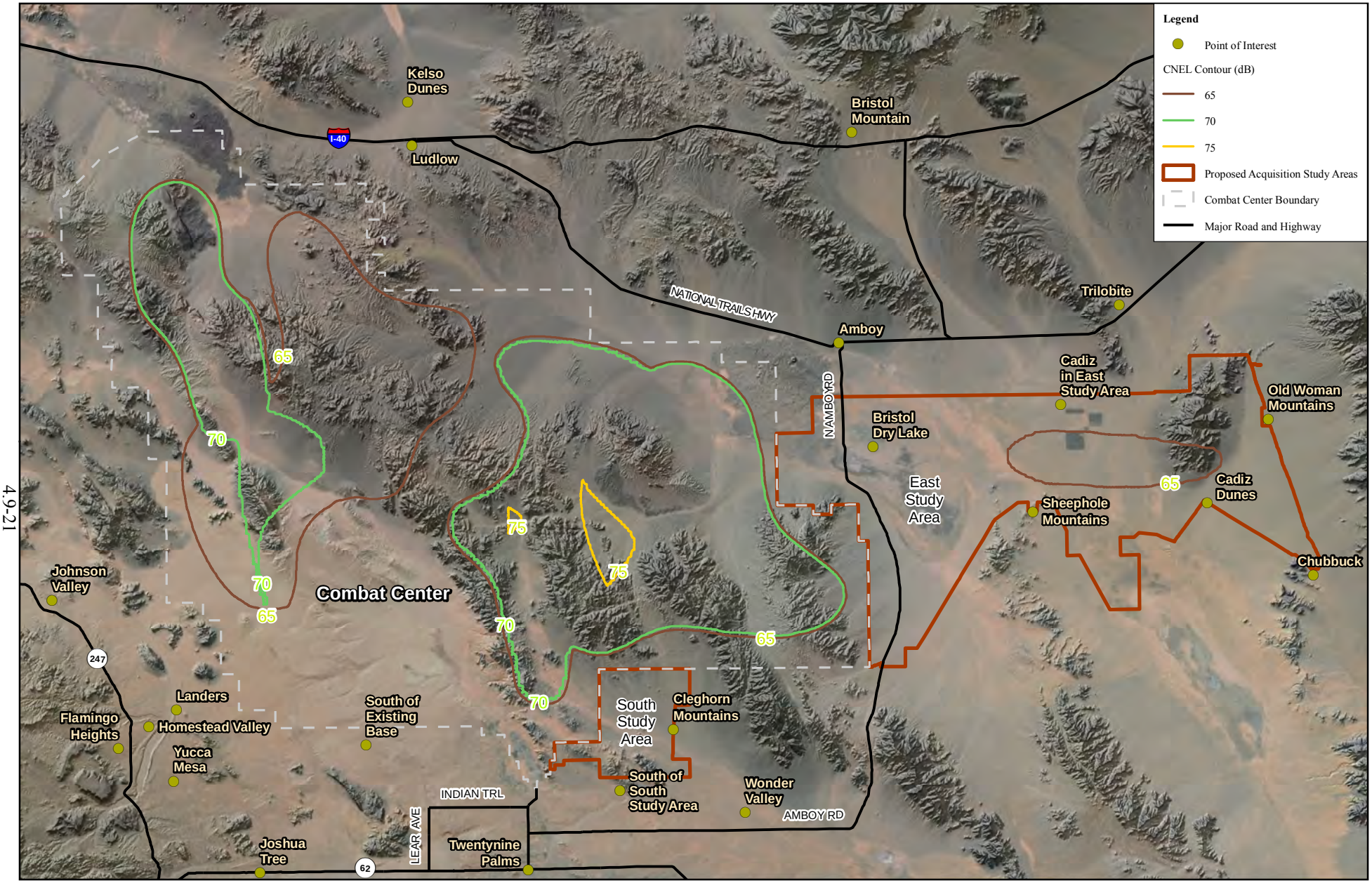
All of the 50 applicable POIs would have $CNEL_{mr}$ less than 65 dB. Relative to baseline conditions, Alternative 3 would represent no change in the number of POI affected by $CNEL_{mr}$ greater than or equal to 65 dB. Noise impacts to POIs, public health and safety, and to wildlife are discussed in Section 4.1, *Land Use*, Section 4.4, *Public Health and Safety*, and Section 4.10, *Biological Resources*, respectively.

Maximum single-event sound levels (L_{max}) of aircraft utilizing the Combat Center at average speeds, power settings and frequent altitudes were shown in Table 4.9-2; these maximum single-event sound levels would also apply to Alternative 3 flight operations. Most fighter/attack aircraft at 4,000 feet AGL and 2 NM from the Alternative 3 range boundaries would exhibit an L_{max} of 46 dB to 64 dB. The F-35B/C at 4,000 feet AGL and 2 NM from the range boundary would produce approximately 76 dB L_{max}. Helicopters and tiltrotors at 200-500 feet AGL would produce L_{max} of between 47 and 61 dB, 1 NM from the Alternative 3 range boundary. Fighter/attack aircraft would fly at lower (read noisier) altitudes than 4,000 feet AGL but flying closer to the range boundary is not anticipated and noise dissipates more as altitude decreases and horizontal distance stays constant or increases. Therefore, single event noise from aircraft activity during Alternative 3 operations may interrupt speech of two people standing at the proposed range property line but only for brief moments.

4.9.4.3 Ordnance Noise

As shown in Figure 4.9-9, the 62 dBC CNEL contour associated with ordnance activity under Alternative 3 would extend beyond the boundaries of the Combat Center primarily to the northeast. As described in Table 4.9-3, the total area outside the proposed installation boundary that would be potentially impacted by the 62 dBC CNEL contour under Alternative 3 is estimated to be 10,861 acres (4,395 hectares). There are no persons residing within the affected areas outside the proposed boundary. The CNEL 70 dBC noise contour would not extend outside the Combat Center complex.

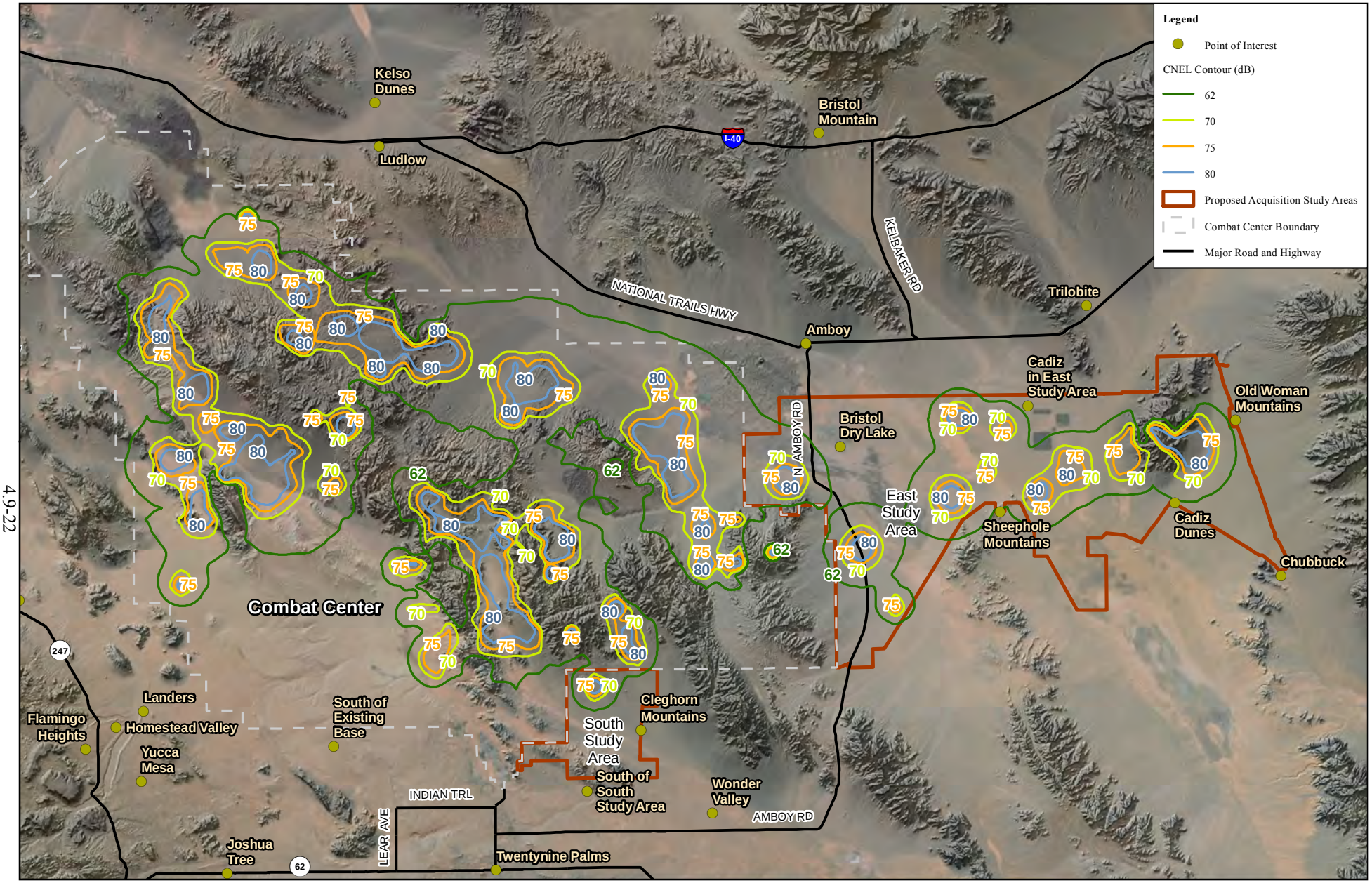
None of the 50 applicable POIs would have CNEL greater than or equal to 62 dBC. Relative to baseline conditions, Alternative 3 would represent no change regarding counts of POIs affected by CNEL greater than or equal to 62 dBC. Noise impacts to POIs, public health and safety, and to wildlife are discussed in Section 4.1, *Land Use*, Section 4.4, *Public Health and Safety*, and Section 4.10, *Biological Resources*, respectively.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 4.9-8
Noise Exposure from Alternative 3 Airspace Operations



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 4.9-9
Noise Exposure from Alternative 3 Ordnance Activity

N

Figure 4.9-10 shows the areas of medium and high potential for noise complaints associated with ordnance activity of Alternative 3. Table 4.9-4 shows the estimated acreage and population outside the proposed Combat Center boundary that would be included within the medium and high complaint risk areas. Under Alternative 3, the medium complaint risk area would increase by 65.3% compared to baseline and would include an estimated 2,874 people (compared to 2,293 persons for the baseline). As shown in Table 4.9-4, the size of the area with high potential for generating noise complaints would be increased by 118.7% under Alternative 3 relative to the baseline condition. As with the baseline, the area of high complaint risk under Alternative 3 would also not include any resident population. The areas surrounding most of the east study area would experience a change in potential for noise complaints from low to medium. There are areas that extend up to 2 miles to the north that would experience a change in potential for noise complaints from low to high. Although it is not associated with any specific degree of complaint potential, a 120 dB PK 15(met) line is shown in Figure 4.9-10 as a reference point within the band of medium complaint potential.

Nine of the 50 applicable POIs would have a medium potential for ordnance noise complaints: #3 Amboy, #4 Chubbuck, #13 Landers, #48 South of Existing Base, #49 South of south study area, #20 Trilobite (wilderness), #24 and #36 Cadiz Dunes (wilderness), and #23 Sheephole Mountains/Valley (wilderness). One POI, #25 Old Woman Mountains (wilderness), would have a high potential for ordnance noise complaints. Relative to baseline conditions, all but three of these 10 POIs, i.e., #3 Amboy, #13 Landers, and #48 South of Existing Base, would be newly affected by Alternative 3.

The probability of damage to any brick-walled structures at POIs #14, #22, and #48 would be less than 0.0001%. Other hard structure types and windows at these POIs would have an even lower probability of damage from blasts. These values indicate extremely low probability of structural damage.

4.9.4.4 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures to address noise impacts but determined that none were feasible for Alternative 3. No mitigation measures are recommended.

4.9.5 Alternative 4 Impacts

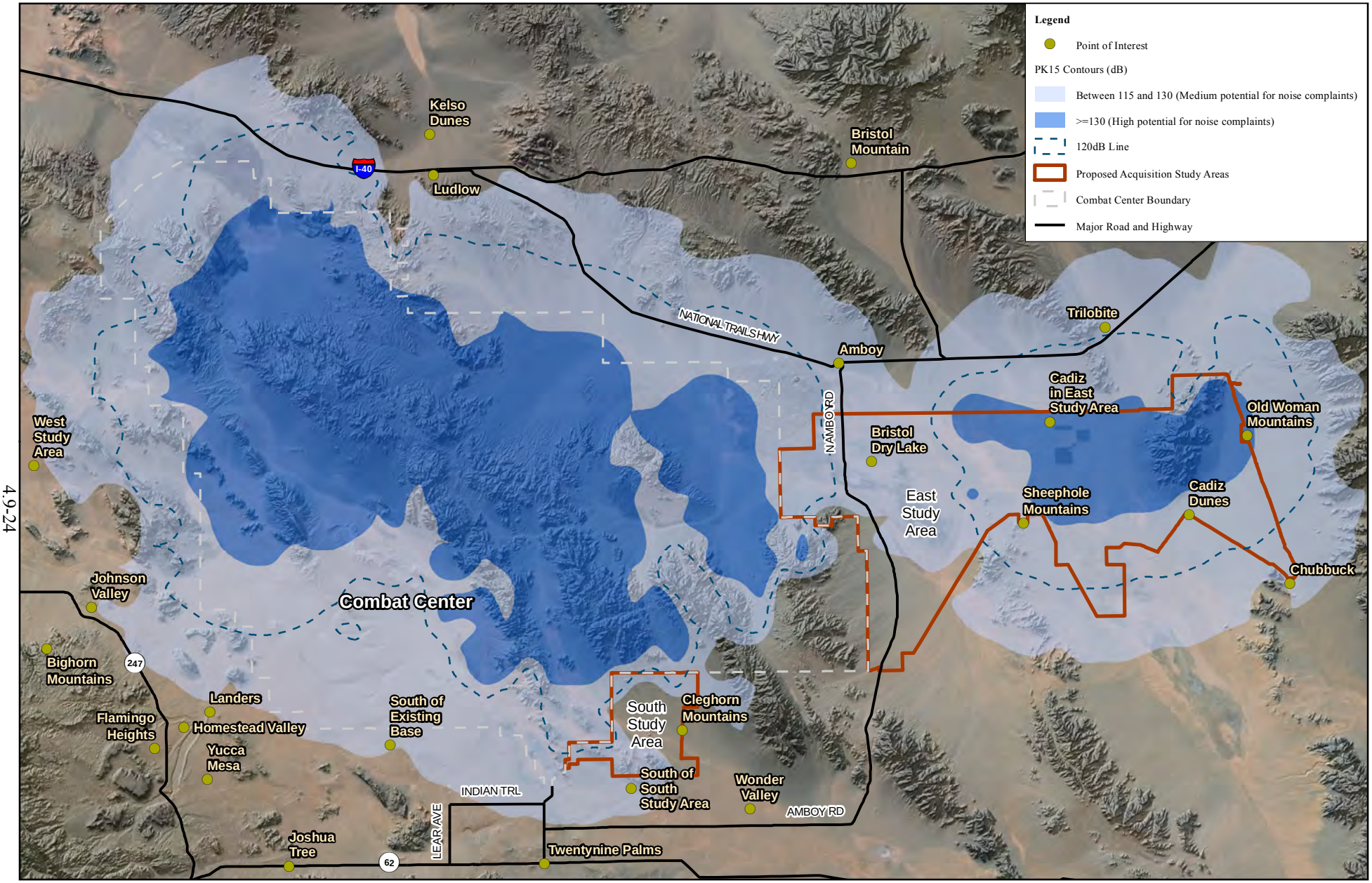
4.9.5.1 Airfield Noise

As shown in Figure 4.9-1, the 65 dB CNEL contour for the airfield environment would be fully contained within the Combat Center's boundary. Therefore, no persons off-base would be exposed to CNEL greater than or equal to 65 dB. None of the 50 applicable POIs for Alternative 4 would be affected by CNEL greater than or equal to 65 dB. Airfield-related noise impacts to POIs, public health and safety, and to wildlife are discussed in Section 4.1, *Land Use*, Section 4.4, *Public Health and Safety*, and Section 4.10, *Biological Resources*, respectively.

4.9.5.2 Airspace Noise

As shown in Figure 4.9-11 and Table 4.9-1, the 65 dB $CNEL_{mr}$ contours for the airspace environment would be fully contained within the Combat Center's proposed boundary. Therefore, no persons located outside the installation would be exposed to $CNEL_{mr}$ greater than or equal to 65 dB.

All of the 50 applicable POIs would have $CNEL_{mr}$ less than 65 dB. Relative to baseline conditions, Alternative 4 would represent no change in the number of POIs affected by $CNEL_{mr}$ greater than or equal to 65 dB. Noise impacts to POIs, public health and safety, and wildlife are discussed in Section 4.1, *Land Use*, Section 4.4, *Public Health and Safety*, and Section 4.10, *Biological Resources*, respectively.

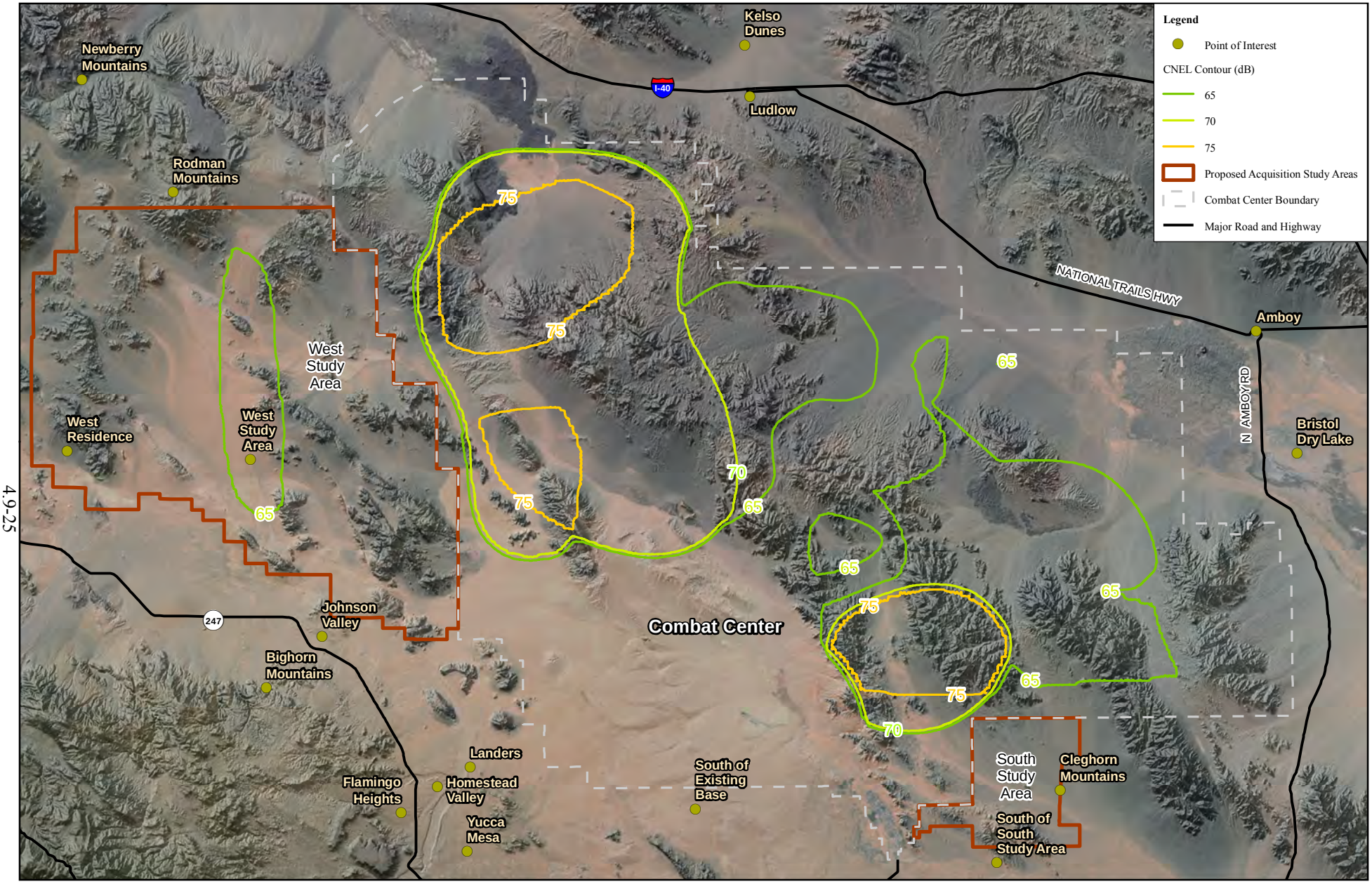


Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 4.9-10
Noise Complaint Potential from Alternative 3 Ordnance Activity

N



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 4.9-11
Noise Exposure from Alternative 4 Airspace Operations

Maximum single-event sound levels (L_{max}) of aircraft utilizing the Combat Center at average speeds, power settings and frequent altitudes were shown in Table 4.9-2; these maximum single-event sound levels would also apply to Alternative 4 flight operations. Most fighter/attack aircraft at 4,000 feet AGL and 2 NM from the Alternative 4 range boundaries would exhibit an L_{max} of 46 dB to 64 dB. The F-35B/C at 4,000 feet AGL and 2 NM from the range boundary would produce approximately 76 dB L_{max}. Helicopters and tiltrotors at 200-500 feet AGL would produce L_{max} of between 47 and 61 dB, 1 NM from the Alternative 4 range boundary. Fighter/attack aircraft would fly at lower (read noisier) altitudes than 4,000 feet AGL but flying closer to the range boundary is not anticipated and noise dissipates more as altitude decreases and horizontal distance stays constant or increases. Therefore, single event noise from aircraft activity during Alternative 4 operations may interrupt speech of two people standing at the proposed range property line but only for brief moments.

4.9.5.3 Ordnance Noise

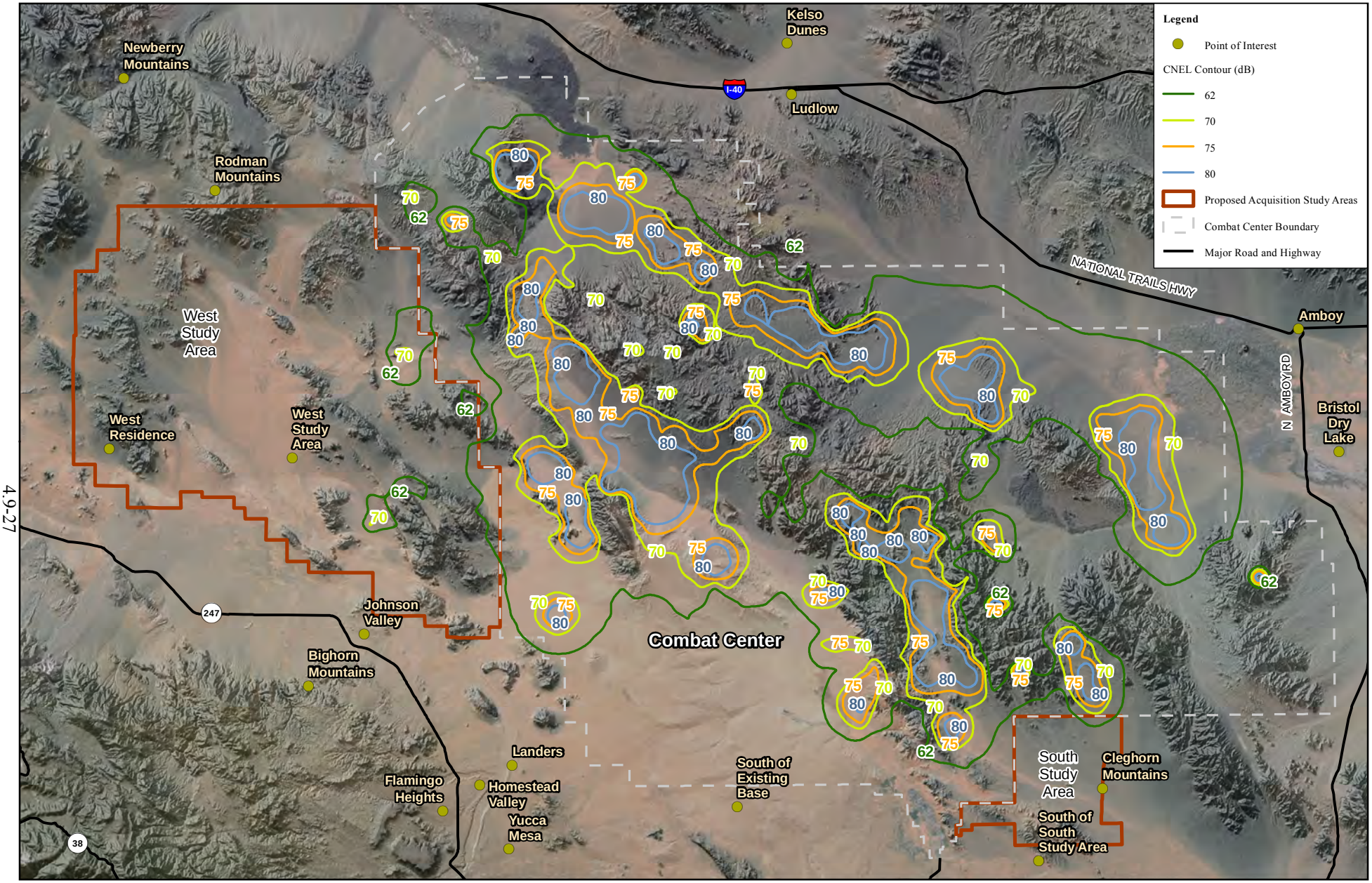
As shown in Figure 4.9-12, the CNEL 62 dBC contour associated with proposed ordnance use under Alternative 4 would extend beyond the boundaries of the Combat Center complex slightly to the northeast. As described in Table 4.9-3, the total area outside the proposed installation boundary that would be potentially impacted by the 62 dBC CNEL contour under Alternative 4 is estimated to be 4,572 acres (1,850 hectares), an increase of 82% compared to the baseline. Despite the increase in acreage affected, there are no persons residing within the affected areas outside the proposed boundary. The CNEL 70 dBC noise contour does not extend outside the Combat Center complex.

None of the 50 applicable POIs would have CNEL greater than or equal to 62 dBC. Relative to baseline conditions, Alternative 4 would represent no change in the number of POIs affected by CNEL greater than or equal to 62 dBC. Noise impacts to POIs, public health and safety, and wildlife are discussed in Section 4.1, *Land Use*, Section 4.4, *Public Health and Safety*, and Section 4.10, *Biological Resources*, respectively.

Figure 4.9-13 shows the areas of medium and high potential for noise complaints associated with ordnance activity of Alternative 4. Table 4.9-4 shows the estimated acreage and population outside the proposed Combat Center boundary that would be included within the medium and high complaint risk areas. Under Alternative 4, the medium complaint risk area would increase by 7.8% compared to baseline and would include an estimated 3,727 people (compared to 2,293 persons for the baseline). As shown in Table 4.9-4, the size of the area with high potential for generating noise complaints would be increased by 30% under Alternative 4 relative to the baseline condition. As with the baseline, the area of high complaint risk under Alternative 4 would also not include any resident population. Areas south and north of the west study area and also areas south of the south study area would experience a change in potential for complaints from low to medium. Although it is not associated with any specific degree of complaint potential, a 120 dB PK 15(met) line is shown in Figure 4.9-13 as a reference point within the band of medium complaint potential.

Five of the 50 applicable POIs would have a medium potential for ordnance noise complaints: #3 Amboy, #13 Landers, #14 Johnson Valley, #48 South of Existing Base, and #52 Bristol Dry Lake. Relative to baseline conditions, one of these five POIs (i.e., #14 Johnson Valley), would be newly affected by the alternative.

The probability of damage to any brick-walled structures at POIs #14, #22, and #48 would be less than 0.0001%. Other hard structure types and windows at these POIs would have an even lower probability of damage from blasts. These values indicate extremely low probability of structural damage.

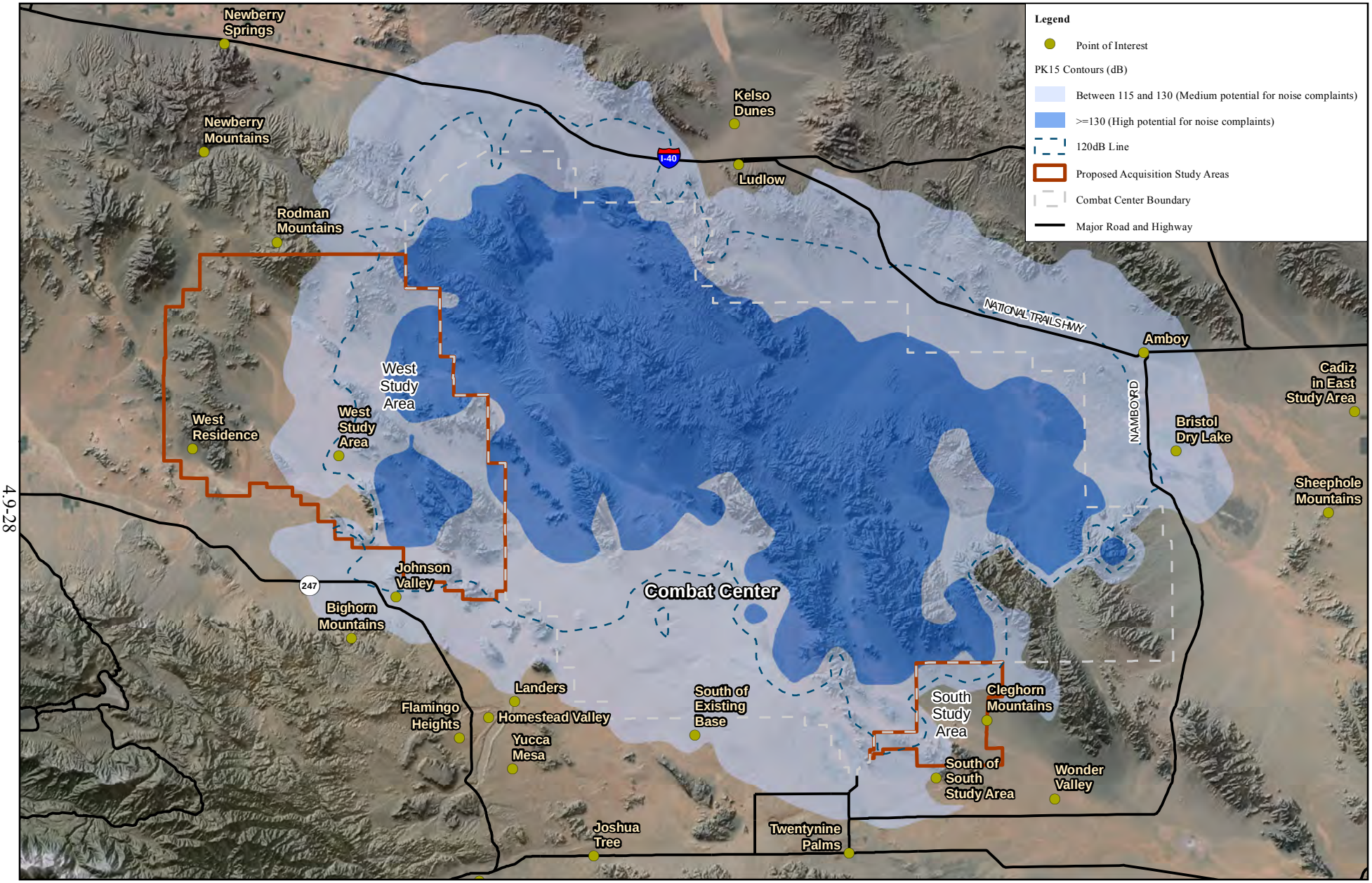


Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 4.9-12
Noise Exposure from Alternative 4 Ordnance Activity

N



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 4.9-13
Noise Complaint Potential from Alternative 4 Ordnance Activity

N

4.9.5.4 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures to address noise impacts but determined that none were feasible for Alternative 4. No mitigation measures are recommended.

4.9.6 Alternative 5 Impacts

4.9.6.1 Airfield Noise

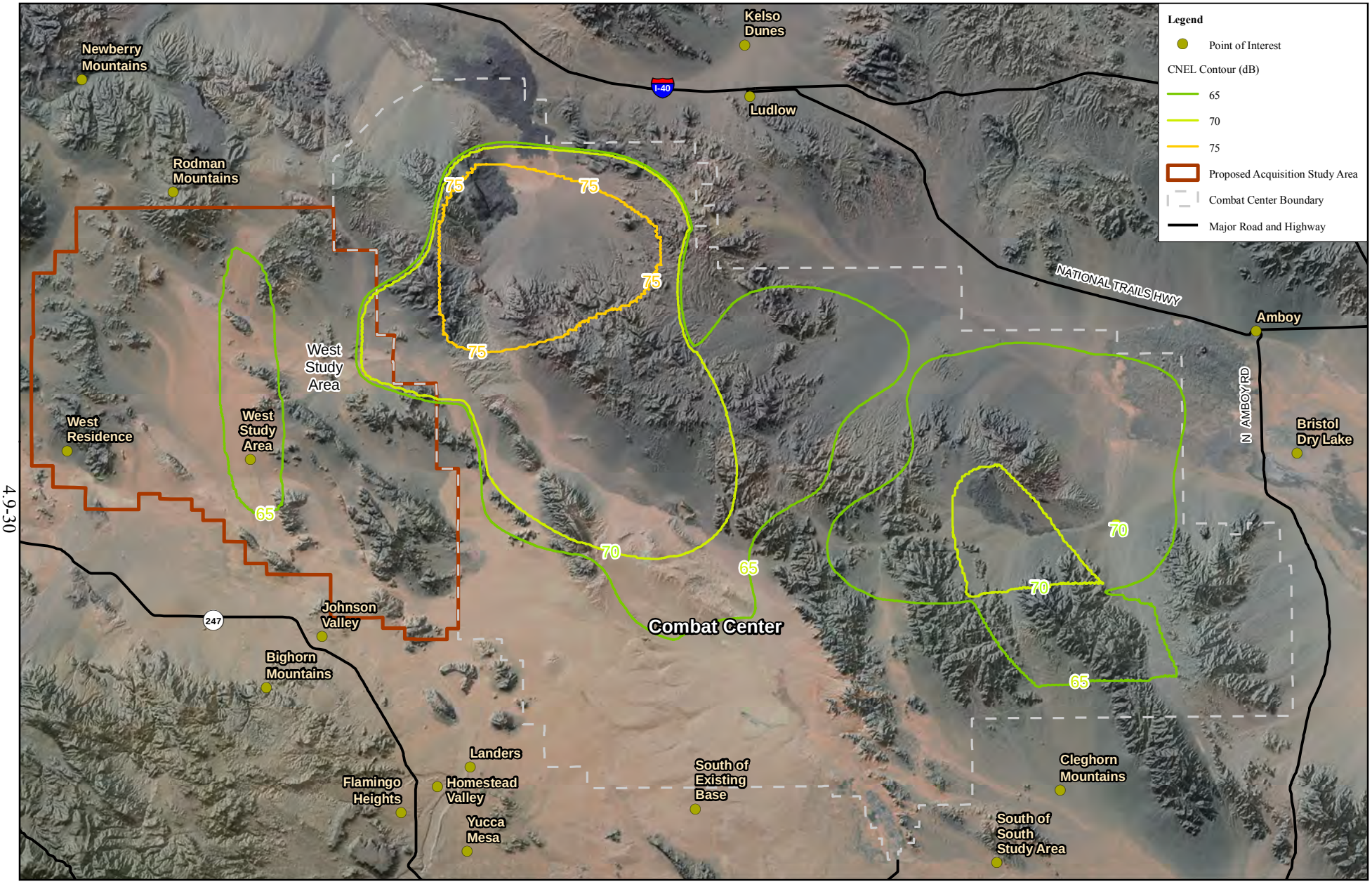
As shown in Figure 4.9-1, the 65 dB CNEL contour for the airfield environment would be fully contained within the Combat Center's boundary. Therefore, no persons off-base would be exposed to CNEL greater than or equal to 65 dB. None of the 50 applicable POIs would be affected by CNEL greater than or equal to 65 dB. Airfield-related noise impacts to POIs, public health and safety, and wildlife are discussed in Section 4.1, *Land Use*, Section 4.4, *Public Health and Safety*, and Section 4.10, *Biological Resources*, respectively.

4.9.6.2 Airspace Noise

As shown in Figure 4.9-14 and Table 4.9-1, approximately 128 acres (52 hectares) of land outside the proposed Combat Center boundaries would be exposed to noise levels in the range of 65 to 70 dB $CNEL_{mr}$ as a result of proposed airspace-related flight activities. However, no sensitive receptors are located within this area and no persons outside the installation would be exposed to $CNEL_{mr}$ greater than or equal to 65 dB.

All of the 50 applicable POIs for Alternative 5 would have $CNEL_{mr}$ less than 65 dB. Relative to baseline conditions, Alternative 5 would represent no change in the number of POIs affected by $CNEL_{mr}$ greater than or equal to 65 dB. Noise impacts to POIs, public health and safety, and to wildlife are discussed in Section 4.1, *Land Use*, Section 4.4, *Public Health and Safety*, and Section 4.10, *Biological Resources*, respectively.

Maximum single-event sound levels (L_{max}) of aircraft utilizing the Combat Center at average speeds, power settings and frequent altitudes were shown in Table 4.9-2; these maximum single-event sound levels would also apply to Alternative 5 flight operations. Most fighter/attack aircraft at 4,000 feet AGL and 2 NM from the Alternative 5 range boundaries would exhibit an L_{max} of 46 dB to 64 dB. The F-35B/C at 4,000 feet AGL and 2 NM from the range boundary would produce approximately 76 dB L_{max}. Helicopters and tiltrotors at 200-500 feet AGL would produce L_{max} of between 47 and 61 dB, 1 NM from the Alternative 5 range boundary. Fighter/attack aircraft would fly at lower (read noisier) altitudes than 4,000 feet AGL but flying closer to the range boundary is not anticipated and noise dissipates more as altitude decreases and horizontal distance stays constant or increases. Therefore, single event noise from aircraft activity during Alternative 5 operations may interrupt speech of two people standing at the proposed range property line but only for brief moments.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 4.9-14
Noise Exposure from Alternative 5 Airspace Operations

N

4.9.6.3 Ordnance Noise

As shown in Figure 4.9-15, the CNEL 62 dBC contour associated with ordnance use under Alternative 5 would extend beyond the range boundaries of the Combat Center slightly to the northeast. As described in Table 4.9-3, the total area outside the proposed installation boundary that would be potentially impacted by the 62 dBC CNEL contour under Alternative 5 is estimated to be 5,150 acres (2,084 hectares), an increase of 105% compared to the baseline. Despite the increase in acreage affected, there are no persons residing within the affected areas outside the proposed boundary. The CNEL 70 dBC noise contour would not extend outside the Combat Center complex.

None of the 50 applicable POIs would have CNEL greater than or equal to 62 dBC. Relative to baseline conditions, Alternative 5 would represent no change in the number of POIs affected by CNEL greater than or equal to 62 dBC. Noise impacts to POIs, public health and safety, and wildlife are discussed in Section 4.1, *Land Use*, Section 4.4, *Public Health and Safety*, and Section 4.10, *Biological Resources*, respectively.

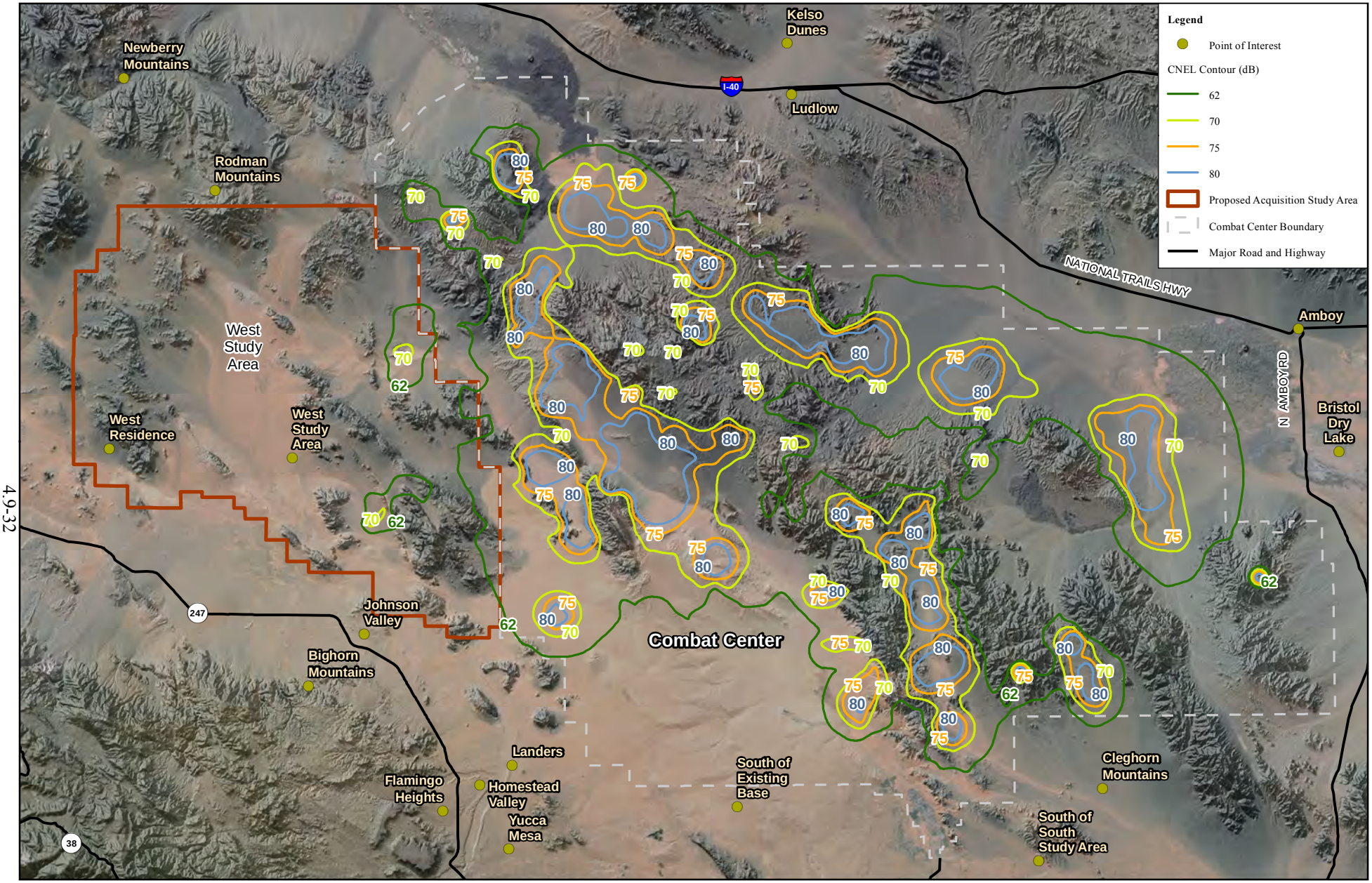
Figure 4.9-16 shows the areas of medium and high potential for noise complaints associated with ordnance activity of Alternative 5. Table 4.9-4 shows the estimated acreage and population outside the proposed Combat Center boundary that would be included within the medium and high complaint risk areas. Under Alternative 5, the medium complaint risk area would increase by 5.9% compared to baseline and would include an estimated 3,135 people (compared to 2,293 persons for the baseline). As shown in Table 4.9-4, the size of the area with high potential for generating noise complaints would be increased by 31.8% under Alternative 5 relative to the baseline condition. As with the baseline, the area of high complaint risk under Alternative 5 would also not include any resident population. Areas south and north of the west study area and also areas south of the south study area would experience a change in potential for complaints from low to medium. Although it is not associated with any specific degree of complaint potential, a 120 dB PK 15(met) line is shown in Figure 4.9-16 as a reference point within the band of medium complaint potential.

Five of the 50 applicable POIs would have a medium potential for ordnance noise complaints: #3 Amboy, #13 Landers, #14 Johnson Valley, #48 South of Existing Base, and #52 Bristol Dry Lake. Relative to baseline conditions, one of these five POIs (i.e., #14 Johnson Valley), would be newly affected by the alternative.

The probability of damage to any brick-walled structures at POIs #14, #22, and #48 would be less than 0.0001%. Other hard structure types and windows at these POI would have an even lower probability of damage from blasts. These values indicate extremely low probability of structural damage.

4.9.6.4 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures to address noise impacts but determined that none were feasible for Alternative 5. No mitigation measures are recommended.

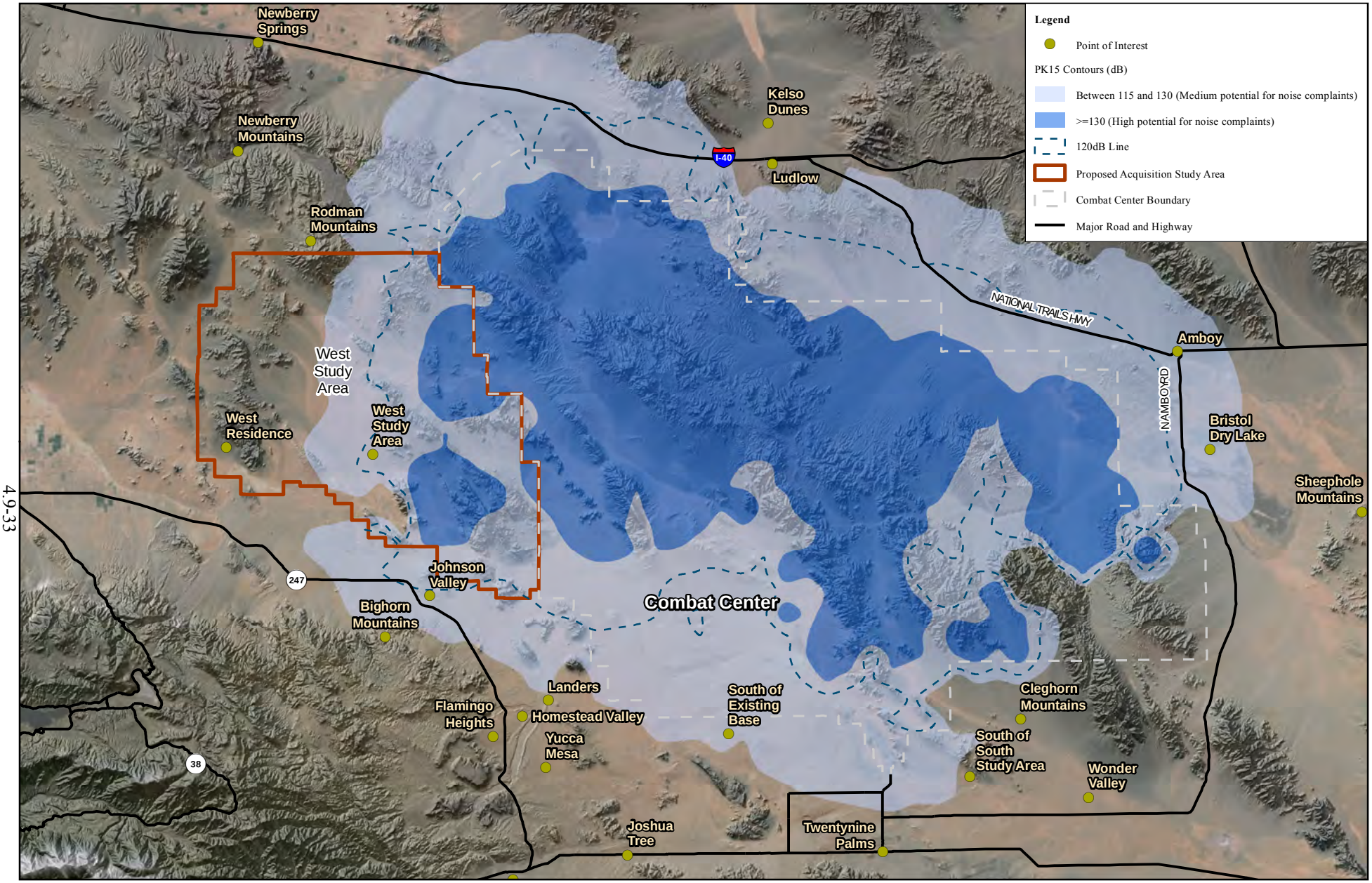


Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 4.9-15
Noise Exposure from Alternative 5 Ordnance Activity

N



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 4.9-16
Noise Complaint Potential from Alternative 5 Ordnance Activity

N

4.9.7 Alternative 6 Impacts (Preferred Alternative)

4.9.7.1 Airfield Noise

As shown in Figure 4.9-1, the 65 dB CNEL contour for the airfield environment would be fully contained within the Combat Center's boundary. Therefore, no persons outside the installation would be exposed to CNEL greater than or equal to 65 dB. None of the 51 applicable POIs for Alternative 6 would be affected by CNEL greater than or equal to 65 dB. Airfield-related noise impacts to POIs, public health and safety, and wildlife are discussed in Section 4.1, *Land Use*, Section 4.4, *Public Health and Safety*, and Section 4.10, *Biological Resources*, respectively.

4.9.7.2 Airspace Noise

As shown in Figure 4.9-17 and Table 4.9-1, the 65 dB $CNEL_{mr}$ contours for the airspace environment would be fully contained within the Combat Center's proposed boundary. Therefore, no individuals outside the installation would be exposed to $CNEL_{mr}$ greater than or equal to 65 dB.

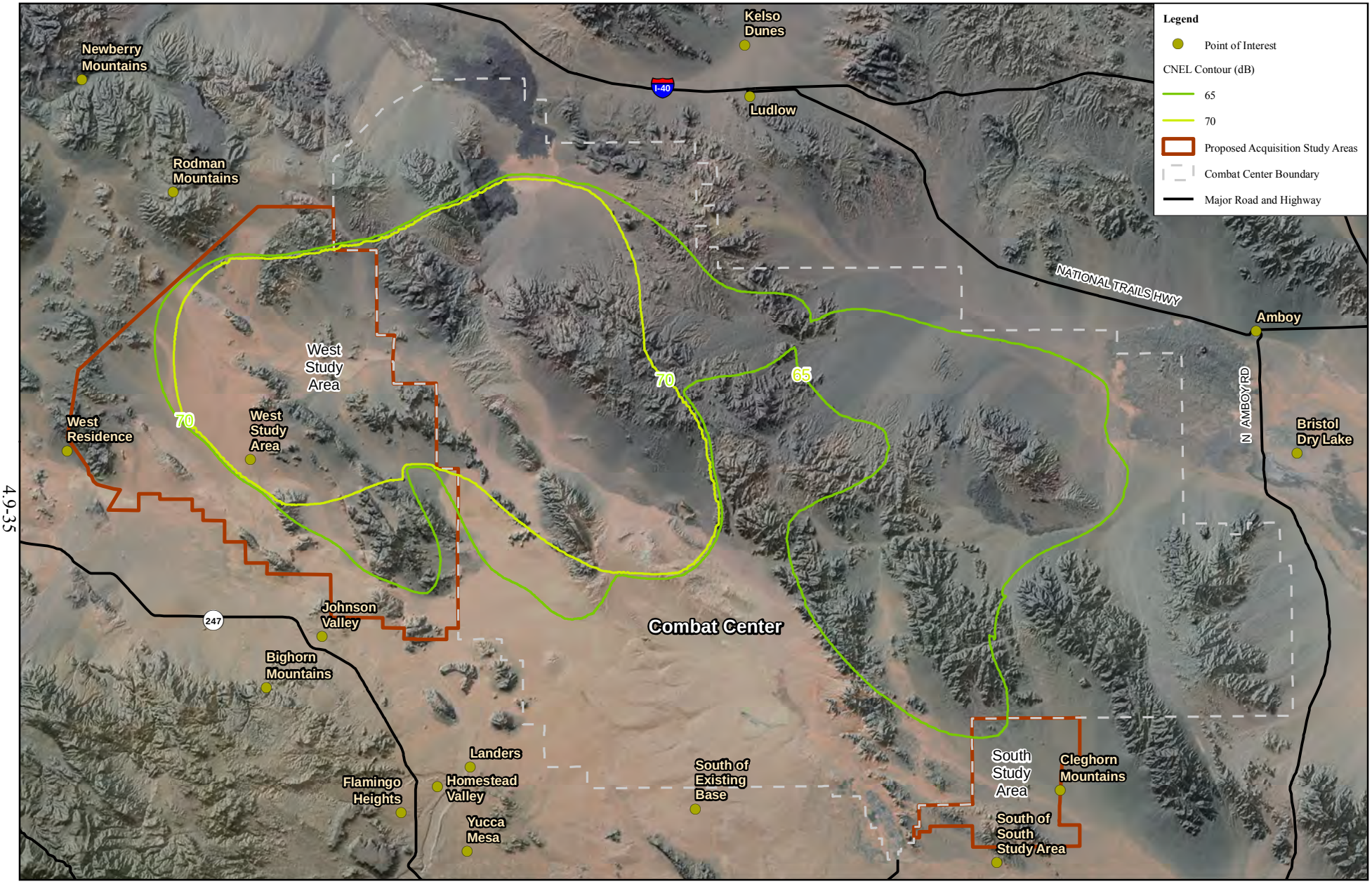
None of the 51 applicable POIs for Alternative 6 would be exposed to $CNEL_{mr}$ greater than or equal to 65 dB. Relative to baseline conditions, Alternative 6 would represent no change to the number of POIs affected by $CNEL_{mr}$ greater than or equal to 65 dB. Noise impacts to POIs, public health and safety, and wildlife are discussed in Section 4.1, *Land Use*, Section 4.4, *Public Health and Safety*, and Section 4.10, *Biological Resources*, respectively.

Maximum single-event sound levels (L_{max}) of aircraft utilizing the Combat Center at average speeds, power settings and frequent altitudes were shown in Table 4.9-2; these maximum single-event sound levels would also apply to Alternative 6 flight operations. Most fighter/attack aircraft at 4,000 feet AGL and 2 NM from the Alternative 6 range boundaries would exhibit an L_{max} of 46 dB to 64 dB. The F-35B/C at 4,000 feet AGL and 2 NM from the range boundary would produce approximately 76 dB L_{max}. Helicopters and tiltrotors at 200-500 feet AGL would produce L_{max} of between 47 and 61 dB, 1 NM from the Alternative 6 range boundary. Fighter/attack aircraft would fly at lower (read noisier) altitudes than 4,000 feet AGL but flying closer to the range boundary is not anticipated and noise dissipates more as altitude decreases and horizontal distance stays constant or increases. Therefore, single event noise from aircraft activity during Alternative 6 operations may interrupt speech of two people standing at the proposed range property line but only for brief moments.

4.9.7.3 Ordnance Noise

As shown in Figure 4.9-18, the CNEL 62 dBC contour associated with ordnance use under Alternative 6 would extend beyond the boundaries of the Combat Center complex to the west and northeast. As described in Table 4.9-3, the total area outside the proposed installation boundary that would be potentially impacted by the 62 dBC CNEL contour under Alternative 6 is estimated to be 2,106 acres (852 hectares). This area would be approximately 16% smaller than under the baseline conditions (No Action). The CNEL 70 dBC noise contour would not extend outside the Combat Center complex under Alternative 6.

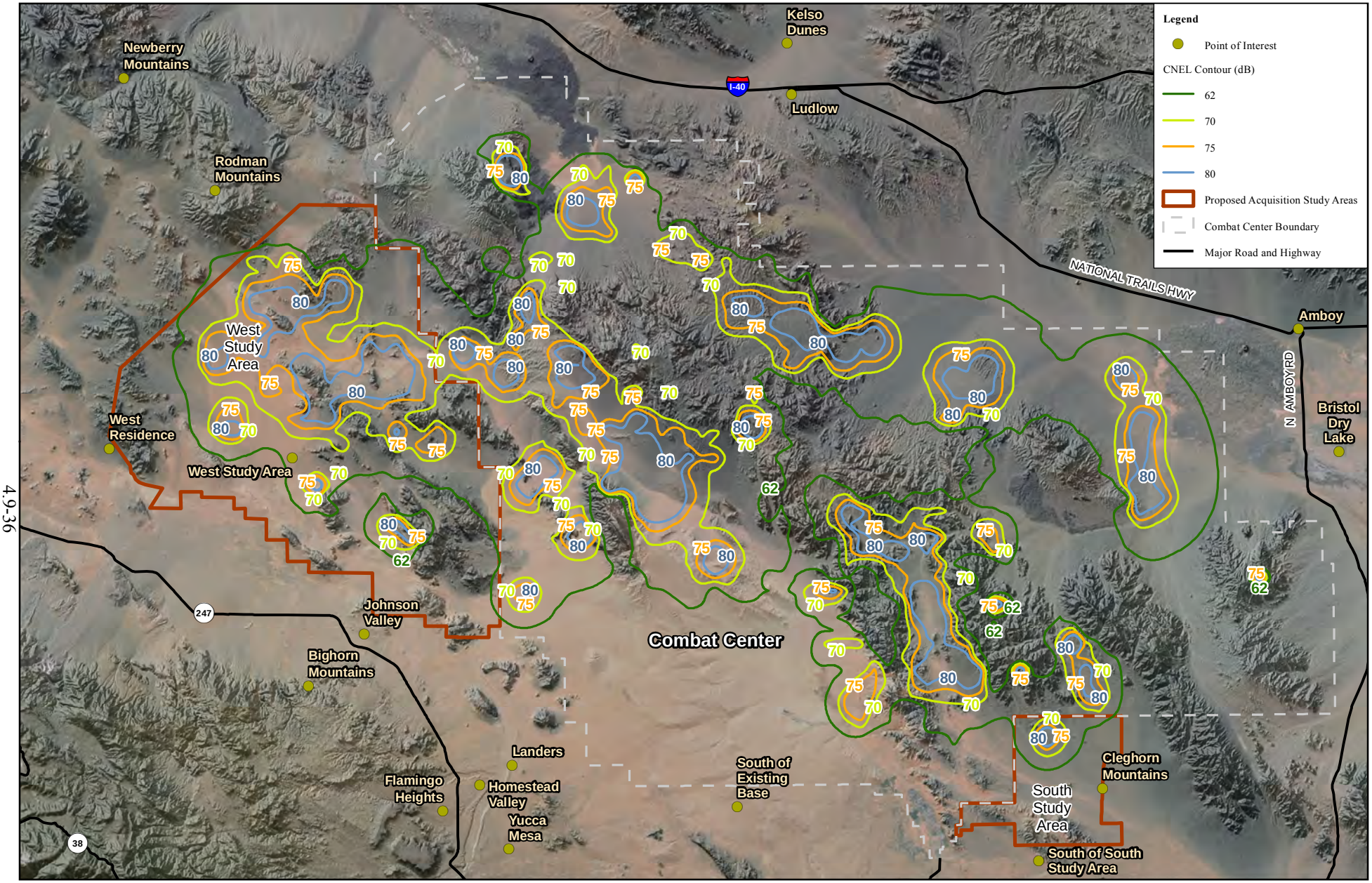
None of the 51 applicable POIs would have CNEL greater than or equal to 62 dBC. Relative to baseline conditions, Alternative 6 would represent no change in the number of POIs affected by CNEL greater than or equal to 62 dBC. Noise impacts to POIs, public health and safety, and wildlife are discussed in Section 4.1, *Land Use*, Section 4.4, *Public Health and Safety*, and Section 4.10, *Biological Resources*, respectively.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 4.9-17
Noise Exposure from Alternative 6 Airspace Operations



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009a

Figure 4.9-18
Noise Exposure from Alternative 6 Ordnance Activity

Figure 4.9-19 shows the areas of medium and high potential for noise complaints associated with ordnance activity of Alternative 6. Table 4.9-4 shows the estimated acreage and population outside the proposed Combat Center boundary that would be included within the medium and high complaint risk areas. Under Alternative 6, the medium complaint risk area would increase by 21.2% compared to baseline and would include an estimated 3,771 people (compared to 2,293 persons for the baseline). As shown in Table 4.9-4, the size of the area with high potential for generating noise complaints would be increased by 59% under Alternative 6 relative to the baseline condition. As with the baseline, the area of high complaint risk under Alternative 6 would also not include any resident population. Areas south and north of the west study area would experience a change in potential for noise complaints from low to medium. There would be an area to the northwest that would extend up to 1 mile from the northern boundary that would experience a change in potential for noise complaints from low to high. Although it is not associated with any specific degree of complaint potential, a 120 dB PK 15(met) line is shown in Figure 4.9-19 as a reference point within the band of medium complaint potential.

Six of the 51 applicable POIs for Alternative 6 would have a medium potential for ordnance noise complaints: #3 Amboy, #13 Landers, #14 Johnson Valley, #48 South of Existing Base, #52 Bristol Dry Lake, and #17 Bighorn Mountains (wilderness). Relative to baseline conditions, two of these seven POIs (i.e., #14 Johnson Valley and #17 Bighorn Mountains [wilderness]), would be newly affected by the alternative.

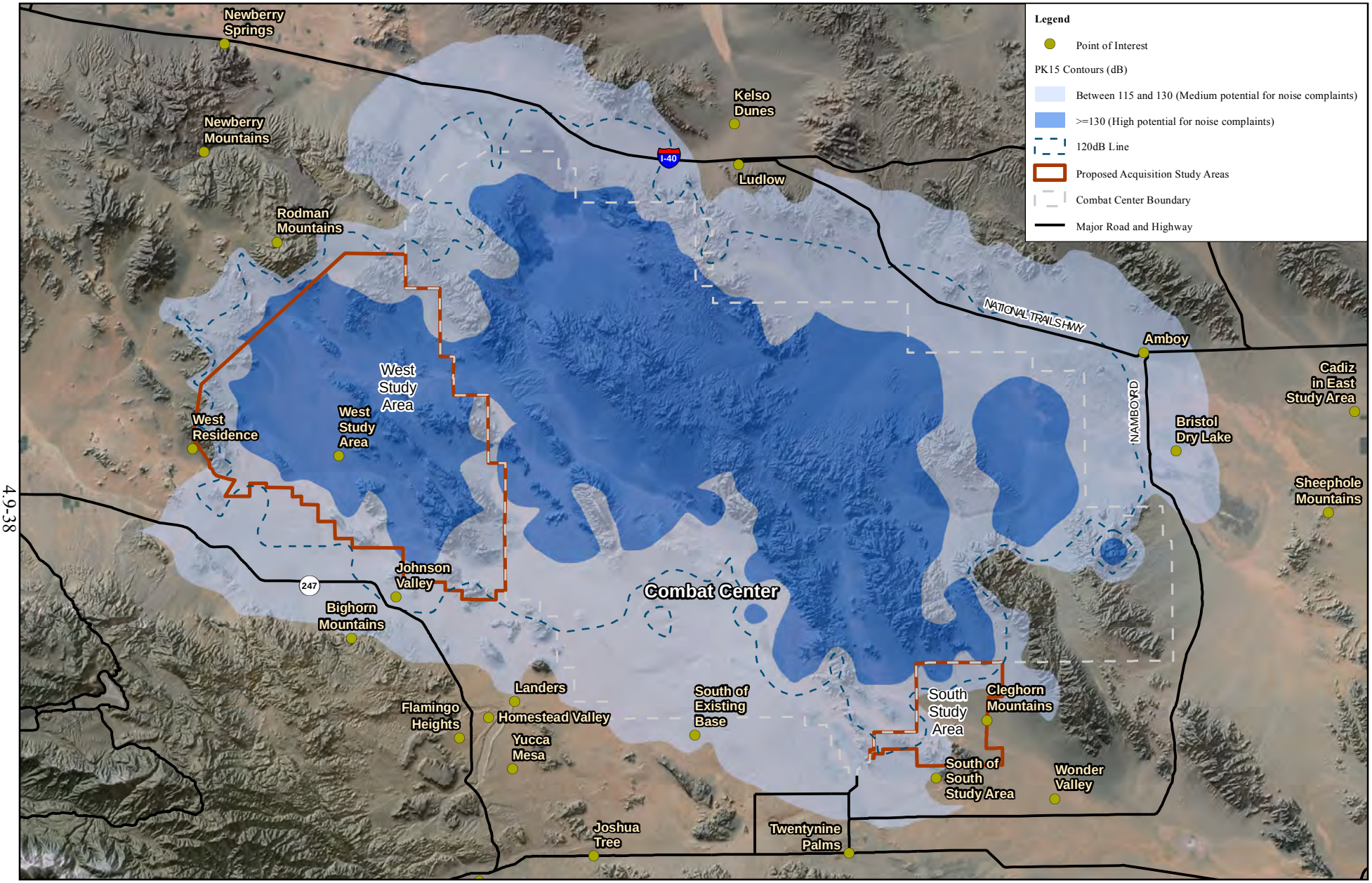
The probability of damage to any brick-walled structures at POIs #14, #22, and #48 would be less than 0.0001%. Other hard structure types and windows at these POIs would have an even lower probability of damage from blasts. These values indicate extremely low probability of structural damage.

4.9.7.4 Potential Mitigation Measures

The Marine Corps considered potential mitigation measures to address noise impacts but determined that none were feasible for Alternative 6. No mitigation measures are recommended.

4.9.8 No-Action Alternative

The No-Action Alternative is identical to baseline conditions. Under this alternative, no persons located outside the proposed Combat Center boundaries would be exposed to $CNEL_{mr}$ greater than or equal to 65 dB due to aircraft noise. As was shown in Figure 3.9-3 in Section 3.9, and as described in Table 4.9-3, the area within the CNEL 62 dBC ordnance noise contour that would be outside the boundaries of the Combat Center complex would be 2,514 acres (1,017 hectares), primarily along the northeast boundary. The CNEL 70 dBC noise contour would not extend outside the Combat Center complex.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles
Source: MAGTF Training Command 2009a

Figure 4.9-19
Noise Complaint Potential from Alternative 6 Ordnance Activity

N

4.9.9 Summary of Impacts

Table 4.9-5 summarizes the impacts of each action alternative and the No-Action Alternative. Noise impacts to POIs, public health and safety, and wildlife are discussed in Section 4.1, *Land Use*, Section 4.4, *Public Health and Safety*, and Section 4.10, *Biological Resources*, respectively.

Table 4.9-5. Summary of Noise Impacts

Alternative	Impacts[1]
Alternative 1	• Aircraft Noise – Overflights would increase and occur at lower altitudes than baseline conditions. The 65 dBA CNEL and $CNEL_{mr}$ contours for the airfield and airspace operations, respectively, would be contained within the range boundary and no populations would be exposed to CNEL (or $CNEL_{mr}$) ≥ 65 dBA. • Ordnance Noise – The 62-70 dBC CNEL contour would extend beyond the range boundary to encompass 7,391 acres (2,991 hectares) but would not affect the land use compatibility of any of the 50 applicable points of interest (POIs). The land area subject to a medium potential for noise complaints would increase by 35% compared to baseline and would encompass an estimated 1,098 more people. The area subject to high potential for noise complaint would decrease by 11.7% compared to baseline, but would not include any populations. Seven POIs would be subject to a medium potential for ordnance noise complaints. The probability of damage from ordnance vibrations would be less than 0.0001%.
Alternative 2	• Aircraft Noise – Overflights would increase and occur at lower altitudes than baseline conditions. The 65 dBA CNEL contours for the airfield operations would be contained within the range boundary and no populations or POIs would be exposed to CNEL ≥ 65 dBA. The 65-70 dB $CNEL_{mr}$ contour band would overlap almost 400 uninhabited acres (162 hectares) outside the range boundary, but with no affected population or POIs. • Ordnance Noise – The 62dBC CNEL contour would extend beyond the range boundary to encompass 7,003 acres (2,834 hectares), but would not affect the land use compatibility of the applicable POIs. The land area subject to a medium potential for noise complaints would increase by 32.6% compared to baseline and would include an estimated 3,072 people (compared to 2,293 persons for the baseline). The area with high potential for generating noise complaints would increase by 206.4% relative to the baseline condition but would not contain any resident population. Seven POIs would be subject to a medium potential for ordnance noise complaints. The probability of damage from ordnance vibrations would be less than 0.0001%.

Continued on next page

Table 4.9-5. Summary of Noise Impacts

Alternative	Impacts[1]
Alternative 3	• Aircraft Noise – Overflights would increase and occur at lower altitudes than baseline conditions. The 65 dBA CNEL contours for the airfield operations would be contained within the range boundary and no populations or POIs would be exposed to CNEL ≥ 65 dBA. The 65 dBA $CNEL_{mr}$ contours for the airspace operations would be contained within the range boundary and no populations would be exposed to $CNEL_{mr}$ ≥ 65 dBA. • Ordnance Noise – The 62-70 dBC CNEL contour would extend beyond the range boundary on 10,861 acres (4,395 hectares) but would not affect the land use compatibility of any of the 50 applicable POIs. The land area subject to a medium potential for noise complaints would increase by 65.3% compared to baseline and would encompass an estimated 581 more people. The area subject to high potential for noise complaint would increase by 118.7% compared to baseline, but would not include any populations. Nine POIs would be subject to a medium potential for ordnance noise complaints while one POI (Old Woman Mountains (wilderness)) would be subject to a high potential for ordnance noise complaints. The probability of damage from ordnance vibrations would be less than 0.0001%.
Alternative 4	• Aircraft Noise – Overflights would increase and occur at lower altitudes than baseline conditions. The 65 dBA CNEL contours for the airfield operations would be contained within the range boundary and no populations or POIs would be exposed to CNEL ≥ 65 dBA. The 65 dBA $CNEL_{mr}$ contours for the airspace operations would be contained within the range boundary and no populations would be exposed to $CNEL_{mr}$ ≥ 65 dBA. • Ordnance Noise – The 62-70 dBC CNEL contour would extend beyond the range boundary on 4,572 acres (1,850 hectares) but would not affect the land use compatibility of any of the 50 applicable POIs. The land area subject to a medium potential for noise complaints would increase by 7.8% compared to baseline and would encompass an estimated 1,434 more people. The area subject to high potential for noise complaint would increase by 30% compared to baseline, but would not include any populations. Five POIs would be subject to a medium potential for ordnance noise complaints. The probability of damage from ordnance vibrations would be less than 0.0001%.
Alternative 5	• Aircraft Noise – Overflights would increase and occur at lower altitudes than baseline conditions. The 65 dBA CNEL contours for the airfield operations would be contained within the range boundary and no populations or POIs would be exposed to CNEL ≥ 65 dBA. The 65-70 dB $CNEL_{mr}$ contour band for airspace noise would extend approximately 128 acres (52 hectares) beyond the range boundary but no resident populations or POIs would be exposed to $CNEL_{mr}$ ≥ 65 dBA due to airspace activity. • Ordnance Noise – The 62-70 dBC CNEL contour would extend beyond the range boundary on 5,150 acres (2,084 hectares) but would not affect the land use compatibility of any of the 50 applicable POIs. The land area subject to a medium potential for noise complaints would increase by 5.9% compared to baseline and would encompass an estimated 842 more people. The area subject to high potential for noise complaint would increase by 31.8% compared to baseline, but would not include any populations. Five POIs would be subject to a medium potential for ordnance noise complaints. The probability of damage from ordnance vibrations would be less than 0.0001%.

Continued on next page

Table 4.9-5. Summary of Noise Impacts

Alternative	Impacts[1]
Alternative 6	• Aircraft Noise – Overflights would increase and occur at lower altitudes than baseline conditions. The 65 dBA CNEL and $CNEL_{mr}$ contours for the airfield and airspace operations, respectively, would be contained within the range boundary and no populations or POIs would be exposed to CNEL (or $CNEL_{mr}$) $\geq$ 65 dBA. • Ordnance Noise – The 62-70 dBC CNEL contour would extend beyond the range boundary on 2,106 acres (852 hectares; 408 acres less than the No-Action Alternative) and would not potentially affect the land use compatibility of any of the 51 applicable POIs. The land area subject to a medium potential for noise complaints would increase by 21.2% compared to baseline and would encompass an estimated 1,478 more people. The area subject to high potential for noise complaint would increase by 59% compared to baseline, but would not include any populations. Six POIs would pose a medium potential for ordnance noise complaints. The probability of damage from ordnance vibrations would be less than 0.0001%.
No-Action Alternative	• Conditions would be identical to baseline conditions for aircraft noise. • No persons located outside the Combat Center boundaries would be exposed to CNEL or $CNEL_{mr}$ greater than or equal to 65 dBA due to aircraft noise. • The area within the CNEL 62 dBC ordnance noise contour that would be outside the boundaries of the Combat Center complex would be 2,514 acres (1,017 hectares), primarily along the northeast boundary. • The CNEL 70 dBC noise contour would not extend outside the Combat Center complex. • Four POIs would be subject to a medium potential for ordnance noise complaints.

Notes: [1]Noise impacts to POIs, public health and safety, and to wildlife are discussed in Section 4.1, *Land Use*; Section 4.4, *Public Health and Safety*; and Section 4.10, *Biological Resources*, respectively.
CNEL = Community Noise Equivalent Level; $CNEL_{mr}$ = Onset-Rate Adjusted Monthly Community Noise Equivalent Level; dBA = A-weighted decibel; dBC = C-weighted decibel; POI = point of interest

4.10 BIOLOGICAL RESOURCES

4.10.1 Approach to Analysis

4.10.1.1 Methodology

The objective of the biological resources analysis is to identify potential adverse effects on biological resources. Consistent with the requirements of the NEPA, the significance of potential impacts is evaluated through the application of criteria described in Section 4.10.1.2.

Limitations of Impact Modeling

Quantitative analysis of impacts to vegetation, occupied desert tortoise habitat, and desert tortoises in this EIS utilizes a GIS analysis. A disturbance footprint was derived from the routes of travel and expected areas of ordnance explosion identified for each alternative in Section 2.4. The impact footprint for the battalion routes of travel accounts for the expectation that battalions will "fan out" as conditions allow to increase the distance between platoons and companies. The amount to which this "fan out" can occur is limited by the constraints of the terrain (e.g., playas, mountains, sand dunes), and operational constraints (e.g., no maneuver areas, Special Use Areas).

The routes of battalion travel and ordnance target areas that are identified in Section 2.4 and used in quantitative GIS analysis are very general and may not represent the actual routes of travel or ordnance targets used during future exercises. The quantitative assessment of impacts to vegetation and occupied desert tortoise habitat, and take of desert tortoises presented in this chapter accounts for moderate deviations from the conceptual routes of battalion travel and provides for a conservatively high estimate. Known special status plant and animal populations have been avoided to the extent practicable when identifying where training exercises would occur; however, physical constraints (e.g., steep slopes, playas), operational requirements (e.g., tactical separation distances between platoons and companies), and restricted use areas (e.g., no maneuver areas, Special Use Areas) were the primary factors used when identifying likely routes of travel during MEB exercises.

The quantitative estimates of disturbance are totals over the project lifetime, which is assumed to be approximately 50 years; however, direct impacts would be greatest when military training under the proposed action begins. After the initial disturbance, new vegetation damage and physical disturbance to desert tortoises and their habitat would decline in intensity as less undisturbed vegetation would be present and tortoises that were initially located in the areas of disturbance would have moved or been killed.

Disturbance from OHV use in the shared-use portions of the west study area under Alternatives 4, 5, and 6 is not included in the quantitative GIS analysis. Qualitative description of impacts resulting from this disturbance is provided where appropriate, and the ways by which OHV use might act synergistically to increase the severity of military training impacts is discussed.

Definitions of Use Levels

Three different levels of operations and activities relevant to potential biological resource impacts are identified for the proposed action: high-, medium-, and low-intensity use. These levels of use are referred to throughout the resource impact analysis as appropriate. Detailed assumptions for these categories are presented in Appendix I.

Vegetation Impacts

Vegetation has been mapped on the Combat Center (Agri-chemical and Supply 2008) and in the east, south, and west study areas (California Department of Forestry [CDF] 2003; USGS 2004). While different nomenclature was used in these efforts, all plant community nomenclature discussed herein is based on California Native Plant Society (CNPS) (2009a) recommendations.

To evaluate the significance of impacts to vegetation, the anticipated levels of disturbance to lands where plant communities are located were identified. To quantify this impact, GIS modeling was used to overlay a vegetation base map with the footprint of planned routes of travel and areas of expected ordnance explosion (see Section 2.4). This impact quantification focused on areas of high- and medium-intensity disturbance, with the rarity of the affected plant community taken into consideration in making an impact determination. Vegetation in the west study area has been impacted to varying degrees by past land use associated with Johnson Valley OHV Area use and mining (BLM 1992; U.S. Fish and Wildlife Service [USFWS] 1991), but this existing degradation was not considered when quantifying impacts to vegetation. Refer to Appendix I for detailed assumptions and methodology used in assessment of impacts to vegetation.

Ecosystem Impacts

Impacts to ecosystems have been evaluated qualitatively per the anticipated level of disturbance to lands characterized and mapped as distinct ecosystems. Only adverse effects judged to substantially affect ecosystem structure or function are considered significant impacts. Examples include total or near total removal of a “foundation” species (i.e., a dominant primary producer such as creosote bush), disruption of soil structure to the extent that native plants cannot successfully germinate and grow, and disruption of a water supply upon which the ecosystem depends. Impacts to individual special status species discussed elsewhere in this document are not evaluated in this section unless the species is considered necessary to ecosystem function.

Wildlife Impacts

Wildlife on the Combat Center have been inventoried on several occasions (refer to Table 3.10-1 in Section 3.10). No comprehensive wildlife surveys have been conducted in the acquisition study areas, but observations of wildlife species have been noted during surveys for protected and special status species in the acquisition study areas (Karl 2009a, 2009b). However, the vegetation mapping which has been completed for the acquisition study areas allows for identification of suitable wildlife habitat, and conservative judgments have been made as to whether certain wildlife species might occur in the acquisition study areas.

To identify potential impacts to these species, the activities associated with the proposed action and alternatives were considered in the context of affected species’ life history (e.g., nesting behavior and habitat, foraging habitat, mobility and migration, etc.). If a planned action was identified as having an adverse effect on the habitat or population of a particular species (defined as a physical loss of or exclusion from required habitat, or death of individuals), the effect was qualitatively assessed based on information gleaned from published scientific literature and the professional experience of involved authors to determine whether the effect would be substantial enough to constitute a significant impact (see Section 4.10.1.2 for evaluation criteria).

Special Status Plant Impacts

The significance of impacts to special status plant species was evaluated based on the presence of these species within the ROI and the anticipated level of disturbance to the areas in which they are present. Focused rare plant surveys have been conducted in the west, south, and east study areas (MAGTF Training Command 2009a, 2009b), and on the Combat Center (MAGTF Training Command 2006).

Protected and Special Status Wildlife Impacts

Similar to above, the significance of impacts to special status wildlife species was evaluated based on the presence of these species within the ROI and the anticipated level of disturbance to the areas in which they are present. The presence of species in the ROI was determined based on species surveys and wildlife inventories which have been conducted for the Combat Center and acquisition study areas (refer to Table 3.10-1 in Chapter 3.10).

Anticipated impacts to tortoise habitat (as defined in Section 3.10) were quantified in a manner similar to that described for impacts to vegetation. GIS modeling was used to overlay a basemap of estimated desert tortoise densities (MAGTF Training Command 2001; Karl 2010) with the footprint of potential disturbance from routes of battalion travel and areas of expected ordnance explosion, as identified by MAGTF Training Command (see Section 2.4). The same basemap was used with GIS analysis to estimate the number of adult and juvenile tortoises located within the disturbance footprint. These impact quantifications were limited to anticipated areas of high- and medium-intensity disturbance. Tortoise habitat in the west study area has been impacted to varying degrees by past land use associated with Johnson Valley OHV Area use and mining ([BLM 1992; USFWS 1991), but this existing degradation was not considered when quantifying impacts to habitat. Refer to Appendix I for more detailed methodology and assumptions for GIS-based analysis.

The calculated take of existing desert tortoises and number of tortoises identified as occurring within impacted areas is based on impacts occurring over the lifetime of the project. Modeling also assumes that densities would remain constant over the lifetime of the project, does not account for movement of tortoises into or out of disturbed areas, and does not account for recovery of disturbed areas (which would not be expected due to ongoing disturbance and long recovery times). The wide range reported for potential take of desert tortoises is related to the uncertainty in estimating desert tortoise density (Karl 2010). Refer to Appendix I for detailed assumptions and methodology used in assessment of impacts to tortoise habitat and take of tortoises.

Indirect Impacts to Special Status Species from Displaced OHV Activity

Section 4.2 (Recreation) and Appendix M of this EIS describe the potential for indirect impacts to occur at other designated recreation areas and West Mojave system OHV routes (in some cases located well beyond the project ROI) as a result of the anticipated displacement of recreational activities from portions of the west study area. Appendix M contains the results of a study that reviews alternative locations in southern California that would potentially attract the displaced recreational activities, and identifies a reasonable scenario of how the displaced OHV activity would be distributed among the identified areas (based on assumptions derived from interviews with relevant land management authorities and other available data). The study also reviews available environmental documentation for the alternative OHV sites and identifies any known environmental conditions and constraints, particularly with regard to the presence of special status species. The study also briefly reviews available research about the relationship between OHV activity and impacts to desert tortoise habitat and populations, noting the lack of a statistical basis for correlating marginal increases in OHV activity to specific degrees of impact, or any

specific thresholds at which OHV activity of a certain magnitude would trigger a particular type or level of impact. As a result, the study focused on the geographic concurrence of special status populations or critical habitat with the projected locations and relative intensity of increased OHV activity, and qualitatively assessing the potential for indirect impacts. Quantification of potential impacts to special status populations and habitat based on projected increases in OHV activity at each location could not be supported based on available data and research. Referencing the study in Appendix M, potential indirect impacts on special status species from displaced OHV activity are qualitatively described in this section of the EIS.

4.10.1.2 Evaluation Criteria

The proposed action was evaluated for potential impacts associated with the following:

- loss of individuals or habitat of a state or federally-listed threatened or endangered species;
- loss of vegetation or wildlife habitat identified as declining or rare in the subject region;
- loss of individuals, populations, or habitat of any species that is a candidate, or has been proposed, for federal listing under the ESA (USFWS 2010a, 2010b);
- loss of individuals, populations, or habitat of any BLM-designated sensitive species (BLM 2004a, 2006a);
- loss of individuals, populations, or habitat of any California species of special concern (California Department of Fish and Game [CDFG] 2009a) or CNPS List 1B or 2 plant species (CNPS 2009a);
- loss or long-term disruption of a regionally important wildlife movement corridor; and
- removal or degradation of a natural community or ecosystem that would substantially impact the size or distribution of native plant and wildlife populations.

These criteria were evaluated as independent variables, and no attempt was made to compensate for correlation between them.

4.10.1.3 Public Scoping Issues

During the 90-day scoping period for the proposed action, a number of agencies, groups, and individuals indicated concern for impacts to potentially affected biological resources. These biological resources concerns include, but are not limited to:

- direct, indirect, and cumulative impacts to listed, rare, and sensitive species;
- general habitat loss;
- impacts to wildlife corridors and linkages;
- potential take of threatened and endangered species;
- adverse effects to cryptobiotic soils; and
- potential violations of existing plans and policies for public land resource management.

4.10.2 Alternative 1 Impacts

A variety of SCMs related to biological resources would be implemented as part of the proposed action (see Section 2.8.4) and would serve to reduce impacts under each alternative.

4.10.2.1 Impacts

Vegetation

A variety of large and small vehicles, both wheeled and tracked, would be used in training exercises under Alternative 1, as would a variety of ordnance. The size and type of vehicles and ordnance used would influence the extent and overall nature of impacts to vegetation. The impact analysis estimates general vegetation impacts associated with the combined use of all anticipated vehicle, and ordnance types to be used during planned training exercises. Vegetation along MSRs on the Combat Center that would potentially be disturbed under Alternative 1 is currently assumed to be moderately disturbed, so impacts occurring along these routes would only result from the increased numbers of vehicle miles under the proposed action (approximately 40% annual increase from MEB exercises). However, mapping of existing disturbance on the Combat Center was not available during EIS preparation, so with the exception of MSRs, the GIS-based analysis of impacts to vegetation does not account for instances in which the new disturbance would occur in already disturbed areas. Refer to Appendix I for complete methodology for the GIS-based analysis of impacts to vegetation. Based on the maneuver design included in Section 2.4, the calculated acreages of disturbance to plant communities would be as listed in Table 4.10-1.

Table 4.10-1. Acres of New Disturbance[1] to Plant Communities under Alternative 1

Plant Community[2]	Combat Center		West Study Area		South Study Area	
	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed
Creosote bush scrub	17,161	67,916	10,120	30,802	1,079	2,538
Mojave yucca	N/A	N/A	13	187	N/A	N/A
Brittlebrush	N/A	72	N/A	N/A	N/A	N/A
Catclaw acacia	588	1,224	N/A	N/A	N/A	N/A
Mesquite	N/A	26	N/A	N/A	N/A	N/A
Big galleta	24	26	N/A	N/A	N/A	N/A
Playa	216	1,459	14	64	N/A	N/A
Dunes	206	515	N/A	N/A	N/A	273
Total	*18,195*	*71,238*	*10,147*	*31,053*	*1,079*	*2,811*

Notes: [1] Disturbance from projected areas of vehicle travel and ordnance explosion. Refer to Appendix I for methodology.
[2]As defined by CNPS (2009b).
Source: Derived from mapping performed by CDF (2003) and USGS (2004)

Vehicle use, Marine movements, and ordnance use associated with the proposed action and alternatives would cause erosion of topsoil and compact soils, reducing permeability to water and air. Vehicle use alone is known to adversely affect plant growth by reducing soil moisture, soil permeability to air, and the capability of plant roots to penetrate into soil horizons (Ouren *et al.* 2007). The size, abundance, and longevity of plants can consequently be reduced when high levels of vehicle use; large numbers of Marines walking, camping, and equipment staging, and ordnance deployment results in the crushing, breaking, removal, and reduction of overall vegetative cover (Wilshire 1983).

Particulate matter, fugitive dust, and/or sediment generated by vehicle and ordnance use can further reduce the photosynthetic capacity of affected plants, potentially reducing growth and vigor (Ouren *et al.*

2007). Sharifi *et al.* (1997) found that windblown dust on creosote bush, cheesebush, and fourwing saltbush reduced net photosynthesis 21%, 56%, and 42%, respectively, compared to control plants protected from dust deposition. Leaf and stem temperatures were 3.6 to 5.4 degrees Fahrenheit (°F) (2 to 3 degrees Celsius [°C]) greater in vegetation exposed to dust deposition and showed reduced transpiration rates compared to control plants. Therefore, particulate matter generation associated with vehicle use, Marine movement, and ordnance deployment under this Alternative may cause plant productivity to decrease in some localized areas. While fugitive dust generation alone may not result in a substantial loss of vegetation, this contributing impact could potentially increase vegetation recovery time in high- and medium-intensity use areas. However, this effect would not constitute a significant impact to vegetation, given the limited acreage of high-impact area relative to the total acreage of the Combat Center and acquisition study areas.

Vegetation regrowth in tank tracks within the Mojave Desert frequently contains a higher density of fibrous-rooted annual plants, often non-native grasses, in comparison to undisturbed soils (Prose and Wilshire 2000). The size of plants on compacted soils can also be shorter than the same species on undisturbed soils. Regarding shrub species, Prose *et al.* (1987) and others, have reported that white bursage and cheesebush are common pioneer shrub species on highly disturbed sites. In contrast, creosote bush is usually present in substantially reduced numbers or absent from high surface disturbance sites.

Given the above, surface disturbance associated with planned military vehicle use under Alternative 1 would be expected to alter the composition of native plant communities in high- and medium-intensity use areas. Shrub density and diversity in disturbance areas would be expected to substantially decrease such that it would be obviously noticeable, with creosote bush becoming less abundant. The northern and eastern parts of the west study area, which have been subject to lesser degrees of OHV activity and related disturbance, could be particularly affected. However, military usage in the eastern part of the west study area would be low due to constraints of the mountainous terrain. Because the area of vegetation that would potentially be highly disturbed under Alternative 1 comprises a small portion of the total vegetated area of the Combat Center and acquisition study areas, and because much of the west study area currently experiences disturbance from OHV activity, physical disturbance to vegetation under Alternative 1 would be a less than significant impact.

The extent of annuals, including non-native grasses, would be anticipated to increase concurrent with shrub decreases in all Marine movement areas, as would the potential threat of wildfire. However, the risk of wildfire would be expected to remain low in the ROI due to the low fuel load and separation between plants. Fires on the Combat Center are rare, and when they have occurred they have burned themselves out before exceeding 1 acre (0.4 hectare) in size (MAGTF Training Command 2010b). Wildfire management prescriptions have been developed for the Combat Center and are outlined in the INRMP (MAGTF Training Command 2007). Under the proposed action, these wildfire management measures would be expanded to address the acquired areas.

Regarding BLM-special designation vegetation areas, portions of the yucca and creosote ring Unusual Plant Assemblages (UPAs) in the west study area could potentially be damaged or lost as a result of training activities under this alternative. Impacts to UPAs would be considered significant because of the rarity of these assemblages and the slow rate at which they recover from disturbance. However, most known yucca rings in the west study area are located within the Upper Johnson Valley Yucca Ring ACEC, which is on the west side of hills located north of Soggy Dry Lake in an area that would not be used for planned military training or subject to ordnance explosion (refer to Figure 3.1-6 *Grazing Allotments and Areas of Critical Environmental Concern*). Further, any yucca rings in the acquisition

study areas would be protected through implementation of an SCM to continue managing them in a manner consistent with UPA protection (refer to Section 2.8.4) – these measures would be incorporated into the Combat Center INRMP.

However, creosote ring UPAs are numerous and often extensive on valley floors in the west study area (San Diego State University 2002; Egan 2010), and many are located in the vicinity of planned training maneuver paths. Implementation of proposed conservation measures described in Section 2.8.4, including mapping of creosote ring UPAs and subsequent protection, would make any adverse effects to creosote ring UPAs a less than significant impact.

Consequently, Alternative 1 would have less than significant impacts to native plant communities.

Ecosystems

Plant Communities

Impacts to ecosystems would occur if wildfires substantially affect a foundation plant community, such as creosote bush scrub, to the extent that the ecosystem no longer functions (e.g., characteristic species no longer exist, non-natives dominate). There would be a general increase in concentrated human activity and equipment use with adoption of Alternative 1, both of which can potentially provide wildfire ignition sources. A higher incidence of wildfire fuel that is more flammable than existing shrub vegetation, such as annual grasses, checkered fiddleneck, mustards, and Russian thistle may also result over time with Alternative 1. Wildfire can remove and alter vegetation, changes the fire frequency regime, and causes wildlife mortality. However, fire risk in the ROI is extremely low due to the low fuel load, and the fires that have occasionally occurred on the Combat Center are smaller than 1 acre (0.4 hectare) in size (MAGTF Training Command 2010b). Furthermore, current OHV use in the west study area may pose a similar or even greater degree of wildfire risk. Therefore, wildfire risk is not expected to substantially increase under the proposed action, and may decrease in the west study area due to closure to public access.

Existing conservation measures from the Combat Center's INRMP would be applied to reduce the potential for ecosystem impact resulting from increased wildfire (i.e., wildfire management and invasive vegetation control). For example, measures have been incorporated into the INRMP (MAGTF Training Command 2007) to comply with the Federal Noxious Weed Act of 1974 (Public Law 93-629) and EO 13112, *Invasive Species*. The goal of these measures is to prevent, contain, and slow the spread of invasive species to conserve native species and the functional value of natural systems. These measures include regular surveying and monitoring designed to allow for early detection and rapid response strategies. The INRMP also calls for the control of two plant species that frequently become established in disturbed soils and can contribute to wildfire spread: Sahara mustard and Russian thistle. Control methods include manual removal and herbicide application by qualified applicators. These prescriptions would be expanded to address lands occurring in the west and south study areas.

Therefore, impacts to plant community ecosystems from Alternative 1 would be less than significant.

Mines and Caves

Mines and caves are located throughout the Combat Center and the west study area. However, no such features occur in the south study area (Karl 2009a). These features are well removed from the paths of travel to be used by vehicles and Marines under this alternative. As such, no substantial direct impacts to these ecosystems would be anticipated under Alternative 1. A low level of unauthorized human visitation by Marines or personnel would be expected. In the west study area, this anticipated visitation level would likely be lower than currently results from public access. Therefore, Alternative 1 would be expected to

have less than significant impacts to mine and cave ecosystems. Potential disturbance of species that are dependent on the habitat associated with caves and mines (i.e., bats) is discussed below in the *Wildlife* and *Protected and Special Status Species* sections.

Aquatic Habitats

Aquatic habitats on the Combat Center are primarily restricted to the golf course pond and wastewater treatment ponds at Mainside. Away from Mainside, water sources are limited to ephemeral "tinajas" and ephemeral water ponding in playas, as discussed below. "Tinajas" are located in rugged, rocky terrain which would receive minimal training activity (limited to foot traffic) and visitation. There is potential for some tinajas to be damaged or destroyed by ordnance explosion, but most tinajas would be expected to escape damage. Therefore, substantial impacts to this ecosystem type would not be expected. Alternative 1 would have less than significant impacts to aquatic habitat ecosystems.

Playas

The relatively unstable ground associated with playas in particular seasons does not readily allow vehicle transit. Playas and dry lakes are not located in paths of travel to be used by vehicles under this alternative and little vehicle travel near these areas would be expected. However, it is possible that limited numbers of Marines could venture onto certain playas under dry conditions. In addition, the representative MEB Final Exercise scenario (see Figure 2-5d) indicates that substantial aircraft activity would occur in the vicinity of Galway Dry Lake, within the west study area.

Waterfowl and raptors which can occur in these areas when water ponding is present can also form a BASH. Low-altitude aircraft activity, including both fixed- and rotary-wing aircraft, could also occur near other playas occurring throughout the Combat Center and within the west study area. This aircraft activity is unlikely to occur frequently during seasons when water ponding may occur, which would reduce BASH substantially.

The potential surface disturbance impacts to playas in the west study area associated with adoption of Alternative 1 would not substantially alter this ecosystem type. In addition, cessation of authorized public OHV use currently occurring in the west study area would more than offset any Marine movement or aircraft impacts to playas occurring in this area. Therefore, Alternative 1 would have less than significant impacts to playa ecosystems.

Cryptobiotic Soils

Cryptobiotic soil crusts are important to several desert ecosystems in the ROI. These crusts are highly susceptible to soil-surface disturbance resulting from foot and vehicle movement and soils with low aggregate stability (i.e., sand dunes and sheets), are particularly vulnerable (USGS 2001).

The cyanobacterial filaments, lichens, and mosses that form cryptobiotic soils are brittle when dry, and crush easily when subjected to compression or shear forces associated with foot trampling or vehicular traffic. The subsurface soils beneath these crusts are generally thin and are easily removed without crust protection. As most crustal biomass is concentrated in the top 3 mm of the soil, a small amount of erosion can change ecosystem dynamics.

Recovery rates for lichen cover in southern Utah, which has somewhat similar conditions to the south central Mojave Desert, have been estimated at a minimum of 45 years, while recovery of moss cover was estimated at 250 years (Belnap 1993). The Combat Center is expected to have large areas (>10 acres [4 hectares]) of relatively intact cryptobiotic soil cover, especially in locations remote from MSRs and fixed ranges. Areas in the northern and western parts of the west study area, and the entirety of the south study area, would also be expected to have large areas of relatively intact cryptobiotic soil cover due to the

historically less intensive OHV use in these areas. A considerable amount of impact to cryptobiotic soils from OHV use has previously occurred in much of the rest of the west study area (Karl 2009a). Closure of the west study area to OHV use may allow for soil recovery in certain sites over many years. However, soil recovery would not be expected to occur in high- and medium-intensity disturbance areas of the west study area due to recurring tank and vehicle movements and ordnance explosion. Adverse effects to cryptobiotic soils in high- and medium-intensity disturbance areas of the south study area and portions of the Combat Center would also be expected; however, these areas of disturbance to cryptobiotic soils would not be large enough to cause a loss of ecosystem function on the Combat Center or acquisition study areas. Some protection of cryptobiotic soils would occur as an indirect result of desert tortoise protection efforts. Therefore, impacts to cryptobiotic soils from Alternative 1 would be less than significant.

Wildlife

Heavy vehicle movement and ordnance explosion in the ROI would result in wildlife injury/mortality and loss of habitat. These impacts would be greatest in high- and medium-intensity disturbance areas. Some degradation and fragmentation of habitat would also occur throughout the ROI, even in areas of low-intensity disturbance.

Wildlife movement and activity of some species in certain areas would also be disrupted during training exercises. Highly mobile generalist species or those animals which are restricted to rocky, mountainous terrain would be expected to fare better than less mobile species, or those specialized for the gently sloping bajadas where training exercises would occur. Death or displacement of many reptiles and mammals from high- and medium-intensity disturbance areas would also be expected.

The proposed action also has the potential to affect wildlife movement patterns as a result of dirt road construction and use in the areas proposed for acquisition. No existing wildlife corridors have been identified, but some alteration of large mammal (e.g., Nelson's bighorn sheep, coyotes, and potentially mountain lions) movement on the Combat Center and acquisition study areas in response to habitat alteration and human activity can be anticipated. The infrequently-used at-grade dirt roads that would be constructed in the proposed acquisition study areas would not be expected to result in the same level of disturbance as a public roadway, with the exception of those days when MEB task forces (or other large assemblages of vehicles) are using the roads. These days would be infrequent enough that they would not constitute a substantial adverse effect (i.e., long-term barrier) to wildlife movement. Existing OHV trails in the west study area would see less use than at present, due to the closure of portions of the Johnson Valley OHV Area. Furthermore, when not in use, any dirt roads would not present major barriers to movement in a habitat already characterized by sparse vegetation. Infrequently used roadways could actually facilitate movement for some wildlife species such as coyotes. Therefore, Alternative 1 would have less than significant impacts to wildlife corridors.

A considerable number of avian species recorded on the Combat Center, and almost all special status bird species, spend only a few hours or days at water or food sources proximal to Mainside during migration. These birds are not frequently observed elsewhere in the ROI. Avian species known to regularly utilize the project's anticipated high- and medium-intensity disturbance areas are considered fairly common and widespread. Planned training activity under this alternative may eliminate visitation by certain bird species or reduce the amount of time they spend in the project area. However, displacement of these avian species during training exercises would not be considered substantial.

Resident wildlife would also be subject to the indirect effects of planned training activities, such as dust generation, ground-air operations, and ordnance deployment. For example, increased aircraft activity

associated with the proposed action would result in potential noise impacts to species in the vicinity of airfields (e.g., the EAF) or landing points (see Section 4.9, *Noise*). Such noise increases would be incremental over existing conditions, to which wildlife in the vicinity are most likely accustomed. Nonetheless, this expansion of noise contours would potentially result in displacement of a small number of sound- and vibration-sensitive animals (e.g., rodents [Randall 1994]) to areas less affected by noise. Dust generation would have a minor adverse impact on plant productivity, and therefore a minor reduction in available forage and cover for wildlife species.

Construction of communication towers in the mountains of the west study area (see Section 2.4) would potentially have short-term impacts on species that utilize those areas. This could include sensitive species such as Nelson's bighorn sheep (if present) or special status bat species, and non-special status species such as mountain lions. Because there are typically no roadways within the higher elevation mountains of the ROI, construction activities would involve multiple helicopter lifts of supplies and personnel during construction with attendant noise, and temporary noise from construction equipment.

The impacts outlined above taken together would be significant in the absence of conservation measures. However, with implementation of the existing conservation measures in the Combat Center INRMP, Biological Opinion, and Combat Center Order that would be extended to any acquired lands, and proposed new conservation measures to consider wildlife corridors in conservation planning (refer to Section 2.8.4), impacts would be reduced to less than significant.

Protected and Special Status Species

Protected - Federally Threatened or Endangered

Desert Tortoise: An estimated 2,903 ± 677 (95% confidence interval [CI]) adult tortoises and 13,684 ± 3,191 (95% CI) juvenile tortoises are located within the lands that would be acquired under Alternative 1 and would fall under the management of the Combat Center. Tortoise injury and/or mortality is expected as a result of planned military training and activities associated with adoption of Alternative 1. Wheeled and tracked vehicles could crush tortoises during vehicle convoys, and in staging and assembly areas. Tortoises could also be crushed or buried as a result of temporary construction, excavation and earth-moving activities, temporary bivouacs, helicopter landings, and the movement of Marines on foot. Based on GIS analysis (refer to Appendix I for methodology and assumptions), between 733 and 3,837 adult tortoises (590 to 978 in the west and south study areas) and 3,455 to 18,086 juvenile tortoises (2,781 to 4,610 in the west and south study areas) are located within areas that would be disturbed by military training under Alternative 1 over the life of the project and could be translocated, injured, or killed (Table 4.10-2). The wide range of this estimate results primarily from the broad range of the low density category (0 to 20 tortoises per mi^2), and the high occurrence of this category on the Combat Center. Much of the impacts to tortoises would occur in the first few years of the proposed action as a result of the new disturbance, with annual rates of translocation, injury, or death decreasing rapidly before reaching a steady and relatively low rate (e.g., 2 to 4 adult tortoises per year). However, tortoises from outside the impacted areas would potentially move into impacted areas throughout the lifetime of the project, contributing to the likelihood of continued translocation, injury, or death. Future changes in the battalion routes of travel would also contribute to continued translocation, injury, or death.

Table 4.10-2. Estimated Number of Adult Desert Tortoises Subject to Translocation, Injury or Death Due To Military Training under the Six Action Alternatives

	Alternative					
	1	**2**	**3**	**4**	**5**	**6**
Overall Number of Adult Tortoises Translocated, Injured, or Killed						
Low estimate	733	608	215	500	472	645
High estimate	3,837	3,298	2,960	3,628	3,186	3,769
Overall Number of Adult Tortoises Translocated, Injured, or Killed in Acquisition Study Areas						
Low estimate	590	466	107	346	324	503
High estimate	978	761	240	592	562	834
Estimated number of adult tortoises in acquisition study areas	2,903	2,001	928	2,903	2,533	2,415

Notes: Take resulting from disturbance in projected areas of vehicle travel and ordnance explosion over an estimated 50-year project lifetime. Calculations based on TRED method. Refer to Appendix I for methodology.

While it is anticipated that most direct tortoise impact would occur in high- and medium-intensity disturbance areas, and to a lesser extent in low-intensity disturbance areas, tortoises occurring both inside and outside of these zones areas would experience indirect adverse effects associated with this alternative. Such impacts would occur as the result of degradation, loss, and fragmentation of habitat. This would include:

- loss of forage, nesting, and cover sites;
- loss of dispersal areas;
- potential increased predation levels associated with increased human activity; and,
- potential replacement of native vegetation by non-native plant species.

Soil compaction from vehicle traffic, Marine traffic, and ordnance explosions could make it difficult or impossible for desert tortoises to dig burrows in some impacted areas. Compaction could also make it difficult for tortoises to practice geophagy, in which soils are eaten perhaps to augment the tortoise's calcium ingestion (Marlow and Tollestrup 1982). Dust generation would have a minor adverse impact on plant productivity, and therefore a minor reduction in available forage and cover for wildlife species.

Although it has not yet been demonstrated through experimentation, increased stress levels in desert tortoises that could result from noise, human presence and activity, or periodic decreased air quality during planned military training exercises, could result in higher susceptibility to diseases, particularly Upper Respiratory Tract Disease. Stress can also result in voiding of the bladder (MAGTF Training Command 2010b). Since desert tortoises store much of their water in their bladders, this can lead to an increase in the potential for dehydration (Jørgensen 1998).

These indirect impacts would vary in their severity among individual tortoises, and their effect on tortoise mortality and reproductive success would be very difficult to quantify. The revised INRMP would continue to require monitoring of desert tortoise populations and research to study threats (e.g., Upper Respiratory Tract Disease) to the individuals and populations.

Placement of additional communications towers in the west study area would provide additional perching areas for the common raven. This perching space would potentially increase the rate of predation on juvenile desert tortoises by common ravens. This potential increase in predation on desert tortoises would

be offset through a proposed SCM to install anti-perching and nesting devices on the towers (refer to Section 2.8.4). Ravens would also be attracted and subsidized by the water and food taken into the west study area for use by Marines during training.

The limited studies performed on responses of desert tortoises to aircraft noise indicate the potential for short-term hearing loss related to sonic booms; however, behavioral responses in these studies were not apparent and hearing typically returned to normal levels within 45 to 60 minutes (Bowles *et al.* 1999). Some behavioral changes were noted for simulated low altitude overflights, but the changes in behavior were short-term and did not appear to include major stress (Bowles *et al.* 1999). Urination, which is a typical occurrence in stressed tortoises (MAGTF Training Command 2010b), was not observed in response to simulated low-altitude overflight or sonic boom conditions (Bowles *et al.* 1999).

Direct and indirect impacts to individual tortoises as a result of actions under Alternative 1 would affect the population via reduction in the number of animals and population fragmentation. These impacts are less quantifiable than habitat loss, but are critical to the survival and recovery of the desert tortoise. As the tortoise is a federally listed species, any adverse impacts to the species that would result from implementation of Alternative 1 are considered significant.

While tortoise habitat in the southeastern portion of the west study area has been degraded by OHV use (see Section 4.2 and Appendix I), planned military training exercises would primarily occur in a portion of the west study area degraded to a lesser degree. Based on assumptions listed in Appendix I, a total of 128,711 acres (52,088 hectares) of occupied tortoise habitat on the Combat Center and in the acquisition study areas is expected to be affected under Alternative 1 (Table 4.10-3, Figure 4.10-1). This would include an estimated 27,944 acres (11,309 hectares) of tortoise habitat in high-intensity disturbance areas, and 99,767 acres (40,374 hectares) of habitat in medium-intensity disturbance areas. Because MEB Building Block training exercises in the west study area would represent a relocation of existing training rather than net new training, impacts to desert tortoises and their habitat in the west study area from MEB Building Block training would be accompanied by a reduction in impacts to desert tortoises and their habitat on the Combat Center, where average desert tortoise densities are higher, as a result of fewer MEB Building Block training exercises there. This is not reflected in the calculations for disturbance on the Combat Center in Table 4.10-3.

Table 4.10-3. Acres of New Disturbance[a] to Occupied Desert Tortoise Habitat under Alternative 1

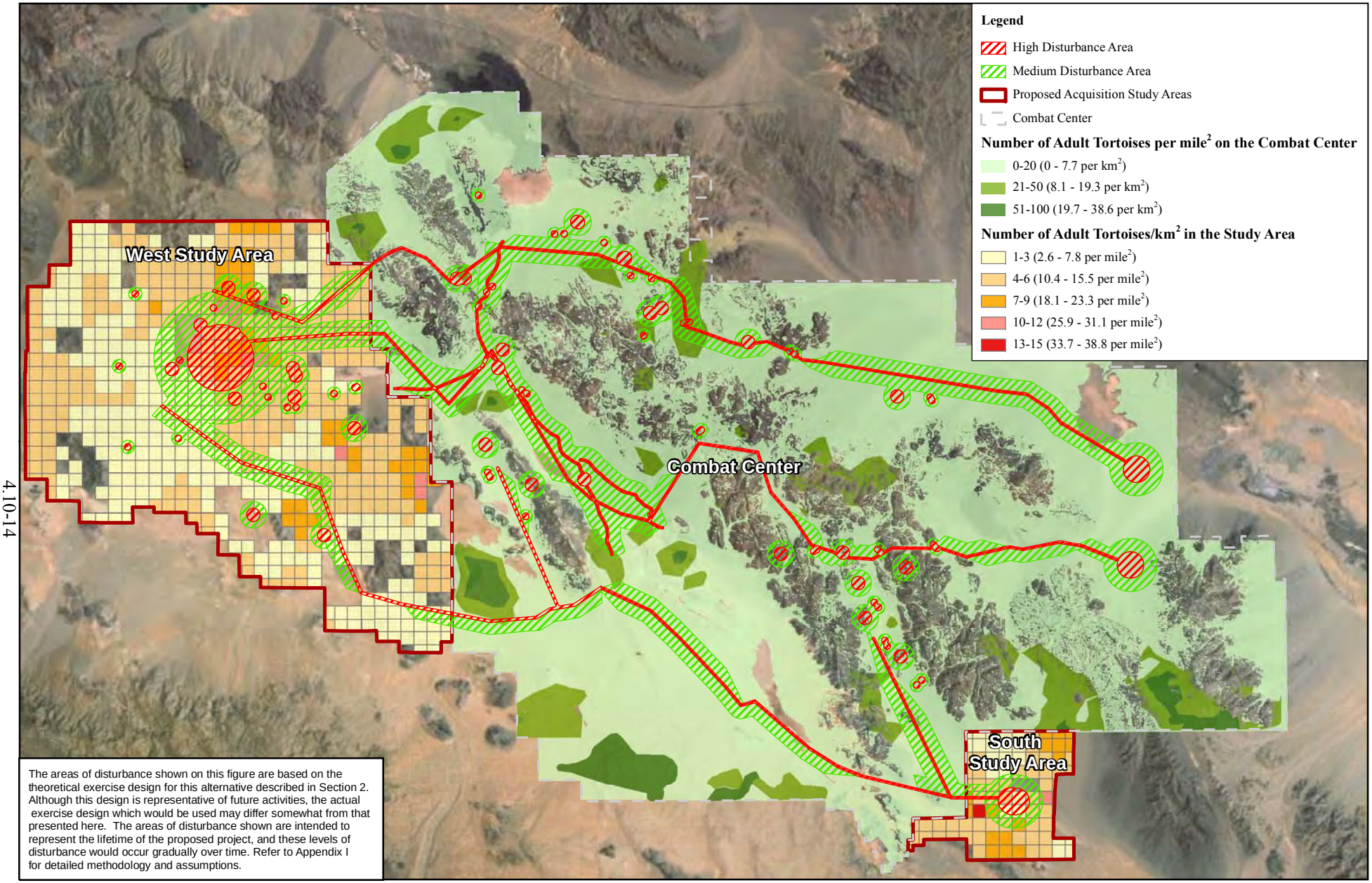
Habitat Utilization by Adult Desert Tortoises[b]	West Study Area		South Study Area		Combat Center	
	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed
0 - ~8 per km^2 [c]					16,367	64,260
1 - 3 per km^2	2,253	11,954	557	244		
4 - 6 per km^2	5,642	15,131	500	2,072		
7 - 9 per km^2	1,737	1,869	22	432		
~9 - ~19 per km^2					637	3,714
10 - 12 per km^2	229	1,027	N/A	64		
13 - 15 per km^2	N/A	N/A	N/A	0.4		
~20 - ~39 per km^2					N/A	
Total	*9,861*	*29,981*	*1,079*	*2,812*	*17,004*	*67,974*

Notes: [a] Disturbance from projected areas of vehicle travel and ordnance explosion. Refer to Appendix I for methodology and assumptions.

[b] Categories in column one are different for the Combat Center versus the acquisition study areas due to different abundance classes used by study authors (i.e., MAGTF Training Command 2001; Karl 2010).

[c] Authors indicate that this category means "tortoises may not exist" in this area.

Source: Modified from MAGTF Training Command 2001 and Karl 2010.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2001, 2009a; Karl 2010

Figure 4.10-1
Disturbance to Occupied Desert Tortoise Habitat Under Alternative 1

N

Under Alternative 1, three new Special Use Areas established as an SCM (Section 2.8.4) would protect 14,950 acres (6,050 hectares) of desert tortoise habitat: 12,015 acres (4,862 hectares) in the west study area and 2,935 acres (1,188 hectares) in the south study area. A total of approximately 234 to 367 (95% CI) adult tortoises and 1,103 to 1,730 (95% CI) juvenile tortoises are located within these areas and would benefit from enhanced protection as compared to existing conditions.

In summary, activities under Alternative 1 would result in the loss of tortoises and occupied habitat, as well as degradation of tortoise habitat, within high- and medium-intensity disturbance areas. A potential also exists for a lower degree of such impact in low-intensity disturbance areas. No critical habitat would be affected, but direct impacts to the desert tortoise under Alternative 1 would be significant.

As described in Section 4.2 (Recreation), closure of most of the Johnson Valley OHV Area under Alternative 1 would displace OHV activity to other designated OHV areas and routes, which would represent an indirect impact of the proposed action. As described previously, Appendix M describes the results of a study of the potential distribution of displaced OHV activity to various alternative OHV sites in southern California and qualitatively evaluates the potential for impact to any known special status populations and critical habitat at these sites. Relevant findings of the study include:

- The network of legal trails traversing the open desert area west and north of Johnson Valley OHV Area (including the Ord Mountain DWMA, the Superior-Cronese DWMA, and the area around Stoddard Valley OHV Area – see Appendix M for details), coincides with desert tortoise critical habitat and medium-to-high tortoise densities. Impacts to desert tortoise from OHV activities in these areas would continue to occur and would be expected to increase with additional displaced OHV activity under Alternative 1.
- Stoddard Valley OHV Area would be expected to attract the largest amount of displaced OHV visitor-days and would be expected to incur the greatest increase in OHV-related indirect impacts to desert tortoise habitat and population.
- Indirect impacts to desert tortoise habitat and population would also potentially increase at El Mirage, Imperial Sand Dunes, Spangler Hills, and Jawbone Canyon, all of which support tortoise populations and would also be expected to attract relatively large proportions of the displaced OHV activity.

Based on these findings, indirect impacts to desert tortoise (and in some cases critical habitat) in these areas would be significant.

Species with Other Federal Status

<u>Mojave Fringe-toed Lizard:</u> Planned military training exercises that would occur under this alternative have the potential to result in injury and/or mortality of this species, as well as habitat loss, degradation, and fragmentation. The wind-blown sand habitat required by this species could be adversely affected by disruption of sand supply and transport, loss of native vegetation, and introduction/spread of non-native vegetation.

Within the west study area, this species is concentrated in the southeast portion, primarily along the western slopes of the mountain ranges occurring east of Means Dry Lake. Habitat for the Mojave fringe-toed lizard in this area has been impacted by OHV use, as the sand dune ecosystem is favored by OHV users. Planned military training exercises would not be expected to substantially add to these existing impacts, because military vehicles and Marines are not likely to transit the loose sand dunes where Mojave fringe-toed lizards are found. Direct fire SDZs and aviation WDZs extend over locations in Emerson Lake, Lavic Lake and Prospect Training Areas where Mojave fringe-toed lizards have been

observed (Cablk and Heaton 2002), and associated ordnance explosion could impact these individuals. Cessation of OHV activity in the west study area associated with Alternative 1 may even result in a beneficial impact to this species. Mojave fringe-toed lizards on the Combat Center and any acquired lands would be monitored through INRMP application of population studies (as for other watch-list species or nominated species). Therefore, Alternative 1 would have less than significant impacts to this species.

Rosy Boa: Vehicle travel and Marine training is not likely to occur in the steep, rocky habitat where rosy boas are typically found. This species has most likely been extirpated in the west and south study areas due to collection, and densities on the Combat Center appear to be low based on the few recorded observations during wildlife inventories (refer to Table 3.10-1). Therefore, Alternative 1 would have less than significant impacts to the rosy boa.

Townsend's Western Big-Eared Bat and Pallid Bat: Disturbance to roosting sites used by both of these species resulting from increased human visitation on the Combat Center would be expected to occur with the adoption of Alternative 1, but this increase would be expected to be incremental due to the remote locations of these sites. Further, because public access to the west and south study areas would be restricted, human visitation to potential roosting sites in these areas would most likely be reduced overall. Aircraft WDZs do overlay some of the locations in Sunshine Peak training area where these bats have been observed to roost (USGS 2005), so some impacts from ordnance explosion and noise could occur. However, similar aerial bombardment of these areas currently occurs under Combat Center military training, and such use has apparently not displaced these species. Impacts to foraging habitat resulting from training exercises would also be expected to occur, but would be similar to that described for other foraging species and not substantial. Therefore, Alternative 1 would have a less than significant impact upon these species.

Nelson's Bighorn Sheep: Training activities, live-fire and ordnance delivery, and aircraft overflights that would occur under this alternative could disturb individual Nelson's bighorn sheep and affect their behavior and/or stress levels, possibly affecting survival and reproduction. However, this species primarily utilizes steep, mountainous habitat situated away from likely paths of vehicle travel and aircraft overflights in the Cleghorn Pass and Bullion Mountains localities of the Combat Center.

A population of Nelson's bighorn sheep estimated at 70 individuals was noted in 1989 as foraging consistently on the Ship Mountains within the east study area when the foliage was green (CDFG 2009b). This population was also noted to travel within the Old Woman Mountains (east of the east study area) within the proposed expansion of the Turtle MOA airspace. This population could potentially be affected by aircraft overflight noise and vibrations within the expanded Turtle MOA/ATCAA and CAX MOA/ATCAA. While existing overflight activity currently occurs in the area, the lower altitude limit under this alternative (1,500 feet) [500 meters]), would potentially result in greater disturbance to this population. No data are available for how the sheep have responded to previous operations; however, the populations have remained in those locations and may have expanded during a period of military overflight activity (Bleich *et al.* 1990, Epps *et al.* 2004), indicating some tolerance to noise from military exercises.

Therefore, these training and overflight activities would not increase enough over the baseline conditions that they would be expected to result in substantial displacement of Nelson's bighorn sheep on the Combat Center, or in the Ship Mountains. Therefore, Alternative 1 would have less than significant impacts to this species.

Golden Eagle: This species is known to forage in open desert areas throughout the ROI, but no nest sites are known to occur in proximity to the areas expected to experience surface disturbance associated or aircraft activity associated with proposed military training exercises.

Eagle foraging habits would likely change in response to the altered abundance and availability of various prey species that would result from changes in vegetation structure and composition within high- and medium-intensity disturbance areas. However, the overall direction and magnitude of such effects is uncertain because of the wide variety of prey species and habitats utilized by eagles. Where shrub cover is reduced, some types of prey (e.g., ground squirrels, jackrabbits) may increase in abundance or ease of capture, whereas others will diminish. Although none of the golden eagles historically observed on the Combat Center (Cutler *et al.* 1999) would fall within aviation WDZs, direct fire SDZs, or indirect fire SDZs, individual birds are likely to be temporarily displaced as a result of planned military training exercises associated with this alternative.

However, as there is ample foraging and nesting habitat located adjacent to the project area, the species would not likely be substantially affected by planned military training exercises. Therefore, Alternative 1 would have less than significant impacts to this species.

LeConte's Thrasher: Some nesting habitat for this species, especially within high-intensity disturbance areas, is expected to be further degraded over time to a degree that it may become unsuitable for use by this species. Affected individual birds, if present in the ROI, are likely to be temporarily displaced as a result of proposed military training exercises. However, based on the projected routes of travel, WDZs, and indirect fire SDZs, most of the locations where LeConte's thrashers were observed to occur by Cutler *et al.* (1999) would not experience high-intensity, or even medium-intensity, disturbance from MEB or MEB Building Block training activities under Alternative 1. The LeConte's thrashers that were historically observed in potentially impacted areas of Lava or Lavic Lake Training Areas were solitary individuals (Cutler *et al.* 1999). The potential loss of these individuals due to project activities would not jeopardize the species' continued existence on the Combat Center or in the region. Therefore, Alternative 1 would have less than significant impacts to this species.

Loggerhead Shrike: Habitat for this species within high- and medium-intensity disturbance areas is expected to be adversely affected over time, but not completely lost. As they are widely distributed across the Combat Center and would fall within aviation WDZs, direct fire SDZs, and indirect fire SDZs, individual birds are likely to be temporarily displaced as a result of proposed military training exercises. However, as a mobile species capable of utilizing a variety of habitats, impacts from military training activities under Alternative 1 are unlikely to substantially affect this species. Therefore, Alternative 1 would have less than significant impacts to this species.

Prairie Falcon: Foraging habitat and prey availability for the species within high- and medium-intensity disturbance areas would be affected over time, but similar to the golden eagle, not necessarily lost or diminished. The northernmost of the three task forces that would move across the Combat Center during MEB Final Exercises would pass near a site in Lead Mountain Training Area where prairie falcons were observed (Cutler *et al.* 1999), but the estimated disturbance footprint for this task force would not overlay this location. Because prairie falcons preferentially nest on rocky slopes or cliff faces (Richardson and Miller 1997), potential nest habitat in the project area would typically be well-separated from Marine or vehicle movements. Direct impacts to this species would therefore be limited to potential disturbance to nesting individuals from artillery or aircraft ordnance. However, the majority of the WDZs and SDZs noted for Alternative 1 would not extend over habitat areas where the species has been recorded in the past (Cutler *et al.* 1999). Therefore, Alternative 1 would have less than significant impacts to the species.

Burrowing Owl: This species typically occurs at very low densities in the west Mojave Desert, but site fidelity to utilized burrows can be high. Two burrowing owls have been observed within the central portion of the west study area and scattered sign of additional presence was observed throughout the west study area (Karl 2009a). Previous Combat Center surveys (USGS 2007) indicate that the species is present primarily on the western margin of the Combat Center, in the Acorn, Emerson Lake, and West Training Areas. Isolated observations of individual birds have also been recorded in northern Lead Mountain Training Area and eastern America Mine Training Area on the Combat Center.

In surveys by Karl (2009a), one owl was recorded within the MEB objective area in the west study area; this area would be highly impacted under Alternative 1 by military training and explosion of artillery and aircraft ordnance. Another owl was observed in the west study area within the likely path of one of the three MEB task forces that would train during MEB Final Exercises, and falls within a Direct Fire SDZ. Burrowing owls in the Maumee Mine and Emerson Lake Training Areas (USGS 2007) would also be affected by maneuvers of task forces during MEB Final Exercises. Owl displacement and/or injury or mortality would be expected to occur in these areas under Alternative 1. However, this would represent a very small portion of the borrowing owl population and would not be considered a significant impact.

Since this species forages in open habitats as well as desert scrub and feeds on a variety of small mammals, reptiles, and insects, foraging habitat and prey availability within high- and medium-intensity disturbance areas would be altered but not necessarily diminished in terms of supporting this species. Alternative 1 would not have significant impacts on foraging habitat for this species.

With implementation of the conservation measures already in place in the Combat Center INRMP, mortality to individuals and effects on the regional population of the species would be limited. Therefore, Alternative 1 would have less than significant impacts to the burrowing owl.

Migratory Bird Species: Numerous migrant bird species have been recorded at the constructed water sources (i.e., sewage ponds, golf course ponds) at Mainside. This area would not experience a substantial change in activity or disturbance with the adoption of Alternative 1.

However, there is some potential for disturbance of three particular migratory bird species associated with the adoption of Alternative 1: bank swallow, Vaux's swift, and yellow warbler. These species have been recorded in portions of the Combat Center located away from Mainside (Cutler *et al.* 1999). Vehicle and Marine movements and ordnance explosions would potentially disturb these migratory birds.

However, as continued use of the Combat Center during migration has been recorded for these species, current military training activities may not be particularly disruptive to their use of affected Combat Center lands. Therefore, Alternative 1 would have less than significant impacts to migratory bird species.

Whitemargin Beardtongue: A population of this plant species is known from the northern-central area of Lavic Lake Training Area, approximately 1.5 mile (2.5 km) east of the Lavic Lake playa. No identified routes of travel, WDZs, or SDZs overlay the location of this plant population. Due to unstable playa soils and seasonal ponding of water, no vehicle movement, and minimal Marine movement, would be expected to occur in this vicinity. Therefore, Alternative 1 would have less than significant impacts to this species.

Harwood's Eriastrum: This plant species is not known to occur on the Combat Center, nor in the west or south study areas. As adoption of Alternative 1 would not involve surface disturbance of any land within the east study area where this species is known to occur, no direct impacts to this species would be expected.

Other Status Species

Crucifixion Thorn: Four populations of this plant species are known from the Combat Center: three that consist of only one to three individuals (from northwest Emerson Lake Training Area, northwest Blacktop Training Area, and southern Lavic Lake Training Area), and one large population in northwest Lavic Lake/Sunshine Peak Training Areas that consists of more than 50 individuals.

The large population noted above would not fall within any path of movement for vehicles or Marines, and is not overlain by any WDZs or SDZs. The smaller plant populations in Blacktop and southern Lavic Lake Training Areas would likely be lost or disturbed during MEB Exercises, as they are situated directly within likely paths of vehicle and Marine movement.

The small population observed in Emerson Lake Training Area would also potentially be lost during MEB Exercises as it lies within a WDZ. Therefore, Alternative 1 would have significant impacts to this species. However, with implementation of the potential mitigation measure BIO-1 listed below to avoid this population through exercise design and/or protect it with fencing, these impacts would be reduced to less than significant. As part of the Combat Center INRMP, populations of these species will be considered for surveys and monitoring as warranted, especially if they become listed under the ESA.

Spectacle Fruit: One population of this plant species is known from the southern portion of Acorn Training Area, located predominantly in a current Restricted Area. Vehicle and Marine movement has not been proposed to occur in the vicinity of this plant population under Alternative 1; nor would any ordnance explosion be expected to occur. Therefore, Alternative 1 would have no impact to this species. As part of the Combat Center INRMP, populations of these species will be considered for surveys and monitoring as warranted, especially if they become listed under the ESA.

Indirect Impacts to Other Species from Displaced OHV Activity Outside the ROI

Appendix M identifies potential alternative OHV recreation areas outside the ROI for the proposed action (and outside the range of the desert tortoise) that may attract smaller amounts of displaced OHV activity and that are known to contain other listed species and/or critical habitat. While the available data are not sufficient to quantify the level of impact, the projected amount of increased use in these areas would be very low. Based on available information and the assumptions described in Appendix M, it is not anticipated that these species or their habitat would be adversely affected by the limited amounts of increased use. Impacts of displaced OHV activity to biological resources within these more remote areas would include loss of individual plants and animals, and incremental degradation of habitat (both unprotected and protected) beyond that which currently occurs. These impacts would be expected to be minimal, and in most instances would not be noticeable. Consequently, indirect impacts to other species at more distant OHV areas would be less than significant.

4.10.2.2 Potential Mitigation Measures

The following potential mitigation measures were identified to offset the biological resources impacts under Alternative 1, and take into account public concerns raised during the scoping process. Impact avoidance is the preferred approach for management of biological resources. If impacts can be avoided through design, establishment of exclusion zones, or other means, then specific mitigation measures may be unnecessary. Where impact avoidance is not feasible, appropriate mitigation measures to minimize impacts are identified, including procedures to be followed if important biological resources are discovered during implementation of the proposed action. Adopted mitigation measures as part of this action may include one or more of the following:

Protected and Special Status Species

Protected - Federally Threatened or Endangered

Desert Tortoise: Special conservation measures described for the proposed action (refer to Section 2.8.4) to extend the desert tortoise protections specified in the existing INRMP and existing Combat Center Biological Opinion to the acquired lands would partially offset this impact. Further offset would occur through the implementation of requirements set forth in a Biological Opinion for this alternative, which would be obtained from USFWS in the event this alternative is selected. No further or additional potential mitigation measures are recommended.

Other Status Species

Crucifixion Thorn:

BIO-1 As feasible, avoid the small populations of crucifixion thorn in the Blacktop, Lavic Lake, and Emerson Lake Training Areas through exercise design and/or installation of protective fencing, before commencement of ground-disturbing training activities.

4.10.3 Alternative 2 Impacts

4.10.3.1 Impacts

Vegetation

As described for Alternative 1, physical disturbance of plant communities from military training under Alternative 2 would adversely affect native plant communities. These effects would be somewhat less in scope than for Alternative 1 due to the smaller disturbance footprint in the west study area, but would be more intense as a similar amount of military training activity would be concentrated into a smaller area. Similarly, concentration of OHV users into the smaller Johnson Valley OHV Area that would be left would be expected to have similar adverse effects to vegetation in that area. The combination of these land uses would result in somewhat greater adverse effects to vegetation as compared to Alternative 1. However, as with Alternative 1, these impacts would be less than significant because the impacted acreage in the west study area has already experienced substantial disturbance from recreational OHV activity, and the vegetation disturbed is not formally protected under federal law. Implementation of existing conservation measures in the Combat Center's INRMP and Combat Center Order would further reduce these adverse effects to vegetation.

Vegetation along MSRs on the Combat Center that would potentially be disturbed under Alternative 2 is currently assumed to be moderately disturbed, so impacts occurring along these routes would only result from the increased numbers of vehicle miles under the proposed action (approximately 40% annual increase from MEB exercises). Refer to Appendix I for complete methodology for the GIS-based analysis of impacts to vegetation. Based on the training design included in Section 2.4, the calculated acreages would be as listed in Table 4.10-4. However, mapping of existing disturbance on the Combat Center was not available during EIS preparation, so with the exception of MSRs the GIS-based analysis of impacts to vegetation does not account for instances in which the new disturbance would occur in already disturbed areas.

Table 4.10-4. Acres of New Disturbance[1] to Plant Communities under Alternative 2

Plant Community[2]	Combat Center		West Study Area		South Study Area	
	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed
Creosote bush scrub	19,653	64,739	10,931	19,135	1,079	2,538
Mojave yucca	N/A	N/A	N/A	3	N/A	N/A
Brittlebrush	N/A	107	N/A	N/A	N/A	N/A
Black brush scrub	N/A	N/A	139	314	N/A	N/A
Catclaw acacia	707	1,124	N/A	N/A	N/A	N/A
Mesquite	N/A	26	N/A	N/A	N/A	N/A
Big galleta	24	26	N/A	N/A	N/A	N/A
Playa	216	1,459	14	375	N/A	N/A
Dunes	206	515	N/A	N/A	N/A	273
Total	*20,806*	*67,996*	*11,084*	*19,827*	*1,079*	*2,811*

Notes: [1] Disturbance from projected areas of vehicle travel and ordnance explosion. Refer to Appendix I for methodology.
[2] As defined by CNPS (2009b).
Source: Derived from mapping performed by CDF (2003) and USGS (2004)

No impacts to yucca ring UPAs would occur, as the lands upon which the UPAs are known to occur would not be acquired. As for Alternative 1, implementation of proposed SCMs described in Section 2.8.4, including mapping of creosote ring UPAs and subsequent protection, would make any adverse effects to creosote ring UPAs a less than significant impact.

Ecosystems

Impacts to ecosystems under Alternative 2 would be similar to those described for Alternative 1 and would be less than significant. However, concentrating military training into the smaller west study area under this alternative would increase the potential for vegetative type conversion and associated fire risk, as well as damage to cryptobiotic soils, in the areas of highest training activity. Similarly, concentration of OHV users into the smaller Johnson Valley OHV Area would be expected to have similar adverse effects to ecosystems in that area. Therefore, although still less than significant, the degree of adverse effect to ecosystems under Alternative 2 would be somewhat higher than for Alternative 1.

Wildlife

Impacts to wildlife from military training under Alternative 2 would be similar to those described for Alternative 1, but would be somewhat reduced due to the smaller area of acquisition in the west study area. However, concentrating military training into the smaller west study area under this alternative would increase the likelihood of wildlife disturbance or mortality in those more heavily used areas. Similarly, concentration of OHV users into the smaller Johnson Valley OHV Area would be expected to have similar adverse effects to ecosystems in that area. Nonetheless, with the extension of the existing conservation measures in the Combat Center INRMP to any acquired lands, Alternative 2 would have less than significant impacts to wildlife. Because of the geographic area and intensity of activity involved in MEB Exercises, some adverse impacts to individual non-special status wildlife species would remain but would be less than significant.

Protected and Special Status Species

Protected - Federally Threatened or Endangered

Desert Tortoise: An estimated 2,001 ± 399 (95% CI) adult tortoises and 9,432 ± 1,881 (95% CI) juveniles are located within the lands that would be acquired under Alternative 2 and would fall under the management of the Combat Center. As with Alternative 1, direct and indirect impacts to individual tortoises as a result of actions under Alternative 2 would affect the population via reduction in the number of animals and population fragmentation. Therefore, activities under Alternative 2 would result in the loss of tortoises and occupied habitat, and degradation of tortoise habitat, within high- and medium-intensity disturbance areas. A potential also exists for a lower degree of such impact in low-intensity disturbance areas. Based on GIS modeling (methodology and assumptions described in Appendix I), it is anticipated that Alternative 2 would result in the take from military training (through translocation, injury, or death) of approximately 608 to 3,298 adult tortoises (466 to 761 in the acquisition study areas) and 2,866 to 15,546 juvenile tortoises (2,197 to 3,587 in the acquisition study areas) over the life of the project . The wide range of the total take estimate results primarily from the broad range of the low density category (0 to 20 tortoises per mi^2), and the high occurrence of this category on the Combat Center. As for Alternative 1, much of this take would occur in the first few years of the proposed action as a result of the new disturbance, with annual rates of take decreasing rapidly before reaching a steady rate of relatively low take (e.g., 2 to 4 tortoises per year). Future changes in the battalion routes of travel would contribute to continued translocation, injury, or death.

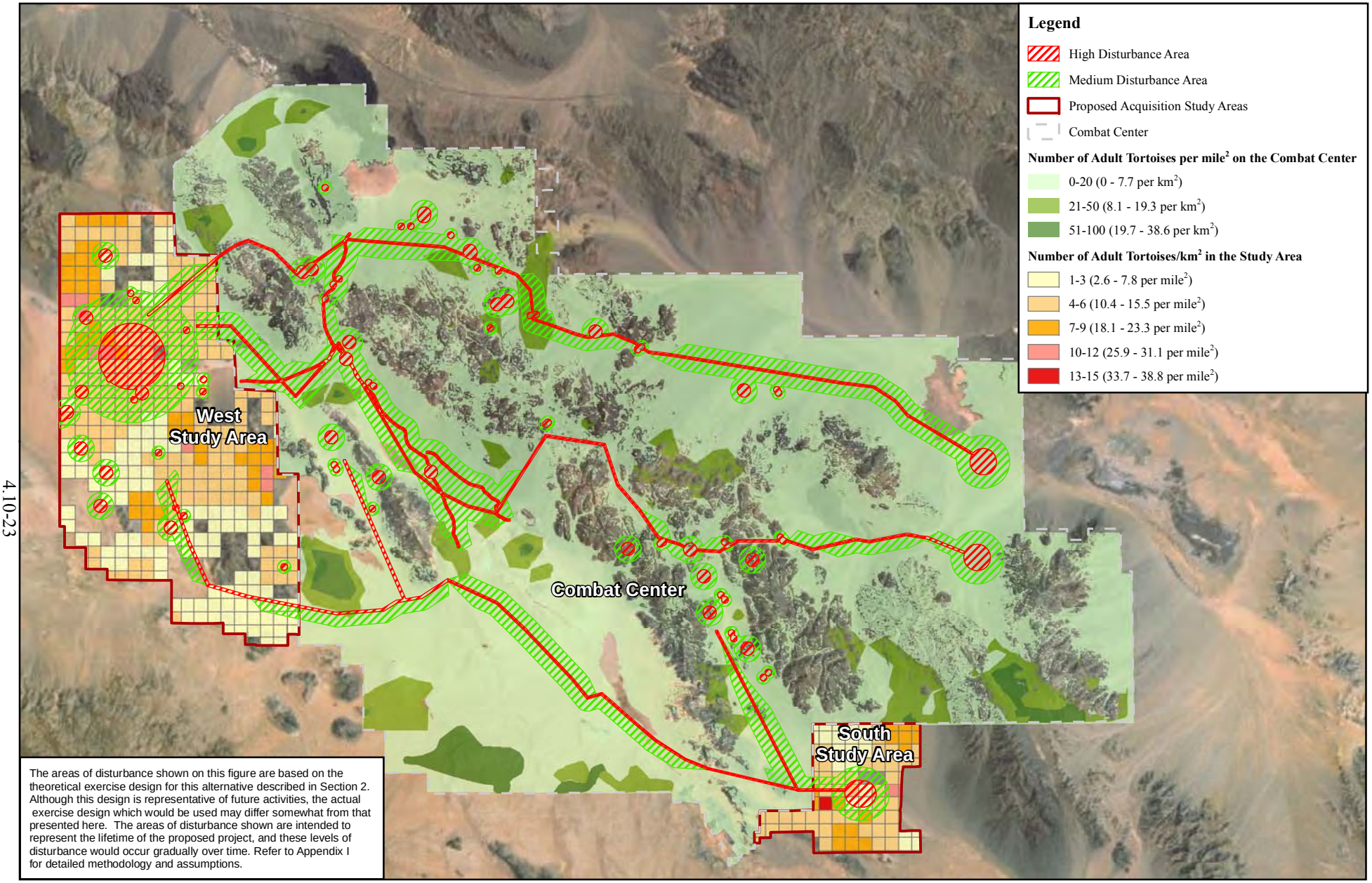
Based on the same assumptions used for Alternative 1 and described in detail in Appendix I, a total of 117,329 acres (47,481 hectares) of occupied desert tortoise habitat may experience impacts from military training under this alternative: an estimated 31,126 acres (12,596 hectares) in high-intensity areas, and 86,203 acres (34,885 hectares) in medium-intensity areas (Table 4.10-5, Figure 4.10-2). No critical habitat would be directly affected.

Table 4.10-5. Acres of New Disturbance[a] to Occupied Desert Tortoise Habitat under Alternative 2

Habitat Utilization by Adult Desert Tortoises[b]	West Study Area		South Study Area		Combat Center	
	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed
0 - ~8 per km^2 [c]					18,961	60,986
1 - 3 per km^2	2,814	3,268	557	244		
4 - 6 per km^2	6,591	13,511	500	2,072		
7 - 9 per km^2	590	1,634	22	432		
~9 - ~19 per km^2					680	3,646
10 - 12 per km^2	411	346	N/A	64		
13 - 15 per km^2	N/A	N/A	N/A	0.4		
~20 - ~39 per km^2					N/A	N/A
Total	*10,406*	*18,759*	*1,079*	*2,812*	*19,641*	*64,632*

Notes: [a] Disturbance from projected areas of vehicle travel and ordnance explosion. Refer to Appendix I for methodology and assumptions.
[b] Categories in column one are different for the Combat Center versus the acquisition study areas due to different abundance classes used by study authors (i.e., MAGTF Training Command 2001; Karl 2010).
[c] Authors indicate that this category means "tortoises may not exist" in this area.

Source: Modified from MAGTF Training Command 2001 and Karl 2010.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2001, 2009a; Karl 2010

Figure 4.10-2
Disturbance to Occupied Desert Tortoise Habitat Under Alternative 2

N

Although a smaller area of land in the west study area would be acquired under this alternative, the land not acquired would be used primarily as a buffer under Alternative 1. Therefore, not acquiring this land would not substantially reduce military impacts to the desert tortoise, and concentrating military training into the smaller west study area under this alternative would increase the likelihood of take for desert tortoises in those more heavily used areas. Because MEB Building Block training exercises in the west study area would represent a relocation of existing training from the Combat Center rather than net new training, impacts to desert tortoises in the west study area from MEB Building Block training would be accompanied by a reduction in impacts to desert tortoises on the Combat Center, where average desert tortoise densities are higher. This reduction in activity on the Combat Center is not accounted for in calculations of disturbance (e.g., Table 4.10-5). Although some recreational OHV activity would be displaced from the acquired lands, a substantial portion of these OHV activities (75% based on assumptions used in Section 4.2 *Recreation*) would be concentrated into the new, smaller Johnson Valley OHV Area. This would result in substantial indirect impacts to desert tortoises in this area, even though no military training would occur there.

Under Alternative 2, two new Special Use Areas established as an SCM (Section 2.8.4) would protect 9,507 acres (3,847 hectares) of desert tortoise habitat: 6,572 acres (2,660 hectares) in the west study area and 2,935 acres (1,188 hectares) in the south study area. A total of approximately 175 to 256 (95% CI) adult tortoises and 825 to 1,207 (95% CI) juvenile tortoises are located within these areas and would benefit from enhanced protection as compared to existing conditions.

Indirect impacts to desert tortoise under Alternative 2 would be similar to those described in Section 4.10.2 and in Appendix M for Alternative 1, but considerably reduced in intensity because the level of potential displacement of OHV activity would be substantially lower under Alternative 2. Nonetheless, because of the threatened status of the desert tortoise, these indirect impacts would be significant.

In summary, activities under Alternative 2 would result in the loss of tortoises and occupied habitat, as well as degradation of tortoise habitat, within high- and medium-intensity disturbance areas. A potential also exists for a lower degree of such impact in low-intensity disturbance areas. No critical habitat would be affected. A substantial amount of indirect take would also result from the concentration of Johnson Valley OHV Area recreation into a smaller area, though indirect impacts on tortoises located in other regional OHV areas (e.g., Stoddard Valley) would be reduced as compared to Alternative 1 because fewer OHV users would be displaced to those locations (23% displaced under Alternative 2 as compared to 67%; refer to Section 4.2 *Recreation*). The Marine Corps has received an incidental take statement (see Appendix O) from the USFWS to account for take or loss associated with the Preferred Alternative (Alternative 6). In the event that Alternative 2 becomes the Preferred Alternative, a revised Biological Opinion and/or incidental take statement would be obtained from USFWS. Compliance with any Biological Opinion and/or incidental take statement would address this impact under Section 7 requirements, but as death or displacement of a federally threatened species would still occur, this impact would remain significant.

Species with Other Federal Status

<u>Mojave Fringe-toed Lizard:</u> Impacts to Mojave fringe-toed lizards under Alternative 2 would be similar to those described for Alternative 1, and would be less than significant. Although less land would be acquired in the west study area under this alternative, the land excluded from acquisition was not found to host any Mojave fringe-toed lizards during surveys (Karl 2009a).

<u>Rosy Boa:</u> Impacts to this species would be as described for Alternative 1. Therefore, Alternative 2 would have less than significant impacts to the rosy boa.

Townsend's Western Big-Eared Bat and Pallid Bat: As with Alternative 1, potential impacts to these species from training would not be substantial. Further, because this alternative would involve acquisition of a smaller portion of the west study area, these potential impacts would be somewhat reduced from Alternative 1. However, the land in the west study area that would not be acquired would also not benefit from the conservation measures described in the Combat Center's INRMP and Combat Center Order. In summary, Alternative 2 would have less than significant impacts to Townsend's western big-eared bat and the pallid bat.

Nelson's Bighorn Sheep: Disturbance of Nelson's bighorn sheep under Alternative 2 would be similar to that described for Alternative 1, as there would be no difference in proposed operations near the Bullion Mountains. Therefore, Alternative 2 would have less than significant impacts to Nelson's bighorn sheep on the Combat Center, acquisition study areas, and in the lands underlying airspace proposed for establishment.

Golden Eagle: As described for Alternative 1, the golden eagle would not be substantially affected by the increased level of operations, land acquisition, or airspace establishment under Alternative 2. In addition, Alternative 2 would involve a smaller amount of land acquisition in the west study area, which would result in an even lower level of effects on this species. However, the land in the west study area that would not be acquired would also not benefit from the conservation measures described in the Combat Center's INRMP and Combat Center Order. In summary, Alternative 2 would have less than significant impacts to the golden eagle.

LeConte's Thrasher: As described for Alternative 1, the habitat required by the LeConte's thrasher would potentially be among those most disturbed by Marine and vehicle traffic under this alternative. The reduced amount of land acquisition under Alternative 2 would lessen the scope of this effect for those LeConte's thrashers that might be present in the west study area, but would concentrate the military training impacts into a smaller area. Nonetheless, based on the projected routes of travel, WDZs, and indirect fire SDZs, most of the locations where LeConte's thrashers were observed to occur by Cutler *et al.* (1999) would not experience high-intensity, or even medium-intensity, disturbance from MEB or MEB Building Block training activities under Alternative 2. Therefore, impacts to the LeConte's thrasher from Alternative 2 would be less than significant.

Loggerhead Shrike: As described for Alternative 1, the loggerhead shrike would not be substantially affected by the increased level of operations, land acquisition, or airspace establishment under Alternative 2. Therefore, Alternative 2 would have less than significant impacts to the loggerhead shrike.

Prairie Falcon: As described for Alternative 1, the cliff habitat in which the prairie falcon typically nests would not be substantially disturbed under Alternative 2, and the abundance of prey species on which it depends would not be substantially reduced. In addition, Alternative 2 would involve a smaller amount of land acquisition in the west study area, which would result in an even lower level of direct effects on this species from military training. However, the land in the west study area that would not be acquired would also not benefit from the conservation measures described in the Combat Center's INRMP and Combat Center Order. In summary, Alternative 2 would have less than significant impacts to the prairie falcon.

Burrowing Owl: Impacts to this species would be similar to those described for Alternative 1. However, Alternative 2 would involve a substantial reduction in the area of land acquired in the west study area. This reduction would be expected to result in a corresponding reduction in adverse effects to the burrowing owl from military training, as less of its habitat would be disturbed by military vehicles and ordnance explosion. However, the land in the west study area that would not be acquired would also not

benefit from the conservation measures described in the Combat Center's INRMP and Combat Center Order and would continue to experience adverse effects from recreational OHV activity. In summary, Alternative 2 would have less than significant impacts to the burrowing owl.

Migratory Birds: Impacts to migratory birds would be as described for Alternative 1 and would be less than significant.

Whitemargin Beardtongue: As was described for Alternative 1, no military training would be expected to occur in the vicinity of known whitemargin beardtongue populations. The only potential impact would be indirect, and would result from deposition of dust. Therefore, Alternative 2 would have less than significant impacts to whitemargin beardtongue.

Harwood's Eriastrum: Impacts to this species would be as described for Alternative 1. Therefore, Alternative 2 would have no impact to Harwood's eriastrum.

Other Status Species

Crucifixion Thorn: As with Alternative 1, the smaller populations in Blacktop and southern Lavic Lake Training Areas would likely be lost or disturbed during MEB Exercises, as they lie directly within the path of vehicle and Marine movement. The small population observed in Emerson Lake Training Area would potentially be lost during MEB exercises as it lies within a WDZ. Therefore, Alternative 2 would have significant impacts to crucifixion thorn. However, with implementation of the potential mitigation measure BIO-1 to avoid this population through exercise design and/or fencing, these impacts would be reduced to less than significant.

Spectacle Fruit: As with Alternative 1, no vehicle or Marine movement, and no ordnance explosion would occur in the vicinity of the spectacle fruit population in Acorn Training Area. Therefore, Alternative 2 would have no impacts to spectacle fruit.

Indirect Impacts to Other Species from Displaced OHV Activity Outside the ROI

Appendix M identifies potential alternative OHV recreation areas outside the ROI for the proposed action (and outside the range of the desert tortoise) that may attract smaller amounts of displaced OHV activity and that are known to contain other listed species and/or critical habitat. While the available data are not sufficient to quantify the level of impact, the projected amount of increased use in these areas would be very low. Based on available information and the assumptions described in Appendix M, it is not anticipated that these species or their habitat would be adversely affected by the limited amounts of increased use. Indirect impacts to other species at more distant OHV areas would be less than significant.

4.10.3.2 Potential Mitigation Measures

Protected and Special Status Species

Protected - Federally Threatened or Endangered

Desert Tortoise: SCMs described for the proposed action (refer to Section 2.8.4) to extend the desert tortoise protections specified in the existing INRMP and existing Combat Center Biological Opinion to the acquired lands would partially offset this impact. Further offset would occur through the implementation of requirements set forth in a Biological Opinion for this alternative, which would be obtained from USFWS in the event this alternative is selected. No further or additional potential mitigation measures are recommended.

Other Status Species

Crucifixion Thorn: Mitigation measures would be as described for Alternative 1.

4.10.4 Alternative 3 Impacts

4.10.4.1 Impacts

Vegetation

As described for Alternative 1, physical disturbance of plant communities under Alternative 3 would adversely affect native plant communities. These effects would be somewhat less than for Alternative 1 due to the smaller amount and diversity of vegetation in the east study area. Implementation of existing conservation measures in the Combat Center's INRMP and Combat Center Order would further reduce these adverse effects to vegetation.

Vegetation along MSRs on the Combat Center that would potentially be disturbed under Alternative 3 is currently assumed to be moderately disturbed, so impacts occurring along these routes would only result from the increased numbers of vehicle miles under the proposed action (approximately 40% annual increase from MEB exercises). Refer to Appendix I for complete methodology for the GIS-based analysis of impacts to vegetation. Based on the training design included in Section 2.4, the calculated acreages would be as listed in Table 4.10-6. However, mapping of existing disturbance on the Combat Center was not available during EIS preparation, so with the exception of MSRs the GIS-based analysis of impacts to vegetation does not account for instances in which the new disturbance would occur in already disturbed areas.

Table 4.10-6. Acres of New Disturbance[1] to Plant Communities under Alternative 3

Plant Community[2]	Combat Center		East Study Area		South Study Area	
	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed
Creosote bush scrub	18,483	70,207	6,935	19,937	893	2,195
Mojave yucca	N/A	141	N/A	N/A	N/A	N/A
Brittlebrush	173	369	77	530	N/A	N/A
Catclaw acacia	594	1,503	66	188	N/A	N/A
Mesquite	25	152	N/A	N/A	N/A	N/A
Saltbush scrub	N/A	N/A	7	322	N/A	N/A
Big galleta	24	26	N/A	N/A	N/A	N/A
Playa	32	798	80	355	N/A	N/A
Dunes	179	223	N/A	N/A	20	516
Total	*19,510*	*73,419*	*7,165*	*21,332*	*913*	*2,711*

Notes: [1]Disturbance from projected areas of vehicle travel and ordnance explosion. Refer to Appendix I for methodology.
[2]As defined by CNPS (2009b).
Source: Derived from mapping performed by USGS (2004)

Although no creosote ring UPAs are known from the east study area, because creosote bush scrub covers several thousands of acres such assemblages are highly likely to occur. As for Alternative 1, implementation of proposed conservation measures described in Section 2.8.4, including mapping of creosote ring UPAs and subsequent protection, would make any adverse effects to creosote ring UPAs a less than significant impact.

Ecosystems

The potential for wildfires on the Combat Center and in the proposed acquisition study areas would potentially increase from implementation of the proposed training activities under this alternative. Unlike the other alternatives, the areas proposed for acquisition under Alternative 3 do not currently experience a substantial level of OHV activity. Therefore, the increased activity in these areas would occur in areas that experience only minimal visitation, and impacts to wildfire risk and fire-related damage to ecosystems would be greater than under Alternative 1. However, because the vegetative cover is low in the east study area and the separation between plants is high, the overall fire risk would remain low. The existing Combat Center Wildfire Management Plan would be extended to the acquired areas, further reducing wildfire risk. Therefore, impacts to ecosystems from fire would be less than significant.

Because movement of Marines across the east study area would be in close proximity to Bristol Dry Lake (the playa extends nearly all the way from the northern border of the acquisition study area to the southern border), Alternative 3 would have a greater potential for impacts to playa ecosystems. However, because vehicle and Marine foot traffic across playas is highly discouraged for operational and ecological reasons, this impact would be less than significant. No beneficial offset for impacts to playas related to closure of Johnson Valley OHV Area would occur under this alternative.

Similar to Alternative 1, Alternative 3 would have less than significant impacts to cryptobiotic soils in the acquisition study areas and the Combat Center. However, because it has not been used for extensive OHV recreation, the east study area may have lower levels of existing soil disturbance as compared to the west study area. As a result, impacts to cryptobiotic soils in this area, though still less than significant, may be greater for Alternative 3 than for the other alternatives. No beneficial offset for impacts to cryptobiotic soils related to closure of Johnson Valley OHV Area would occur under this alternative. Some protection of cryptobiotic soils would occur as an indirect result of desert tortoise protection efforts.

Wildlife

Impacts to wildlife under Alternative 3 would be similar to those described for Alternative 1, but would be somewhat reduced due to the lower habitat diversity in the east study area (Karl 2010). With extension of existing conservation measures in the Combat Center INRMP, Biological Opinion, and Combat Center Order to the acquired lands, these impacts would be less than significant. Because of the geographic area and intensity of activity involved in MEB Exercises, some adverse impacts to individual non-special status wildlife species would remain but would be less than significant.

Protected and Special Status Species

Protected - Federally Threatened or Endangered

Desert Tortoise: An estimated 928 ± 304 (95% CI) adult tortoises and 4,374 ± 1,433 (95% CI) juvenile tortoises are located within the lands that would be acquired under Alternative 3 and would fall under the management of the Combat Center. As with Alternative 1, direct and indirect impacts to individual tortoises as a result of actions under Alternative 3 would affect the population via reduction in the number of animals, population fragmentation, and possible local extirpation. However, the east study area is host to a much lower density of tortoises than the west study area (Karl 2010), so activities occurring there would be expected to result in substantially lower desert tortoise mortality than in the west study area under Alternative 1 or any of the other action alternatives. Based on GIS modeling (methodology and assumptions described in Appendix I), it is anticipated that Alternative 3 would result in the take from military training (through translocation, injury, or death) of approximately 215 to 2,960 adult tortoises (107 to 240 in the acquisition study areas) and 1,013 to 13,952 juvenile tortoises (504 to 1,131 in the

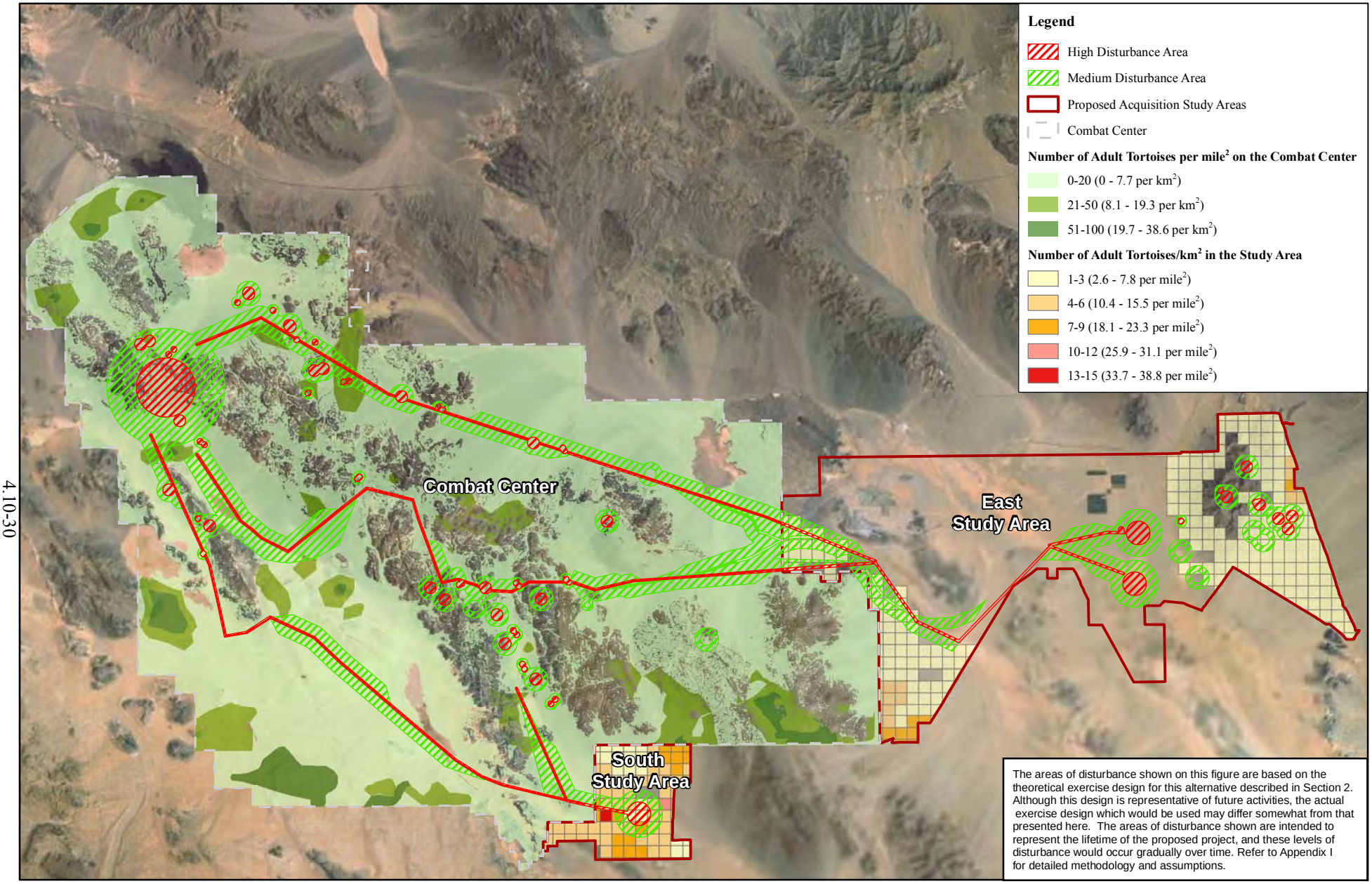
acquisition study areas) over the life of the project . The wide range of the total take estimate results primarily from the broad range of the low density category (0 to 20 tortoises per mi^2), and the high occurrence of this category on the Combat Center. As for Alternative 1, much of this take would occur in the first few years of the proposed action as a result of the new disturbance, with annual rates of take decreasing rapidly before reaching a mostly steady state of take. Future changes in the battalion routes of travel would contribute to continued translocation, injury, or death.

Based on the assumptions described in Appendix I, a total of 98,571 acres (39,890 hectares) of occupied desert tortoise habitat may experience impacts from military training under this alternative: an estimated 20,775 acres (8,407 hectares) in high-intensity areas, and 77,796 acres (31,483 hectares) in medium-intensity areas (Table 4.10-7, Figure 4.10-3). No critical habitat would be directly affected.

Table 4.10-7. Acres of New Disturbance[a] to Occupied Desert Tortoise Habitat under Alternative 3

Habitat Utilization by Adult Desert Tortoises[b]	East Study Area		South Study Area		Combat Center	
	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed
0 - ~8 per km^2 [c]					16,286	62,525
1 - 3 per km^2	3,101	9,775	578	168		
4 - 6 per km^2	N/A	N/A	209	2,089		
7 - 9 per km^2	N/A	N/A	121	430		
~9 - ~19 per km^2					475	2,755
10 - 12 per km^2	N/A	N/A	N/A	25		
13 - 15 per km^2	N/A	N/A	5	N/A		
~20 - ~39 per km^2					N/A	29
Total	*3,101*	*9,775*	*913*	*2,712*	*16,761*	*65,309*

Notes: [a] Disturbance from projected areas of vehicle travel and ordnance explosion. Refer to Appendix I for methodology and assumptions.
[b] Categories in column one are different for the Combat Center versus the acquisition study areas due to different abundance classes used by study authors (i.e., MAGTF Training Command 2001; Karl 2010).
[c] Authors indicate that this category means "tortoises may not exist" in this area.
Source: Modified from MAGTF Training Command 2001 and Karl 2010.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2001, 2009a; Karl 2010

Figure 4.10-3
Disturbance to Occupied Desert Tortoise Habitat Under Alternative 3

N

Under Alternative 3, a new Special Use Area established as an SCM (Section 2.8.4) would protect 2,935 acres (1,188 hectares) of desert tortoise habitat in the south study area. A total of approximately 68 to 95 (95% CI) adult tortoises and 321 to 448 (95% CI) juvenile tortoises are located within this area and would benefit from enhanced protection as compared to existing conditions.

Nonetheless, activities under Alternative 3 would result in the loss of tortoises and occupied habitat, as well as degradation of tortoise habitat, within high- and medium-intensity disturbance areas. A potential also exists for a lower degree of such impact in low-intensity disturbance areas. No critical habitat would be affected. Because MEB Building Block training exercises in the east study area would represent a relocation of existing training from the Combat Center rather than net new training, impacts to desert tortoises in the east study area from MEB Building Block training would be accompanied by a reduction in impacts to desert tortoises on the Combat Center where average desert tortoise densities are higher. This reduction in activity on the Combat Center is not accounted for in calculations of disturbance (e.g., Table 4.10-7). Unlike the west study area, the existing take of tortoises in the east study area is expected to be minimal, as recreational OHV activity is minimal in comparison to the heavily used Johnson Valley OHV Area. Beneficial offset to impacts resulting from closure of the Johnson Valley OHV Area would not occur under this alternative. However, indirect impacts to tortoises located within other regional OHV areas (e.g., Stoddard Valley) would also not occur as no substantial OHV activity would be displaced.

The Marine Corps has received an incidental take statement (see Appendix O) from the USFWS to account for take or loss associated with the Preferred Alternative (Alternative 6). In the event that Alternative 3 becomes the Preferred Alternative, a revised Biological Opinion and/or incidental take statement would be obtained from USFWS. Compliance with any Biological Opinion and/or incidental take statement would address this impact under Section 7 requirements, but as death or displacement of a federally threatened species would still occur, this impact would remain significant.

Species with Other Federal Status

<u>Mojave Fringe-Toed Lizard:</u> Under Alternative 3, one of the task force assembly areas for the MEB Final Exercise would be located in the east study area near a concentration of Mojave fringe-toed lizards (Karl 2009b). The conceptual route for the MEB Final Exercise in which two task forces would move through the east study area would also cross some additional areas where Mojave fringe-toed lizards were observed (Karl 2009b). However, the loose sand ecosystem that the Mojave fringe-toed lizards are almost solely found in is not conducive to vehicle or Marine foot traffic and would most likely be avoided during exercises. Therefore, impacts to this species from military training would be less than significant.

<u>Rosy Boa:</u> Impacts to this species would be as described for Alternative 1. There are no known occurrences of the rosy boa in the east study area, and those on the Combat Center would not be expected to be affected by the expanded training because their rocky habitat is not typically used for training. Therefore, Alternative 3 would have less than significant impacts to the rosy boa.

<u>Townsend's Western Big-Eared Bat and Pallid Bat:</u> As with Alternative 1, potential impacts to these species from training would not be substantial. Further, potential roost sites in the east study area appear to be fewer than in the west study area and on the Combat Center, due to flatter topography and assumedly fewer caves. Therefore, Alternative 3 would have less than significant impacts to Townsend's western big-eared bat and the pallid bat.

<u>Nelson's Bighorn Sheep:</u> Impacts to this species on the Combat Center and in the lands underlying airspace proposed for acquisition would be similar to those described for Alternative 1. However, a

population estimated at 70 individuals was noted in 1989 as foraging consistently on the Ship Mountains within the east study area when the foliage was green (CDFG 2009b). This population was also noted to travel within the Old Woman Mountains (east of the east study area) within the proposed expansion of the Turtle MOA airspace. Under Alternative 3, during MEB Final Exercises, two task forces would stage within approximately 3 to 5 miles (5 to 8 km) west-southwest of the Ship Mountains. Indirect fire would commence approximately 9 miles (14 km) west of the Ship Mountains. The MEB Building Block four-day training cycle (see Figure 2-9) would result in substantial impacts to any sheep utilizing the Ship Mountains, with direct fire SDZ's, indirect fire SDZ's, and aviation WDZ's extending over the southern half of the mountain for an average of 160 days per year.

Therefore, Alternative 3 would have potentially significant impacts to Nelson's bighorn sheep in the east study area. However, with implementation of the potential mitigation measure BIO-2 listed below, these impacts would be less than significant.

Golden Eagle: As described for Alternative 1, golden eagles would not be substantially affected by the increased level of operations, land acquisition, or airspace establishment under Alternative 3. Furthermore, the quality of available habitat in the lands to be acquired in the east study area would potentially be lower than the land acquired under the other alternatives (e.g., lower total amount of forage habitat). Therefore, Alternative 3 would have less than significant impacts to the golden eagle.

LeConte's Thrasher: As described for Alternative 1, the habitat required by the LeConte's thrasher would potentially be among those most disturbed by Marine and vehicle traffic under Alternative 3. However, the amount of habitat for the LeConte's thrasher in the east study area is lower than in the west study area, so adverse effects would be expected to be lower than for Alternative 1. Based on the projected routes of travel, WDZs, and indirect fire SDZs, most of the locations where LeConte's thrashers were observed to occur by Cutler *et al.* (1999) would not experience high-intensity, or even medium-intensity, disturbance from MEB Final Exercise or MEB Building Block training activities under Alternative 3. Exceptions include those individuals observed in Lavic Lake and Lava Training Areas (Cutler *et al.* 1999). However, the LeConte's thrashers that were historically observed in potentially impacted areas of Lava or Lavic Lake Training Areas were solitary individuals (Cutler *et al.* 1999). The potential loss of these individuals due to project activities would not jeopardize the species' continued existence on the Combat Center or in the region. Therefore, impacts to the LeConte's thrasher from Alternative 3 would be less than significant.

Loggerhead Shrike: As described for Alternative 1, the loggerhead shrike would not be substantially affected by the increased level of operations, land acquisition, or airspace establishment under Alternative 3. Furthermore, the quality of available habitat in the lands to be acquired in the east study area would potentially be lower than the land acquired under the other alternatives (e.g., lower total amount of vegetation). Therefore, Alternative 3 would have less than significant impacts to the loggerhead shrike.

Prairie Falcon: As described for Alternative 1, the cliff habitat in which the prairie falcon typically nests would not be substantially disturbed under Alternative 3, and the abundance of prey species on which it depends would also not be substantially reduced. In addition, the land in the east study area proposed for acquisition under Alternative 3 has less cliff habitat than exists in the west study area, which would result in an even lower potential for adverse effects on this species. Therefore, Alternative 3 would have less than significant impacts to the prairie falcon.

Burrowing Owl: Burrowing owls are sparsely distributed in the east study area (Karl 2009b). Individual owls were observed in the area where task forces would assemble for MEB Final Exercises and near the MEB Objective in Maumee Mine Training Area on the Combat Center. Owl displacement and/or injury

or mortality would be expected to occur in these areas, but this would represent a very small portion of the borrowing owl population and would not be considered a significant impact. With implementation of the conservation measures already in place in the Combat Center INRMP, mortality to individuals and effects on the regional population of the species would be further limited.

Migratory Birds: Impacts to migratory birds would be as described for Alternative 1 and would be less than significant.

Whitemargin Beardtongue: Populations of whitemargin beardtongue are known from the northern central area of Lavic Lake Training Area, one within the center of the Lavic Lake playa and one approximately 1.5 miles (2.5 km) east of the playa. As with Alternative 1, no vehicle movement, and minimal Marine movement would be expected to occur in the vicinity of the playa, and no WDZs or SDZs overlay the location of this population. Therefore, Alternative 3 would have less than significant impacts to whitemargin beardtongue.

Harwood's Eriastrum: A population of more than 100 individual Harwood's eriastrum was observed in the southern-middle extent of the east study area, along the leeward slopes within the partially stabilized saltbrush dunes of Cadiz Dunes (MAGTF Training Command 2009b). Plants were found all the way to the northern extent of the survey area, so there is potential for this species to occur further north in the east study area. These plants would be at risk of crushing or trampling by personnel during assembly for MEB Final Exercises and MEB Building Block Exercises. Therefore, Alternative 3 would have significant impacts to Harwood's eriastrum. This impact would be reduced to less than significant through the implementation of potential mitigation measure BIO-3.

Other Status Species

Spectacle Fruit: As with Alternative 1, no vehicle or Marine movement, and no ordnance explosion would occur in the vicinity of the spectacle fruit population in Acorn Training Area. Therefore, Alternative 3 would have no impacts to spectacle fruit.

Crucifixion Thorn: No crucifixion thorn populations are known from the east study area, so activities occurring there under Alternative 3 would not be expected to impact this species. The small population observed in Emerson Lake Training Area would not be impacted as it lies just outside WDZs and SDZs. However, as with Alternative 1, the smaller populations in Blacktop and southern Lavic Lake Training Areas would likely be lost or disturbed by MEB Exercises, as they are directly within the path of proposed vehicle and Marine movement. Therefore, Alternative 3 would have significant impacts to crucifixion thorn. However, with implementation of the potential mitigation measure BIO-1, which would avoid this population through exercise design and/or fencing, these impacts would be reduced to less than significant.

4.10.4.2 Potential Mitigation Measures

Protected and Special Status Species

Protected - Federally Threatened or Endangered

Desert Tortoise: Special conservation measures described for the proposed action to extend the desert tortoise protections specified in the existing INRMP and existing Combat Center Biological Opinion to the acquired lands would partially offset this impact (refer to Section 2.8.4). Further offset would occur through the implementation of requirements set forth in a Biological Opinion for this alternative, which would be obtained from USFWS in the event this alternative is selected. No further or additional potential mitigation measures are recommended.

Species with Other Federal Status

Nelson's Bighorn Sheep:

BIO-2 Prepare an updated survey for Nelson's bighorn sheep in the east study area, focusing on usage of the Ship Mountains. The results of this survey would then be utilized by MAGTF Training Command in coordination with Natural Resources and Environmental Affairs (NREA) to modify the timing of military training exercises in the vicinity of the Ship Mountains or the locations of targets for ordnance delivery, such that disturbance to this population would be minimized to the extent possible without compromising the military mission.

Harwood's Eriastrum:

BIO-3 Monitoring of Harwood's eriastrum would be included in the updated INRMP, and surveys for presence of this species on the Combat Center and acquired lands would be included as periodic surveys under the INRMP. Targeted surveys to delineate boundaries of the populations north of Cadiz Dry Lake would be performed. Based on the results of these surveys, this population would be avoided through exercise design or protected by fencing, as most effective.

Other Status Species

Crucifixion Thorn: Mitigation measures would be as described for Alternative 1.

4.10.5 Alternative 4 Impacts

4.10.5.1 Impacts

Vegetation

Similar to Alternative 1, physical disturbance of plant communities under Alternative 4 would have less than significant impacts to vegetation; however, due to the allowance of public access in the west study area when military activities are not occurring, adverse effects to vegetation would be somewhat greater for Alternative 4.

Vegetation along MSRs on the Combat Center that would potentially be disturbed under Alternative 4 is currently assumed to be moderately disturbed, so impacts occurring along these routes would only result from the increased numbers of vehicle miles under the proposed action (approximately 40% annual increase resulting from MEB exercises). Refer to Appendix I for complete methodology for the GIS-based analysis of impacts to vegetation. Based on the training design included in Section 2.4, the calculated acreages would be as listed in Table 4.10-8. However, mapping of existing disturbance on the Combat Center was not available during EIS preparation, so with the exception of MSRs the GIS-based analysis of impacts to vegetation does not account for instances in which the new disturbance would occur in already disturbed areas.

Table 4.10-8. Acres of New Disturbance[1] to Plant Communities under Alternative 4

Plant Community[2]	Combat Center		West Study Area		South Study Area	
	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed
Creosote bush scrub	17,971	73,198	5,184	21,781	129	991
Mojave yucca	N/A	N/A	118	434	N/A	N/A
Brittlebrush	N/A	N/A	N/A	N/A	N/A	N/A
Catclaw acacia	612	1,322	N/A	N/A	N/A	N/A
Mesquite	N/A	26	N/A	N/A	N/A	N/A
Big galleta	24	25	N/A	N/A	N/A	N/A
Playa	99	332	N/A	N/A	N/A	N/A
Dunes	279	542	N/A	N/A	N/A	11
Total	*18,985*	*75,445*	*5,302*	*22,215*	*129*	*1,002*

Notes: [1]Disturbance from projected areas of vehicle travel and ordnance explosion. Refer to Appendix I for methodology.
[2]As defined by CNPS (2009b).
Source: Derived from mapping performed by CDF (2003) and USGS (2004)

Although it is not reflected in the calculations in Table 4.10-8, allowing continued public use of the west study area could result in greater adverse effects to vegetation than under Alternative 1, due to the effects of OHV activity. It is difficult to speculate whether the effects of public access during times when MEB Exercises are not occurring would be greater than those resulting from MEB Building Block training, as would occur under Alternative 1. In general, however, public access and OHV activity are less regulated and damage to vegetation would be more difficult to avoid or mitigate in areas of public access.

Similar to the vegetation impacts described above, Alternative 4 would also have somewhat greater adverse effects to creosote ring UPAs than Alternative 1, due to the continuation of public access in the west study area. As for Alternative 1, proposed conservation measures (Section 2.8.4) to map and protect creosote ring UPAs in a manner consistent with ACEC designation would reduce this to less than significant. No impacts to yucca ring UPAs would occur, as the lands upon which these UPAs are known to occur would not be used for military training or ordnance explosion, and per proposed conservation measures would remain fenced and managed as ACECs. Therefore, Alternative 4 would have less than significant impacts to creosote ring UPAs and yucca ring UPAs.

Ecosystems

Impacts to ecosystems would be similar to those described for Alternative 1, and would be less than significant. However, public shared use of the west study area would mean that adverse effects to sensitive ecosystems such as playas, cryptobiotic soils, and caves would not be offset as much as they would if activities in the acquired lands were limited to strictly military training (as in Alternatives 1, 2, and 3). These ecosystems are notably slow to recover from disturbance. Risk of wildfire would also be greater under this alternative due to continued public use (e.g., campfires, sparks from OHV exhaust, etc.). Wildfire hazard would still remain low due to minimal fuel load and separation between plants, which would greatly reduce any risk of wildfire spread. Existing conservation measures in the Combat Center INRMP would be applied to reduce the potential for ecosystem impact resulting from any increased wildfire (i.e., wildfire management and invasive vegetation control). Some protection of cryptobiotic soils would occur as an indirect result of desert tortoise protection efforts.

Wildlife

Impacts to wildlife under Alternative 4 would be similar to those described for Alternative 1, but would be somewhat greater as the acquisition study areas would not benefit from closure to public access. With extension of existing conservation measures in the Combat Center INRMP, Biological Opinion, and Combat Center Order to the acquired lands, these impacts would be less than significant. Because of the geographic area and intensity of activity involved in MEB Exercises, some adverse impacts to individual non-special status wildlife species would remain but would be less than significant.

Protected and Special Status Species

Protected - Federally Threatened or Endangered

Desert Tortoise: Activities under Alternative 4 would result in the loss of tortoises and occupied habitat, as well as degradation of tortoise habitat, within high- and medium-intensity disturbance areas. An estimated 2,903 ± 677 (95% CI) adult tortoises and 13,684 ± 3,191 (95% CI) juvenile tortoises are located within the lands that would be acquired under Alternative 4 (same as for Alternative 1) and would fall under the management of the Combat Center. Military activities in the west study area would be limited to vehicle and Marine movements and direct fire during MEB Final Exercises. Impacts to tortoises from aircraft-delivered ordnance and artillery would not occur in the west study area under this alternative, but these activities would be concentrated more within the existing Combat Center boundaries. Based on GIS analysis (refer to Appendix I for methodology and assumptions), it is anticipated that Alternative 4 would result in the take from military training (through translocation, injury, or death) of between 500 and 3,628 adult tortoises (346 to 592 in the acquisition study areas) and between 2,357 and 17,101 juvenile tortoises (1,631 to 2,790 in the acquisition study areas) over the lifetime of the project . The wide range of the total take estimate results primarily from the broad range of the low density category (0 to 20 tortoises per mi^2), and the high occurrence of this category on the Combat Center. As for Alternative 1, much of this take would occur in the first few years of the proposed action as a result of the new disturbance, with annual rates of take decreasing rapidly before reaching a steady rate of relatively low take (e.g., 2 to 4 tortoises per year). Future changes in the battalion routes of travel would contribute to continued translocation, injury, or death.

Based on the same assumptions used for Alternative 1 and listed in Appendix I, a total of 117,941 acres (47,729 hectares) of occupied desert tortoise habitat may experience impacts from military training under this alternative: an estimated 23,331 acres (9,442 hectares) in high-intensity areas, and 94,610 acres (38,287 hectares) in medium-intensity areas (Table 4.10-9, Figure 4.10-4). A potential also exists for a lower degree of such impact in low-intensity disturbance areas. No designated desert tortoise critical habitat would be affected.

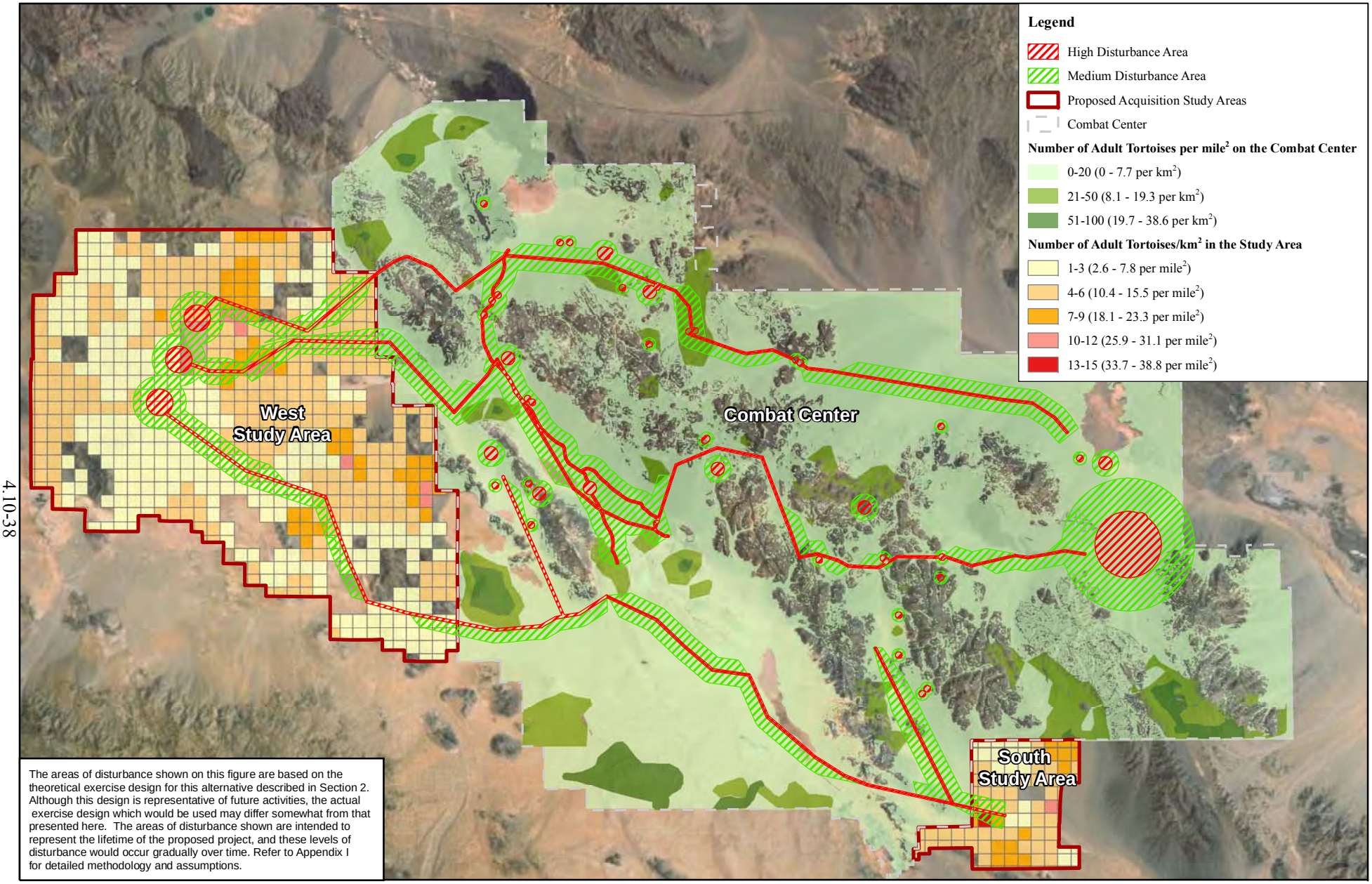
Further, under Alternative 4, recreational use in the west study area would continue when military training is not occurring, so the impacts from MEB exercises would not be offset by a cessation of adverse effects from OHV use. Disturbance in the west study area from recreational vehicles would act synergistically with disturbance from military training, potentially leading to greater overall disturbance in the west study area than currently exists. However, MEB Building Block training would not occur in the west study area for 160 days per year as it would under Alternative 1, so the annual duration of impacts from military training would be shorter.

Table 4.10-9. Acres of New Disturbance[a] to Occupied Desert Tortoise Habitat under Alternative 4

Habitat Utilization by Adult Desert Tortoises[b]	West Study Area		South Study Area		Combat Center	
	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed
0 - ~8 per km^2 [c]					17,475	67,963
1 - 3 per km^2	2,715	9,313	6	0.2		
4 - 6 per km^2	1,994	10,174	65	536		
7 - 9 per km^2	323	1,317	57	313		
~9 - ~19 per km^2					638	4,050
10 - 12 per km^2	57	790	N/A	N/A		
13 - 15 per km^2	N/A	N/A	0.7	154		
~20 - ~39 per km^2					*18,113*	*72,013*
Total	*5,089*	*21,594*	*129*	*1,003*	17,475	67,963

Notes: [a] Disturbance from projected areas of vehicle travel and ordnance explosion. Refer to Appendix I for methodology and assumptions.
[b] Categories in column one are different for the Combat Center versus the acquisition study areas due to different abundance classes used by study authors (i.e., MAGTF Training Command 2001; Karl 2010).
[c] Authors indicate that this category means "tortoises may not exist" in this area.

Source: Modified from MAGTF Training Command 2001 and Karl 2010.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2001, 2009a; Karl 2010

Figure 4.10-4
Disturbance to Occupied Desert Tortoise Habitat Under Alternative 4

N

An unknown additional amount of take would result from recreational use authorized in the west study area when military training is not occurring; however, that take would be approximately the same as or less than currently occurs in the Johnson Valley OHV Area. During the approximately 2 months per year that the Johnson Valley OHV Area would be closed, displaced recreational OHV use would result in some indirect impacts to desert tortoises located within other regional OHV areas (e.g., Stoddard Valley); however this displacement would be much less than under Alternative 1 (23% displaced under Alternative 4 as compared to 67%; refer to Section 4.2 *Recreation*).

Under Alternative 4, three new Special Use Areas established as an SCM (Section 2.8.4) would protect 14,950 acres (6,050 hectares) of desert tortoise habitat: 12,015 acres (4,862 hectares) in the west study area and 2,935 acres (1,188 hectares) in the south study area. A total of approximately 234 to 367 (95% CI) adult tortoises and 1,103 to 1,730 (95% CI) juvenile tortoises are located within these areas and would benefit from enhanced protection as compared to existing conditions.

Indirect impacts to desert tortoise under Alternative 4 would be similar to those described in Section 4.10.2 and in Appendix M for Alternative 1, but considerably reduced in intensity because the level of potential displacement of OHV activity would be substantially lower under Alternative 4. Nonetheless, because of the threatened status of the desert tortoise, these indirect impacts would be significant.

The Marine Corps has received an incidental take statement (see Appendix O) from the USFWS to account for take or loss associated with the Preferred Alternative (Alternative 6). In the event that Alternative 4 becomes the Preferred Alternative, a revised Biological Opinion and/or incidental take statement would be obtained from USFWS. Compliance with any Biological Opinion and/or incidental take statement would address this impact under Section 7 requirements, but as death or displacement of a federally threatened species would still occur, this impact would remain significant.

Species with Other Federal Status

Mojave Fringe-Toed Lizard: Under Alternative 4, during MEB Exercises the southern task force would travel near habitat known to host Mojave fringe-toed lizards in the west study area and on the Combat Center. In addition, the northern task force would travel in close proximity to populations historically observed in northern Lead Mountain and Lavic Lake Training Areas. However, the loose sand ecosystem to which the Mojave fringe-toed lizard is restricted would not be likely to be traversed by vehicles or Marines on foot. Similarly, artillery and aviation target arrays would not be set up in the loose sand area, so the chances of ordnance impacting these areas would be relatively low. Adverse effects would be more likely to result from the continuation of public access to the west study area, but this would not represent an impact compared to baseline conditions. Therefore, similar to Alternative 1, Alternative 4 would have less than significant impacts to these populations of Mojave fringe-toed lizards.

Rosy Boa: Impacts to this species would be as described for Alternative 1, as the only known rosy boas in the ROI have been observed on the Combat Center, and activities on the Combat Center under Alternative 4 would be roughly the same as for Alternative 1. Therefore, Alternative 4 would have less than significant impacts to the rosy boa.

Townsend's Western Big-Eared Bat and Pallid Bat: Overall, impacts to these species would be similar to those described for Alternative 1. The potential for human disturbance in the west study area would be greater because the land would be available to the public when MEB Exercises are not occurring, but adverse effects from Alternative 4 would still not be substantial. Therefore, Alternative 4 would have less than significant impacts to these bat species. Recommended mitigation measures such as gating unprotected roost sites, as provided below, would further reduce the potential for significant impacts.

Nelson's Bighorn Sheep: Disturbance of Nelson's bighorn sheep under Alternative 4 would be similar to that described for Alternative 1, as there would be no difference in proposed operations near the Bullion Mountains. Additionally, airspace establishment over the Ship Mountains in the east study area, where another population of sheep is located, would be the same as described for Alternative 1. Therefore, Alternative 4 would have less than significant impacts to Nelson's bighorn sheep.

Golden Eagle: As described for Alternative 1, the golden eagle would not be substantially affected by the increased level of operations, land acquisition, or airspace establishment under Alternative 4. The availability of land in the west study area for public shared use would not be expected to result in substantially greater adverse effects on this species, for the same reasons specified for military activities. Therefore, Alternative 4 would have less than significant impacts to the golden eagle.

LeConte's Thrasher: As described for Alternative 1, the habitat required by the LeConte's thrasher would potentially be among those most disturbed by Marine and vehicle traffic under Alternative 4. The shared public access allowed under this alternative would mean that potential impacts would not be offset by the cessation of public OHV activity. Therefore, Alternative 4 would have greater adverse effects to the LeConte's thrasher than would Alternative 1. However, based on the projected routes of travel, WDZs, and indirect fire SDZs, most of the locations where LeConte's thrashers were observed to occur by Cutler *et al.* (1999) would not experience high-intensity, or even medium-intensity, disturbance from MEB or MEB Building Block training activities under Alternative 4. Exceptions include those individuals observed in Lavic Lake and Lava Training Areas (Cutler *et al.* 1999). The LeConte's thrashers that were historically observed in potentially impacted areas of Lava or Lavic Lake Training Areas were solitary individuals (Cutler *et al.* 1999). The potential loss of these individuals due to project activities would not jeopardize the species' continued existence on the Combat Center or in the region. Therefore, impacts to the LeConte's thrasher from Alternative 4 would be less than significant.

Loggerhead Shrike: As described for Alternative 1, the loggerhead shrike would not be substantially affected by the increased level of operations, land acquisition, or airspace establishment under Alternative 4. The availability of the land in the west study area for public shared use would not be expected to result in substantially greater adverse effects on this species, for the same reasons specified for military activities. Therefore, Alternative 4 would have less than significant impacts to the loggerhead shrike.

Prairie Falcon: As described for Alternative 1, the cliff habitat in which the prairie falcon typically nests would not be substantially disturbed under Alternative 4, and the abundance of prey species on which it depends would also not be substantially reduced. The availability of the land in the west study area for public shared use would not be expected to result in substantially greater adverse effects on this species, for the same reasons specified for military activities. Therefore, Alternative 4 would have less than significant impacts to the prairie falcon.

Burrowing Owl: Under Alternative 4, impacts to the known burrowing owl populations in the west study area would be different from Alternative 1, but still less than significant. Rather than having a MEB objective located in the vicinity of one of the burrowing owl dens, this area would be used as a task force assembly point. In addition, allowing shared public use in the west study area would result in continued impacts from OHV use and human disturbance. Although some burrows may be crushed and some individual owls would be displaced, these effects would not be substantial enough to constitute a significant impact to this species. Therefore, Alternative 4 would have less than significant impacts to the burrowing owl.

Migratory Birds: Impacts to migratory birds would be as described for Alternative 1 and would be less than significant.

Whitemargin Beardtongue: Populations of whitemargin beardtongue are known from northern-central Lavic Lake Training Area: one within the center of the Lavic Lake playa and one approximately 1.5 miles (2.5 km) east of the playa. As with Alternative 1, no vehicle movement, and minimal Marine movement would be expected to occur in the vicinity of the playa, and no WDZs or SDZs overlay the location of this population. Therefore, Alternative 4 would have less than significant impacts to whitemargin beardtongue.

Harwood's Eriastrum: Impacts to this species would be as described for Alternative 1. Therefore, Alternative 4 would have no impact to Harwood's eriastrum.

Other Status Species

Crucifixion Thorn: As with Alternative 1, the smaller populations in Blacktop and southern Lavic Lake Training Areas would likely be lost or disturbed by MEB Exercises, as they lie directly within the path of proposed vehicle and Marine movement. The small population observed in Emerson Lake Training Area would potentially be lost during MEB exercises as it lies within a WDZ. Therefore, Alternative 4 would have significant impacts to crucifixion thorn. However, with implementation of potential mitigation measure BIO-1, these populations would be avoided through exercise design and/or fencing, and impacts to crucifixion thorn would be reduced to less than significant.

Spectacle Fruit: As with Alternative 1, no vehicle or Marine movement and no ordnance explosion would occur in the vicinity of the spectacle fruit population in Acorn Training Area. Therefore, Alternative 4 would have no impacts to spectacle fruit.

Indirect Impacts to Other Species from Displaced OHV Activity Outside the ROI

Appendix M identifies potential alternative OHV recreation areas outside the ROI for the proposed action (and outside the range of the desert tortoise) that may attract smaller amounts of displaced OHV activity and that are known to contain other listed species and/or critical habitat. While the available data are not sufficient to quantify the level of impact, the projected amount of increased use in these areas would be very low. Based on available information and the assumptions described in Appendix M, it is not anticipated that these species or their habitat would be adversely affected by the minimal amounts of increased use. Indirect impacts to other species at more distant OHV areas would be less than significant.

4.10.5.2 Potential Mitigation Measures

Protected and Special Status Species

Protected - Federally Threatened or Endangered

Desert Tortoise: Special conservation measures described for the proposed action (refer to Section 2.8.4) to extend the desert tortoise protections specified in the existing INRMP and existing Combat Center Biological Opinion to the acquired lands would partially offset this impact. Further offset would occur through the implementation of requirements set forth in a Biological Opinion for this alternative, which would be obtained from USFWS in the event this alternative is selected. No further or additional potential mitigation measures are recommended.

Other Status Species

Crucifixion Thorn: Mitigation measures would be as described for Alternative 1.

4.10.6 Alternative 5 Impacts

4.10.6.1 Impacts

Vegetation

Native plant communities would be adversely affected by crushing, destruction, and dust deposition, similar to that described for Alternative 1. This alternative would contain fewer acres of vegetation as compared to Alternative 1, because the south study area would not be acquired. Unlike the west study area, the south study area does not currently experience much use, so not acquiring the south study area would presumably mean that degradation would not occur.

Vegetation along MSRs on the Combat Center that would potentially be disturbed under Alternative 5 is currently assumed to be moderately disturbed, so impacts occurring along these routes would only result from the increased numbers of vehicle miles under the proposed action (approximately 40% annual increase from MEB exercises). Refer to Appendix I for complete methodology for the GIS-based analysis of impacts to vegetation. Based on the training design included in Section 2.4, the calculated acreages would be as listed in Table 4.10-10. However, mapping of existing disturbance on the Combat Center was not available during EIS preparation, so with the exception of MSRs the GIS-based analysis of impacts to vegetation does not account for instances in which the new disturbance would occur in already disturbed areas. Although it is not reflected in the calculations in Table 4.10-10, allowing continued public use of the west study area could result in greater adverse effects to vegetation than under Alternative 1, because the impacts of increased military activity would not be offset by closure to recreational use (i.e., OHV activity). However, impacts to vegetation from Alternative 5 would remain less than significant.

Table 4.10-10. Acres of New Disturbance[1] to Plant Communities under Alternative 5

Plant Community[2]	Combat Center		West Study Area	
	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed
Creosote bush scrub	16,260	63,414	5,184	22,035
Mojave yucca	N/A	N/A	118	435
Brittlebrush	N/A	N/A	N/A	N/A
Catclaw acacia	601	987	N/A	N/A
Mesquite	N/A	5	N/A	N/A
Big galleta	24	25	N/A	N/A
Playa	119	357	N/A	N/A
Dunes	30	303	N/A	N/A
Total	*17,034*	*65,091*	*5,302*	*22,470*

Notes: [1] Disturbance from projected areas of vehicle travel and ordnance explosion. Refer to Appendix I for methodology.
[2] As defined by CNPS (2009b).
Source: Derived from mapping performed by CDF (2003) and USGS (2004).

Similar to the vegetation impacts described above, Alternative 5 would also have somewhat greater adverse effects to creosote ring UPAs than Alternative 1, due to the continuation of public access in the west study area. As for Alternative 1, proposed conservation measures (Section 2.8.4) to map and protect creosote ring UPAs in a manner consistent with ACEC designation would reduce this to less than significant. No impacts to yucca ring UPAs would occur, as the lands upon which the Upper Johnson Valley Yucca Rings ACEC is located would not be used for military training or ordnance explosion, and

per proposed conservation measures would remain fenced and managed as an ACEC. Therefore, Alternative 5 would have less than significant impacts to creosote ring UPAs and yucca ring UPAs.

Ecosystems

Impacts to ecosystems would be similar to Alternative 1 and would be less than significant, but would be slightly reduced because the south study area would not be acquired. However, public shared use of the west study area would mean that impacts to sensitive ecosystems such as playas and cryptobiotic soils would not be offset as much as they would be if activities were limited to strictly military training (as in Alternatives 1, 2, and 3). These ecosystems are notably slow to recover from disturbance. Nonetheless, impacts to cryptobiotic soils would be limited to the areas covered by the MSRs, ordnance and artillery target areas, and task force assembly points, and travel would not be expected to occur on playas. In the context of the large acreage of intact cryptobiotic soils present on the Combat Center and west study area, these impacts would remain less than significant. Some protection of cryptobiotic soils would occur as an indirect result of desert tortoise protection efforts.

Risk of wildfire would also be greater under this alternative due to continued public use (e.g., campfires, sparks from OHV exhaust, etc.). However, wildfire hazard would remain low due to the low fuel load and separation between vegetation, and would be further addressed by the Combat Center's existing Wildland Fire Plan. Therefore, Alternative 5 would have less than significant impacts to plant community ecosystems resulting from fire.

Wildlife

Impacts to wildlife under Alternative 5 would be similar to those described for Alternative 1, but would be somewhat greater due to the availability of the west study area for public shared use. This availability would be largely offset by not acquiring the south study area.

Because of the geographic area and intensity of activity involved in MEB Exercises, some adverse impacts to individual non-special status wildlife species would remain but would be less than significant.

Protected and Special Status Species

Protected - Federally Threatened or Endangered

Desert Tortoise: Activities under Alternative 5 would result in the loss of tortoises and occupied habitat, as well as degradation of tortoise habitat, within high- and medium-intensity disturbance areas. An estimated 2,533 ± 633 (95% CI) adult tortoises and 11,940 ± 2,984 (95% CI) juvenile tortoises are located within the lands that would be acquired under Alternative 5 and would fall under the management of the Combat Center. Military activities in the west study area would be limited to vehicle and Marine movements, and direct fire during MEB Final Exercises. Impacts to tortoises from aircraft-delivered ordnance and artillery would not occur in the west study area under this alternative, but these activities would be concentrated more within the existing Combat Center boundaries. Based on GIS modeling (methodology and assumptions described in Appendix I), it is anticipated that Alternative 5 would result in the take from military training (through translocation, injury, or death) of approximately 472 to 3,176 adult tortoises (324 to 562 in the acquisition study area) and 2,225 to 14,970 juvenile tortoises (1,527 to 2,649 in the acquisition study area) over the life of the project. The wide range of the total take estimate results primarily from the broad range of the low density category (0 to 20 tortoises per mi^2), and the high occurrence of this category on the Combat Center. As for Alternative 1, much of this take would occur in the first few years of the proposed action as a result of the new disturbance, with annual rates of take decreasing rapidly before reaching a steady rate of relatively low take (e.g., 2 to 4 adult tortoises per

year). Future changes in the battalion routes of travel would contribute to continued translocation, injury, or death.

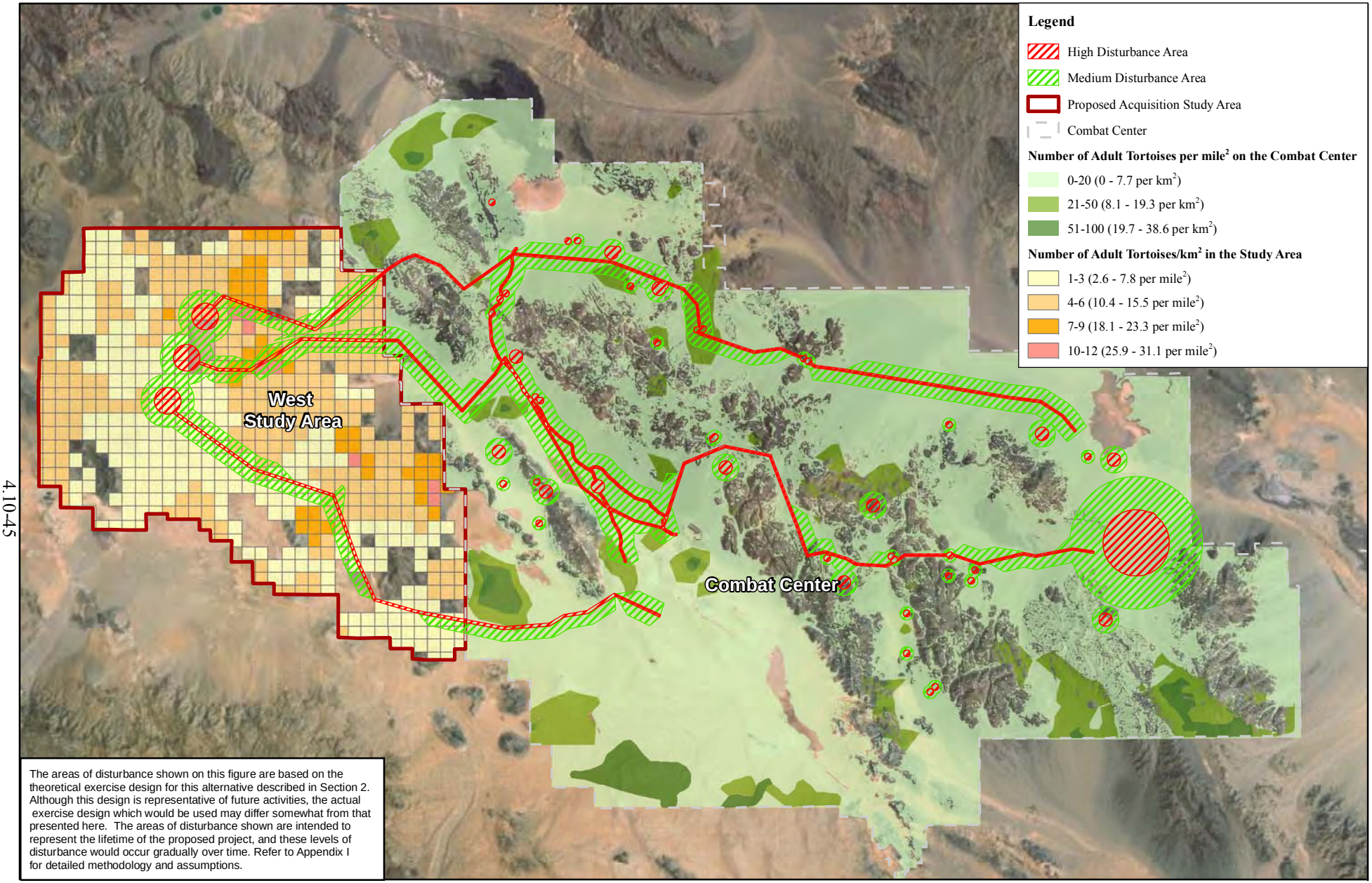
Based on the same assumptions used for Alternative 1 and listed in Appendix I, a total of 104,153 acres (42,149 hectares) of occupied desert tortoise habitat may experience impacts from military training under this alternative: an estimated 21,125 acres (8,549 hectares) in high-intensity areas, and 83,028 acres (33,600 hectares) in medium-intensity areas (Table 4.10-11, Figure 4.10-5). A potential also exists for a lower degree of such impact in low-intensity disturbance areas. No designated desert tortoise critical habitat would be affected.

Table 4.10-11. Acres of New Disturbance[a] to Occupied Desert Tortoise Habitat under Alternative 5

Habitat Utilization by Adult Desert Tortoises[b]	West Study Area		Combat Center	
	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed
0 - ~8 per km^2 [c]			15,420	57,281
1 - 3 per km^2	2,715	9,326		
4 - 6 per km^2	1,994	10,395		
7 - 9 per km^2	323	1,329		
~9 - ~19 per km^2			616	3,895
10 - 12 per km^2	57	802		
~20 - ~39 per km^2			N/A	N/A
Total	*5,089*	*21,852*	*16,036*	*61,176*

Notes: [a] Disturbance from projected areas of vehicle travel and ordnance explosion. Refer to Appendix I for methodology and assumptions.
[b] Categories in column one are different for the Combat Center versus the acquisition study areas due to different abundance classes used by study authors (i.e., MAGTF Training Command 2001; Karl 2010).
[c] Authors indicate that this category means "tortoises may not exist" in this area.

Source: Modified from MAGTF Training Command 2001 and Karl 2010.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2001, 2009a; Karl 2010

Figure 4.10-5
Disturbance to Occupied Desert Tortoise Habitat Under Alternative 5

N

Further, under Alternative 5, recreational use in the west study area would continue, so increased military activities would not be offset by a cessation of adverse effects from OHV use. It is difficult to speculate whether the effects of public access during times when MEB Exercises are not occurring would be greater than those resulting from MEB Building Block training, as would occur under Alternative 1. In general, however, public access and OHV activity are less regulated and tortoise injury and/or mortality would be more difficult to avoid or mitigate in areas of public access. Disturbance in the west study area from recreational vehicles would act synergistically with disturbance from military training, potentially leading to greater overall disturbance in the west study area than currently exists. However, because the south study area would not be acquired, desert tortoises in that relatively undisturbed area would not be adversely affected by military training activities. In addition, MEB Building Block training would not occur in the west study area for 160 annual days as it would under Alternative 1, so the annual duration of impacts from military training would be shorter.

An unknown additional amount of take would result from recreational use authorized in the west study area when military training is not occurring; however, that take would be approximately the same as currently occurs in the Johnson Valley OHV Area. During the approximately 2 months per year that the Johnson Valley OHV Area would be closed, displaced recreational OHV use would result in some indirect impacts to desert tortoises located within other regional OHV areas (e.g., Stoddard Valley); however this displacement would be much less than under Alternative 1 (23% displaced under Alternative 5 as compared to 67%; refer to Section 4.2 *Recreation*).

Under Alternative 5, two new Special Use Areas established as an SCM (Section 2.8.4) would protect 12,015 acres (4,862 hectares) of occupied desert tortoise habitat in the west study area. A total of approximately 170 to 272 (95% CI) adult tortoises and 801 to 1,282 (95% CI) juvenile tortoises are located within these areas and would benefit from enhanced protection as compared to existing conditions.

Indirect impacts to desert tortoise under Alternative 5 would be similar to those described in Section 4.10.2 and in Appendix M for Alternative 1, but considerably reduced in intensity because the level of potential displacement of OHV activity would be substantially lower under Alternative 5. Nonetheless, because of the threatened status of the desert tortoise, these indirect impacts would be significant.

The Marine Corps has received an incidental take statement (see Appendix O) from the USFWS to account for take or loss associated with the Preferred Alternative (Alternative 6). In the event that Alternative 5 becomes the Preferred Alternative, a revised Biological Opinion and/or incidental take statement would be obtained from USFWS. Compliance with any Biological Opinion and/or incidental take statement would address this impact under Section 7 requirements, but as death or displacement of a federally threatened species would still occur, this impact would remain significant.

Species with Other Federal Status

<u>Mojave Fringe-Toed Lizard:</u> Under Alternative 5, during MEB Exercises the southern task force would potentially travel near habitat known to host Mojave fringe-toed lizards in the west study area and the Combat Center. In addition, during MEB Exercises, the northern task force would travel in close proximity to populations historically observed in northern Lead Mountain and Lavic Lake Training Areas. However, the loose sand ecosystem to which the Mojave fringe-toed lizard is restricted would not be likely to be traversed by vehicles or Marines on foot. Similarly, artillery and aviation target arrays would not be set up in the loose sand area, so the chances of ordnance impacting these areas would be relatively low. Adverse effects would be more likely to result from the continuation of public access to the west study area, but this would not represent an impact compared to baseline conditions. Therefore, similar to

Alternative 1, Alternative 5 would have less than significant impacts to these populations of Mojave fringe-toed lizards.

Rosy Boa: Impacts to this species would be as described for Alternative 1, as the only known rosy boas in the ROI have been observed on the Combat Center, and activities on the Combat Center under Alternative 5 would be roughly the same as for Alternative 1. Therefore, Alternative 5 would have less than significant impacts to the rosy boa.

Townsend's Western Big-Eared Bat and Pallid Bat: Overall, impacts to these species would be similar to those described for Alternative 1. The potential for human disturbance in the west study area would be greater because the land would be available to the public when MEB Exercises are not occurring, but adverse effects from Alternative 5 would still not be substantial. Therefore, Alternative 5 would have less than significant impacts to these bat species.

Nelson's Bighorn Sheep: Disturbance of Nelson's bighorn sheep under Alternative 5 would be similar to that described for Alternative 1, as there would be no difference in proposed operations near the Bullion Mountains. Additionally, airspace establishment over the Ship Mountains in the east study area, where another population of sheep is located, would be the same as described for Alternative 1. Therefore, Alternative 5 would have less than significant impacts to Nelson's bighorn sheep.

Golden Eagle: As described for Alternative 1, the golden eagle would not be substantially affected by the increased level of operations, land acquisition, or airspace establishment under Alternative 5. The availability of the land in the west study area for public shared use would not be expected to result in substantially greater adverse effects on this species, for the same reasons specified for military activities. Furthermore, by not acquiring land in the south study area, potential impacts would be reduced compared to Alternative 1. Therefore, Alternative 5 would have less than significant impacts to the golden eagle.

LeConte's Thrasher: As described for Alternative 1, the habitat required by the LeConte's thrasher would potentially be among those heavily disturbed by Marine and vehicle traffic under this alternative. The shared public access allowed under this alternative would result in somewhat greater impacts than under Alternative 1. However, by eliminating acquisition of the south study area, much of these additional impacts would be offset. Based on the projected routes of travel, WDZs, and indirect fire SDZs, most of the locations where LeConte's thrashers were observed to occur by Cutler *et al.* (1999) would not experience high-intensity, or even medium-intensity, disturbance from MEB or MEB Building Block training activities under Alternative 5. Exceptions include those individuals observed in Lavic Lake and Lava Training Areas (Cutler *et al.* 1999). The LeConte's thrashers that were historically observed in potentially impacted areas of Lava or Lavic Lake Training Areas were solitary individuals (Cutler *et al.* 1999). The potential loss of these individuals due to project activities would not jeopardize the species' continued existence on the Combat Center or in the region. Therefore, impacts to the LeConte's thrasher from Alternative 5 would be less than significant.

Loggerhead Shrike: As described for Alternative 1, the loggerhead shrike would not be substantially affected by the increased level of operations, land acquisition, or airspace establishment under Alternative 5. The availability of land in the west study area for public shared use would not be expected to result in substantially greater adverse effects on this species, for the same reasons specified for military activities. Any adverse effects that might occur would be offset by not acquiring the south study area. Therefore, Alternative 5 would have less than significant impacts to the loggerhead shrike.

Prairie Falcon: As described for Alternative 1, the cliff habitat in which the prairie falcon typically nests would not be substantially disturbed under Alternative 5, and the abundance of prey species on which it

depends would also not be substantially reduced. The availability of land in the west study area for public shared use would not be expected to result in substantially greater adverse effects on this species, for the same reasons specified for military activities. In addition, by not acquiring the land in the south study area, any potential effects to this species would be reduced. Therefore, Alternative 5 would have less than significant impacts to the prairie falcon.

Burrowing Owl: Because the south study area would not be acquired, no impacts to burrowing owls in the south study area would occur. Impacts to the known burrowing owl populations in the west study area would be different from Alternative 1, but still less than significant. Rather than having a MEB objective located in the vicinity of one of the burrowing owl dens, this area would be used as a task force assembly point. In addition, allowing shared public use in the west study area would result in continued impacts from OHV use and human disturbance. Although some burrows may be crushed and some individual owls would be displaced, these effects would not be substantial enough to constitute a significant impact to this species. Therefore, Alternative 5 would have less than significant impacts to the burrowing owl.

Whitemargin Beardtongue: Populations of whitemargin beardtongue are known from the northern central area of Lavic Lake Training Area, one within the center of the Lavic Lake playa and one approximately 1.5 miles (2.5 km) east of the playa. As with Alternative 1, no vehicle movement, and minimal Marine movement would be expected to occur in the vicinity of the playa, and no WDZs or SDZs overlay the location of this population. Therefore, Alternative 5 would have less than significant impacts to whitemargin beardtongue.

Harwood's Eriastrum: Impacts to this species would be as described for Alternative 1. Therefore, Alternative 5 would have no impacts to Harwood's eriastrum.

Other Status Species

Crucifixion Thorn: As with Alternative 1, the smaller populations in Blacktop and southern Lavic Lake Training Areas would likely be lost or disturbed by MEB Exercises, as they lie directly within the path of vehicle and Marine movement. The small population observed in Emerson Lake Training Area would potentially be lost during MEB Exercises as it lies within a WDZ. Therefore, Alternative 5 would have significant impacts to crucifixion thorn. However, with implementation of the potential mitigation measure BIO-1, these populations would be avoided through exercise design and/or fencing, and impacts to crucifixion thorn would be reduced to less than significant.

Spectacle Fruit: As with Alternative 1, no vehicle or Marine movement and no ordnance explosion would occur in the vicinity of the spectacle fruit population in Acorn Training Area. Therefore, Alternative 5 would have no impacts to spectacle fruit.

Indirect Impacts to Other Species from Displaced OHV Activity Outside the ROI

Appendix M identifies potential alternative OHV recreation areas outside the ROI for the proposed action (and outside the range of the desert tortoise) that may attract smaller amounts of displaced OHV activity and that are known to contain other listed species and/or critical habitat. While the available data are not sufficient to quantify the level of impact, the projected amount of increased use in these areas would be very low. Based on available information and the assumptions described in Appendix M, it is not anticipated that these species or their habitat would be adversely affected by the minimal amounts of increased use. Indirect impacts to other species at more distant OHV areas would be less than significant.

4.10.6.2 Potential Mitigation Measures

Protected and Special Status Species

Protected - Federally Threatened or Endangered

Desert Tortoise: Special conservation measures described for the proposed action (refer to Section 2.8.4) to extend the desert tortoise protections specified in the existing INRMP and existing Combat Center Biological Opinion to the acquired lands would partially offset this impact. Further offset would occur through the implementation of requirements set forth in a Biological Opinion for this alternative, which would be obtained from USFWS in the event this alternative is selected. No further or additional potential mitigation measures are recommended.

Other Status Species

Crucifixion Thorn: Mitigation measures would be as described for Alternative 1.

4.10.7 Alternative 6 Impacts (Preferred Alternative)

4.10.7.1 Impacts

Vegetation

Under Alternative 6, native plant communities would be adversely affected by crushing, destruction, and dust deposition as described for Alternative 1. Vegetation along MSRs on the Combat Center that would potentially be disturbed under Alternative 6 is currently assumed to be moderately disturbed, so impacts occurring along these routes would only result from the increased numbers of vehicle miles under the proposed action (approximately 40% annual increase from MEB exercises). Refer to Appendix I for complete methodology for the GIS-based analysis of impacts to vegetation. Based on the training design included in Section 2.4, the calculated acreages would be as listed in Table 4.10-12. However, mapping of existing disturbance on the Combat Center was not available during EIS preparation, so with the exception of MSRs the GIS-based analysis of impacts to vegetation does not account for instances in which the new disturbance would occur in already disturbed areas.

Table 4.10-12. Acres of New Disturbance to Plant Communities under Alternative 6

Plant Community[2]	Combat Center		West Study Area		South Study Area	
	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed	Highly Disturbed	Moderately Disturbed
Creosote bush scrub	18,349	67,637	9,454	30,686	908	2,379
Mojave yucca	N/A	N/A	74	337	N/A	N/A
Brittlebrush	N/A	53	N/A	N/A	N/A	N/A
Catclaw acacia	645	1,141	N/A	N/A	N/A	N/A
Mesquite	N/A	26	N/A	N/A	N/A	N/A
Big galleta	24	26	N/A	N/A	N/A	N/A
Playa	239	1,439	13	52	N/A	N/A
Dunes	234	505	N/A	N/A	N/A	238
Total	*19,491*	*70,827*	*9,541*	*31,075*	*908*	*2,617*

Notes: [1]Disturbance from projected areas of vehicle travel and ordnance explosion. Refer to Appendix I for methodology.
[2]As defined by CNPS (2009b).
Source: Derived from mapping performed by CDF (2003) and USGS (2004).

Although it is not reflected in the calculations in Table 4.10-12, allowing continued public use of the RPAA could result in greater adverse effects to vegetation than under Alternative 1, due to the effects of OHV activity. It is difficult to speculate whether the effects of public access in the RPAA during times when MEB Exercises are not occurring would be greater than those resulting from MEB Building Block training, as would occur under Alternative 1. In general, however, public access and OHV activity are less regulated and damage to vegetation would be more difficult to avoid or mitigate in areas of public access.

Similar to the vegetation impacts described above, Alternative 6 would also have somewhat greater adverse effects to creosote ring UPAs than Alternative 1, due to the continuation of public access in the west study area. As for Alternative 1, proposed conservation measures (Section 2.8.4) to map and protect creosote ring UPAs in a manner consistent with ACEC designation would reduce this to less than significant. No impacts to yucca ring UPAs would occur, as the lands upon which the Upper Johnson Valley Yucca Ring ACEC is located would not be used for military training or ordnance explosion, and per proposed conservation measures would remain fenced and managed as an ACEC. Therefore, Alternative 6 would have less than significant impacts to creosote ring UPAs and yucca ring UPAs.

Ecosystems

Impacts to ecosystems would be relatively similar to Alternative 1, as much of the same land would be acquired and used for training activities. However, specific areas within the west study area would have substantial differences. A total of 35,909 acres (14,532 hectares) in the west study area, mostly in the northwest corner would not be acquired under Alternative 6. Further, approximately 38,137 acres (15,434 hectares) in the southern portion of the west study area would be open for restricted public access and use (subject to restrictions described in Section 2.5) during periods when the MEB Exercise is not occurring. The benefits of not acquiring the land in the northwest of the west study area would be largely offset by allowing continued public access (with attendant ecosystem effects from OHV use) on the southern portion. Continued public use would result in greater adverse effects to sensitive ecosystems such as playas and cryptobiotic soils than if activities were limited to strictly military training. Risk of wildfire would also be greater under this alternative due to public use (campfires, sparks from OHV exhaust, etc.), but would remain less than significant. Wildfire hazard would be addressed by the Combat Center's existing Wildland Fire Plan, which would be extended to any acquired lands. Some protection of

cryptobiotic soils would occur as an indirect result of desert tortoise protection efforts. Therefore Alternative 6 would have less than significant impacts to plant community ecosystems resulting from fire, as well as less than significant impacts to cryptobiotic soils.

Wildlife

Adverse effects to wildlife under Alternative 6 would be similar to those described for Alternative 1, but would be somewhat greater due to the availability of a portion of the west study area for public shared use. With extension of existing conservation measures in the Combat Center INRMP, Biological Opinion, and Combat Center Order to the acquired lands, these impacts would be less than significant. Because of the geographic area and intensity of activity involved in MEB Exercises, some adverse impacts to individual non-special status wildlife species would remain but would be less than significant.

Protected and Special Status Species

Protected - Federally Threatened or Endangered

Desert Tortoise: Activities under Alternative 6 would result in the loss of tortoises and occupied habitat, as well as degradation of tortoise habitat, within high- and medium-intensity disturbance areas. Using the TRED survey method, an estimated 2,415 ± 547 (95% CI) adult tortoises and 22,093 (95% CI 10,759 to 42,844) juvenile tortoises are located within the lands that would be acquired under Alternative 6 and would fall under the management of the Combat Center. Based on GIS modeling (methodology and assumptions described in Appendix I), it is anticipated that Alternative 6 would result in the take from military training (through translocation, injury, or death) of between 645 and 3,769 adult tortoises over the life of the project (503 to 834 in the acquisition study areas). Take of juvenile tortoises is estimated to range between 3,040 and 17,766 over the life of the project (2,371 to 3,931 in the acquisition study areas). The wide range of the total take estimates results primarily from the broad range of the low density category (0 to 20 tortoises per mi^2), and the high occurrence of this category on the Combat Center. As for Alternative 1, much of this take would occur in the first few years of the proposed action as a result of the new disturbance, with annual rates of take decreasing rapidly before reaching a steady rate of relatively low take (e.g., 2 to 4 adult tortoises per year). Future changes in the battalion routes of travel would contribute to continued translocation, injury, or death.

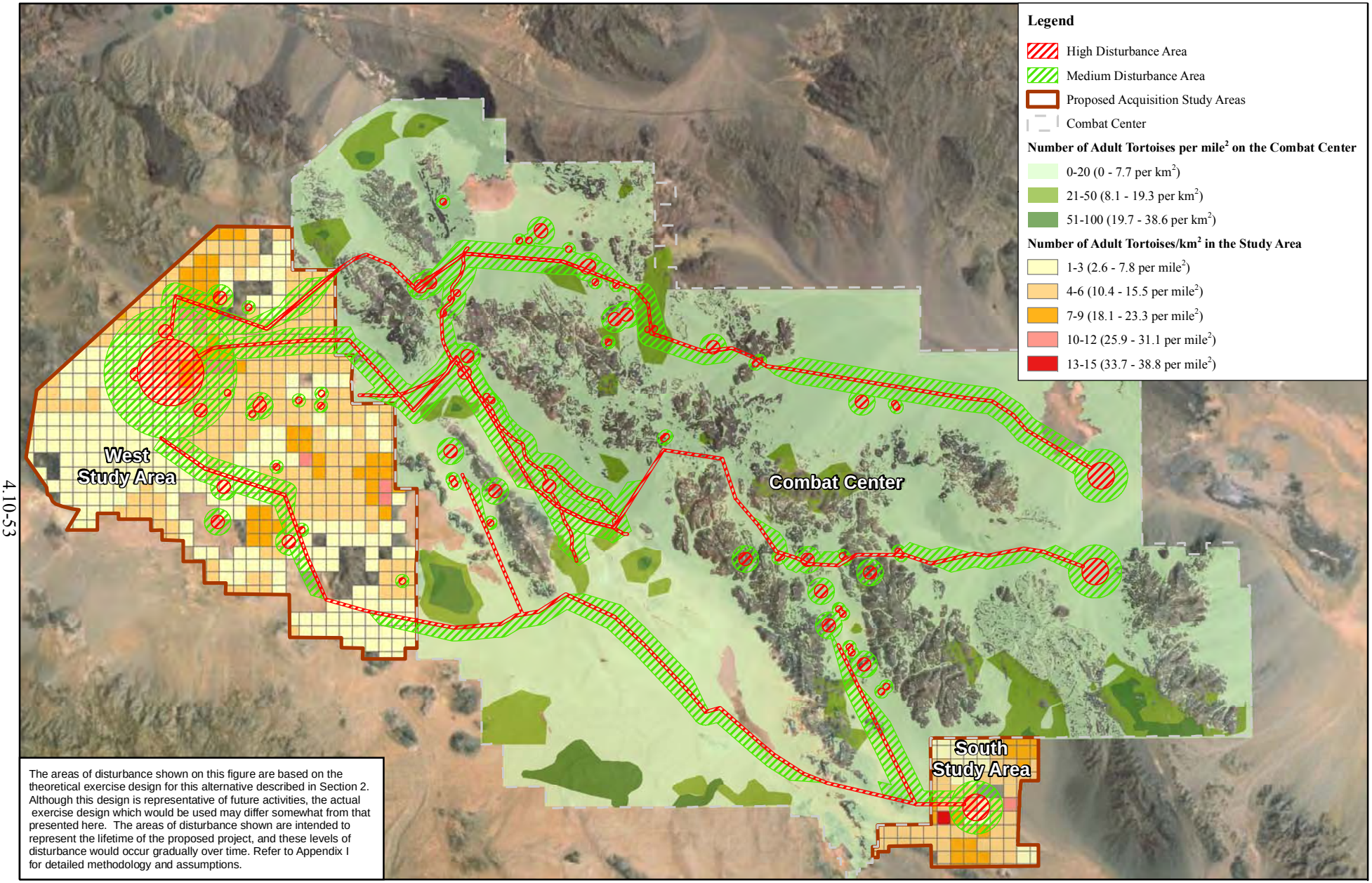
Based on the same assumptions used for Alternative 1 and listed in Appendix I, a total of 125,265 acres (50,693 hectares) of occupied desert tortoise habitat under this alternative may experience impacts from military training during the estimated 50-year project lifetime: an estimated 28,790 acres (11,651 hectares) in high-intensity areas, and 96,475 acres (39,042 hectares) in medium-intensity areas (Table 4.10-13, Figure 4.10-6). A potential also exists for a lower degree of such impact in low-intensity disturbance areas. No designated desert tortoise critical habitat would be affected. Further, under Alternative 6, recreational use in the west study area would continue, so increased military activities would not be offset by a cessation of adverse effects from OHV use. Instead, disturbance in the RPAA from recreational vehicles would act synergistically with disturbance from military training, potentially leading to greater overall disturbance in the RPAA than currently exists.

Table 4.10-13. Acres of New Disturbance[a] to Occupied Desert Tortoise Habitat under Alternative 6

Habitat Utilization by Adult Desert Tortoises[b]	West Study Area		South Study Area		Combat Center	
	High Intensity	Medium Intensity	High Intensity	Medium Intensity	High Intensity	Medium Intensity
0 - ~8 per km^2 [c]					17,545	65,570
1 - 3 per km^2	3,890	8,107	468	332		
4 - 6 per km^2	4,620	13,237	415	1,884		
7 - 9 per km^2	1,133	2,060	24	400		
~9 - ~19 per km^2					686	3,636
10 - 12 per km^2	9.2	1,248	N/A	N/A		
13 - 15 per km^2	N/A	N/A	N/A	0.4		
~20 - ~39 per km^2					N/A	N/A
Total	*9,652*	*24,652*	*907*	*2,617*	*18,231*	*69,206*

Notes: [a] Disturbance from projected areas of vehicle travel and ordnance explosion. Refer to Appendix I for methodology and assumptions.
[b] Categories in column one are different for the Combat Center versus the acquisition study areas due to different abundance classes used by study authors (i.e., MAGTF Training Command 2001; Karl 2010).
[c] Authors indicate that this category means "tortoises may not exist" in this area.

Source: Modified from MAGTF Training Command 2001 and Karl 2010.



Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2001, 2009a; Karl 2010

Figure 4.10-6
Disturbance to Occupied Desert Tortoise Habitat Under Alternative 6

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Under Alternative 6, three new Special Use Areas established as an SCM (Section 2.8.4) would protect 14,950 acres (6,050 hectares) of desert tortoise habitat: 12,015 acres (4,862 hectares) in the west study area and 2,935 acres (1,188 hectares) in the south study area. A total of approximately 234 to 367 (95% CI) adult tortoises and 1,103 to 1,730 (95% CI) juvenile tortoises are located within these areas and would benefit from enhanced protection as compared to existing conditions.

Because MEB Building Block training exercises in the west study area would represent a relocation of existing training from the Combat Center rather than net new training, impacts to desert tortoises in the west study area from MEB Building Block training would be accompanied by a reduction in impacts to desert tortoises on the Combat Center, where average desert tortoise densities are higher. This reduction in activity on the Combat Center is not accounted for in calculations of disturbance (e.g., Table 4.10-13).

An unknown additional amount of take would result from recreational use authorized in the RPAA of the west study area when military training is not occurring; however, that take would be approximately the same or less than currently occurs in the Johnson Valley OHV Area. Closure of a portion of the Johnson Valley OHV Area under Alternative 6 (the exclusive military use area) would be expected to result in concentration of OHV activity in the RPAA (approximately 70% of the displaced recreational users are expected to use the RPAA), which would result in greater adverse effects from OHV activity in those lands than currently occurs. Some OHV activity would also be displaced to other regional OHV Areas (e.g., Stoddard Valley), resulting in indirect impacts to tortoises in those areas, though displacement is estimated to be less than under Alternative 1 (23% displaced under Alternative 6 as compared to 67%; refer to Section 4.2 *Recreation*).

Indirect impacts to desert tortoise under Alternative 6 would be similar to those described in Section 4.10.2 and in Appendix M for Alternative 1, but considerably reduced in intensity because the level of potential displacement of OHV activity would be substantially lower under Alternative 6. Nonetheless, because of the threatened status of the desert tortoise, these indirect impacts would be significant.

The Marine Corps has received an incidental take statement (see Appendix O) from the USFWS to account for take or loss associated with this alternative. Compliance with the Biological Opinion would address this impact under Section 7 requirements, but as death or displacement of a federally threatened species would still occur, this impact would remain significant.

Species with Other Federal Status

Mojave Fringe-Toed Lizard: As noted for Alternative 1, Mojave fringe-toed lizards in the west study area are concentrated in the southeast region, mostly along the western slope of the mountains that contain the "Hammers" OHV trails, east of Means Dry Lake. This area would be included in the lands proposed for acquisition under Alternative 6. However, this area would be designated for Restricted Public Access, allowing continued OHV use. Therefore, this area would be subject to the limited adverse effects resulting from MEB Exercises while continuing to undergo disturbance from OHV use. However, adverse effects from OHV use would be somewhat reduced from existing conditions due to the restricted availability. Therefore, Alternative 6 would have less than significant impacts to the Mojave fringe-toed lizard.

Rosy Boa: Because the rosy boa is thought to be extirpated from the west study area, the shared use with OHV recreation would not result in additional impacts to this species as compared to Alternative 1. Therefore, Alternative 6 would have less than significant impacts to the rosy boa.

Townsend's Western Big-Eared Bat and Pallid Bat: Overall, impacts to these species would be similar to those described for Alternative 1. The potential for human disturbance in the west study area would be

greater because the land would be available to the public when MEB Exercises are not occurring, but adverse effects from Alternative 6 would still not be substantial. Therefore, Alternative 6 would have less than significant impacts to these bat species.

Nelson's Bighorn Sheep: Disturbance of Nelson's bighorn sheep under Alternative 6 would be similar to that described for Alternative 1, as there would be no difference in proposed operations near the Bullion Mountains. Additionally, airspace establishment over the Ship Mountains in the east study area, where another population of sheep is located, would be the same as described for Alternative 1. Therefore, Alternative 6 would have less than significant impacts to Nelson's bighorn sheep.

Golden Eagle: As described for Alternative 1, the golden eagle would not be substantially affected by the increased level of operations, land acquisition, or airspace establishment under Alternative 6. The availability of some of the land in the west study area for public shared use would not be expected to result in substantially greater adverse effects on this species, for the same reasons specified for military activities. Therefore, Alternative 6 would have less than significant impacts to the golden eagle.

LeConte's Thrasher: As described for Alternative 1, the habitat required by the LeConte's thrasher would potentially be among those heavily disturbed by Marine foot and vehicle traffic under this alternative. The shared public access allowed under this alternative would result in somewhat greater adverse effects than under Alternative 1. Based on the projected routes of travel, WDZs, and indirect fire SDZs, most of the locations where LeConte's thrashers were observed to occur by Cutler *et al.* (1999) would not experience high-intensity, or even medium-intensity, disturbance from MEB or MEB Building Block training activities under Alternative 6. Exceptions include those in Lava and Lavic Lake Training Areas, which fall within the estimated disturbance footprint for this alternative. However, the LeConte's thrashers that were historically observed in potentially impacted areas of Lava or Lavic Lake Training Areas were solitary individuals (Cutler *et al.* 1999). The potential loss of these individuals due to project activities would not jeopardize the species' continued existence on the Combat Center or in the region. Therefore, impacts to the LeConte's thrasher from Alternative 6 would be less than significant.

Loggerhead Shrike: As described for Alternative 1, the loggerhead shrike would not be substantially affected by the increased level of operations, land acquisition, or airspace establishment under Alternative 6. The availability of the land in the west study area for public shared use would not be expected to result in substantially greater adverse effects on this species, for the same reasons specified for military activities. Therefore, Alternative 6 would have less than significant impacts to the loggerhead shrike.

Prairie Falcon: As described for Alternative 1, the cliff habitat in which the prairie falcon typically nests would not be substantially disturbed under Alternative 6, and the abundance of prey species on which it depends would not be substantially reduced. The availability of land in the west study area for public shared use would not be expected to result in substantially greater adverse effects on this species, for the same reasons specified for military activities. Therefore, Alternative 6 would have less than significant impacts to the prairie falcon.

Burrowing Owl: Under Alternative 6, impacts to the known burrowing owl populations in the west study area would be similar to those described for Alternative 1. Allowing shared public use in the west study area would, however, result in continued impacts from OHV use and human disturbance. Nonetheless, Alternative 6 would have less than significant impacts to the burrowing owl.

Migratory Birds: Impacts to migratory birds would be as described for Alternative 1 and would be less than significant.

Whitemargin Beardtongue: Populations of whitemargin beardtongue are known from the northern central area of Lavic Lake Training Area, one within the center of the Lavic Lake playa and one approximately 1.5 miles (2.5 km) east of the playa. As with Alternative 1, no vehicle movement, and minimal Marine movement would be expected to occur in the vicinity of the playa, and no WDZs or SDZs overlay the location of this population. Therefore, Alternative 6 would have no impacts to whitemargin beardtongue.

Harwood's Eriastrum: Impacts to this species would be as described for Alternative 1. Therefore, Alternative 6 would have no impacts to Harwood's eriastrum.

Other Status Species

Crucifixion Thorn: As with Alternative 1, the smaller populations in Blacktop and southern Lavic Lake Training Areas would likely be lost or disturbed during MEB Exercises, as they lie directly within the path of vehicle and Marine movement. The small population observed in Emerson Lake Training Area would potentially be lost during MEB Exercises as it lies within a WDZ. Therefore, Alternative 6 would have significant impacts to crucifixion thorn. However, with implementation of the potential mitigation measure BIO-3, these populations would be avoided through exercise design and/or fencing, and impacts to crucifixion thorn would be reduced to less than significant.

Spectacle Fruit: As with Alternative 1, no vehicle or Marine movement and no ordnance explosion would occur in the vicinity of the spectacle fruit population in Acorn Training Area. Therefore, Alternative 6 would have no impacts to spectacle fruit.

Indirect Impacts to Other Species from Displaced OHV Activity Outside the ROI

Appendix M identifies potential alternative OHV recreation areas outside the ROI for the proposed action (and outside the range of the desert tortoise) that may attract smaller amounts of displaced OHV activity and that are known to contain other listed species and/or critical habitat. While the available data are not sufficient to quantify the level of impact, the projected amount of increased use in these areas would be very low. Based on available information and the assumptions described in Appendix M, it is not anticipated that these species or their habitat would be adversely affected by the minimal amounts of increased use. Indirect impacts to other species at more distant OHV areas would be less than significant.

4.10.7.2 Potential Mitigation Measures

Protected and Special Status Species

Protected - Federally Threatened or Endangered

Desert Tortoise: Special conservation measures described for the proposed action (refer to Section 2.8.4) to extend the desert tortoise protections specified in the existing INRMP and existing Combat Center Biological Opinion to the acquired lands would partially offset this impact. Further offset would occur through the implementation of requirements set forth in the Biological Opinion (see Appendix O). In addition, the proposed Special Use Areas would provide disturbance-free habitat for desert vegetation and wildlife and impacts across the training area would be minimized by maintaining the same training footprint for each exercise. No further or additional potential mitigation measures are recommended.

Other Status Species

Crucifixion Thorn: Mitigation measures would be as described for Alternative 1.

4.10.8 No-Action Alternative

Under the No-Action Alternative, the Marine Corps would not establish a large-scale training facility to accommodate sustained, combined-arms, live-fire, and maneuver training exercises for a MEB-sized MAGTF. Ongoing operations, environmental protection programs, and training exercises throughout the installation would continue unchanged. Current activities in the areas proposed for acquisition (e.g., OHV recreation, mining, potential energy development) would continue.

No impacts to biological resources would occur. However, adverse effects from public access and OHV activity in the west study area would continue.

4.10.9 Summary of Impacts

Table 4.10-14 summarizes the impacts of each action alternative and the no-action alternative.

Table 4.10-14. Summary of Impacts

Alternative	Impacts
Alternative 1	SI <u>Protected - Federally Threatened or Endangered Species</u> • Over the project lifetime, significant impacts to and potential take of 733 to 3,837 (590 to 978 in the acquisition study areas) federally threatened adult desert tortoises would occur from translocation, crushing due to vehicle and Marine movements, and ordnance explosion on the Combat Center and in the west and south study areas. However, an unknown but substantial amount of take that currently occurs due to OHV recreation and public access in the west study area would no longer occur, providing a positive offset to the military training impact in the west study area. Most of this OHV activity would be displaced to other regional OHV areas and designated routes, thereby causing significant indirect impacts to tortoises and critical habitat located in those areas. SI-M <u>Other Status Species</u> • Small crucifixion thorn populations in Blacktop, Emerson Lake, and southern Lavic Lake Training Areas would likely be destroyed or damaged during MEB Exercises as a result of crushing or ordnance explosion. However, with implementation of the potential mitigation measure BIO-1 to avoid this population through exercise design, and/or protect it with fencing, these impacts would be reduced to less than significant. LSI <u>Protected - Federally Threatened or Endangered Species</u> • A total of 128,711 acres of non-critical desert tortoise habitat may experience impacts from military training under this alternative, but this impact would be less than significant. <u>Species With Other Federal Status</u> • Less than significant impacts to Mojave fringe-toed lizards on the Combat Center and in the west and south study areas would occur from Marine and vehicle movement and ordnance explosion. • Less than significant impacts to resident special status and migratory birds on the Combat Center and in the west and south study areas would result from loss of vegetation and physical disturbance or displacement. • Less than significant impacts to special status bat species (pallid bat and Townsend's western big-eared bat) would occur due to ordnance explosion and potential Marine movement in the vicinity of current and potentially occupied mines and caves.

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Table 4.10-14. Summary of Impacts

Alternative	Impacts
Alternative 1 (continued)	• Less than significant impacts to Nelson's bighorn sheep on the Combat Center and on the lands underlying the proposed airspace establishment would occur. • Less than significant impacts would occur to whitemargin beardtongue. Other Status Species • Less than significant impacts would occur to spectacle fruit populations due to physical damage and destruction from training activities. • Indirect impact of displaced OHV use on species and occupied habitat in more distant OHV areas located outside the ROI. Vegetation • Less than significant impacts would occur to vegetation and creosote ring UPAs due to physical damage and destruction from training activities. • Less than significant impacts to native plant communities would occur from proliferation of non-native plant species due to anthropogenic dispersal and increased risk of fire. Ecosystems • Less than significant impacts to plant community ecosystems would occur due to increased risk of fire, changes in fire frequency regime, and wildlife mortality. • Less than significant impacts to cryptobiotic soils would occur on the Combat Center and in the west and south study areas due to Marine and vehicle movement, ordnance explosion, and helicopter landings. • Less than significant impacts would occur to caves and mines, aquatic habitats, and playas. Wildlife • Less than significant impacts to non-special status wildlife species, including mammals, amphibians, reptiles, and birds would result from training activities on the Combat Center and in the west and south study areas.
Alternative 2	SI Protected - Federally Threatened or Endangered Species • Impacts to desert tortoises are from military training would be similar to those under Alternative 1, but would be somewhat reduced due to the smaller west study area. Over the project lifetime, potential take of 608 to 3,298 federally threatened adult desert tortoises (466 to 761 in the acquisition study areas) would occur from translocation, crushing due to vehicle and Marine movements, and ordnance explosion on the Combat Center and west and south study areas. An unknown but substantial amount of take that currently occurs due to OHV recreation and public access in the west study area would no longer occur, providing a positive offset to impacts from military training in the west study area. However, less of the Johnson Valley OHV Area would be closed, so more recreational activity is expected to simply be displaced to the remaining OHV Area. As a result, although Alternative 2 would result in slightly reduced impacts to desert tortoises from military training, the indirect impact of intensified activity on the remaining OHV Area, along with displaced OHV activity at Stoddard Valley OHV Area and other selected areas in the vicinity would make the overall impact to tortoises from Alternative 2 greater than Alternative 1.

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Table 4.10-14. Summary of Impacts

Alternative	Impacts
Alternative 2 (continued)	SI-M Other Status Species • Small crucifixion thorn populations in Blacktop, Emerson Lake, and southern Lavic Lake Training Areas would likely be destroyed or damaged during MEB Exercises as a result of crushing or ordnance explosion. However, with implementation of the potential mitigation measure BIO-1 to avoid this population through exercise design, and/or protect it with fencing, these impacts would be reduced to less than significant. LSI Protected - Federally Threatened or Endangered Species • A total of 117,329 acres of non-critical desert tortoise habitat may experience impacts from military training under this alternative, but this impact would be less than significant. Species With Other Federal Status • Impacts to Mojave fringe-toed lizards under Alternative 2 would be as described for Alternative 1, and would be less than significant. Although less land would be acquired in the west study area under this alternative, the land excluded from acquisition was not found to host any Mojave fringe-toed lizards during surveys. • Impacts to resident special status and migratory birds would be as described for Alternative 1 and would be less than significant. • Impacts to other federal status species would be as described for Alternative 1 and would not be significant. Other Status Species • Impacts to spectacle fruit populations would be the same as described for Alternative 1 and would be less than significant. • Indirect impact of displaced OHV use on species and occupied habitat in more distant OHV areas located outside the ROI. Vegetation • Impacts to vegetation from military training would be similar to those under Alternative 1 and would be less than significant, and would be further reduced due to the smaller acreage of the west study area. As for desert tortoise impacts, intensification of OHV recreation in the smaller Johnson Valley OHV Area would result in indirect impacts to the portion of the west study area not acquired. Ecosystems • Impacts to cryptobiotic soils and playas from military training would be similar to those under Alternative 1 and would be less than significant, and would be further reduced due to the smaller acreage of the west study area. Concentration of recreational OHV use into a smaller Johnson Valley OHV Area may result in greater adverse impacts to cryptobiotic soils and playas there, however. • Impacts to caves and mines, and aquatic habitats would be similar to Alternative 1 and would be less than significant. Wildlife • Impacts to wildlife from military training would be similar to those described for Alternative 1 and would be less than significant, and would be further reduced due to the smaller area of acquisition in the west study area.

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Table 4.10-14. Summary of Impacts

Alternative	Impacts
Alternative 3	SI <u>Protected - Federally Threatened or Endangered Species</u> • Take of desert tortoises would be lower than for the other alternatives due to the lower desert tortoise density in the east study area, with a potential take of 215 to 2,960 adult desert tortoises (107 to 240 in the acquisition study areas) over the project lifetime. However, the existing take in the east study area is expected to be minimal, unlike the west study area. No beneficial offset from closure of the Johnson Valley OHV Area would occur. However, Alternative 3 would not have indirect impacts to tortoises in other regional OHV areas, as recreational displacement would be minimal. Therefore, Alternative 3 would have lower overall impacts to desert tortoises from take than Alternative 1. SI-M <u>Species with Other Federal Status</u> • Impacts to Nelson's bighorn sheep in the Ship Mountains of the east study area from ordnance explosion during MEB Final Exercises and MEB Building Block training would be significant. • Significant impacts would occur to populations of Harwood's eriastrum in the east study area north of Cadiz Dry Lake. <u>Other Status Species</u> Small crucifixion thorn populations in Blacktop, Emerson Lake, and southern Lavic Lake Training Areas would likely be destroyed or damaged during MEB Exercises as a result of crushing or ordnance explosion. However, with implementation of the potential mitigation measure BIO-1 to avoid this population through exercise design, and/or protect it with fencing, these impacts would be reduced to less than significant. LSI <u>Protected - Federally Threatened or Endangered Species</u> • An estimated 98,571 acres of non-critical desert tortoise habitat may experience impacts from military training under this alternative. Much of this habitat in the east study area is occupied at low densities. This would result in even lesser impacts than under Alternative 1. <u>Species With Other Federal Status</u> • Impacts to Mojave fringe-toed lizards under Alternative 3 would be less than significant as routes of travel and ordnance explosion under proposed action would be remote from known populations. • Impacts to resident special status and migratory birds would be as described for Alternative 1 and would be less than significant. • Impacts to other species with other federal status would be less than for Alternative 1, due to the apparent lower density of these species in the east study area. <u>Other Status Species</u> • Impacts to spectacle fruit populations would be the same as described for Alternative 1 and would be less than significant. <u>Vegetation</u> • Physical disturbance of plant communities under Alternative 3 would have less than significant impacts to vegetation. These impacts may be further reduced as compared to Alternative 1 due to the smaller amount of sensitive vegetation in the east study area. However, the east study area does not currently experience a substantial level of OHV activity, so the change in disturbance from existing conditions may be greater.

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Table 4.10-14. Summary of Impacts

Alternative	Impacts
Alternative 3 (continued)	LSI <u>Ecosystems</u> • Impacts to plant community ecosystems would be similar to those described for Alternative 1 and would be less than significant. Lower densities of creosote bush scrub are present in the east study area; however, the east study area does not currently experience a substantial level of OHV activity, so disturbance to the vegetation there could be somewhat greater than in the west study area under the other alternatives. • Impacts to cryptobiotic soils would be similar to those under Alternative 1 and would be less than significant. However, the east study area has historically had lower levels of soil disturbance as compared to the west study area, so impacts to cryptobiotic soils in this area would be expected to be somewhat greater than for the other alternatives. Impacts to playas would be less than significant because vehicles would not be likely to enter Bristol Dry Lake for risk of stranding. • Impacts to caves and mines and aquatic habitats would be similar to Alternative 1 and would be less than significant. <u>Wildlife</u> • Impacts to wildlife under Alternative 3 would be similar to those described for Alternative 1 and would be less than significant, and somewhat reduced due to the lower habitat diversity in the east study area.
Alternative 4	SI <u>Protected - Federally Threatened or Endangered Species</u> • Impacts to desert tortoises from military training would be substantially reduced from Alternative 1 due to the lack of MEB Building Block training in the west study area. Over the project lifetime, potential take of 500 to 3,628 federally threatened adult desert tortoises (346 to 592 in the acquisition study areas) would occur from translocation, crushing due to vehicle and Marine movements, and ordnance explosion on the Combat Center and west and south study areas. However, maintaining public access to the west study area would eliminate the beneficial offset to impacts from military activities and allow an unknown amount of take from OHV recreation and public access to continue. Indirect impacts to tortoises in other regional OHV areas would be reduced, however. Overall, the net impact to desert tortoises from take associated with this alternative would be similar, but somewhat lower than for Alternative 1. SI-M <u>Other Status Species</u> • Small crucifixion thorn populations in Blacktop, Emerson Lake, and southern Lavic Lake Training Areas would likely be destroyed or damaged during MEB Exercises as a result of crushing or ordnance explosion. However, with implementation of the potential mitigation measure BIO-1 to avoid this population through exercise design, and/or protect it with fencing, these impacts would be reduced to less than significant. LSI <u>Protected - Federally Threatened or Endangered Species</u> • Impacts to non-critical potential desert tortoise from military exercises would be somewhat reduced from those described for Alternative 1, as a result of differences in the maneuver design. A total of 117,941 acres of occupied desert tortoise habitat may experience impacts from military training under this alternative.

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Table 4.10-14. Summary of Impacts

Alternative	Impacts
Alternative 4 (continued)	LSI Species With Other Federal Status • Impacts to Mojave fringe-toed lizards would be similar to those described for Alternative 1 and would be less than significant. However, adverse effects to this species' loose sand habitat would continue from public access and OHV recreation. Impacts to all other federal status species would be the same as under Alternative 1 and would be less than significant. Other Status Species • Impacts to spectacle fruit populations would be the same as described for Alternative 1 and would be less than significant. • Indirect impact of displaced OHV use on species and occupied habitat in more distant OHV areas located outside the ROI. Vegetation • Impacts to vegetation from military activities would be less than under Alternative 1 and would remain less than significant. However, because public access to the west study area would continue, the potential beneficial effects to the west study area resulting from cessation of recreational OHV activity would not occur. Displacement of OHV activity from Johnson Valley OHV Area and the resultant indirect impacts on vegetation in other regional OHV areas would be minimal, superior to Alternative 1. • Impacts to creosote ring UPAs would be similar to those described for Alternative 1 and would be less than significant. However, adverse effects may continue to occur from public access in the west study area. Ecosystems • Impacts to ecosystems would be similar to those described for Alternative 1 and would be less than significant. However, public shared use of the west study area would mean that impacts to sensitive ecosystems such as playas, cryptobiotic soils, and caves would not be offset as much as they would if activities were limited to strictly military training (as in Alternatives 1, 2, and 3). Wildlife • Impacts to wildlife under Alternative 4 would be similar to those described for Alternative 1 and would be less than significant, but would be somewhat greater as the west study area would not benefit from closure to public access.
Alternative 5	SI Protected - Federally Threatened or Endangered Species • Impacts to desert tortoises from military training would be substantially reduced from Alternative 1 due to the lack of MEB Building Block training in the west study area and not acquiring the south study area. Over the project lifetime, potential take of 472 to 3,186 federally threatened adult desert tortoises (324 to 562 in the acquisition study area) would occur from translocation, crushing due to vehicle and Marine movements, and ordnance explosion on the Combat Center and west study area. However, maintaining public access to the west study area would eliminate a beneficial offset to impacts from military activities and allow an unknown amount of take from OHV recreation and public access to continue. Some indirect impacts to specific OHV alternative areas in the vicinity would be expected to occur during the 2 months per year of exclusive military use of the west study area. Overall, the net impact to desert tortoises from take associated with this alternative would be similar, but somewhat lower than for Alternative 1.

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Table 4.10-14. Summary of Impacts

Alternative	Impacts
Alternative 5 (continued)	SI-M <u>Other Status Species</u> • Small crucifixion thorn populations in Blacktop, Emerson Lake, and southern Lavic Lake Training Areas would likely be destroyed or damaged during MEB Exercises as a result of crushing or ordnance explosion. However, with implementation of the potential mitigation measure BIO-1 to avoid this population through exercise design, and/or protect it with fencing, these impacts would be reduced to less than significant. LSI <u>Protected - Federally Threatened or Endangered Species</u> • Impacts to non-critical desert tortoise habitat from military exercises would be somewhat reduced from those described for Alternative 1, as a result of differences in the maneuver design and not acquiring the south study area, and would remain less than significant. A total of 104,153 acres of occupied desert tortoise habitat may experience impacts from military training under this alternative. Maintaining public access to the west study area would eliminate a potential beneficial offset to impacts from military activities, but would prevent most indirect impacts to tortoise habitat in other regional OHV areas from displaced OHV users. <u>Species With Other Federal Status</u> • Impacts to Mojave fringe-toed lizards would be similar to those described for Alternative 1 and would be less than significant. However, adverse effects to this species' loose sand habitat would continue from public access and OHV recreation. • Impacts to all other federal status species would be the same as under Alternative 1. <u>Other Status Species</u> • Impacts to spectacle fruit populations would be the same as described for Alternative 1 and would be less than significant. • Indirect impact of displaced OHV use on species and occupied habitat in more distant OHV areas located outside the ROI. <u>Vegetation</u> • Impacts to vegetation from military activities would be less than under Alternative 1 and would remain less than significant. Not acquiring the relatively undisturbed south study area would further reduce impacts to vegetation. Because public access to the west study area would continue, the potential beneficial offsets resulting from cessation of recreational OHV activity would not occur. However, indirect impacts to vegetation resulting from displacement of OHV users to other regional OHV areas would not occur. • Impacts to creosote ring UPAs would be similar to those described for Alternative 1 and would be less than significant. However, adverse effects would continue to occur from public access in the west study area. <u>Ecosystems</u> • Impacts to ecosystems would be similar to those described for Alternative 1 and would be less than significant. However, public shared use of the west study area would mean that adverse effects to sensitive ecosystems such as playas, cryptobiotic soils, and caves would not be offset as much as they would if activities were limited to strictly military maneuvers (as in Alternatives 1, 2, and 3).

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Table 4.10-14. Summary of Impacts

Alternative	Impacts
Alternative 5 (continued)	LSI <u>Wildlife</u> • Impacts to wildlife would be similar to those described for Alternative 1 and would remain less than significant. Not acquiring the relatively undisturbed south study area would further reduce impacts to wildlife. Because public access to the west study area would continue, the potential beneficial offsets to wildlife impacts resulting from cessation of recreational OHV activity would not occur. However, indirect impacts to wildlife resulting from displacement of OHV users to other regional OHV areas would not occur.
Alternative 6	SI <u>Protected - Federally Threatened or Endangered Species</u> • Impacts to desert tortoises from military training are very similar to those under Alternative 1, despite the exclusion of military training from the Restricted Public Access Area for much of the year. Potential take of 645 to 3,769 federally threatened adult desert tortoises (503 to 834 in the acquisition study areas) would occur from translocation, crushing due to vehicle and Marine movements, and ordnance explosion on the Combat Center and west and south study areas. Maintaining public access to the Restricted Public Access Area in the west study area would eliminate much of the potential beneficial offset from cessation of OHV recreation, and would be expected to result in greater overall take and impacts to tortoises than under Alternative 1. Indirect impacts to tortoise populations and critical habitat from displaced OHV activity at other regional OHV areas and designated routes would be similar to Alternative 1, but substantially reduced based on a much lower amount of displaced activity under Alternative 6. SI-M <u>Other Status Species</u> • Small crucifixion thorn populations in Blacktop, Emerson Lake, and southern Lavic Lake Training Areas would likely be destroyed or damaged during MEB Exercises as a result of crushing or ordnance explosion. However, with implementation of the potential mitigation measure BIO-1 to avoid this population through exercise design, and/or protect it with fencing, these impacts would be reduced to less than significant. LSI <u>Protected - Federally Threatened or Endangered Species</u> • Impacts to non-critical desert tortoise habitat from military exercises would be somewhat reduced from those described for Alternative 1 as a result of differences in the maneuver design and would remain less than significant. A total of 125,265 acres of occupied desert tortoise habitat may experience impacts from military training under this alternative. Maintaining public access to the RPAA in the west study area would eliminate much of the potential beneficial offset from cessation of OHV recreation. LSI <u>Species With Other Federal Status</u> • Impacts to Mojave fringe-toed lizards remain less than significant under this Alternative, but would be greater than under Alternative 1 because the area currently occupied by Mojave fringe-toed lizards in the west study area would remain open to OHV recreation for much of the year. • Impacts to all other species with other federal status are similar to those described for Alternative 1 and would be less than significant.

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Table 4.10-14. Summary of Impacts

Alternative	Impacts
Alternative 6 (continued)	Other Status Species • Impacts for spectacle fruit populations would be as described for Alternative 1 and would be less than significant. • Indirect impact of displaced OHV use on species and occupied habitat in more distant OHV areas located outside the ROI. Vegetation • Impacts to vegetation from military activities would be less than under Alternative 1 and would remain less than significant. However, because public access to a portion of the west study area would continue, potential beneficial offsets resulting from cessation of recreational OHV activity would not be as great as under Alternative 1. • Impacts to creosote ring UPAs would be similar to those described for Alternative 1 and would be less than significant. However, adverse effects would continue from public access and OHV recreation in the Restricted Public Access Area of the west study area. Ecosystems • Impacts to ecosystems would be similar to those described for Alternative 1 and would be less than significant. However, public shared use of the west study area would mean that impacts to sensitive ecosystems such as playas, cryptobiotic soils, and caves would not be offset as much as they would if activities were limited to strictly military maneuvers (as in Alternatives 1, 2, and 3). Wildlife • Impacts to wildlife would be similar to those described for Alternative 1 and would be less than significant, but would be somewhat greater as the west study area would not benefit from closure to public access.
No-Action Alternative	NI No impacts to biological resources would occur; however, adverse effects from public access and OHV activity in the west study area would continue.

Notes: CNPS = California Native Plant Society; LSI = Less than significant impact; MEB = Marine Expeditionary Brigade; NI = No impact; OHV = off-highway vehicle; SI = Significant Impact; SI-M = Significant impact mitigable to less than significant; UPA = Unusual Plant Assemblage

4.11 CULTURAL RESOURCES

4.11.1 Approach to Analysis

4.11.1.1 Methodology

Under Section 106 of the National Historic Preservation Act (NHPA), federal agencies are required to consider the effects of their undertakings on historic properties listed in or eligible for listing in the National Register of Historic Places (NRHP) and afford the Advisory Council on Historic Places (ACHP) the opportunity to comment on the undertaking. Additionally, the agency must also consult with the State Historic Preservation Office (SHPO) to determine the effect of the action on eligible properties. If there would be an adverse effect, the agency must consult to consider methods to mitigate the impact. Regulations for the determination of adverse effects have been published in 36 CFR 800 and methods for managing significant resources have been provided in a President's ACHP publication, *Recommended Approach for Consultation on Recovery of Significant Information from Archaeological Sites (1999).*

4.11.1.2 Evaluation Criteria

Under the NHPA, any effect is measured by its impact upon the characteristics that qualify a property to be eligible for listing in the NRHP. Effects can be direct or indirect, but they constitute the physical, visual, or audible changes in the environment that could alter the character of a significant site.

Adverse effects, as defined by the Section 106 process, are considered significant impacts for NEPA. According to 36 CFR Part 800.5a (2), there may be adverse effects upon a historic property when there is:

1. Destruction or alteration of all or part of a property,
2. Isolation from or alteration of the property's surrounding environment,
3. Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting,
4. Neglect of a property resulting in its deterioration or destruction, or
5. Transfer or sale of a property without adequate conditions or restrictions regarding preservation, maintenance, or use.

Several factors need to be considered to identify and compare the potential impact on historic properties in each alternative of the project. Avoiding NRHP eligible properties is preferred; however, it may not be possible to meet this goal. It should be noted that almost all of the historic properties located to date within the Area of Potential Effect (APE) are by and large prehistoric archeological sites with a relatively fewer number of historic archeological sites. The latter include historic mines/mining related sites, military sites, homesteads, and refuse scatters. When comparing alternatives, determining the scope, type, and level of impact to cultural resources eligible for listing in the NRHP is crucial.

For all archeological property types, the vulnerability to direct impact is considered to be high. If ground disturbance occurs at a site, it would decrease the site's integrity and can greatly reduce the ability of the site's data to contribute to our knowledge of prehistory or history, thereby affecting the NRHP eligibility of the site. The vulnerability of a site to indirect impacts is determined by what degree the impact has to the aspects of setting, feeling, and association that contribute to the overall "recognizeability" of the site's historical significance (Hardesty and Little 2000). For some sites, such as national trails and traditional cultural properties, significance may be directly tied to its setting and the feeling it conveys; therefore, vulnerability to indirect impacts might be considered high. In these cases, the "experience" of the site is

just as important as its physical remains. Without one or the other, the character and feeling of the site is compromised and its eligibility for listing in the NRHP can be compromised.

As indicated in Section 3.11, the term Historic Property refers to "any prehistoric or historic district, site, building, structure or object included in or eligible for inclusion in, the National Register of Historic Places" [16 USC 470w(5)]. The five types of properties eligible for the NRHP are: 1. buildings; 2. structures; 3. sites (archeological sites, either historic or prehistoric); 4. districts; and 5. objects. The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, material workmanship, feeling and association. Races may be important to the OHV community, but they do not meet the criteria of being considered historic properties, and therefore, are not discussed further in this section. Criteria of eligible historic properties include:

- is unique;
- is associated with events that have made a significant contribution to the broad patterns of our history;
- is associated with the lives of persons significant in our past;
- embodies distinctive characteristics of a type, period or method of construction;
- represents the work of a master, possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual distinction;
- has yielded or is likely to yield information important in prehistory or history [36 CFR 60.4].

As indicated in Section 3.11, the Homestead Act does not meet the criteria to be eligible for protection under the NHPA, therefore, "homestead communities" such as Johnson Valley, Wonder Valley, and Flamingo Heights are not discussed further in this section.

4.11.1.3 Public Scoping Issues

Concerns that were raised by the public during the 90-day scoping period (October 30, 2008 through January 31, 2009) are addressed in this analysis. These cultural resources concerns include, but are not limited to:

- impacts to cultural resources of the region, including artifacts, historic cabins, and historic mining/freighting sites;
- potential destruction or elimination of significant archaeological and religious sites;
- violation of tribal concerns and rights, which includes the access to culturally significant sites and the compromise of culturally significant sites and their settings;
- possible destruction or elimination of historic structures and/or districts, including potentially historically important mines; and
- potential impacts to various plant species historically used by Native Americans for subsistence.

4.11.2 Alternative 1 Impacts

As part of the proposed action, the following SCMs would be implemented under any of the action alternatives.

CUL SCM 1: Cultural resources would be managed in accordance with the provisions of federal laws and regulations as well as Marine Corps policy. The Programmatic Agreement (PA), *Programmatic Agreement Between the United States Marine Corps and the California State Historic Preservation Officer 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, California,* would be amended to include any lands acquired as a consequence of the proposed action alternative.

CUL SCM 2: As required by the PA, an Integrated Cultural Resources Management Plan (ICRMP) would be prepared and the historic preservation program prescribed in the ICRMP would be implemented under the direct supervision of a person or persons meeting at a minimum the Secretary of Interior's Professional Qualifications Standards (48 *Federal Register* 44738-44739).

CUL SCM 3: The ICRMP would detail the historic preservation program to inventory, manage and treat any identified historic properties located on lands under the jurisdiction of the Marine Corps. The existing ICRMP for the Combat Center would be modified to include all newly acquired lands and cultural resources. The ICRMP would be modified and developed in consultation with the SHPO and the Native American Tribes that have an interest in lands under the jurisdiction of the Marine Corps. The SHPO would indicate acceptance of the ICRMP by endorsement and the ICRMP would be implemented under the authority of the amended PA.

CUL SCM 4: Additional measures would be developed in consultation with the California SHPO and affiliated Tribes.

CUL SCM 5: The Marine Corps would continue to provide training on the significance of cultural resources and the relevant federal laws that are intended to protect them.

4.11.2.1 Prehistoric and Historic Sites

Within the current boundaries of the Combat Center there are 222 known sites within a .62 mile- (1 km-) wide corridor surrounding proposed MEB routes (and outside already restricted areas) that are potentially affected. Of these, 216 are prehistoric sites, 3 are historic, and 3 contain both prehistoric and historic components. Fifty-three of these sites have been tested; 22 have been recommended as eligible and 31 have been recommended ineligible. Over half the sites in the corridors are considered to be a segregated reduction locus (SRL), others including 18 habitation sites and the rest lithic scatters. It should be noted that the proposed MEB routes are hypothetical and have not yet been tactically defined. As the routes become better defined, a more precise analysis of impacts would be developed within the framework of the ICRMP.

Outside the Combat Center on Alternative 1 lands in the west and south study areas, 57 archeological sites have been preliminarily assessed for NRHP eligibility; these include 34 prehistoric and 23 historic sites (Table 4.11-1). Of these, only 12 appear to meet eligibility criteria for listing in the NRHP, all of them located in the west study area.

These 12 sites appear to meet eligibility criteria in Alternative 1 areas, including 8 prehistoric (SBR-1880, SBR-12933, SBR-12934, SBR-12942, SBR-13358, SBR-13362, SBR-13368, SBR-13370) and 4 historic sites (SBR-8946H, ASM H-13, ASM H-14, ASM H-15). Three of the former are ancient habitation sites located around Galway Lake (SBR-12933, SBR-13358, SBR-13362), others being a felsite quarry (SBR-

12934), a large habitation complex near Melville Lake (SBR-1880), and small habitation sites at Means Lake (SBR-12942, SBR-13370) and on the southwest shore of Emerson Lake (SBR-13368). Eligible historic sites include the Emerson Mill (SBR-8946H), the Los Padres Mine (ASM H-13), and two other substantial mining sites (ASM H-14 and ASM H-15). Prehistoric sites around Galway Lake and Means Lake appear to have sustained damage from current OHV activity and other recreational uses, but still retain research value and may be eligible for listing in the NRHP.

All of these resources are at risk to damage from ground disturbances introduced by military training exercises, including direct and indirect weapons fire, vehicle traffic, and battalion movements. In the long term, the sites may also be damaged from the construction of roads, and temporary use areas. Because archeological sites and their constituents are fragile, these impacts may damage or destroy artifacts and features situated in surface or subsurface contexts. Over the long term, irreversible impacts to the sites could include degradation from the proposed activities.

Table 4.11-1. Archeological Sites by Alternatives

	Alternatives				
	1 & 4	**2**	**3**	**5**	**6**
Previously Recorded Sites without NRHP Recommendation (n = 16)	8	2	8	8	7
Sites with Preliminary NRHP Recommendation (n = 124)	57	50	72	52	49
Prehistoric (n = 72)					
Eligible	8	8	25	8	8
Ineligible	26	24	17	22	24
Total	34	32	42	30	32
Historic (n = 52)					
Eligible	4	3	12	4	3
Ineligible	19	15	18	18	14
Total	23	18	30	22	17
Sites Recommended Eligible by Alternative	12	11	37	12	11
Sites Recommended Not Eligible by Alternative	45	39	35	40	38

Notes: Site totals in parentheses do not match column totals due to overlap in site counts between alternatives.
NRHP = National Register of Historic Places

Sites not considered to be eligible for listing in the NRHP are still afforded protection from theft, vandalism, and other unauthorized activities by laws such as Archaeological Resources Protection Act (ARPA) and Native American Graves Protection and Repatriation Act (NAGPRA), as well as statutes concerning theft of government property.

4.11.2.2 Traditional Cultural Properties

No traditional cultural properties are known to be located in the APE for Alternative 1. The identification of such properties is an ongoing process identified in the Combat Center ICRMP (2007). Alternative 1 lands fall within the territory occupied by the Vanyume/Serrano people during historic times. The Vanyume were the desert Serrano and they ranged along the Mojave River from Victorville/Hesperia to east of Barstow. Various Serrano groups also exploited the southernmost portions of the Mojave Desert that include the installation and acquisition study areas on a seasonal basis, as did the Cahuilla and Chemehuevi (Kroeber 1925; Strong 1929). It is also known that the southern Mojave Desert was traversed by the Mohave Indians and they indicate that there are a number of places in the region identified in their stories and myths and as such are important to their culture.

4.11.2.3 Summary of Alternative 1 Impacts

Impacts to cultural resources could result from ground disturbances introduced by military training exercises (e.g., direct and indirect weapons fire, vehicle traffic, battalion movements, and the construction of roads and temporary use areas). Impacts to archeological sites eligible for listing in the NRHP cannot be detailed at this stage of the documentation process. The California SHPO has recommended the Marine Corps request an addendum to the existing PA, *A Programmatic Agreement between the United States Marine Corps and the California State Historic Preservation Officer 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, California*, to include any lands acquired as a consequence of the proposed action. An updated ICRMP would be prepared to include all lands under the jurisdiction of the Marine Corps. The ICRMP would be developed in consultation with SHPO and the seven Native American Tribes who have interests in the southern Mojave Desert. Upon endorsement by MAGTF Training Command and SHPO, the ICRMP would guide the continued identification and evaluation of cultural resources and appropriate treatments would be developed in consultation with the SHPO, the Tribes, and interested parties for adverse effects that are anticipated from ground disturbing activities related to the undertaking. Documentation of the results of the consultation process would be submitted to the ACHP for comment.

The acquisition of additional airspace for military operations would generally not impact cultural resources. Aircraft would not be considered a visual intrusion to any potential cultural landscapes or visitor experience as they would generally fly at high elevations. The only way that added airspace might cause potential impacts to cultural resources, albeit highly unlikely, is that more frequent air traffic might increase the potential for accidents and unintentional damage. Rare accidents could involve actual crashes or the loss of aircraft parts onto archeological sites, causing major to minor physical damage.

Treatment strategies for NRHP-eligible properties that may be adversely affected by the proposed undertaking would be developed in consultation with the SHPO and the Tribes, and may include measures to avoid adverse effects to the property through avoidance or reduce effect to “no adverse effect” through scientific data recovery efforts and curation. Consequently, impacts to cultural resources from Alternative 1 would be less than significant.

4.11.2.4 Potential Mitigation Measures

In addition to the adoption of the SCMs for cultural resources (see Section 4.11.2), the Combat Center ICRMP would be modified to include acquired lands in consultation with SHPO and the Native American Tribes that have an interest in lands under the jurisdiction of the Marine Corps. The current ICRMP expires in 2014, and the new ICRMP would be updated to incorporate any applicable potential mitigation measures as determined during consultation with SHPO.

4.11.3 Alternative 2 Impacts

Within the current boundaries of the Combat Center, there are 255 sites within a .62 mile (1 km)-wide corridor surrounding MEB routes (and outside already restricted areas) that have a potential to be affected. Of these, 249 are prehistoric sites, 3 are historic, and 3 contain both prehistoric and historic components. Sixty-two of these sites have been tested; 22 have been recommended eligible and 37 have been recommended ineligible. Over half of the sites in the corridors are comprised of SRLs, while 19 are habitation sites and the remainder is lithic scatters. It should be noted that the proposed MEB routes are hypothetical and have not yet been tactically defined. As the routes become better defined, a more precise analysis of impacts would be developed within the framework of the ICRMP.

There are 50 archeological sites in Alternative 2 land acquisition study areas that have been assessed for preliminary NRHP eligibility, including 32 prehistoric and 18 historic sites (see Table 4.11-1). Only 11 sites appear to meet criteria that would make them eligible for listing in the NRHP; these are the same ones identified for Alternative 1 except for ASM H-15, which is excluded by this option (SBR-1880, SBR-12933, SBR-12934, SBR-12942, SBR-13358, SBR-13362, SBR-13368, SBR-13370, SBR-8946H, ASM H-13, and ASM H-14). In general, anticipated impacts to these sites are the same as described for Alternative 1.

4.11.3.1 Summary of Alternative 2 Impacts

Implementation of Alternative 2 would result in less than significant impacts to cultural resources as described for Alternative 1.

4.11.3.2 Potential Mitigation Measures

Potential mitigation measures for Alternative 2 are the same as described for Alternative 1.

4.11.4 Alternative 3 Impacts

Within the boundaries of the Combat Center, there are a total of 126 sites within a .62 mile- (1 km-) wide corridor surrounding the MEB routes (and outside already restricted areas) that have a potential to be affected. Of these, 123 are prehistoric sites, 2 are historic, and 1 contains both prehistoric and historic components. Fifty-three of these sites have been evaluated, and of these, 12 have been recommended eligible and 41 have been recommended ineligible for NRHP listing. The majority of the sites in the corridors are comprised of SRLs and lithic scatters. In addition, there are two habitation sites. It should be noted that the proposed MEB routes are hypothetical and have not yet been tactically defined. As the routes become better defined, a more precise analysis of impacts would be developed within the framework of the ICRMP.

There are 72 archeological sites in the Alternative 3 land acquisition study area that have been assessed for preliminary NRHP eligibility, including 42 prehistoric and 30 historic sites (Table 4.11-1). A group of 37 sites appears to meet criteria that would make them eligible for listing in the NRHP, including 25 prehistoric and 12 historic resources.

Prehistoric sites recommended eligible in Alternative 3 areas include 17 habitations and 8 lithic scatters. Most of the habitations are clustered around the northeast shore of Bristol Lake (SBR-13215, SBR-13216, SBR-13217, SBR-13218, SBR-13328, SBR-13332, SBR-13334, SBR-13336, SBR-13337, SBR-13338, ASM EA-TL-3, ASM-EA-TL-7, ASM-EA-TL-8, ASM-EA-TL-10), as are all of the lithic scatters (SBR-13329, SBR-13330, SBR-13335, SBR-13339, SBR-13340, ASM–EA-TL-4, ASM-EA-TL-6, ASM-EA-TL-9). The remaining habitation sites are spread around the perimeter of Cadiz Lake (SBR-13225, SBR-13229, SBR-13230). All of the sites located along the shoreline of Bristol Lake appear to be of at least Middle Holocene antiquity (>4,000 YBP).

Of the historic sites recommended as NRHP-eligible, one is the Chambless homestead (ASM H-3), one is the Archer Railroad Station (ASM H-6), six are railroad work camps/refuse deposits (SBR-9850H, SBR-9851H, ASM H-7, ASM H-8, ASM H-9, and ASM H-10), and the remaining five include two military camps/refuse deposits (SBR-13224H, ASM-EA-TL-1), a refuse deposit possibly associated with a railroad work camp (SBR-9856H), a possible mining camp (ASM H-2), and a section of Pacific Telephone/Telegraph line (SBR-11586H). Most of these sites are located along or near the Atchison, Topeka, & Santa Fe Railroad line that runs on a northwest-southeast parallel through the eastern half of

the east study area. In general, anticipated impacts to these sites are the same as described for Alternative 1.

4.11.4.1 Summary of Alternative 3 Impacts

The implementation of Alternative 3 would result in less than significant impacts to cultural resources as described for Alternative 1.

4.11.4.2 Potential Mitigation Measures

Potential mitigation measures for Alternative 3 are the same as described for Alternative 1.

4.11.5 Alternative 4 Impacts

Within the current Combat Center boundaries, 218 known sites within a .62 mile- (1 km-) wide corridor surrounding the MEB route (and outside already restricted areas) have a potential to be affected. Of these, 212 are prehistoric sites, 3 are historic, and 3 contain both prehistoric and historic components. Fifty-nine of these sites have been tested; 23 have been recommended eligible and 36 have been recommended ineligible. Nearly half of the sites in the MEB corridor are comprised of SRLs, others including 18 habitation sites and the rest lithic scatters. It should be noted that the proposed MEB routes are hypothetical and have not yet been tactically defined. As the routes become better defined, a more precise analysis of impacts would be developed within the framework of the ICRMP.

The 57 archeological sites in Alternative 4 areas that have been assessed for preliminary NRHP eligibility are the same as those for Alternative 1 (34 prehistoric, 23 historic). Accordingly, the same 12 sites appear to meet criteria that would make them eligible for listing in the NRHP, including 8 prehistoric (SBR-1880, SBR-12933, SBR-12934, SBR-12942, SBR-13358, SBR-13362, SBR-13368, SBR-13370) and 4 historic (SBR-8946H, ASM H-13, ASM H-14, ASM H-15). Anticipated impacts to these sites for Alternative 4 are the same as described for Alternative 1.

4.11.5.1 Summary of Alternative 4 Impacts

Implementation of Alternative 4 would result in less than significant impacts to cultural resources as described for Alternative 1.

4.11.5.2 Potential Mitigation Measures

Potential mitigation measures for Alternative 4 are the same as described for Alternative 1.

4.11.6 Alternative 5 Impacts

Within the current boundaries of the Combat Center, there are 186 sites within a .62 mile- (1 km-) wide corridor surrounding the MEB route (and outside already restricted areas) that have a potential to be affected. Of these, 181 are prehistoric sites, 3 are historic, and 2 contain both prehistoric and historic components. Forty-five of these sites have been tested, and of these, 17 have been recommended eligible and 28 have been recommended ineligible. Some 113 of the sites in the corridors are SRLs, 17 are habitation sites, and 51 are lithic scatters. It should be noted that the proposed MEB routes are hypothetical and have not yet been tactically defined. As the routes become better defined, a more precise analysis of impacts would be developed within the framework of the ICRMP.

A total of 52 sites on lands encompassed by Alternative 5 have been assessed for preliminary NRHP eligibility, including 30 prehistoric and 22 historic sites (see Table 4.11-1). Only 12 of the sites (8 prehistoric, 4 historic) appear to meet criteria that would make them eligible for NRHP listing. Lands

covered by Alternative 5 in the west study area are the same as those encompassed by Alternative 1 and 4, and for that reason the sites recommended eligible for NRHP listing are the same as those for Alternative 1 and 4 (prehistoric sites SBR-1880, SBR-12933, SBR-12934, SBR-12942, SBR-13358, SBR-13362, SBR-13368, SBR-13370; historic sites SBR-8946H, ASM H-13, ASM H-14, ASM H-15). Anticipated impacts to these sites for Alternative 5 are the same as described for Alternative 1.

4.11.6.1 Summary of Alternative 5 Impacts

Implementation of Alternative 5 would result in less than significant impacts to cultural resources as described for Alternative 1.

4.11.6.2 Potential Mitigation Measures

Potential mitigation measures for Alternative 5 are the same as described for Alternative 1.

4.11.7 Alternative 6 Impacts (Preferred Alternative)

Within the current Combat Center boundaries there are 316 sites within a .62 mile- (1 km-) wide corridor surrounding the MEB route (and outside already restricted areas) that have a potential to be affected. Of these, 311 are prehistoric sites, 3 are historic, and 2 contain both prehistoric and historic components. A total of 128 sites has been tested, 26 having been recommended as eligible and 102 having been recommended ineligible. The vast majority of the sites in the corridor are comprised of SRLs, 94 of which are isolated SRL features. There are 18 habitation sites, 8 of which contain rock features and 10 of which are classified as habitations based on presence of ground stone, and the remaining 83 prehistoric sites are all lithic scatters. Seven sites contain prehistoric ceramics and four sites contain diagnostic projectile points. In addition, 34 other sites are located within the .62 mile- (1 km-) wide MEB route corridor but fall within existing restricted zones at Emerson Lake, Deadman Lake, and at the Foxtrot Petroglyph Area. All of these sites are prehistoric. Of all 350 sites, 19 have been tested or otherwise evaluated; of these, 10 are recommended eligible, 8 have been recommended ineligible, and 1 (the Foxtrot Petroglyph Site) is already listed in the NRHP.

There are 49 sites on lands encompassed by Alternative 6 boundaries that have been assessed for preliminary NRHP eligibility, including 32 prehistoric and 17 historic sites (see Table 4.11-1). Only 11 sites (8 prehistoric, 3 historic) appear to meet criteria that would make them eligible for NRHP listing. For this alternative, however, west study area lands are divided into two sub-areas of variable access and use. Each sub-area thus contains a different set of archeological sites, both eligible and ineligible (see below).

4.11.7.1 Restricted Public Access

The RPAA encompasses roughly 38,137 acres (15,434 hectares) along the south edge of the west study area. It contains 19 sites that have been assessed for NRHP eligibility, 10 prehistoric and 9 historic. The former include two habitations at Means Lake (SBR-12942 and SBR-13370), one extensive habitation complex southwest of Melville Lake (SBR-1880), one lithic quarry (SBR-12934), and six lithic scatters, one of them isolated (SBR-13371) and the other five clustered near the edge of the west study area at the Combat Center boundary (SBR-12951, SBR-12952, SBR-12953, SBR-12954, and SBR-13369). The latter include six mining sites (SBR-12938H, SBR-12940H, SBR-12941H, SBR-12955H, ASM-WA-CL-2, and SBR-3405H/ASM H-13 [Los Padres Mine]), two refuse deposits (SBR-13372H, ASM-WA-TL-2), and the site of “Means Well” at Means Lake (ASM-WA-TL-1). Of all these sites, only the habitations at Means Lake and Melville Lake (SBR-12942, SBR-13370, and SBR-1880), the lithic quarry (SBR-

12934), and the Los Padres Mine (SBR-3405/ASM H-13) have been recommended eligible for NRHP listing.

Cultural resources in this sub-area could be impacted by occasional MEB training (as described for other alternatives) and by the use of non-dud producing ordnance during such exercises during the 2 months of military use. Cultural resources in the sub-area would receive continued impacts from OHV use during the 10 months of allowed public use of Johnson Valley OHV area.

4.11.7.2 Exclusive Military Use

This sub-area encompasses roughly 108,530 acres (43,921 hectares) in the central and eastern portions of the west study area and contains 30 archeological sites that have been preliminarily assessed for NRHP eligibility. Of these, 22 prehistoric sites include 5 habitations (SBR-12933, SBR-13358, SBR-13360, SBR-13362, and SBR-13368), 11 lithic scatters (SBR-12929, SBR-12930, SBR-12931, SBR-12949, SBR-12950, SBR-13359, SBR-13361, SBR-13363, SBR-13365, SBR-13366, and ASM-WA-CL-1), 5 lithic quarries (SBR-12932, SBR-12935, SBR-12936, SBR-12937, and SBR-12961), and a possible trail segment (SBR-12944). Many of the habitations and lithic scatters are clustered around Galway Lake. Eight historic sites include the Emerson Mill (SBR-8946H) and three other mining sites (SBR-12943H, SBR-13364H, and ASM H-14), three unassociated refuse deposits (SBR-13357H, SBR-13367H, and ASM-WA-TL-3), and a World War II-era military target area (SBR-12939H).

In all, only six of these sites appear to meet the criteria that would make them eligible for NRHP listing, four prehistoric (SBR-12933, SBR-13358, SBR-13362, SBR-13368) and two historic (SBR-8946H and ASM H-14).

Anticipated military impacts to sites in this sub-area are the same as described for previous alternatives, given no differences in proposed land use or accessibility. Given the known clustering of prehistoric sites at Galway Lake and at other locations, and the relative abundance of historic mining sites in the west study area, it is likely that portions of this sub-area not yet inventoried for cultural resources harbor additional sites that may be eligible for listing in the NRHP.

4.11.7.3 Summary of Alternative 6 Impacts

Implementation of Alternative 6 would result in less than significant impacts to cultural resources as described for Alternative 1.

4.11.7.4 Potential Mitigation Measures

Potential mitigation measures for Alternative 6 are the same as described for Alternative 1.

4.11.8 No-Action Alternative

The No-Action Alternative would default to current BLM management practices, allowing the continuation of current recreational uses. Lands in the west, south, and east study areas would remain open to application for multiple-use activities, and inventories for cultural resources would be required to assess the impacts resulting from various rights-of-way projects, permits for grazing leases, and mining under the 1872 General Mining Law and for sales of sand and gravel. A number of historic properties were identified on BLM lands that could potentially be eligible for listing in the NRHP during recent inventories and their treatment would be determined by the BLM under their cultural resources compliance documents.

The Cultural Resource Element of the CDCA Plan is summarized in Table 4.11-2, and serves to convey the manner in which the BLM would continue to manage the acquisition study areas under the No-Action

Alternative. Even under the No-Action Alternative, however, the degradation of any cultural resources that could be important to Native Americans would continue.

Table 4.11-2. Cultural Resource Management Plan Goals

No.	1999 Cultural Resource Element Plan Modified Goals
1.	Broaden the archeological and historical knowledge of the CDCA through continuing inventory efforts and the use of existing data. Continue the effort to identify the full array of CDCA's cultural resources.
2.	Preserve and protect representative sample(s) of the full array of the CDCA's cultural resources.
3.	Ensure that cultural resources are given full consideration in land use planning and management decisions, and ensure that BLM authorized actions avoid inadvertent impacts.
4.	Ensure proper data recovery of significant (NRHP-eligible) cultural resources where adverse impacts cannot be avoided.
5.	Ensure that paleontological resources are given consideration in land use planning and in management decisions.
6.	Preserve and protect a representative sample of the full array of the CDCA's paleontological resources.
7.	Ensure proper data recovery of significant paleontological resources where adverse impacts cannot be avoided or otherwise mitigated (BLM 1999:22).

Notes: BLM = Bureau of Land Management; CDCA = California Desert Conservation Area; NRHP = National Register of Historic Places

Presently, Johnson Valley is an authorized OHV Open Area. The south and east study areas are currently designated as Limited Use Areas where OHVs are required to use existing routes. The Plan further states that field inventories for cultural resources in other than project specific cases would be undertaken primarily within Classes M and I designated areas. These field assessments would focus on areas where archeological knowledge is limited and use is concentrated. Contingent on budget allocations, 2,000 acres (809 hectares) or more per resource area would be inventoried each year. Volunteers would be used where feasible (BLM 1980).

The BLM has not had the budget allocations to inventory this type of acreage. Over the period of the Plan (1980) if the inventories would have been directed to the Open Areas, over 60,000 acres (24,281 hectares) would have been inventoried in Johnson Valley and another 60,000 acres (24,281 hectares) in the Bristol Lake area. Chapter 8 of the Plan (BLM 1999) indicated that OHV access and efforts to protect cultural resources would both be impacted by the adoption of the Plan and its various plan elements. The proposed plan was predicted to affect both traditionally significant natural and cultural resources of Native American value and the formal relationship between the BLM and reservation governments. It is uncertain if this has occurred; however, whatever effects the current uses would have on the areas would continue under the No-Action Alternative.

4.11.9 Summary of Impacts

Because specific avoidance measures may not be feasible in the conduct of military exercises, impacts to archeological sites may occur as a result of proposed military training in acquired lands as well as in the MEB corridors transecting the installation. Anticipated impacts to cultural resources could result from ground disturbances introduced by military training exercises (e.g., direct and indirect weapons fire, MEB Objective operations, group and individual vehicle traffic, battalion movements, aviation WDZ, and the construction of roads, temporary use areas). Impacts would be less than significant.

Impacts to archeological sites eligible for listing in the NRHP cannot be detailed at this stage of the documentation process.

The acquisition of additional airspace for military operations would generally not impact cultural resources. Aircraft would not be considered a visual intrusion to any potential cultural landscapes or visitor experience as they would generally fly at high elevations. The only ways that added airspace might cause potential impacts to cultural resources, albeit highly unlikely, is that more frequent air traffic might increase the potential for accidents and unintentional damage. Rare accidents could involve actual crashes or the loss of aircraft parts onto archeological sites, causing major to minor physical damage.

Table 4.11-3. Summary of Impacts

Alternative	Impacts
Alternative 1	LSI • Direct and indirect impacts may result from weapons fire, MEB Objective operations, group and individual traffic, battalion movements, aviation WDZ, road construction and temporary training and construction exercises. • SCMs and other measures would be implemented to avoid or reduce impacts to resources. NI • No specific impact anticipated from airspace acquisition. In the rare case of aircraft accidents, falling debris could cause impacts to archeological sites.
Alternative 2	LSI/NI • Impacts would be the same as Alternative 1.
Alternative 3	LSI/NI • Impacts would be the same as Alternative 1.
Alternative 4	LSI/NI • Impacts would be the same as Alternative 1, with the addition of continued impacts from OHV use during the 10 months of allowed public use of Johnson Valley OHV area. OHV damage would be lessened during the other 2 months of the year.
Alternative 5	LSI/NI • Impacts would be the same as Alternative 4.
Alternative 6	LSI/NI • Impacts would be the same as Alternative 4.
No-Action Alternative	LSI • Existing conditions would remain unchanged. Impacts from OHV use in the Johnson Valley OHV Area would continue for all 12 months in the year.

Notes: LSI = Less than significant impact; MEB = Marine Expeditionary Brigade; NI = No impact; OHV = Off-Highway Vehicle; SCM = Special Conservation Measure; WDZ = Weapons Danger Zone

4.12 GEOLOGICAL RESOURCES

4.12.1 Approach to Analysis

4.12.1.1 Methodology

The analysis of potential impacts to geological resources included review and evaluation of maps, reports, and other relevant data depicting the location and known status of soil types, topographical features, and mineral deposits in the project area. This information was correlated to maps of the acquisition study areas and information about the locations, characteristics, and relative intensity of proposed training activities that would occur under each action alternative. Known deposits of mineral resources to which access would potentially be constrained or eliminated by the proposed action were evaluated qualitatively for their relative importance in a regional as well as national context. Documentation of the known effects of military training activities on Combat Center soil types were compared and extrapolated to the soil types that occur in portions of the acquisition study areas that would be subject to similar training activities.

4.12.1.2 Evaluation Criteria

The evaluation of impacts as described in this section of the EIS focuses on potential reduction or loss of access to mineral resources resulting from land acquisition, on soil disturbance that would result from training activities, and on the potential for impacts to paleontological resources. Minimal construction of new infrastructure is proposed, including grading and periodic maintenance of unpaved roads, installation of two or three prefabricated communications towers with small surface footprints, and three tank crossings on Amboy Road, but for the following reasons the effects of such development are expected to be inconsequential and are therefore not evaluated in detail in this section. The amount and specific location of grading for new unpaved roads to access acquired training areas has not yet been planned in detail, but the number and extent of such roads would be limited to the minimum necessary to provide essential access; the objective of maximizing training realism and exercise design flexibility would preclude extensive development of new roads within the training space. Site preparation and construction requirements for communications towers would also be very limited in scale and scope, and would mostly occur on ridgetop areas that have been similarly developed. The proposed tank crossings would be constructed on an existing paved roadway. All of these construction activities would be of very short duration, and standard procedures and designs for erosion control, dust control, drainage, and structural integrity would be applied to all proposed construction. All engineering designs and construction procedures would also comply with relevant federal, state, local, and Marine Corps requirements for slope and seismic stability, so there would be no construction-or structural-related impacts associated with seismic safety. The effects of ordnance delivery would be limited to surficial and near-surface soils so the proposed action would not be expected to have an impact on topography or seismic conditions or hazards within the ROI or in the Twentynine Palms region. Little or no training activity at the Combat Center takes place in steeper, mountainous areas or other locations that might be considered to have unique geological features, such as lava flows. These areas are avoided during training activities due to unsuitable topography and potential damage to vehicles. Similar procedures would be followed under the proposed action, resulting in no potential for impact to unique geological features.

4.12.1.3 Public Scoping Issues

Concerns that were raised by the public during the 90-day scoping period (October 30, 2008 through January 31, 2009) are addressed in this analysis. Concerns regarding geological resources include, but are not limited to:

- impacts to chloride mining operations in the east study area;
- closure of federal lands to future mine development and limited access to current mining resources; and
- increased soil erosion and potential seismic hazards.

4.12.2 Alternative 1 Impacts

4.12.2.1 Combat Center

Mineral Resources

The Combat Center is closed to mineral claims. No mineral production occurs at the Combat Center under existing conditions. There would be no change to this situation under Alternative 1; therefore, there would be no direct or indirect impacts to mineral resources at the Combat Center under Alternative 1.

Soils

All training activities conducted at the Combat Center are sources of soil disturbance (DoN 2003). Vehicle and infantry maneuvers and ordnance delivery cause the most disturbance, especially in valley floors, playa lakebeds, and bajadas (broad low-elevation alluvial fan slopes) where most Combat Center training takes place. Vehicle maneuver activities that cause the most disturbance to soils include: 1) off-road use of vehicles, 2) digging in of vehicles and infantry fighting positions, and 3) use of engineering equipment and vehicles to construct roads and obstacles.

There are two main ways that training activities disturb soils: soil compaction and damage to surface crusts, exposing the soil below. Soil compaction reduces soil aeration and plant root growth. Compaction also reduces absorption of moisture, increasing runoff, erosion, and the potential for flash flooding. Surface soil disruption increases susceptibility to wind and water erosion, accelerates the decomposition of organic matter, weakens the soil aggregate stability, and reduces the amount of water that enters the soil (Tierra Data Systems 1998). These changes produce an environment that is generally more difficult for plants and animals (Tierra Data Systems 1998). Wind erosion is a greater concern than water erosion at the Combat Center, due to the generally dry environment and the fact that runoff does not carry sediment outside the installation (DoN 2003).

The landforms of the Combat Center most susceptible to damage from vehicles are steep slopes, gravelly and sandy faces of gentle slopes, and stabilized sand dunes. The least susceptible areas are unstabilized sand dunes and playa lake beds, except when wet. Playas have fine-particle soils covered by a mineral crust that may include a cryptobiotic component. When the crust is disturbed by vehicle traffic, the underlying fine soil can become windborne (Tierra Data Systems 1998). Vehicle traffic also causes significant, long-lasting compaction of playa soils when wet. Though vehicle maneuvers cause direct disturbance to soils, the impacts are largely confined to previously disturbed “Go” and “Slow Go” zones and, therefore, are not widespread throughout the Combat Center (DoN 2003).

Air- and land-based ordnance use can result in impacts to soils at the Combat Center by creating small craters, causing compaction and shearing of soil profiles and dispersing soil particles as dust via explosive

contact. Most of the explosive ordnance fired at the Combat Center leave craters that are about 2 feet (0.6 meters) wide and 6 inches (15 centimeters) deep (DoN 2003). Impact craters from Hellfire missiles are larger, 15 feet wide (5 meters) and 2 feet deep (0.6 meter) (ABC News Internet Ventures 2010). Much of the heavier ordnance delivery with the most damage potential for soils is conducted on Fixed Ranges that have been developed for this purpose. Ordnance delivery outside of Fixed Ranges tends to be focused on previously disturbed areas. Although artillery use occurs within multiple areas at the Combat Center, it mainly takes place within valley bottoms and low-elevation alluvial fan bases. Concentration of ordnance use in previously disturbed areas within the Combat Center would reduce the extent of soil disturbance. Installation of target arrays for the ordnance impact areas involves minor excavation that also results in soil disturbance and compaction.

Aircraft operations (non-ordnance related) such as parachute drops, Marine inserts, and cargo drops can form small depressions in the soil and otherwise compact and disturb desert soils, potentially leaving them susceptible to wind and water erosion. However, the majority of such operations occur in pre-designated, hardened DZs, thereby limiting disturbance to soils. Soil disturbance tends to be concentrated in these previously disturbed areas within the installation, which reduces the extent of disturbance overall. Hovering/landing helicopters are also a source of localized soil disturbance at the Combat Center, causing fine soil particles to be blown laterally in the immediate area of the operation.

Foot traffic associated with infantry maneuvers disrupts soil crusts in previously undisturbed areas. Foot traffic also causes general disturbance and mixing of soil profiles in already disturbed areas. Bivouacking and other excavation activities often take place along with infantry training, which frequently extend over several days. Bivouacking activities and the associated construction of trenches, fighting positions, obstacles, etc., are the largest source of soil disturbance associated with infantry training. These activities disturb desert soils to varying depths, exposing alluvial and sand deposits that can become more susceptible to wind and water erosion (DoN 2003). All digging must be cleared by Combat Center NREA Office personnel, or take place in pre-designated Range Training Support Sites (MAGTF Training Command 2007). MAGTF Training Command procedures require excavations to be backfilled to original grade when infantry maneuvers are completed to minimize soil disturbance related to infantry maneuvers and bivouacking activities. MAGTF Training Command also conducts awareness programs designed to educate Marines on ways to minimize natural resource impacts during training. These programs and procedures minimize soil disturbance impacts associated with ongoing infantry training.

Natural resources including soils at the Combat Center are managed according to a site-specific INRMP. The INRMP specifies measures to offset adverse impacts of training and to sustain natural resources at the installation (MAGTF Training Command 2007). One way this is accomplished is by encouraging military units to utilize previously disturbed areas, especially for off-road maneuvers, digging, or berming. For example, each MAGTF or Mojave Viper evolution trains a different unit. This allows training to utilize the same training corridor during each exercise while still providing realistic training to the unit. This training doctrine has contributed to reducing training land disturbance, with minimal areas receiving heavy use, some areas receiving moderate use, and most areas receiving no use at all. Other strategies to offset the impacts of training as specified in the INRMP include:

- Avoiding wet areas for vehicular traffic and creating a limited number of authorized crossings for Deadman Lake to minimize impacts to playa soils.
- Designing tank traps and other modifications to maintain the natural flow of water during run-off events, to maintain the natural alluvial sediment transport processes.

- Restoring disturbed washes to allow for proper functioning in alluvial sediment transport.
- Restoring training lands to stabilize soils and provide long-term vegetative cover (MAGTF Training Command 2007).

In addition, MAGTF Training Command conducts an ongoing Land Condition Trend Analysis for the Combat Center to evaluate the effects training exercises have on Training Area lands. Combining field data collected from observation plots at the Combat Center, data from the 1999 NRCS *Soil Survey of Marine Corps Air Ground Combat Center, Twentynine Palms, California*, wildlife surveys, and military training requirements, the Land Use Compatibility Model Project recommends land management strategies for maintaining viability and sustainability of training lands in view of current and future training mission requirements (MAGTF Training Command 2001). These strategies from the Land Use Compatibility Model Project have been incorporated into the *Integrated Training and Land Management Plan*, which specifies measures for minimizing impacts to the soil types that occur at the Combat Center (MAGTF Training Command 2001). Some, but not all of the strategies include:

- Change training scenarios and locations of training events to spread out impacts so broad areas do not become completely compacted.
- In sandy areas with perennial grasses, keep activity low to moderate, avoid use of ignition sources, and place targets in a cleared area. These fire-prevention measures also reduce impacts to soil by preserving the vegetation that protects against erosion.
- In areas designated as "Go" for vehicles at the base of alluvial fans, spread low to moderate use as widely as possible to disperse the impact over a wide area.
- Minimize use footprint in areas designated "Sensitive" soil type or "Slow Go" for vehicles, or when activity level is high (MAGTF Training Command 2001).

To minimize impacts to soils from vehicular traffic, MAGTF introduced several measures, including:

- Requiring vehicular traffic to stay on well-defined roads unless training scenarios require otherwise;
- Using previously disturbed sites as much as possible during off-road maneuvers to minimize damage to undisturbed sites (Naval Facilities Engineering Command [NAVFAC] Southwest Division 1996);
- Maintaining natural drainage at the lowest elevation possible and avoiding realignment or blockage of drainages by roads and other construction;
- Aligning linear features perpendicular to the wind direction to minimize wind erosion;
- Minimizing travel on old soils (such as those covered by desert pavement) as these soils can be permanently altered through heavy use; and
- Filling tank traps, trenches, and other major excavations to original grade (when feasible) when training exercises are completed.

These measures, along with periodic erosion control projects, monitoring programs such as the Land Condition Trend Analysis, and maintenance and use of existing environmental resource databases, support the goals of the INRMP and Integrated Training and Land Management Plan of managing training lands for long-term sustainability and protection of natural resources such as soils. These

programs and procedures limit adverse impacts to soils associated with ongoing training activities at the Combat Center.

Under Alternative 1, the same SCMs described above (see Section 2.8) to avoid and minimize impacts to soils at the Combat Center would continue to be applied to current training areas and activities. Tank and artillery use would increase in areas already moderately to highly used for these training functions. Areas that may not have previously been used for training, particularly for ordnance delivery, may also be used for training under Alternative 1. Areas within the Combat Center designated as No Go for vehicles, volcanic rock areas, dune sands, dry lake beds, no maneuver and restricted maneuver areas would continue to be so designated for the MEB training. The same programs and procedures that apply to current training activities to avoid and minimize impacts to soils at the Combat Center would be extended to the MEB training and are incorporated as an SCM to this project (see Section 2.8). Therefore, under Alternative 1, direct impacts to soils at the Combat Center would be less than significant.

Indirect impacts relative to soils, such as off-site soil transport and water quality impacts would also be less than significant, given that there is little to no surface water, a generally permeable soil material, and closed-basin drainage. The indirect impact to air quality as a result of fine soil material being mobilized by ordnance and vehicle use and wind erosion is discussed in Section 4.8, *Air Quality*.

Paleontological Resources

Potential impacts to paleontological resources under Alternative 1 include damage and/or destruction to fossils from ordnance explosions, vehicle traffic, and digging in infantry fighting positions. As stated in Section 3.12, *Geological Resources*, paleontological resources within the Combat Center boundaries are managed by the NREA Natural and Cultural Resources Branch (MAGTF Training Command 2007). Paleontological resources that might be present in the existing Combat Center training areas are subject to an ongoing management and conservation program. Therefore, direct impacts to paleontological resources within the Combat Center would be less than significant. There would be no indirect impacts.

Seismicity

As stated in Section 3.12.3.1, there is currently no evidence linking earthquake activity with the use of explosives (USGS 2011). Therefore, the expanded training activities proposed to occur on the Combat Center under Alternative 1 would have no impact on the seismic activity of the Mojave Desert.

4.12.2.2 West Study Area

Mineral Resources

Under Alternative 1, the entire west study area would be acquired for exclusive military use. As described in Section 3.12, *Geological Resources*, and listed in Table 3.12-4, in the west study area there are no active mines, however there is one mine that holds the necessary permits (but is not currently operating), several abandoned mines, and abandoned mine features. Figure 3.12-1 in Chapter 3 shows locations of mineral resources and mining claim density, locations of some of the mines in the west study area, and potential for mineral occurrence in the region.

As stated in Section 2.6, under Alternative 1 the Marine Corps would acquire the patented and unpatented claims associated with the Morris Lode and Bessemer Mines, which are known to coincide with areas proposed for exclusive military use. After purchase, the mines would be closed, and reclaimed in compliance with appropriate federal and state law.

Morris Lode Mine claimants have an approved reclamation permit from the County of San Bernardino to mine 71.1 acres (28.8 hectares) of their patented mining claims for a period of up to 45 years issued in August 2011 (County of San Bernardino 2011a). If Morris Lode Mine is not producing ore at the time of the proposed acquisition, there would be no loss of existing ore production, which would result in no direct impacts. If the Morris Lode Mine is producing ore before the proposed acquisition, there would be a direct impact due to the loss of active iron ore production and an indirect impact due to the loss of access to potential future ore production. As a potential local/regional source of iron ore, the potential loss of access to Morris Lode Mine would represent a less than significant impact for the first few years following implementation of the proposed action, during which time alternative local supplies of iron ore would continue to be available. This assumes that the two known alternative sources of local iron ore (Baxter Quarry and Silver Lake Mine) would continue to be in production until at least 2020 and 2022, respectively, as per their current SMARA permits (see discussion in Section 3.12.3.2). Iron ore is used as an additive to reduce the amount of heat required for the cement manufacturing process (BLM 2008a). The Morris Lode Mine could become regionally important if the two currently-operating local sources of iron ore for cement manufacturing plants in Lucerne Valley and southern California were no longer available.

The acquisition of and extended loss of access to the Morris Lode iron mine, regardless of whether or not it is producing ore at the time of the proposed acquisition, would have potential future indirect impacts to the local cement manufacturing industry if production from this mine became the sole source of local iron ore in the future (i.e., after closure and reclamation of the two alternative sources, Baxter Quarry and Silver Lake mine). This impact would likely manifest itself by causing local/regional cement companies to find other, more distant sources of iron ore and pay additional costs for transportation of the ore. Transporting a bulk commodity like iron ore over long distances would increase costs and GHG emissions (California Construction and Industrial Materials Association 2009). However, as indicated by Figure 3.12-1, there are areas designated as either high or moderate potential for occurrence of minerals in the surrounding area; therefore, impacts would be less than significant.

In addition to the abandoned mines, there are a number of mining claims in the west study area, mostly unpatented claims. Only a few claims, patented or unpatented, are currently being worked under federal and state laws and regulations. As stated in Section 2.6, all other owners of patented or unpatented mining claims within the acquisition boundary would be offered fair market value for their claims or, depending on the location of the claim(s) relative to proposed MEB training locations or other factors, may be afforded reasonable access to their claims. Decisions on whether to provide access to a claim would be made on a case-by-case basis by the Marine Corps. Because the claims are not producing usable quantities of ore, and the proposed acquisition allows for consideration of continued access, implementation of Alternative 1 would have no direct or indirect impacts to mineral resources.

Under Alternative 1 there would be a potential future impact to geological resources with respect to availability of construction aggregate (rock particles that make up the bulk volume of concrete). As described in Section 3.12.3, San Bernardino County is one of five regions statewide with the greatest projected future need for construction aggregate and the county has only 24% of the permitted aggregate resources as compared to the 50 year demand (California Geological Survey 2006). It is BLM policy to make sand and gravel on its lands available for use by communities and contractors through a contract sales process (BLM 2010a). The west study area is not currently a source of construction aggregate and no quarry facilities exist there, but alluvial sand and gravels that occur in the west study area could potentially be commercial sources of aggregate in the future. Under Alternative 1, the alluvial deposits of the west study area would be withdrawn from public access and potential sale by BLM for use as

construction aggregate. Therefore, there would be a potential future indirect impact associated with the availability of this type of resource if regional permitted sources continue to decline and if demand for such resources continues to increase. Assuming that other potential local/regional sources could be identified and developed if the supply/demand conditions became sufficiently favorable, and given the unknown and speculative nature of those conditions in the future, the impact of Alternative 1 on the availability of construction aggregate supply is estimated to be less than significant.

Soils

Under Alternative 1 there would be impacts to soils in the west study area due to use of military vehicles, ordnance delivery, and infantry training. As described in Section 4.12.2.1, the impacts of military vehicle operations would include disturbance of soil crusts and soil compaction, and excavations to conceal vehicles or construct tank traps. Playa lakebed soils would become compacted and windborne as a result of vehicle movements. Helicopter hovering/landing would displace surface soil in the immediate operating area. Air- and land-based ordnance would create craters, soil compaction, shear soil profiles, and disperse soil particles as dust via explosive contact. There would be localized minor excavations to install target arrays. Foot traffic associated with infantry training would disrupt soil crusts in previously undisturbed areas, and disturb and mix soil profiles in already disturbed areas. There would also be impacts from digging infantry fighting positions. A new INRMP for the Combat Center would be developed that would include the west study area land and would evaluate this land to establish policies and procedures for managing resources there, and has been incorporated as an SCM to this project (see Section 2.8). The topography and geology of the west study area are similar to that of the Combat Center in that they are characterized by northwest to southeast trending mountain ridges and intervening alluvial valleys, some of which contain playa lake beds. Therefore, the west study area contains areas that would be designated dry lake beds, which would be classified as no maneuver and restricted maneuver areas in the same way playa lakebeds have been so designated at the Combat Center. Combat Center Orders regarding vehicle activity on playas would also apply to playas in the west study area. The west study area land would be subject to the same vehicle No Go restrictions as the Combat Center.

The same programs and procedures that apply to current training activities to avoid and minimize impacts to soils at the Combat Center would be extended to the acquired lands in the west study area (see Section 2.8). Tank traps, foxholes, trenches, and obstacles would be filled and graded when training exercises are completed. Upon completion of the training exercises, all the ranges would be swept to remove military munitions and debris. Following the sweep, craters caused by exploding ordnance would be backfilled and graded to natural contours. Through application of installation programs and procedures to avoid and minimize impacts to soil from training (see Section 2.8), direct impacts to soils under Alternative 1 would be less than significant.

As described in Section 4.2, *Recreation*, a portion of the existing Johnson Valley OHV area would not be acquired (i.e., the land outside the west study area). Unrestricted public access and year-round OHV use would continue on the land not acquired, approximately 9% of the existing Johnson Valley OHV area. This would likely concentrate the impacts of OHV use within a much smaller area. Soils in the Johnson Valley OHV area are already disturbed by OHV use, and the land is designated for OHV use, so the impacts would be less than significant. Recreational OHV use would no longer take place on the acquired land and soils would no longer be subject to the impacts of recreational OHV use.

As described under Alternative 1 (see Section 4.12.2.1), there would be indirect impacts to water and air quality under this alternative as a result of fine soil particles mobilized by disturbance and erosion. Indirect impacts to water quality would less be than significant due to the closed basin/playa drainage

scenario of the Mojave Desert region that limits transport of fine sediment in water. The impacts to air quality as a result of fine soil material being mobilized by ordnance and vehicle use and wind erosion is discussed in Section 4.8.2, *Air Quality*.

Disturbed sites of acquired mines would be restored in accordance with their SMARA permit requirements. Due to compliance with the permit and other applicable regulatory requirements, closure activities would have a less than significant impact on soils.

As stated in Section 2.6, abandoned mines would be physically closed, and would be identified and avoided during training exercises. This would prevent impacts to soil and subsurface stability due to use of former mining areas for military purposes. For further information on impacts to health and safety, refer to Section 4.4, *Public Health and Safety*.

Paleontological Resources

Similar to the Combat Center, alluvial sediments in the west study area have the potential to contain significant fossil remains; however, it is difficult to predict whether fossils will be found at any particular location. With implementation of Alternative 1, ordnance delivery and military vehicle travel (activities that could crush/destroy fossils) would take place in Mojave Desert alluvial sediments where fossils may be present. The extent of the impact would be difficult to quantify due to the focus of ordnance target areas on non-fossil bearing formations in upland areas, and the varying types of alluvial deposits that battalion routes would traverse. Paleontological resources within the west study area would be managed by the MAGTF Training Command NREA Natural and Cultural Resources Branch, and would be subject to the same management and conservation program that NREA currently implements at the Combat Center. Due to the dispersed occurrence of fossils, and a proactive MAGTF Training Command program to conserve any such resources that may be present, direct impacts to paleontological resources under Alternative 1 would be less than significant. There would be no indirect impacts.

Seismicity

As stated in Section 3.12.3.1, there is currently no evidence linking earthquake activity with the use of explosives (USGS 2011). Therefore, the expanded training activities proposed to occur in the west study area under Alternative 1 would have no impact on the seismic activity of the Mojave Desert.

4.12.2.3 South Study Area

Mineral Resources

Under Alternative 1, all land in the south study area would be acquired. There are several abandoned mine sites in the south study area; however, there are no active mines or active mining claims, see Figure 3.1-5 in Section 3.1, *Land Use* (DoN 2010; BLM and U.S. Forest Service [USFS] 2010). Therefore, there would be no direct or indirect impacts to mineral resources under Alternative 1.

Under Alternative 1, alluvial sand and gravel deposits in the south study area would be withdrawn from public access and potential sale by BLM for use as construction aggregate. The direct impact on aggregate resources would be the same as that described for the west study area, i.e., less than significant. There would be no indirect impacts.

Soils

The south study area would be used primarily for unit marshalling and maneuvers only, with some live fire emanating from the area towards targets within the existing Combat Center. Abandoned mines would be physically closed, and would be identified and avoided during training activities. For information

regarding safety impacts of abandoned mines, refer to Section 4.4, *Public Health and Safety*. There would be direct impacts to the soils as a result of vehicular traffic, e.g., surface disturbance and compaction. Impacts to soils from stray ordnance falling in the south study area would be minimal. A new INRMP for the Combat Center would be developed that would include the south study area land and would evaluate this land to establish policies and procedures for managing resources there. Through application of installation programs and procedures to avoid and minimize impacts to soil from training (see Section 2.8), direct impacts to soils under Alternative 1 would be less than significant.

As described under Alternative 1 (see Section 4.12.2.1), there would be indirect impacts to water and air quality under this alternative as a result of fine soil particles mobilized by disturbance and erosion. Indirect impacts to water quality would less be than significant due to the closed basin/playa drainage scenario of the Mojave Desert region that limits transport of fine sediment in water. The impacts to air quality as a result of fine soil material being mobilized by ordnance and vehicle use and wind erosion is discussed in Section 4.8.2, *Air Quality*.

Paleontological Resources

As stated in Section 3.12 *Geological Resources*, alluvial sediments in the south study area have the potential to contain fossil remains; however, it is difficult to predict whether fossils would be found at any particular location. The impacts to paleontological resources in the south study area would be the same as those described for the west study area: less than significant direct impacts, no indirect impacts.

Seismicity

As stated in Section 3.12.3.1, there is currently no evidence linking earthquake activity with the use of explosives (USGS 2011). Therefore, the expanded training activities proposed to occur in the south study area under Alternative 1 would have no impact on the seismic activity of the Mojave Desert.

4.12.2.4 Potential Mitigation Measures

In addition to the adoption of the SCMs for geological resources (see Section 2.8), the Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 1 would result in less than significant and unmitigable impacts.

4.12.3 Alternative 2 Impacts

4.12.3.1 Combat Center

Mineral Resources

Under Alternative 2, the impacts to mineral resources within the existing Combat Center would be the same as for Alternative 1: no direct or indirect impacts.

Soils

Impacts to soils within the existing Combat Center under Alternative 2 would be the same as for Alternative 1: less than significant direct and indirect impacts.

Paleontological Resources

Impacts to paleontological resources within the existing Combat Center under Alternative 2 would be the same as for Alternative 1: less than significant direct impacts, no indirect impacts.

Seismicity

Impacts to seismicity under Alternative 2 would be the same as for Alternative 1: no impact.

4.12.3.2 West Study Area

Mineral Resources

Under Alternative 2, a smaller portion of the west study area would be acquired (113,558 acres [44,920 hectares] as compared to 180,353 acres [72,987 hectares] under Alternative 1). The land not acquired under Alternative 2 would be the far western portion of the west study area where several abandoned gold mines are located and multiple mining claims are clustered. Under Alternative 2, those areas would remain open to mineral claims and development. All of the acquired land would be for exclusive military use, and location of a mining claim relative to MEB training locations would determine whether the claim is to be purchased or reasonable access provided.

As with Alternative 1, the Marine Corps would acquire the patented and unpatented claims associated with the Morris Lode and Bessemer Mines, which are known to coincide with areas proposed for exclusive military use. The mines would be closed and reclaimed in compliance with appropriate federal and state law. If the Morris Lode Mine is not producing ore at the time of the proposed acquisition, there would be no loss of existing ore production, so there would be no direct impacts. If the Morris Lode Mine is producing ore at the time the west study area land is acquired, the impacts would be the same as described under Alternative 1: the loss of active ore production would result in a direct but less than significant impact. Loss of future mining potential would result in a less than significant indirect impact. As with Alternative 1, the longer-term loss of access to the Morris Lode ore deposit would potentially have future indirect impacts to local/regional cement manufacturers depending on the circumstances with regard to other available sources of iron ore.

The impact to construction aggregate materials would be the same as for Alternative 1, i.e., indirect, less than significant. As under Alternative 1, all other owners of patented or unpatented mining claims within the acquisition boundary would be offered fair market value for their claims or, depending on the location of the claim(s) relative to proposed MEB training locations or other factors, may be afforded reasonable access to their claims. Decisions on whether to provide access to a claim would be made on a case-by-case basis by the Marine Corps. Because the claims are not producing usable quantities of ore, and the proposed acquisition allows for consideration of continued access, implementation of Alternative 2 would have no direct or indirect impacts to mineral resources.

Soils

Similar to Alternative 1, unrestricted public access and OHV use would continue on the land not acquired under Alternative 2. Approximately 45% of Johnson Valley OHV area would remain open for unrestricted public access and OHV use. The direct and indirect impacts to soils would be similar to those described for Alternative 1. While a much smaller area would potentially be affected by military training under Alternative 2, most of the training activities would take place in the same geographical and topographical locations under both alternatives. Therefore, under Alternative 2 the same types of impacts would occur to the same soil types as described for Alternative 1. As described in Section 4.12.2.1, there would be direct impacts to soils from disturbance of soil crusts and soil compaction, displacement due to helicopter hovering/landing, dispersion of soil particles as dust due to explosive contact, and from shearing/mixing of soil profiles as a result of vehicle operations, ordnance delivery, target array installation, and infantry training. As described in Section 4.12.2.2, a new INRMP would be developed that would include the west study area lands, and Combat Center programs and procedures to avoid and

minimize impacts to soil from training would be implemented. Therefore, direct impacts would be less than significant.

As described under Alternative 1 (see Section 4.12.2.1), there would be indirect impacts to water and air quality under this alternative as a result of fine soil particles mobilized by disturbance and erosion. Indirect impacts to water quality would less be than significant due to the closed basin/playa drainage scenario of the Mojave Desert region that limits transport of fine sediment in water. The impacts to air quality as a result of fine soil material being mobilized by ordnance and vehicle use and wind erosion is discussed in Section 4.8.2, *Air Quality*.

Paleontological Resources

Similar to the Combat Center, alluvial sediments in the west study area have the potential to contain significant fossil remains; however, it is difficult to predict whether fossils will be found at any particular location. With implementation of Alternative 2, ordnance delivery and military vehicle travel (activities that could crush/destroy fossils) would occur in Mojave Desert alluvial sediments where fossils may be present. The extent of the impact would be difficult to quantify due to the focus of ordnance target areas on non-fossil bearing formations in upland areas, and the varying types of alluvial deposits that battalion routes would traverse. Paleontological resources within the west study area would be managed by the MAGTF Training Command NREA Natural and Cultural Resources Branch, and would be subject to the same management and conservation program that NREA currently implements at the Combat Center. Due to the non-uniform distribution or occurrence of fossils, and a proactive MAGTF Training Command program to conserve any such resources that may be present, direct impacts to paleontological resources under Alternative 2 would be less than significant. There would be no indirect impacts.

Seismicity

Impacts to seismicity under Alternative 2 would be the same as for Alternative 1: no impact.

4.12.3.3 South Study Area

Mineral Resources

The impacts would be the same as for Alternative 1: no direct or indirect impacts.

Soils

The impacts would be the same as for Alternative 1: less than significant direct and indirect impacts.

Paleontological Resources

The impacts would be the same as for Alternative 1: less than significant direct impacts, no indirect impacts.

Seismicity

Impacts to seismicity under Alternative 2 would be the same as for Alternative 1: no impact.

4.12.3.4 Potential Mitigation Measures

In addition to the adoption of the SCMs for geological resources (see Section 2.8), the Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 2 would result in less than significant and unmitigable impacts.

4.12.4 Alternative 3 Impacts

4.12.4.1 Combat Center

Mineral Resources

Under Alternative 3, the impacts to mineral resources within the existing Combat Center would be the same as for Alternative 1: no direct or indirect impacts.

Soils

Impacts to soils within the existing Combat Center under Alternative 3 would be the same as for Alternative 1: less than significant direct and indirect impacts.

Paleontological Resources

Impacts to paleontological resources within the existing Combat Center under Alternative 3 would be the same as for Alternative 1: less than significant direct impacts, no indirect impacts.

Seismicity

Impacts to seismicity under Alternative 2 would be the same as for Alternative 1: no impact.

4.12.4.2 South Study Area

Mineral Resources

The impacts would be the same as for Alternative 1: no direct or indirect impacts.

Soils

The impacts would be the same as for Alternative 1: less than significant direct and indirect impacts.

Paleontological Resources

The impacts would be the same as for Alternative 1: less than significant direct impacts, no indirect impacts.

Seismicity

Impacts to seismicity under Alternative 2 would be the same as for Alternative 1: no impact.

4.12.4.3 East Study Area

Mineral Resources

Under Alternative 3, all land in the east study area would be for exclusive military use. As stated in Section 2.6, the location of a mining claim relative to MEB training locations would determine whether the claim is to be purchased or reasonable access provided. As described in Section 3.12, *Geological Resources*, and listed on Table 3.12-6, two active mining operations (TETRA and National Chloride) occur in the east study area. Figure 3.1-5 in Section 3.1, *Land Use*, shows locations of these mines, as well as other mines, mining claims, and mineral resources within the acquisition study areas. Figure 3.12-1 in Chapter 3 shows locations of mineral resources and mining claim density, locations of some of the mines in the east study area, and potential for mineral occurrence in the region. Although there are mineral resources present in the area, there are currently only two active mines within the east study area.

If the TETRA and National Chloride mining operations were to continue in the east study area under Alternative 3, there would be no loss of active mineral production. Thus, there would be no direct or indirect impacts to mineral resources.

Regionally, TETRA has another brine evaporation facility located outside the east study area on the Cadiz Lake playa (State of California Department of Conservation 2005). Superior Salt, Inc. also operates a small brine collection facility outside the east study area, southeast of Amboy Road (State of California Department of Conservation 2005). These facilities access groundwater brines with the same, or similar, calcium chloride chemistry as the TETRA and National Chloride facilities on the Bristol Playa (BLM 2008a). TETRA is the leading worldwide producer of calcium chloride, with multiple production and terminal facilities located in the U.S. and Europe (TETRA 2010b). The Bristol Lake calcium chloride deposits exploited by TETRA and National Chloride are not essential or unique geologic resources of a regional, national, or global nature.

The world's continental sources of sodium chloride are almost limitless. Salt in seawater provides an endless supply. There are substantial economic and sub-economic salt deposits in the major salt producing nations (USGS 2010). In 2008, China and the U.S were the largest producers of salt, producing 5.6 billion tons and 4.4 billion tons, respectively. Within the U.S. there are rock salt and brine salt resources in the northeast, central Wisconsin, and the south Gulf Coast states (USGS 2010). There are five major solar salt production sites in California, four in Utah, and two in New Mexico (Salt Institute 2009).

If the TETRA and National Chloride mining operations were closed under Alternative 3, there would be a direct impact due to loss of active mineral production. However, the impact would be less than significant because the production from these two facilities is not a major contributor to national or worldwide supply. There would also be an indirect impact due to loss of access to these two sources of calcium and sodium chloride. Due to the abundance of alternate potential production sources and methods, the indirect impact would be less than significant.

With respect to patented and unpatented mining claims, as stated in Section 2.6, mining claim owners would be offered fair market value for their claims, or would be afforded reasonable access to their claims. Decisions on whether to purchase a mining claim, or provide access to the claim, would be made on a case-by-case basis. If it is determined that abandoned mines (e.g., Vulcan and America Mines in the east study area) are compatible with MEB training locations, the claimants would be granted reasonable access. These mines are not producing ore, so there would be no loss of active ore production if the mines are found to be incompatible and purchased and closed. The same conditions would apply to all patented and unpatented mining claims in the east study area, whether or not associated with abandoned mines. Therefore, with implementation of Alternative 3 there would be no direct or indirect impacts to mineral resources related to abandoned mines, and patented and unpatented mining claims.

Under Alternative 3, alluvial sand and gravel deposits of the east study area would be withdrawn from public access and potential sale by BLM for use as construction aggregate. The direct impact on aggregate resources would be the same as that described for Alternative 1: less than significant. There would be no indirect impacts.

Soils

Soils in the Bristol Lake playa in the east study area have been disturbed by the TETRA and National Chloride salt production operations, e.g., excavation of brine collection ditches, trenches, holding ponds, and processing areas, as described in Section 3.12. If these mining operations continued to operate under Alternative 3, direct impacts to soils would be less than significant due to compliance with their SMARA permits, which would be required by state law. Indirect impacts to water and air quality would also be less than significant as result of compliance with SMARA permit requirements.

If the land is acquired and the mining operations closed under Alternative 3, the mining sites would be restored according to the requirements of their SMARA permits. The direct impact to soils (potential loss of soil due to excavation/erosion) would be less than significant due to the SMARA requirements to minimize flooding, erosion, and replace topsoil (California Department of Conservation 2007a, 2007c). Indirect impacts (soil mobilization and displacement due to the action of water and wind) would be less than significant because there are no surface water areas in the vicinity other than the Bristol Lake playa (the low spot that contains the sites), intermittent streams fed by seasonal rainfall (DoN 2008), and due to SMARA permit requirements to maintain air quality (California Department of Conservation 2007a).

Cadiz Inc. has agricultural operations on 1,600 acres (648 hectares) on alluvial soils in the north-central portion of the east study area. Due to overlap of planned direct and indirect fire SDZs, the Cadiz Inc. facilities and their personnel would present incompatible use and safety concerns for the planned military uses of the east study area. The owners of the property would be offered fair market value for their land, the agricultural operations would be closed, and the facilities and equipment would be removed. As stated in Section 4.1.4.5, San Bernardino County has 1,021,585 acres (413,400 hectares) in agricultural production. Therefore, loss of access to agricultural soil in the east study area would be a less than significant impact to soil resources.

The east study area is dominated by the soil types of playas and broad alluvial fan bases. Due to constraints posed by the playa soils, vehicle travel and maneuvers most likely would occur in sandy soils on alluvial fans. The target areas for ordnance delivery would be within the Combat Center and alluvial fans and the Ship Mountains in the eastern portion of the east study area.

As described in Section 4.12.2.1, there would be direct impacts to soils from disturbance of soil crusts and soil compaction, dispersion of soil particles as dust due to explosive contact, displacement due to helicopter hovering/landing, and shearing/mixing of soil profiles as a result of vehicle operations, ordnance delivery, target array installation, and infantry training. As described for Alternative 1, an updated INRMP would be prepared that would include the east study area lands and Combat Center programs, and procedures to avoid and minimize impacts to soil from training would be implemented. Tank traps, trenches, and obstacles would be filled and graded when training exercises are completed. In accordance with range management SOPs, stray ordnance that lands in the playa soils would be removed. Therefore, direct impacts would be less than significant.

As described in Section 4.12.2.1, there would be indirect impacts to water and air quality under this alternative as a result of fine soil particles mobilized by disturbance and erosion, but they would be less than significant.

Paleontological Resources

As described in Section 3.12.3.4, some specific locations of paleontological resources in the east study area were documented through a survey conducted in conjunction with the Cadiz Groundwater Storage and Dry-Year Supply Program (Metropolitan Water District [MWD] and BLM 2001). Under Alternative 3, areas known to contain significant fossil resources could be among those planned for ordnance delivery and military vehicle travel (activities that would crush/destroy fossils). However, paleontological resources within the east study area would be managed by the MAGTF Training Command NREA Natural and Cultural Resources Branch, and would be addressed by a proactive management and conservation program to minimize damage or loss. Therefore, under Alternative 3 there would be less than significant direct impacts. There would be no indirect impacts.

Seismicity

Impacts to seismicity under Alternative 3 would be the same as for Alternative 1: no impact.

4.12.4.4 Potential Mitigation Measures

In addition to the adoption of the SCMs for geological resources (see Section 2.8), the Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 1 would result in less than significant and unmitigable impacts.

4.12.5 Alternative 4 Impacts

4.12.5.1 Combat Center

Mineral Resources

Under Alternative 4, the impacts to mineral resources within the existing Combat Center would be the same as for Alternative 1: no direct or indirect impacts.

Soils

Impacts to soils within the existing Combat Center under Alternative 4 would be the same as for Alternative 1: less than significant direct and indirect impacts.

Paleontological Resources

Impacts to paleontological resources within the existing Combat Center under Alternative 4 would be the same as for Alternative 1: less than significant direct impacts, no indirect impacts.

Seismicity

Impacts to seismicity under Alternative 4 would be the same as for Alternative 1: no impact.

4.12.5.2 West Study Area

Mineral Resources

Under Alternative 4, the same land would be acquired as under Alternative 1, i.e., all of the west study area. The difference between Alternative 1 and Alternative 4 is that Alternative 4 would allow restricted public access to all of the west study area approximately 10 months out of the year, when training and/or maintenance activities are not taking place. Decisions on whether to purchase a mine or mining claim, or provide access to the mine or claim, would be made on a case-by-case basis. The location of a mine or mining claim relative to MEB training locations would determine whether the mine or claim is to be purchased or reasonable access provided. If the Morris Mine is producing ore at the time the west study area land is acquired and reasonable access is provided to conduct mining operations, there would be no loss of active ore production and there would be no direct or indirect impacts. If the Morris Lode Mine is producing ore at the time the west study area land is acquired, but is purchased and closed, the impacts would be the same as described under Alternative 1: a direct impact due to the loss of active ore production that would be less than significant because other regional sources are available. As with Alternative 1, the longer-term loss of access to the Morris Lode iron ore deposit would potentially have future indirect impacts to local/regional cement manufacturers depending on the circumstances with regard to other available sources of iron ore. Similar to Alternative 1, if the Morris Lode Mine is not producing ore at the time of the proposed acquisition, there would be no loss of existing ore production, which would result in no direct impacts.

Impacts to construction aggregate materials and mineral resources associated with unpatented mining claims in the west study area at the time that Alternative 4 would be implemented would be the same as for Alternative 1: no direct or indirect impacts.

Soils

Under Alternative 4, the same land would be acquired as for Alternative 1. However, under Alternative 4, the west study area would be used for military training purposes approximately 2 months per year and available for OHV use for about 10 months per year. Direct impacts from OHV use (surface disturbance, compaction, erosion) would continue in Johnson Valley for approximately 10 months per year. The soils in the west study area are already disturbed by OHV use, and the land is designated for OHV use; therefore, these direct impacts would not be significant. Indirect impacts of Alternative 4 would be the same as for Alternative 1: less than significant.

Under Alternative 4, the same impacts to soils would occur as a result of military activities and the potential continuation of mining activities as under Alternative 1. However, under Alternative 4, the impacts from military activities would only take place for approximately 2 months per year as opposed to up to 46 weeks per year for Alternative 1 (including the MEB Building Block training). Under Alternative 4, the exercise maneuvers would traverse from west to east, with only non-dud producing ordnance used while in the west study area. As described in Section 4.12.2.1, there would be direct impacts to soils from disturbance of soil crusts and soil compaction, displacement due to helicopter hovering/landing, dispersion of soil particles as dust due to explosive contact, and shearing/mixing of soil profiles as a result of military vehicle operations, ordnance delivery, target array installation, and infantry training. As described in Section 4.12.2.2, a new INRMP would be developed that would include the west study area lands.

After each training exercise, the range would be swept to remove munitions and debris. Following the sweep, craters caused by ordnance would be backfilled and graded to natural contours. Tank traps, trenches, and obstacles would also be filled and graded. Under Alternative 4, there would be direct impacts to soils in the west study area. However, through application of these procedures to render the west study area safe for civilian use, and implementation of Combat Center programs and procedures to avoid and minimize impacts to soil from training (see Section 2.8), direct impacts would be less than significant.

If reasonable access were to be provided to patented mine properties, and if any mining operations were to be conducted in the project area under Alternative 4, direct impacts to soils would include potential loss of soil due to excavation and erosion. Impacts would be less than significant due to compliance with the mine's SMARA permit, which would be required by state law. Indirect impacts to water and air quality would also be less than significant because of compliance with SMARA permit requirements. If the Morris Lode Mine is acquired and closed, the mine property would be reclaimed in accordance with the operators' SMARA permit requirements. The direct and indirect impacts of closure would be less than significant due to compliance with the permit and other applicable regulatory requirements.

As described in Section 4.12.2.1, there would be indirect impacts to water and air quality under this alternative as a result of fine soil particles mobilized by disturbance and erosion, but they would be less than significant.

Paleontological Resources

The impacts would be the same as for Alternative 1: less than significant direct and indirect impacts.

Seismicity

Impacts to seismicity under Alternative 4 would be the same as for Alternative 1: no impact.

4.12.5.3 South Study Area

Mineral Resources

The impacts would be the same as for Alternative 1: no direct or indirect impacts.

Soils

The impacts would be the same as for Alternative 1: no direct or indirect impacts.

Paleontological Resources

The impacts would be the same as for Alternative 1: less than significant direct impacts, no indirect impacts.

Seismicity

Impacts to seismicity under Alternative 4 would be the same as for Alternative 1: no impact.

4.12.5.4 Potential Mitigation Measures

In addition to the adoption of the SCMs for geological resources (see Section 2.8), the Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 4 would result in less than significant and unmitigable impacts.

4.12.6 Alternative 5 Impacts

4.12.6.1 Combat Center

Mineral Resources

Under Alternative 5, the impacts to mineral resources within the existing Combat Center would be the same as for Alternative 1: no direct or indirect impacts.

Soils

Impacts to soils within the existing Combat Center under Alternative 5 would be the same as for Alternative 1: less than significant direct and indirect impacts.

Paleontological Resources

Impacts to paleontological resources within the existing Combat Center under Alternative 5 would be the same as for Alternative 1: less than significant direct impacts, no indirect impacts.

Seismicity

Impacts to seismicity under Alternative 5 would be the same as for Alternative 1: no impact.

4.12.6.2 West Study Area

Under Alternative 5, the same land in the west study area would be acquired as under Alternative 1. The major difference between Alternatives 4 and 5 is that Alternative 5 does not include acquisition and use of the south study area. Therefore, impacts under Alternatives 4 and 5 would be the same with respect to the west study area.

Mineral Resources

The impacts would be the same as for Alternative 4:

- Less than significant direct impact if the Morris Lode Mine producing iron ore at the time the west study area is acquired, is found to be incompatible with MEB training operations, and is acquired and closed.
- Less than significant indirect impact to future iron ore production.
- Potential future indirect impacts to local/regional cement manufacturers depending on the circumstances with regard to other available sources of iron ore.
- No impact if the Morris Lode Mine is not producing ore when the west study area is acquired, or if the mine is found to be compatible with MEB training operations and reasonable access is granted to conduct mining operations.
- No direct or indirect impacts to construction aggregate materials and mineral resources associated with unpatented/abandoned mining claims.

Soils

Under Alternative 5, the same land in the west study area would be acquired as for Alternative 1. However, under Alternative 5, the west study area would be used for military training purposes approximately 2 months per year and available for OHV use for about 10 months per year. Direct impacts from OHV use (surface disturbance, compaction, erosion) would continue in Johnson Valley for approximately 10 months per year. The soils in the west study area are already disturbed by OHV use, and the land is designated for OHV use; therefore, these direct impacts would not be significant. Indirect impacts of Alternative 5 would be the same as for Alternative 1: less than significant.

Under Alternative 5, the same impacts to soils would occur as a result of military activities and the potential continuation of mining activities as under Alternative 1. However, under Alternative 5, the impacts from military activities would only take place for approximately 60 days per year as opposed to up to 160 days per year for Alternative 1 (including the MEB Building Block training). Under Alternative 5, the exercise maneuvers would traverse from west to east, with only non-dud producing ordnance used while in the west study area. As described in Section 4.12.2.1, there would be direct impacts to soils from disturbance of soil crusts and soil compaction, displacement due to helicopter hovering/landing, dispersion of soil particles as dust due to explosive contact, and shearing/mixing of soil profiles as a result of military vehicle operations, ordnance delivery, target array installation, and infantry training. As described in Section 4.12.2.2, a new INRMP would be developed that would include the west study area lands.

After each training exercise, the range would be swept to remove munitions and debris. Following the sweep, craters caused by ordnance would be backfilled and graded to natural contours. Tank traps, trenches, and obstacles would also be filled and graded. Under Alternative 5, there would be direct impacts to soils in the west study area. However, through application of these procedures to render the west study area safe for civilian use, and implementation of Combat Center programs and procedures to avoid and minimize impacts to soil from training (see Section 2.8), direct impacts would be less than significant.

If reasonable access were to be provided to any active mine properties, and if any mining operations were to be conducted in the project area under Alternative 5, direct impacts to soils would include potential loss

of soil due to excavation/erosion. Impacts would be less than significant due to compliance with the mines' SMARA permits, which would be required by state law. Indirect impacts to water and air quality would also be less than significant as a result of compliance with SMARA permit requirements. If mines are acquired and closed, the mine sites would be restored in accordance with their SMARA permit requirements. The direct and indirect impacts of closure would be less than significant due to compliance with the permit and other applicable regulatory requirements.

As described in Section 4.12.2.1, there would be indirect impacts to water and air quality under this alternative as a result of fine soil particles mobilized by disturbance and erosion, but they would be less than significant.

Paleontological Resources

The impacts would be the same as for Alternative 1: less than significant direct and indirect impacts.

Seismicity

Impacts to seismicity under Alternative 5 would be the same as for Alternative 1: no impact.

4.12.6.3 Potential Mitigation Measures

In addition to the adoption of the SCMs for geological resources (see Section 2.8), the Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 5 would result in less than significant and unmitigable impacts.

4.12.7 Alternative 6 Impacts (Preferred Alternative)

4.12.7.1 Combat Center

Mineral Resources

Under Alternative 6, the impacts to mineral resources within the existing Combat Center would be the same as for Alternative 1: no direct or indirect impacts.

Soils

Impacts to soils within the existing Combat Center under Alternative 6 would be the same as for Alternative 1: less than significant direct and indirect impacts.

Paleontological Resources

Impacts to paleontological resources within the existing Combat Center under Alternative 6 would be the same as for Alternative 1: less than significant direct impacts, no indirect impacts.

Seismicity

Impacts to seismicity under Alternative 6 would be the same as for Alternative 1: no impact.

4.12.7.2 West Study Area

Mineral Resources

Under Alternative 6, approximately 44,665 acres (18,075 hectares) of land that would not be acquired in the northwestern portion of the west study area (as compared with Alternative 1) would remain open to mineral claims and development. This land is where several abandoned gold mines are located and multiple mining claims are clustered. Out of 146,667 acres (59,354 hectares) acquired, restricted public

access would be allowed on 38,137 acres (15,434 hectares) in the southeastern portion of the west study area when MEB exercises are not taking place (with the exception of two small designated Company Objectives that would remain exclusive military use).

As with Alternative 1, the Marine Corps would acquire the patented and unpatented claims associated with the Morris Lode and Bessemer Mines, which are known to coincide with areas proposed for exclusive military use. The mines would be closed and reclaimed in compliance with appropriate federal and state law. If the Morris Lode Mine is not producing ore at the time of the proposed acquisition, there would be no loss of existing ore production, so there would be no direct impacts. If the Morris Lode Mine is producing ore when the west study area land is acquired, the impacts would be the same as described under Alternative 1: less than significant direct impact due to the loss of active ore production and less than significant indirect impacts. As with Alternative 1, the longer-term loss of access to the Morris Lode iron ore deposits would potentially have future indirect impacts to local/regional cement manufacturers depending on the circumstances with regard to other available sources of iron ore. All other owners of patented or unpatented mining claims within the acquisition boundary would be offered fair market value for their claims or, depending on the location of the claim(s) relative to proposed MEB training locations or other factors, may be afforded reasonable access to their claims. Decisions on whether to provide access to a claim would be made on a case-by-case basis by the Marine Corps. Because the claims are not producing usable quantities of ore, and the proposed acquisition allows for consideration of continued access, implementation of Alternative 6 would have no direct or indirect impacts to mineral resources.

Potential impacts to construction aggregate materials and mineral resources associated with mining claims in the west study area at the time that Alternative 6 would be implemented would be the same as for Alternative 1: no direct or indirect impacts.

Soils

As described in Section 4.2, *Recreation*, under Alternative 6, approximately 44% of the existing Johnson Valley OHV area would be available for public use approximately 10 months per year. Reduction of the available public use area would concentrate OHV use within a smaller area. There would be direct and indirect impacts to soils from more concentrated OHV use on the available land. However, the impacts would be similar to those described for Alternative 1, and would be less than significant.

As described in Section 4.12.2.1, there would be direct impacts to soils from disturbance of soil crusts and soil compaction, displacement due to helicopter hovering/landing, dispersion of soil particles as dust due to explosive contact, and shearing/mixing of soil profiles as a result of military vehicle operations, ordnance delivery, target array installation, and infantry training. As described in Section 4.12.2.2, a new INRMP would be developed that would include the west study area lands. Through application of procedures to render the west study area safe for civilian use, and implementation of Combat Center programs and procedures to avoid and minimize impacts to soil (see Section 2.8), direct impacts would be less than significant.

As with Alternative 1, disturbed sites of acquired mines would be restored in accordance with their SMARA permit requirements. The direct and indirect impacts of closure would be less than significant due to compliance with the permit and other applicable regulatory requirements.

As described in Section 4.12.2.1, there would be indirect impacts to water and air quality under this alternative as a result of fine soil particles mobilized by disturbance and erosion, but they would be less than significant.

Paleontological Resources

The impacts would be the same as for Alternative 1: less than significant direct and indirect impacts.

Seismicity

Impacts to seismicity under Alternative 6 would be the same as for Alternative 1: no impact.

4.12.7.3 South Study Area

Mineral Resources

The impacts would be the same as for Alternative 1: no direct or indirect impacts.

Soils

The impacts would be the same as for Alternative 1: no direct or indirect impacts.

Paleontological Resources

The impacts would be the same as for Alternative 1: less than significant direct impacts, no indirect impacts.

Seismicity

Impacts to seismicity under Alternative 6 would be the same as for Alternative 1: no impact.

4.12.7.4 Potential Mitigation Measures

In addition to the adoption of the SCMs for geological resources (see Section 2.8), the Marine Corps considered potential mitigation measures but determined that none were feasible. No mitigation measures are recommended. Consequently, Alternative 6 would result in less than significant and unmitigable impacts.

4.12.8 No-Action Alternative

Under the No-Action Alternative, the Marine Corps would not establish a large-scale training facility to accommodate sustained, combined-arms, live-fire, and maneuver training exercises and the Marine Corps would not acquire land in any of the proposed acquisition study areas. Direct impacts from OHV use (surface disturbance, compaction, erosion) would continue in the Johnson Valley OHV Area. The soils in this area are already disturbed by OHV use, and the land is designated for OHV use; therefore, these direct impacts would not be significant. Implementation of the No-Action Alternative would maintain existing conditions and there would be no impacts to geological resources.

4.12.9 Summary of Impacts

Table 4.12-1 summarizes the impacts of each action alternative and the no-action alternative.

Table 4.12-1. Summary of Impacts

Alternative	Impacts
Alternative 1	LSI • Soils: Direct impacts from disturbance of soil crusts and soil compaction, dispersion of soil particles as dust due to explosive contact, and shearing/mixing of soil profiles, as a result of military vehicle operations, ordnance delivery, and infantry training. • Soils: Direct impacts (surface disturbance, erosion, and compaction) from continued OHV activity concentrated in a smaller area. • Soils: Indirect impacts to water and air quality from military activities on acquired land and OHV use concentrated in smaller area on land not acquired. • Mineral resources: Direct impact and indirect impacts due to loss of ore production if the Morris Lode Mine becomes active and begins producing ore in the west study area and is purchased and closed. • Mineral resources: Indirect impact if alluvial sand and gravel on BLM lands are no longer available for potential sale as construction aggregate. • Paleontological resources: Direct impact (damage/destruction from ordnance/vehicle traffic, digging infantry positions) to fossils if present in training areas in alluvial soils. NI • Mineral resources: No direct or indirect impacts to mineral resources if the Morris Lode Mine is not producing ore in the west study area. No direct or indirect impacts from purchase of patented and unpatented mining claims and closure of abandoned mines. No direct or indirect impacts to mineral resources in the Combat Center and the south study area. • Seismicity: There is currently no evidence linking earthquake activity with the use of explosives; therefore, proposed training activities would not affect seismic activity in the Mojave Desert.
Alternative 2	LSI • Soils: Direct and indirect impacts from military activities would be the same as for Alternative 1, except they would occur over a smaller portion of the west study area. • Soils: Direct impacts (surface disturbance, erosion, and compaction) from continued OHV activity concentrated in smaller area. • Soils: Indirect impacts to water and air quality from military activities on acquired land and OHV use concentrated in smaller area on land not acquired. • Mineral resources: Direct and indirect impacts would be the same as for Alternative 1. • Paleontological resources: Direct impact would be the same as for Alternative 1. NI • Mineral resources: Direct and indirect impacts would be the same as for Alternative 1. • Seismicity: Impacts would be the same as for Alternative 1.

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Table 4.12-1. Summary of Impacts

Alternative	Impacts
Alternative 3	LSI • Soils: The impacts due to military activities would be the same as for Alternative 1, except that they would occur in the east study area. • Direct impacts to access of agricultural soils in the east study area, due to overlap of planned direct and indirect fire SDZs with existing agricultural operations. • Soils: Direct and indirect impacts from continuation of active mining operations and/or mine closure. • Indirect impacts to water and air quality associated with military activities would be the same as for Alternative 1, except they would occur in the east study area. • Mineral resources: Direct impact and indirect impacts if two currently operating calcium chloride mining facilities in the east study area are purchased and closed. • Mineral resources: Indirect impact if alluvial sand and gravel on BLM lands are no longer available for potential sale as construction aggregate • Paleontological resources: Direct impact (damage/destruction from ordnance/vehicle traffic, digging infantry positions) to fossils if present in training areas in alluvial soils NI • Mineral resources: No direct or indirect impacts to mineral resources if existing calcium chloride mines in the east study area continue operations. No direct or indirect impacts from purchase of unworked/unpatented mining claims and/or closure of abandoned mines. No direct or indirect impacts to mineral resources in the Combat Center and the south study area. • Seismicity: Impacts would be the same as for Alternative 1.
Alternative 4	LSI • Soils: Direct and indirect impacts to soils from military activities would be the same as under Alternative 1, except that the impacts from military activities would occur for approximately only 60 days per year as opposed to up to 160 days per year under Alternative 1. • Soils: Direct impacts (surface disturbance, erosion, and compaction) from continued OHV activity would occur during 10 months of restricted public access. • Soils: Indirect impacts to water and air quality due to transport of soil material mobilized by water and air, resulting from both military activities and OHV use. • Soils: Direct and indirect impacts from potential continuation of active mining operations and/or mine closure. • Mineral resources: Direct and indirect impacts if the Morris Lode Mine becomes active and begins producing ore and is purchased because it is found to be incompatible with military operations. • Paleontological resources: Direct impact would be the same as for Alternative 1. NI • Mineral resources: If the Morris Lode Mine is not producing ore, or is found to be compatible with military operations. • Seismicity: Impacts would be the same as for Alternative 1.

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Table 4.12-1. Summary of Impacts

Alternative	Impacts
Alternative 5	LSI • Soils: Direct and indirect impacts to soils from military activities and mining continuation or closure would be the same as for Alternative 4. • Soils: Direct and indirect impacts associated with OHV use would be the same as for Alternative 4. • Mineral resources: Direct and indirect impacts would be the same as for Alternative 4. • Paleontological resources: Direct impacts would be the same as for Alternative 1. NI • Mineral resources: The impacts to mineral resources would be the same as for Alternative 4. • Seismicity: Impacts would be the same as for Alternative 1.
Alternative 6	LSI • Soils: Direct and indirect impacts from military activities would be the same as for Alternative 1, except they would occur over a smaller portion of the west study area. For up to 160 days, there would be impacts from military activities on (108,530 acres [43,921 hectares]) as opposed to 180,353 acres (72,987 hectares) under Alternative 1. Impacts from military activities would occur for 60 days within the RPAA (38,137 acres [15,434 hectares]). • Soils: Direct impacts from OHV use (surface disturbance, compaction, erosion) would increase within the RPAA area available for use (44% of existing Johnson Valley OHV area open 10 months per year, 24% of existing area open year round). • Soils: Indirect impacts from OHV use (impacts to water and air quality due to transport of soil material mobilized by water and air) would increase within the area available for use (44% of existing Johnson Valley OHV area open 10 months per year, 24% of existing area open year round). • Mineral resources: Direct and indirect impacts would be the same as for Alternative 1. • Paleontological resources: Direct impacts would be the same as for Alternative 1. NI • Mineral resources: Direct and indirect impacts would be the same as for Alternative 1. • Seismicity: Impacts would be the same as for Alternative 1.
No-Action Alternative	NI • Existing conditions would remain unchanged.

Notes: BLM = Bureau of Land Management; LSI = Less than Significant impact; NI = No impact; OHV=Off-highway vehicle; RPAA = Restricted public access area; SDZ = Surface Danger Zone

4.13 WATER RESOURCES

4.13.1 Approach to Analysis

The analysis of potential impacts to water resources addresses specific issues related to surface water and groundwater for each of the project alternatives. Surface water impacts include water quality, water supply to sensitive habitats, and increased risk of flooding in terms of surface water and water quality. Groundwater impacts include potable water quality, groundwater supply, and changes in groundwater flow patterns. These issues are very similar to those that were identified during the public scoping process (see Section 4.13.1.3).

4.13.1.1 Methodology

Direct and indirect impacts to water resources were analyzed by considering the size and location of activities associated with each of the alternatives (as described in Chapter 2) and their potential to alter the quality, quantity, or beneficial uses of the existing resources (described in Section 3.13). No new studies or modeling were conducted in support of these analyses. Instead, the analyses were based on assessments of existing information and key findings from other, appropriately representative studies such as the *Range Environmental Vulnerability Assessment* (REVA) (Headquarters Marine Corps 2008) and USGS (Li and Martin 2011) that addressed groundwater resources as related to potential impacts associated with the project alternatives. Specifically, impacts to water quality were evaluated by considering the potential for the project alternatives to alter the composition of surface water and groundwater and comparing the altered composition to water quality standards, where appropriate. Impacts from flooding were evaluated by considering the extent to which the project alternatives would alter surface runoff patterns, such that newly constructed or existing structures would be susceptible to inundation. Potential water supply impacts were evaluated by determining the extent to which existing resources can support the added demands of additional personnel associated with the training exercises.

The impact analysis assumed that no additional water infrastructure would be developed to supply water for the training exercises. Instead, it was assumed that all water required to support the training exercises would be supported by existing groundwater supplies at the Combat Center (i.e., the Surprise Spring subbasin), and none of the project alternatives would extract groundwater from the proposed west, south, or east study areas. The analysis also assumed that two or three communication towers (depending on the alternative) would be constructed, with no other permanent structures constructed. Further, all project-related activities associated with water usage at the Combat Center would be required to comply with existing orders (e.g., Combat Center Order 5090.1D), and these orders would also apply to any operations conducted in the proposed acquisition study areas.

As discussed in Section 3.13, the Combat Center has relied historically on the Surprise Springs subbasin for all of the potable water needs. As a result, the demand has placed the aquifer in an overdraft situation. To resolve this situation, the Combat Center is working with USGS to determine the effects of projected growth, increased training, and implementation of various conservation measures on the Combat Center's water supply. As a result of this study, the Combat Center has implemented several procedures to reduce the potable water usage while continuing the mission and meeting future goals. For example, the Combat Center is recycling all wastewater for irrigation use, which has provided a significant reduction in potable water usage. The Combat Center also has enacted watering hours and other conservation measures which are included in Combat Center Order 4100.3D and enforced by the NREA Compliance Support Branch.

NREA is working on an Installation Energy and Sustainability Strategy (IESS) which will include water use strategies and conservation measures at the Combat Center.

To achieve a sustainable water supply, the Combat Center is evaluating plans to "blend" groundwater from the Surprise Springs subbasin with those from one or more aquifers on base. Some blending scenarios modeled by USGS (Li and Martin 2011) were shown to meet future demands, minimize or eliminate over-drafting of Surprise Springs Subbasin and provide recharge. The Combat Center is also evaluating other options for managing the potable water supply. While there is no target completion date for this evaluation (Combat Center 2010), completion and implementation of the IESS is an SCM for the proposed action (see Section 2.8.5).

The impact analyses evaluated the potential for the project alternatives to affect water resources by determining whether the action would exceed any of the evaluation criteria listed in Section 4.13.1.2. An activity that resulted in an exceedance of one or more criteria was considered a significant impact. For a significant impact, a determination was made as to whether the impact could be mitigated and, if so, whether the magnitude of the residual impact would be less than significant.

4.13.1.2 Evaluation Criteria

For the purposes of this analysis, the following issues are evaluated:

- increase of risks to housing, structures, or humans from flooding;
- alteration of existing water flow patterns or drainages to the extent that water supplies to sensitive habitats and/or groundwater recharge are substantially reduced;
- degradation of the quality of groundwater, resulting in noncompliance with all applicable water quality standards, laws, and regulations;
- degradation of the quality of surface waters by introducing contaminants that represent a human health or ecological risk or otherwise interfere with beneficial uses; or
- Relative degree of any reduction in long-term water supply for the Combat Center or surrounding communities.

These evaluation criteria are based on considerations of the project alternatives to deplete or degrade existing resources, interfere with beneficial uses, or present a potential risk to humans or biological resources.

4.13.1.3 Public Scoping Issues

Potential issues related to water resources that were identified during the public scoping process included:

- impacts to the limited potable water supply and the potential to overdraft the aquifer;
- concern regarding the potential for hazardous materials to enter groundwater aquifers, changes to groundwater flow patterns, and impacts to groundwater recharge potential;
- concerns regarding surface water impacts, including erosion and sedimentation, contamination from fuel spills and leaks, contamination from ordnance, and reduction in riparian systems and ephemeral streams;
- potential for increased water withdrawal and acquisition of adjudicated water rights associated with private lands acquired;

- potential impacts to floodplains;
- potential loss of lives and assets from increased risk of flash flooding;
- potential impacts of ordnance to aquifers and geologic faults;
- impacts to southern California water supply by eliminating the Cadiz Valley Water Project; and
- concern regarding potential damage to domestic water wells from nearby military activities and ordnance use.

These issues are addressed for each of the project alternatives in the following sections.

4.13.2 Alternative 1 Impacts

As part of the proposed action, the following SCMs for water resources would be implemented under any action alternative to reduce impacts.

WAT SCM 1: The Combat Center would complete and implement the IESS that balances water demands (including those associated with the proposed action) with water supplies by increasing water conservation, using more recycled water, importing water, treating lower quality groundwater, and/or other methods deemed appropriate. The strategy would address sustainable water usage within the Combat Center, as well as regional water management, particularly if the strategy included groundwater extraction from other than the Surprise Springs aquifer.

WAT SCM 2: The Combat Center would review the REVA findings, including the activities associated with the MEB exercises addressed by the proposed action, at a frequency of once every five years or sooner based on changes in training exercises that could potentially alter the risk by increasing or decreasing the loading factors, changing locations of where munitions are being used, or other factors that are different from current assumptions and model parameters.

4.13.2.1 Surface Water

In general, potential issues related to surface water impacts involve changes to water quality, water supplies to sensitive habitats, and surface runoff, related concerns for erosion/sedimentation, and flooding risks. These potential impacts to surface waters are evaluated below.

<u>Water Quality</u>

Contamination from Waste Discharges and Fuel Spills/Leaks

Waste discharges and/or accidental spills or releases of hazardous materials, such as petroleum products, during training exercises have a potential to affect water quality. Marine Expeditionary Brigade exercises associated with Alternative 1 would generate “grey water” and “black water” wastes. These wastes would be processed in accordance with guidance in Combat Center Order 5090.1D (MAGTF Training Command 2006), which specifies that sanitary sewage generated by MEB exercises and MEB Building Block training would be collected in portable toilets, and would be properly disposed of at the Camp Wilson lift station or at the Southwest Region Fleet Transportation facilities.

Marine Expeditionary Brigade exercises would also involve the use of some hazardous materials, including petroleum, oil, and lubricants. Combat Center Order 5090.1D (MAGTF Training Command 2006) provides specific guidance for restrictions on use of hazardous materials; treatment of hazardous wastes; and spill prevention, containment, and cleanup. Control, cleanup, and reporting of spills are also covered by an environmental SOP. Per Combat Center Order 5090.1D, no hazardous materials, hazardous waste, or solid wastes would be disposed of, left, buried, or abandoned in training areas.

Based on these in-place procedures, impacts to surface waters from storage and disposal of wastewaters, storage and use of petroleum products, and/or containment and cleanup of spills of waste or hazardous material for Alternative 1 would be less than significant. Also, given the low frequency of rain events within the project area, the potential for dispersion and transport of spilled materials or wastes before cleanup is relatively low. Therefore, Alternative 1 would have less than significant impacts to surface water quality.

Contamination from Munitions Constituents

Marine Expeditionary Brigade exercises associated with Alternative 1 would involve the use of munitions for the MEB training exercise only within the Combat Center and the west study area. The location and estimated use of munitions for the MEB training exercises are provided in Chapter 2, Figure 2-4d and Table 2-5. The estimated use of munitions for the MEB Building Block training is provided in Appendix F. Unrecovered munitions constituents (MC) represent a potential source of water contamination. Combat Center Order 5090.1D (MAGTF Training Command 2006) provides specific guidance for recovery and recycling of residues from live-fire and maneuver areas. In addition, DoD Instruction 3200.16 requires Services to conduct Operational Range Clearance, which reduces the amount of MCs that could potentially migrate off-range. Marine Air Ground Task Force Training Command typically recycles range residues (i.e., scrap metal) directly from live-fire and maneuver areas, except when training exercises generate range residue amounts that exceed the capacity of the recycling center. In this case, MAGTF Training Command temporarily consolidates range residues at a single location on an active range for subsequent disposal.

The Marine Corps' REVA program uses a conservative, USEPA-approved screening model for MCs in surface water and groundwater. As noted in Section 3.13, the REVA concluded that MC can migrate from the range training areas via dissolution and transport in periodic surface water flows and eventually deposit and accumulate within the playas. Military training has occurred at the Combat Center since 1914. The REVA assessed the historical loading of MC within the Combat Center since 1914 and predicted MC concentrations within the playas. Predicted concentrations of some MC exceeded the REVA trigger levels at the edge of the loading areas and/or at the playas. However, predicted levels were substantially below toxicity thresholds for sensitive indicator species (Headquarters Marine Corps 2008). The low precipitation rate, long distance between ranges and intermittent receiving surface water bodies, and deep groundwater, limits the migration of MC residues and thus the potential impacts of use of munitions (Headquarters Marine Corps 2008). Use of munitions under Alternative 1 at the Combat Center would be similar to existing use and, therefore, potential impacts from the use of munitions would be minimal. The west study area is similar to the Combat Center in geology and climate, and therefore potential impacts from the use of the munitions in the west study area would also be minimal. The REVA did not consider the potential risks associated with future MEB training exercises activities, such as those evaluated in this EIS. However, the REVA states that the findings would be re-evaluated on a five-year basis or sooner if substantial changes occur in training or MC loading (Headquarters Marine Corps 2008).

Re-evaluation of the REVA findings, to include the MEB exercises, at a frequency of every five years or sooner, is an SCM (see Section 2.8.5). The five-year assessment began at the Combat Center in October 2010 and found no detectable levels of MCs. Confirmatory sampling would occur if a future REVA evaluation indicates there are a source, pathway, and receptor with detectable levels of MC.

Because of the ongoing management and minimization of MC residues at the Combat Center and implementation of management and minimization of MC residues in the acquisition study areas, direct impacts to surface water quality from Alternative 1 would be less than significant. Similarly, given the low potential for offsite transport of MC residues or other waste materials, via stormwater runoff, atmospheric deposition, or other processes, indirect effects to surface water quality outside of the Alternative 1 footprint also would be less than significant.

Water Supply to Sensitive Habitats

Alternative 1 would require some temporary ground excavation, grading, or other maintenance/improvements to unpaved roads, as well as vehicular operations, with potential for causing erosion or sedimentation that could alter runoff patterns and disturb surface soils throughout the training region, including areas within dry washes. Sedimentation within dry washes could slightly alter existing runoff patterns and cause localized, temporary ponding or erosion following a rain event. Localized diversions or ponding could slightly reduce the amount of surface water runoff draining to the terminal playas.

The proposed training ranges currently experience routine vehicular traffic. In accordance with the INRMP, the Combat Center has ongoing programs, such as Training Disturbance Minimization measures, to design tank traps and other land modifications that maintain the natural flow of water during run-off events and to restore, as needed, disturbed washes to allow for proper functioning. These in-place procedures are derived from existing plans, programs, and regulations, as well as various agency consultations, and would continue to be implemented as part of any training scenario. In addition, Combat Center Order 5090.1D (MAGTF Training Command 2006) provides general guidance for avoiding impacts to natural resources, as well as specific guidance for avoiding disturbance of playas or other sensitive areas. The existing INRMP and compliance under Combat Center Order 5090.1D applies to existing and continued use in the Combat Center and would be expanded to cover the acquisition study areas. Operations associated with Alternative 1 would not affect seeps and springs because these are located in mountainous terrain and are generally outside of the training and maneuvering areas. Therefore, Alternative 1 would have less than significant impacts to water supply to sensitive habitats. Further, Alternative 1 would not cause any changes in precipitation rates or drainage patterns that would alter water supplies to sensitive habitats outside of the footprint, and indirect impacts would be less than significant.

Increased Risk of Flooding

Alternative 1 would construct three permanent communications towers located at the top of mountains (see Section 2.1). The communication towers would not alter drainage patterns in the vicinity of Mainside or other areas of the Combat Center that have existing structures. Therefore, there is no potential for this alternative to increase the risk of flooding damage to buildings or other infrastructure or increase risks to public safety associated with flooding. Therefore, direct and indirect impacts from Alternative 1 due to flooding risk would be less than significant impacts.

In summary, Alternative 1 would have less than significant impacts to surface water resources.

4.13.2.2 Groundwater

In general, issues related to groundwater impacts involve potential changes to water quality, water supply, and changes in flow patterns. These potential sources of impacts to groundwater are evaluated below.

Groundwater Quality

As noted in Section 4.13.2.1, all training operations would be conducted in accordance with Combat Center Order 5090.1D (MAGTF Training Command 2006), which provides guidance for managing wastes and containing and cleaning spills. Implementation of these procedures would minimize the potential for leaching of surface-released contaminants to the groundwater.

The REVA (Headquarters Marine Corps 2008) concluded that the groundwater contamination from MC residues is not expected because the potential for MC migration from the surface to groundwater is very low and training areas that generate MC residues are not proximal to drinking water wells in the west study area. Use of munitions under Alternative 1 at the Combat Center would be similar to existing use and, therefore, potential impacts from the use of munitions would be limited. The west study area is similar to the Combat Center in geology and climate and potential impacts from the use of the munitions in the west study area would also be limited. Therefore, Alternative 1 would have less than significant impacts to groundwater quality. Further, as mentioned for surface waters (Section 4.13.2.1), given the low potential for migration of MC residues or other wastes, indirect impacts to groundwater quality in adjacent areas outside of the project footprint would be less than significant.

Groundwater Recharge

Alternative 1 would not add impervious surfaces or otherwise restrict surface water migration to the aquifer. Furthermore, this alternative would not rely on surface waters to support training exercises. As noted in Section 3.13, groundwater recharge is principally from groundwater subsurface flow originating from runoff from the surrounding mountains and migrating through adjacent basins. Percolation from rainfall on the land overlying the aquifers provide little to no groundwater recharge. Therefore, Alternative 1 would have no direct or indirect impact on groundwater recharge within the project area.

Potable Water Quality and Groundwater Supply

Groundwater from the Surprise Spring subbasin is the only potable water source for the Combat Center. Development of new groundwater sources in other basins for potable water supply would not occur under Alternative 1. U.S. Geological Survey (Li and Martin 2011) recently completed an assessment of the potable water management strategy for the Combat Center indicating that the potable groundwater in Surprise Spring subbasin is diminishing due to pumping-induced overdraft and more restrictive federal drinking water standards on arsenic concentrations. Any other current or future projects that rely on groundwater in the Surprise Spring basin for a source of drinking water would exacerbate the current overdraft conditions.

One of the limitations of amending the water extractions from Surprise Spring with groundwater from other adjacent subbasins is the high concentrations of groundwater constituents, particularly arsenic, that constrain the amount of blending without exceeding federal drinking water standards. For example, the maximum amount of non-potable water from the Deadman Lake subbasin that can be blended with potable water from the Surprise Spring subbasin, without exceeding the drinking water standard for arsenic concentrations, is 25% of the potable water demand. As groundwater levels continue to decline in the Surprise Spring subbasin, progressively higher percentages of water would need to be obtained from

the lower aquifer, which has poor water quality due to high concentrations of total dissolved solids (TDS), fluoride, and arsenic.

However, this condition is being addressed in the Combat Center's IESS to the extent that water conservation practices are implemented and other sources of drinking water are developed and substituted for planned groundwater withdrawals. Alternative sources for potable water supply include importing water, extraction and treatment of groundwater from other basins, conservation, and additional recycling of water. Implementation of the IESS is an SCM for this and the other project alternatives (see Section 2.8.5).

Alternative 1 would increase the potable water demand on the Surprise Spring subbasin in proportion to the additional persons for the MEB training exercises: approximately 15,000 persons for 30 days, twice a year, and 70 additional full-time support personnel. The Marine Corps uses a logistic planning factor of 8.4 gallons (31.7 liters) per person per day for training exercises in arid environments. Using this factor, the MEB training exercise would increase the water demand by approximately 6.1 million gallons (23 megaliters [ML]) per year or 19 acre-feet (AF) per year (23 ML per year). Based on the potable water use of 0.2 AF (0.25 ML) per person per year for personnel stationed at the Combat Center in 2009 (Table 3.13-4), the 70 additional support personnel would increase potable water demand by 14 AF per year (17 ML per year). Therefore, total increase in potable water demand in Alternative 1 would be up to 33 AF per year (40 ML per year). Based on an average usage rate of 3,300 AF per year for the 10-year period 2000 to 2009, this would represent a 1% increase in potable water demand. Thus, the relative degree of any reduction in long-term water supply for the Combat Center or surrounding communities would be minor.

The combined increase of 2,425 personnel and associated dependents at the Combat Center is planned to occur over a 4-year time period from 2008 to 2011. In 2009, the total number of personnel at the Combat Center increased by 2,100 from 2008, while the potable water use declined by 400 AF. This is consistent with the trend from 2000 to 2009 where personnel levels have increased at the Combat Center coincident with a decline in potable water use. Therefore, the increase in end strength, as of 2009, has not caused an increasing rate of withdrawal from the Surprise Spring subbasin. This was made possible because of increased efficiency of potable water use at the Combat Center, allowing the Combat Center to mitigate the water supply impacts of increasing the end strength.

The USGS study (Li and Martin 2011) acknowledges that the Combat Center is developing water management strategies to meet projected water demands at the Combat Center for the period 2008 to 2017. These strategies may include various measures for increasing water conservation, using more recycled water, and treating lower quality groundwater. As has been shown by recent data, the Combat Center has successfully mitigated the impacts of increased personnel levels from 2000 to 2009 while at the same time reducing potable water usage through the increased efficiency (water conservation, recycling, etc.). In addition, DoD's Strategic Sustainability Performance Plan establishes a goal of reducing potable water consumption intensity by 26% in Fiscal Year (FY) 20 from FY07 levels (DoD 2010). The Combat Center has the ability to manage the future water needs associated with this alternative. See also Section 5.4.13 for a discussion of potential cumulative effects.

Nevertheless, as discussed in Section 4.13.1, the Combat Center is currently evaluating options for developing sustainable water supplies, and meeting projected water demands at the Combat Center for the period 2008 to 2017, to be consistent with the IESS. With the implementation of this strategy, the impacts to water supply would be less than significant. Further, because the relative reduction in the long-term water supply for surrounding communities would be minor, indirect impacts also would be less

than significant. Due to elevated background arsenic levels reported in some regional production wells, groundwater within the study area would be tested before any proposed use as potable water supply, to ensure compliance with applicable drinking water standards.

Changes in Groundwater Flow Patterns

Groundwater production from the Surprise Spring subbasin would decrease local groundwater elevations and induce an increase in groundwater flow from adjacent groundwater aquifers. While the connectivity between groundwater basins is poorly known in this region, the potential for inducing declines in groundwater elevations within adjacent groundwater basins exists and may be detrimental to the surrounding communities utilizing these groundwater resources for their water supply. However, given that the water needs associated with Alternative 1 would only be 1% of the current production and with implementation of the IESS, changes in groundwater flow patterns associated with the alternative would be less than significant.

Impacts to Domestic Water Wells

Ross (1995) summarizes the work of four studies conducted to determine the effects of underground explosions on domestic water wells. Charges as large as 50 pounds (22 kilograms) were detonated at distances as small as 18 feet (6 meters) from the wells. Following the detonations, no appreciable permanent damage was found using down-hole cameras inside the wells, and pumping tests showed no reduction in yield (Ross 1995). In some cases, underground use of very large charges at small distances from wells caused temporary silty water that cleared after a short period of pumping (Ross 1995). Military activities involving ordnance use would occur at the ground surface and at much greater distances from domestic water wells than the explosions in these studies. Therefore, Alternative 1 would have no impact on domestic water wells.

In summary, Alternative 1 would have no impact to groundwater recharge and domestic water wells, and less than significant impacts to groundwater quality, groundwater flow patterns, and potable water quality and groundwater supply.

4.13.2.3 Potential Mitigation Measures

In addition to the adoption of SCMs for water resources (see Chapter 2), the Marine Corps considered potential mitigation measures but determined that none were feasible for Alternative 1. No mitigation measures are recommended. Consequently, Alternative 1 would result in less than significant, unmitigable impacts.

4.13.3 Alternative 2 Impacts

Alternative 2 would support two MEB exercises per year for a period of approximately 30 days per event. Each exercise would involve off-road operations of wheeled and tracked vehicles (see Chapter 2, Table 2-3). The MEB training exercises would occur mainly within the western half of the Combat Center and a reduced west study area. MEB Building Block training would occur in the reduced west study area and would include off-road operations during approximately 160 days per year. The south study area would only be used for unit marshalling and maneuvering.

4.13.3.1 Surface Water

Marine Expeditionary Brigade exercises associated with Alternative 2 would involve the use of munitions for the MEB training exercise only within the Combat Center and the reduced west study area. The location and estimated use of munitions for the MEB training exercises are provided in Chapter 2, Figure

2-6d and Table 2-5. The estimated use of munitions for the MEB Building Block training is provided in Appendix F. Impacts to surface water resources would be the same as discussed above for Alternative 1. Therefore, direct and indirect impacts from Alternative 2 to surface water resources would be less than significant.

4.13.3.2 Groundwater

Impacts from Alternative 2 to groundwater resources would be the same as discussed above for Alternative 1. Therefore, Alternative 2 would have less than significant impacts to groundwater quality and no impact on groundwater recharge and domestic wells.

Similar to Alternative 1, Alternative 2 would increase demands for potable water from existing sources at the Combat Center by up to 32 AF per year (39 ML per year), representing a 1% increase in potable water demand. Thus, the relative degree of any reduction in long-term water supply for the Combat Center or surrounding communities would be minor. As of 2009, the Combat Center has been able to mitigate the water supply impacts of increasing the end strength, and the Combat Center is presently developing water management strategies to meet projected water demands for the period 2008 to 2017. With implementation of the SCM (development and implementation of the IESS), the impacts to water resources from Alternative 2 would be less than significant. Further, because the relative reduction in the long-term water supply for surrounding communities would be minor, indirect impacts would be less than significant.

4.13.3.3 Potential Mitigation Measures

In addition to the adoption of SCMs for water resources (see Chapter 2), the Marine Corps considered potential mitigation measures but determined that none were feasible for Alternative 2. No mitigation measures are recommended. Consequently, Alternative 2 would result in less than significant, unmitigable impacts.

4.13.4 Alternative 3 Impacts

Alternative 3 would support two MEB exercises per year for a period of approximately 30 days per event. Each exercise would involve off-road operations of wheeled and tracked vehicles, and would occur within the Combat Center and east study area (see Table 2-3). MEB Building Block training would occur within the east study area, and involve off-road operations during approximately 160 days per year. The south study area would only be used for unit marshalling and maneuvering.

4.13.4.1 Surface Water

Marine Expeditionary Brigade exercises associated with Alternative 3 would involve the use of munitions for the MEB training exercise within the Combat Center and the use of munitions for the MEB Building Block training in the east study area. The location and estimated use of munitions for the MEB training exercises are provided in Chapter 2, Figure 2-7d and Table 2-5. The estimated use of munitions for the MEB Building Block training is provided in Appendix F.

<u>Water Quality</u>

Impacts from Alternative 3 to surface water resources on the Combat Center would be the similar to those discussed above for Alternative 1. The east study area has similar surface hydrologic processes as the Combat Center (Section 3.13). Based on the in-place procedures described in Alternative 1, the impacts from the storage and disposal of wastewaters, storage and use of petroleum products, and/or containment and cleanup of spills of waste or hazardous material, Alternative 3 impacts to surface waters would be

less than significant. Also, given the low frequency of rain events within the east study area, the potential for dispersion and transport of spilled materials or wastes before cleanup is relatively low. Therefore, direct and indirect impacts from Alternative 3 to surface water resources would be less than significant.

Because of the ongoing management and minimization of MC residues at the Combat Center and implementation of management and minimization of MC residues in the east study area, impacts to surface water quality from Alternative 3 MCs would be less than significant.

Water Supply to Sensitive Habitats

As described under Alternative 1, the existing INRMP and compliance under Combat Center Order 5090.1D applies to existing and continued use in the Combat Center and would be expanded to cover the east study area. Operations associated with Alternative 3 would not affect seeps and springs because these are located in mountainous terrain and are generally outside of the training and maneuvering areas. Therefore, Alternative 3 would have less than significant impacts to water supply to sensitive habitats.

In summary, Alternative 3 would have less than significant impacts to surface water resources.

4.13.4.2 Groundwater

Impacts from Alternative 3 to groundwater quality and recharge would be the same as discussed above for Alternative 1. Therefore, direct and indirect impacts to groundwater quality and recharge from Alternative 3 would be less than significant.

Similar to Alternative 1, Alternative 3 would increase demands for potable water from existing sources at the Combat Center by up to 31 AF per year (38 ML per year), representing a 1% increase in potable water demand. Thus, the relative degree of any reduction in long-term water supply for the Combat Center or surrounding communities would be minor. As of 2009, the Combat Center has been able to mitigate the water supply impacts of increasing the end strength, and the Combat Center is presently developing water management strategies to meet projected water demands for the period 2008 to 2017. With implementation of the SCM (development and implementation of the IESS), the impacts to water resources from Alternative 3 would be less than significant. Further, because the relative reduction in the long-term water supply for surrounding communities would be minor, indirect impacts would be less than significant.

4.13.4.3 Potential Mitigation Measures

In addition to the adoption of SCMs for water resources (see Chapter 2), the Marine Corps considered potential mitigation measures but determined that none were feasible for Alternative 3. No mitigation measures are recommended. Consequently, Alternative 3 would result in less than significant, unmitigable impacts.

4.13.5 Alternative 4 Impacts

Alternative 4 would support two MEB exercises per year for a period of approximately 30 days per event. Each exercise would involve off-road operations of wheeled and tracked vehicles within the Combat Center and west study area (see Table 2-3). MEB Building Block training would occur within the Combat Center, and would involve off-road operations during approximately 160 days per year. The south study area would only be used for unit marshalling and maneuvering.

4.13.5.1 Surface Water

Marine Expeditionary Brigade exercises associated with Alternative 4 would involve the use of munitions for the MEB training exercise within the Combat Center and the west study area, and the use of munitions for the MEB Building Block training in the Combat Center. The location and estimated use of munitions for the MEB training exercises are provided in Chapter 2, Figure 2-8d and Table 2-5. The estimated use of munitions for the MEB Building Block training is provided in Appendix F. Impacts from surface water resources would be the same as discussed above for Alternative 1. Therefore, direct and indirect impacts to surface water resources for Alternative 4 would be less than significant.

4.13.5.2 Groundwater

Impacts from Alternative 4 to groundwater resources would be the same as discussed above for Alternative 1. Therefore, Alternative 4 would have less than significant impacts to groundwater quality and no impact on groundwater recharge and domestic water wells.

Similar to Alternative 1, Alternative 4 would increase demands for potable water from existing sources at the Combat Center by up to 34 AF per year (42 ML per year), representing a 1% increase in potable water demand. Thus, the relative degree of any reduction in long-term water supply for the Combat Center or surrounding communities would be minor. As of 2009, the Combat Center has been able to mitigate the water supply impacts of increasing the end strength, and the Combat Center is presently developing water management strategies to meet projected water demands for the period 2008 to 2017. With implementation of the SCM (development and implementation of the IESS), the impacts to water resources from Alternative 4 would be less than significant. Further, because the relative reduction in the long-term water supply for surrounding communities would be minor, indirect impacts also would be less than significant.

4.13.5.3 Potential Mitigation Measures

In addition to the adoption of SCMs for water resources (see Chapter 2), the Marine Corps considered potential mitigation measures but determined that none were feasible for Alternative 4. No mitigation measures are recommended. Consequently, Alternative 4 would result in less than significant, unmitigable impacts.

4.13.6 Alternative 5 Impacts

Alternative 5 would support two MEB exercises per year for a period of approximately 30 days per event. Each exercise would involve off-road operations of wheeled and tracked vehicles within the Combat Center and west study area (see Table 2-3). MEB Building Block training would occur within the Combat Center and would involve off-road operations during approximately 160 days per year.

4.13.6.1 Surface Water

Marine Expeditionary Brigade exercises associated with Alternative 5 would involve the use of munitions for the MEB training exercise within the Combat Center and the west study area and the use of munitions for the MEB Building Block training in the Combat Center. The location and estimated use of munitions for the MEB training exercises are provided in Chapter 2, Figure 2-8d and Table 2-5. The estimated use of munitions for the MEB Building Block training is provided in Appendix F.

Impacts from Alternative 5 to surface water resources would be the same as discussed above for Alternative 1. Therefore, Alternative 5 would have less than significant impacts to surface water

resources. No mitigation measures are recommended since impacts to surface water resources for Alternative 5 are expected to be less than significant.

4.13.6.2 Groundwater

Impacts from Alternative 5 to groundwater resources would be the same as discussed above for Alternative 1. Therefore, Alternative 5 would have less than significant impacts to groundwater quality and no impact on groundwater recharge and domestic water wells.

Similar to Alternative 1, Alternative 5 would increase demands for potable water from existing sources at the Combat Center by up to 35 AF per year (43 ML per year), representing a 1% increase in potable water demand. Thus, the relative degree of any reduction in long-term water supply for the Combat Center or surrounding communities would be minor. As of 2009, the Combat Center has been able to mitigate the water supply impacts of increasing the end strength, and the Combat Center is presently developing water management strategies to meet projected water demands for the period 2008 to 2017. With the implementation of the SCM (development and implementation of the IESS), the impacts to water resources from Alternative 2 would be less than significant. Further, because the relative reduction in the long-term water supply for surrounding communities would be minor, indirect impacts also would be less than significant.

4.13.6.3 Potential Mitigation Measures

In addition to the adoption of SCMs for water resources (see Chapter 2), the Marine Corps considered potential mitigation measures but determined that none were feasible for Alternative 5. No mitigation measures are recommended. Consequently, Alternative 5 would result in less than significant, unmitigable impacts.

4.13.7 Alternative 6 Impacts (Preferred Alternative)

Alternative 6 would support two MEB exercises per year for a period of approximately 30 days per event. Each exercise would involve off-road operations of wheeled and tracked vehicles (see Chapter 2, Table 2-3). The MEB training exercises would occur mainly within the western half of the Combat Center and the west study area. MEB Building Block training would occur in the military exclusive use portion of the west study area and would include off-road operations during approximately 160 days per year. The south study area would only be used for unit marshalling and maneuvering.

4.13.7.1 Surface Water

Marine Expeditionary Brigade exercises associated with Alternative 6 would involve the use of munitions for the MEB training exercise only within the Combat Center and the west study area. The location and estimated use of munitions for the MEB training exercises are provided in Chapter 2, Figure 2-11d and Table 2-5. The estimated use of munitions for the MEB Building Block training is provided in Appendix F.

Impacts from Alternative 6 to surface water resources would be the same as discussed above for Alternative 1. Therefore, direct and indirect impacts to surface water resources from Alternative 6 would be less than significant.

4.13.7.2 Groundwater

Impacts from Alternative 6 to groundwater resources would be the same as discussed above for Alternative 1. Therefore, Alternative 6 would have less than significant impacts to groundwater quality and no impact on groundwater recharge and domestic water wells.

Similar to Alternative 1, Alternative 6 would increase demands for potable water from existing sources at the Combat Center by up to 34 AF per year (42 ML per year), representing a 1% increase in potable water demand. Thus, the relative degree of any reduction in long-term water supply for the Combat Center or surrounding communities would be minor. As of 2009, the Combat Center has been able to mitigate the water supply impacts of increasing the end strength, and the Combat Center is presently developing water management strategies to meet projected water demands for the period 2008 to 2017. With the implementation of the SCM (development and implementation of the IESS), the impacts to water resources from Alternative 2 would be less than significant. Further, because the relative reduction in the long-term water supply for surrounding communities would be minor, indirect impacts also would be less than significant.

4.13.7.3 Potential Mitigation Measures

In addition to the adoption of SCMs for water resources (see Chapter 2), the Marine Corps considered potential mitigation measures but determined that none were feasible for Alternative 6. No mitigation measures are recommended. Consequently, Alternative 6 would result in less than significant, unmitigable impacts.

4.13.8 No-Action Alternative

Under the No-Action Alternative, there would be no project-related impacts to surface or groundwater quality, and no increase in groundwater demands. Therefore, the No-Action Alternative would have no significant impacts to surface or groundwater quality. However, as discussed in Section 4.13.1, the current demand has placed the aquifer in an overdraft situation. To resolve this situation, the Combat Center is working with USGS to determine the effects of projected growth, increased training, and implementation of various conservation measures on the Combat Center's water supply. To achieve a sustainable water supply, the Combat Center is evaluating strategies to "blend" groundwater from the Surprise Springs subbasin with those from one or more aquifers on base, as well as other options for managing the potable water supply. With the expected implementation of the IESS, the No-Action Alternative would cause less than significant impacts to water resources.

4.13.9 Summary of Impacts

Table 4.13-1 summarizes the significant impacts of each action alternative and the No-Action Alternative.

Table 4.13-1. Summary of Impacts

Alternative	Impacts
Alternative 1	LSI • Water demands associated with the proposed action, as well as the long-term needs for potable water supply at the Combat Center, would be addressed by implementation of the IESS, which is a SCM for this action. With implementation of the SCM, Alternative 1 would have no impacts to groundwater recharge and less than significant impacts to groundwater quality and groundwater flow patterns. NI • There would be no impacts to local water wells for ordnance usage.
Alternative 2	LSI • Impacts and SCMs would be the same as for Alternative 1. NI • Impacts would be the same as for Alternative 1.
Alternative 3	LSI • Impacts and SCMs would be the same as for Alternative 1. NI • Impacts would be the same as for Alternative 1.
Alternative 4	LSI • Impacts and SCMs would be the same as for Alternative 1. NI • Impacts would be the same as for Alternative 1.
Alternative 5	LSI • Impacts and SCMs would be the same as for Alternative 1. NI • Impacts would be the same as for Alternative 1.
Alternative 6	LSI • Impacts and SCMs would be the same as for Alternative 1. NI • Impacts would be the same as for Alternative 1.
No-Action Alternative	LSI • With implementation of the IESS, continued water usage at current rates would result in less than significant impacts to the long-term water supply.

Notes: IESS = Installation Energy and Sustainability Strategy; LSI = Less than significant impact; SCM = Special Conservation Measure

CHAPTER 5. CUMULATIVE IMPACTS

5.1 OVERVIEW OF CUMULATIVE EFFECTS ANALYSIS

Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of the National Environmental Policy Act (NEPA) define cumulative effects 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." (40 Code of Federal Regulations [CFR] § 1508.7).

The CEQ also provides guidance on cumulative impacts analysis in *Considering Cumulative Effects Under the National Environmental Policy Act* (CEQ 1997), and the Memorandum *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis* (CEQ 2005). Noting that environmental impacts result from a diversity of sources and processes, 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."

5.2 GEOGRAPHIC AND TEMPORAL BOUNDARIES FOR CUMULATIVE IMPACTS ANALYSIS

Cumulative effects analysis normally encompasses geographic boundaries beyond the immediate area of the proposed action, and a timeframe including past actions and reasonably foreseeable future actions, to capture these additional effects. The geographic scope of the cumulative effects analysis varies by resource area. For example, the geographic scope of cumulative impacts on resources such as soils and vegetation is localized, whereas the geographic scope of air quality is the region. For the purposes of this analysis, the Marine Corps identified proposed projects approximately 30-miles from the boundary of the Combat Center and acquisition study areas and associated airspace for cumulative effects analysis in this Environmental Impact Statement (EIS).

5.3 OTHER PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

Identifiable effects of other past, 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 action are also analyzed. As part of the evaluation of cumulative impacts, a review of other projects in the vicinity of the proposed action was conducted. Other past, present, and reasonably foreseeable actions that could interact directly or indirectly with the proposed action are discussed below. Other projects at the Combat Center that do not have the potential to interact cumulatively with the proposed action are not addressed in this EIS.

5.3.1 Projects Associated With the Combat Center

5.3.1.1 Proposed Increase in End Strength and Temporary Facility Bed-down

An Environmental Assessment (EA) was prepared in October 2007 to evaluate the environmental impacts associated with the Marine Corps' Grow the Force Initiative; a proposed increase in end strength of 2,125 personnel and associated dependents at the Combat Center, phased over a 4-year time period. Total personnel increase is anticipated to be completed by 2011. The proposed action included the construction of temporary supporting facilities in the Mainside area to support the increase in personnel, and the subsequent removal of these facilities 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 (FONSI) was signed on 13 December 2007. The construction of temporary facilities, and subsequent removal, would not have any temporal overlap with the activities under the proposed action. The additional personnel would still be present at the Combat Center during and after implementation of the proposed land acquisition.

5.3.1.2 Permanent Facilities Bed-Down of Increased End-Strength

An EA was prepared in September 2009 to evaluate the environmental impacts associated with construction of permanent facilities and infrastructure and the addition of 300 Marines at the Combat Center to support the Marine Corps' Grow the Force Initiative. All construction is expected to be completed by 2016. 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 FONSI was signed on September 29, 2009.

5.3.1.3 West Coast Basing of the F-35B

An EIS was prepared to analyze potential impacts from the proposed west coast basing of 184 F-35B aircraft (Project Website: www.usmcjsfwest.com). 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 would include:

- basing of 11 operational F-35B Joint Strike Fighter squadrons (176 aircraft), and one F-35B Operational Test and Evaluation squadron (8 aircraft) on the West Coast of the U.S.;
- 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.

The EIS addressed five action alternatives for basing, and the No-Action Alternative, none of which are at the Combat Center. However, the action includes occasional use of airspace overlaying the Combat Center: Restricted Area R-2501 North, South, East, and West; Bristol Air Traffic Control Assigned Airspace (ATCAA) and Military Operations Area (MOA); and Sundance MOA. The frequency of airspace use would be equivalent to or less than current use by the aircraft that would be replaced by the F-35B. The Notice of Intent (NOI) was published in the *Federal Register* on January 15, 2009, and the

public comment period on the Draft EIS occurred May 21 to July 6, 2010. The Notice of Availability for the Final EIS was published in the *Federal Register* on October 22, 2010.

5.3.1.4 West Coast Basing of the MV-22

West Coast Basing of the MV-22 Osprey tilt-rotor (MV-22) aircraft would require construction of expanded apron space and hangar upgrades at Marine Corps Air Station Miramar and Marine Corps Air Station Pendleton. The Marine Corps estimates these MV-22s would fly about 3,900 operations annually at the Twentynine Palms Expeditionary Airfield (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.

5.3.1.5 Aerial Maneuver Zones for MV-22 and Rotary-Wing Training

An EA has been completed to analyze the impacts associated with the use of aerial maneuver zones by MV-22 aircraft and rotary-wing aircraft at the Combat Center. Under the proposed action, up to eight MV-22 aircraft squadrons (12 aircraft per squadron) would be integrated into the existing/on-going tactical and ground training activities. Established Special Use Airspace (SUA) would not be expanded or modified with implementation of the proposed action. The EA addressed two action alternatives and the No-Action Alternative. Resources evaluated for impact include biological resources, cultural resources, air quality, and noise. The FONSI for this project was signed in May 2010.

5.3.1.6 Electrical System Upgrade at the Combat Center

An EA is currently being prepared to analyze the impacts associated with the proposed construction of a new customer-dedicated electrical substation (Leatherneck Substation) at the Combat Center. The EA also evaluates the potential effects associated with upgrading and connecting subtransmission lines from two existing off-base substations (Carodean and Hi Desert) to the new Leatherneck Substation. The EA addresses two action alternatives and the No-Action Alternative. Construction of all components would occur simultaneously. The project would require approximately 20 months to complete, working 22 8-hour days per month. Both lines may be constructed simultaneously; at least one line is expected to be completed by the end of 2011. Potential impacts were analyzed for geological resources, biological resources, water resources, cultural resources, aesthetics, air quality, electrical utilities, socioeconomics, and public health and safety. No significant environmental impacts are expected to result from either of the action alternatives, which differ in the alignment of the upgraded subtransmission line.

5.3.1.7 General Military Construction Projects

The remaining projects listed in Table 5-1 are general military construction projects that would occur in the Mainside area of the Combat Center between the 2012 and 2019 timeframe. These projects are not well-defined at this time, and very little information is available to characterize the potential effects of each project. Appendix L provides additional details about each project, including the proposed size of each structure or infrastructure footprint and any project-specific site improvements or design features.

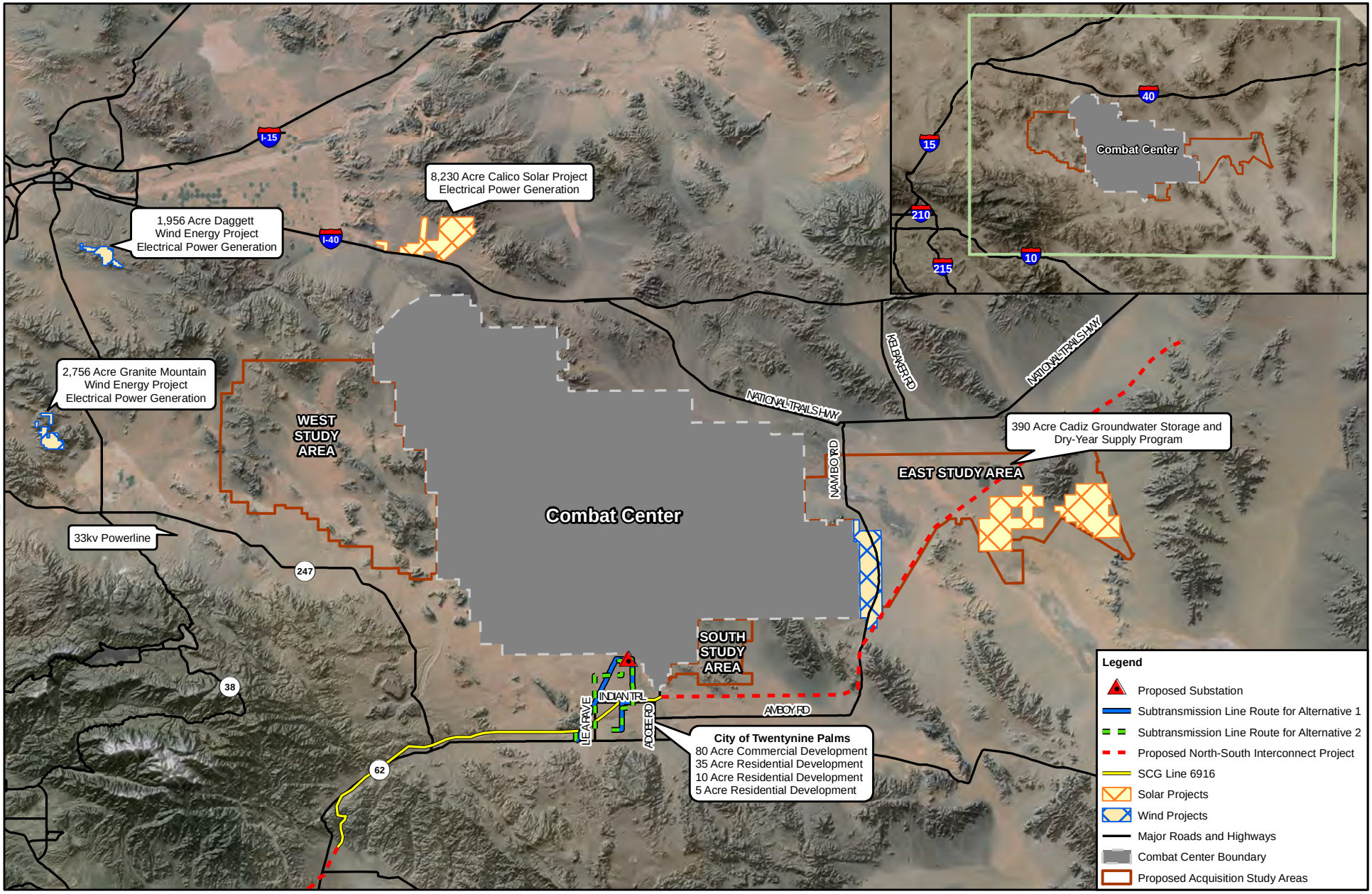
Table 5-1. General Military Construction Projects at the Combat Center

Project Number	Project Title	Approximate Size	FY
P-987	Addition to Temporary Lodging Facility	8,860 SF	2012
P-175	Consolidated Emergency Response Center	29,504 SF	2014
P-504	Consolidated Community Support Facility	114,356 SF	2014
P-617	Waste Handling and Recovery Complex	36,575 SF	2014
P-641	Addition East Gym 1588	19,999 SF	2014
P-903	Consolidated Radar Classroom	32,292 SF	2014
P-926B	Library/Lifelong Learning Center, Phase II	21,000 SF	2014
P-980	Substation System	n/a	2014
P-190	Band Facility	15,389 SF	2015
P-192	Deadman Lake Sub-Basin Well Field	n/a	2015
P-193	MTU Multipurpose Classroom	11,916 SF	2015
P-204	ATG COP Shadow Compound	n/a	2014
P-212	Child Development Center and Youth Center	35,822 SF	2012
P-581	Combat Center Headquarters Building	22,270 SF	2015
P-680	Addition to West Gym, 1518	19,999 SF	2017
P-688	Public Works Shops	n/a	2019
P-811	Concrete Ramp, EAF	93,287 SY	2019
P-900	Marine Corps Communication and Electronic Classroom	91,762 SF	2015
P-920	Multi-Battalion Operations Center	65,789 SF	2016
P-928	MCCES Classroom	n/a	2018
P-930	Construct PWD, ROICC, NREA Compound	n/a	2019
P-978	Rifle Range Water Distribution System	n/a	2015
P-988	Gate Reconfiguration, Anti-terrorism/Force Protection Upgrades	2,497 SF	2015
P-989	Antiterrorism/Force Protection Perimeter Fence	n/a	2018
P-191	Addition to Camp Wilson Gym (Building 5411)	3,208 SF	2016
P-194	Convert Building 2025 to Wheeled Vehicle Maintenance Facility	22,680 SF	2016
P-602	Training Integration Center	41,635 SF	2016
P-618	Multi-Purpose Administration Building	29,084 SF	2016
P-902	Bulk Supply Warehouse	12,109 SF	2016
P-921	Electronic/Communications Maintenance & Storage Facility	34,853 SF	2017
P-927	Marine Corps Communication and Electronic Classroom	91,106 SF	2017
P-603	Vehicle Training and Equipment Facility	27,706 SF	2018
P-662	Expeditionary Fighting Vehicle Maintenance Facility	67,371 SF	2018
P-810	Concrete Taxiway	943,326 SF	2019
P-571	Roads Southeast Access	167,439 SY	unprogrammed
P-808	Concrete Ramp – Expeditionary Airfield	742,904 SF	unprogrammed

Note: EAF = Expeditionary Airfield; FY = Fiscal Year; NREA = Natural Resources and Environmental Affairs SF = square feet; SY = square yards; n/a = not applicable.

5.3.2 Projects in the Surrounding Area

General community development and growth is expected to occur in all local and regional areas. Therefore, projects such as redevelopment of existing commercial areas, commercial and residential growth, and road maintenance projects are expected to occur in all areas surrounding the installation and in proximity to the proposed acquisition study areas. Figure 5-1 identifies the approximate project locations for the past, present, and reasonably foreseeable actions occurring in the surrounding area (if project location information was available).



Source: TBD

Figure 5-1
Cumulative Projects

5.3.2.1 Increased Use of Twentynine Palms Valley Groundwater Basin

The Twentynine Palms Water District (TPWD) plans to initiate a groundwater study of the Twentynine Palms Valley Basin (described by the U.S. Geological Survey [USGS] as the Mesquite subbasin) to determine the effects of increased pumping on the basin. The Twentynine Palms Valley Basin has not been previously tapped for water supply by TPWD because of water quality concerns (particularly fluoride, which prevented the water from being used without treatment). The TPWD believes that it may be possible to shift additional water production from the Joshua Tree Basin to the Twentynine Palms Valley Basin to stabilize water levels within the Joshua Tree Basin. The results of this study would be used to determine whether or not the District can manage its groundwater basins by shifting supply from the heavily-used Joshua Basin to the less-utilized Twentynine Palms Valley Basin (TPWD 2008).

5.3.2.2 Southern California Gas Company North-South Interconnect Project

An EA is currently being prepared to analyze the impacts associated with construction of a 1.5 mile (2.4 kilometers [km]) long interconnect and conversion of an approximately 47.3 mile (76.1 km) long existing petroleum pipeline to natural gas in San Bernardino County. All project components would be located within existing Bureau of Land Management (BLM) rights-of-way, with the exception of the northern interconnection, which would require approximately 12.4 acres (5 hectares) of new permanent right-of-way on BLM-managed land. The project would occur from Desert Hot Springs, California to Essex, California. The project would temporarily impact Carson Wash and Whitewater River and 40 unnamed drainages. These washes eventually drain into Watson Wash, Bristol Lake, or Dale Lake, except for the Whitewater River, which drains into the Salton Sea. Construction is anticipated to begin in 2010 and require approximately 5 months to complete. The pipeline project would occur on lands that are proposed to be acquired under Alternative 3.

5.3.2.3 Chevron Energy Solution's Lucerne Valley Solar Project

A Final EIS was completed in August 2010 to evaluate the environmental impacts associated with developing a 45-megawatt solar photovoltaic plant and associated facilities on 516 acres (209 hectares) of federal land managed by the BLM. The site of the proposed project is located on unincorporated land in the Mojave Desert, approximately 8 miles east of Lucerne Valley in San Bernardino County. Also included in the proposal is an interconnection to an existing Southern California Edison distribution line located north of the site. In addition, the proposal includes an amendment to the California Desert Conservation Area (CDCA) Plan that would designate the proposed site as suitable for solar energy generation. The EIS determined that the proposed action would result in short-term and long-term adverse effects (after mitigation) on biological resources; unavoidable, short-term effects on visual resources during construction and decommissioning; long-term but minor impacts on visual resources; and moderate, short-term cumulative effects on air quality (particulate matter less than 10 microns in diameter [PM_{10}] levels) during construction and decommissioning. The EIS also determined that beneficial effects on social and economic conditions may result.

5.3.2.4 Calico Solar Project

The Calico Solar Project, proposed by Calico Solar, LLC, (formerly known as the Stirling Energy Systems Solar One Project) is an electric-generating facility, designed to generate 663.5 megawatts through concentrated solar power. The Calico Solar Project site would be located about 5 miles (8 km) north of the northwestern portion of the Combat Center, on undeveloped alluvial fan slopes on the north side of Interstate 40. The Calico Solar Project has a total footprint that covers 4,604 acres (1,863 hectares) of BLM-managed public land. The project would construct 26,540 "SunCatchers" (individual

dish-shaped solar collectors) on-site in two phases. The Calico Solar Project would deliver power to an upgraded Pisgah Substation via a 230-kilovolt interconnection line after completion of phase I. Phase II would require new transmission capacity through a proposed 500-kilovolt Pisgah to Lugo transmission line independent of the Calico Solar Project. The project also includes construction of four other buildings and a wastewater treatment facility with two 0.5 acre (0.2 hectare) evaporation ponds within the project boundary. This BLM Renewable Energy Fast Track Project approved by the BLM on October 20, 2010 and by the California Energy Commission on October 28, 2010 (BLM 2010; California Energy Commission 2010). The total construction period for this project is approximately 44 months. The August 2010 Final EIS completed for the Calico Solar Project concluded that there would be direct adverse impacts to visual resources and short and long-term indirect impacts on the BLM Pisgah Crater Area of Critical Environmental Concern (ACEC) because existing off-highway vehicle (OHV) routes through the project site that connect to OHV routes in the Pisgah Crater ACEC would be closed. The EIS also found that the project would have adverse, long-term direct and indirect impacts to surface water hydrology and California jurisdictional waters; direct and indirect short and long-term adverse impacts to general wildlife, general vegetation, wildlife movement corridors, special-status animal species, and soils. Permanent, long-term adverse direct, indirect, and cumulative impacts were noted for cultural resources other than those with potential for listing on the National Register of Historic Places (NRHP).

5.3.2.5 Daggett Ridge Wind Energy Project

The Daggett Ridge Wind Energy project is a wind-powered, electrical-generating facility designed to generate 82.5 megawatts of renewable power. The project's total footprint covers about 1,576 acres (638 hectares) of BLM-managed public land and 380 acres (154 hectares) of private land. Daggett Ridge Wind Energy project would consist of 33 General Electric, or similar, 2.5-megawatt wind turbine generators, a project substation, an overhead transmission line, and interconnection to the existing Southern California Edison 115-kilovolt transmission line, along with other structures. The Daggett Ridge Wind Energy project site encompasses two mountain ridge tops located about 25 miles (40 km) northwest of the northwestern corner of the Combat Center. This BLM Renewable Energy Fast Track Project could potentially be cleared for approval sometime in 2011. According to the NOI filed for the Daggett Ridge Wind Energy project by the County of San Bernardino in November 2009, construction was anticipated to begin in the fourth quarter of 2010. However, because of potential delays in providing active interconnection by Southern California Edison, the start of construction may be delayed to as late as mid-2011. Construction of the Daggett Ridge Wind Energy project would take 9 to 11 months. A Draft EIS for the Daggett Ridge Wind Energy project was in preparation as of September 2010.

5.3.2.6 Granite Mountain Wind Energy Project

The Granite Mountain Wind Energy Project proposed by RES North America, LLC, would be located on vacant desert lands within the Granite Mountains about 27 miles (43 km) west of the Combat Center. The proposed project would be located on the central ridgeline of the Granite Mountains within approximately 2,086 acres (844 hectares) of public lands administered by the Barstow Field Office and 670 acres (271 hectares) of privately owned land under County land use jurisdiction. This project would consist of a main access road from the east (off Spinel Road) up to the ridge, internal access roads on the ridge, 28 Siemens or similar wind turbines that stand up to 428 feet (130 meters) from ground level to the tip of the blade, new transmission and fiber optic lines, and two substations, one within the project area and one at the other end of the utility grid interconnect point to Southern California Edison's Pisgah-Lugo #1 near where the Southern California Edison line crosses State Route (SR) 247 north of Lucerne Valley. The proposed project also includes a maintenance building, two meteorological towers, a temporary office,

and temporary construction and staging areas. According to the Draft EIS for this project made available for public comment on April 2, 2010, impacts to visual resources would remain significant after implementation of mitigation measures. The Draft EIS analyzed all other resource areas and found that there would be less than significant impacts. The 90-day Public Comment period for this Environmental Impact Statement ended on July 2, 2010. The Granite Mountain Wind Energy Project is also a Renewable Energy Fast Track Project and could potentially be cleared for approval sometime in 2011.

5.3.2.7 Cadiz Valley Water Conservation, Recovery, and Storage Project

The Cadiz Valley Water Conservation, Recovery, and Storage Project is designed to capture and conserve thousands of acre-feet (AF) of native groundwater currently being evaporated from Cadiz and Bristol Dry Lakes. In Phase 1 of the project, a wellfield would be constructed to create a sustainable annual water supply through the capture of the average annual natural recharge in the aquifer system plus an amount needed to maintain hydrologic control in the vicinity of the wellfield. An estimated 50,000 AF per year would be recovered by wells and conveyed to the Colorado River Aqueduct via a 42-mile conveyance pipeline constructed within the Arizona and California Railroad right-of-way. The water would be delivered to participating water agencies throughout southern California. In Phase 2, recharge basins would be used to recharge surplus water available during 'wet' years on the Colorado River or by way of exchanges from other imported water sources. Total imported water storage capacity is estimated at approximately 1,000,000 AF. Project facilities for Phase 1 and Phase 2 would be built on the property of Cadiz Inc. and other privately-owned land in the eastern study area (Cadiz Inc. 2011).

Cadiz Inc. has entered into agreements to participate in the development of the project with the following five southern California water agencies: Santa Margarita Water District, Three Valleys Municipal Water District, Golden State Water Company, Suburban Water Systems and Jurupa Community Services District. As part of the agreements, Santa Margarita Water District is the lead agency for the California Environmental Quality Act (CEQA) process. In February 2011 the preparation of the Draft Environmental Impact Report was formally commenced (Cadiz Inc. 2011).

A report (Husing 2011) analyzing the economic impacts of the Cadiz Inc. project was released in May of 2011, in advance of final project design. The report describes potential impacts that construction of the project would have on job creation, labor and proprietor income, the indirect economic activity generated, and state and local taxes generated. According to the economic impact report, construction of the Cadiz Inc. project would take place in four phases over four years; the exact timing of the project is reported as unknown and subject to environmental approvals. Over the expected four year period, the economic impact report estimates that construction of the Cadiz Inc. project would generate 5,986 jobs, $326 million in labor and proprietor income, nearly $900 million in overall economic activity, and $38 million in state and local taxes.

5.3.2.8 Expansion of Granite Construction

According to Twentynine Palms Planning File PC 06-51, Granite Construction is proposing to expand an existing mine to include an additional 356 acres (144 hectares) of land for a total of 469.5 acres (190 hectares), of which 178 acres (72 hectares) would be preserved as open space. The proposed expansion seeks to increase the annual aggregate production from 330,000 tons to 450,000 tons and extend the mine's closure date from 2008 to 2092. The plan proposes reclamation activities to be concurrent with the project. The mine site would be restored to un-irrigated open space, a retention basin for flood control, and wildlife habitat at closure of the mine. The mine expansion has not been considered by the City of Twentynine Palms and a decision date has not been identified.

5.3.2.9 Senate Bill (SB) 2921: California Desert Protection Act of 2010

Introduced into Congress on December 21, 2009, the California Desert Protection Act (CDPA) of 2010 Bill (SB 2921) would build upon the legacy of the 1994 CDPA, which protected more than 7 million acres of pristine desert in Southern California, and established Death Valley National Park, Joshua Tree National Park, and the Mojave National Preserve. This first title of the bill deals primarily with conservation and recreation purposes. Under Title I, the bill would designate two new national monuments in the Mojave Desert (the Mojave Trails National Monument and the Sand to Snow National Monument), add adjacent lands to Joshua Tree and Death Valley National Parks and the Mojave National Preserve, protect nearly 76 miles (122 km) of four important waterways (Deep Creek, Whitewater River, Amargosa River, and Surprise Canyon Creek) as Wild and Scenic Rivers, designate approximately 250,000 acres (101,170 hectares) of new wilderness area near Fort Irwin, and enhance recreational opportunities while ensuring that the training needs of the military have been met (SB 2921). The CDPA was revised and reintroduced to Congress on 25 January 2011 as S.138.

5.3.2.10 Development Within the City of Twentynine Palms

A majority of the future planned or proposed projects for the City of Twentynine Palms are located along Adobe Road. These projects consist primarily of standard commercial development. In addition, there are a number of residential housing projects proposed for development east and southeast of Twentynine Palms. All projects are proposed to occur within the next 5 to 10 years as part of standard planning and community growth. The City of Twentynine Palms is required to implement California Environmental Quality Act (CEQA) for any projects that are determined not to be exempt from CEQA. Therefore, any project that is determined to have significant environmental effects would be required to mitigate these impacts to a level of insignificance (City of Twentynine Palms 2010). The following commercial and residential projects located in the vicinity of the proposed action and have been approved or are pending:

- **80-acre Commercial Development Project –** Project to develop 80 acres (32 hectares) for retail businesses, multi-family housing, and restaurants. Located on the northeast corner of Adobe Road and Valle Vista, just outside of the main gate of the Combat Center. The project was approved by the City of Twentynine Palms, but no construction was initiated and the application expired.
- **35-acre Residential Development Project** – Proposed development of 35 acres (14 hectares) for 135 lots. Located on Amboy Road west of Adobe Road and south of the south study area. The tentative tract map was approved October 4, 2005, but the project is currently on hold.
- **10-acre Residential Development Project -** Pulliam Construction proposal to develop 10 acres (4 hectares) for four lots. Located on the northwest corner of Utah Trail and Indian Trail, southwest of the south study area. The tentative tract map was approved May 15, 2005; project currently on hold.
- **5-acre Residential Development Project -** Sunwest Development proposal to develop 5 acres (2 hectares) for 17 lots. Located on Amboy Road west of Adobe Road, and south of the south study area. Project pending.

5.4 POTENTIAL CUMULATIVE IMPACTS BY ENVIRONMENTAL RESOURCE AREA

5.4.1 Land Use

5.4.1.1 Alternative 1

Plans and Policies

Alternative 1 would be inconsistent with the Johnson Valley OHV Area Management Plan because it would prohibit OHV recreation on approximately 168,000 acres (67,987 hectares) of acquired lands in the Johnson Valley. Other impacts related to inconsistency with plans and policies would be less than significant. The inconsistency with the OHV plan would be significant and unavoidable. However, this plan inconsistency is not, in itself, considered to be a cumulative impact; however, the resulting reduction in recreation access and use is evaluated for its contribution to cumulative impacts.

Land Status and Ownership

Relocation impacts from Alternative 1 would not be significant because the acquisition study area is essentially uninhabited and therefore, minimal or no residential and non-residential relocations would occur. The additive effect of relocation impacts from the past, present, and reasonably foreseeable actions together with Alternative 1 is expected to be less than significant for the local area.

Recreation

No additional cumulative impacts were identified other than those related to plans and policies above. Cumulative impacts on recreation use are addressed in Section 5.4.2, *Recreation.*

Mining

There are no active mines producing ore in the west and south study areas and therefore land use impacts related to mining would be less than significant. Patented mines in the west study area would be acquired in accordance with applicable regulations. Existing mining claims and leases in the area would be acquired on a case-by-case basis, also in accordance with applicable regulations. Cumulative land use impacts related to mining would be less than significant due to the presence of mineral resources and mines elsewhere in the local area.

Grazing

Grazing impacts for Alternative 1 would be less than significant because no grazing occurs on the Johnson Valley Allotment due to the nine mile rule and, despite loss of approximately 25,222 acres (10,207 hectares) within the Ord Mountain Allotment, the remaining area of the allotment outside the west study area could still be grazed. Impacts to grazing are considered to be less than significant on a project-level basis, but *cumulatively significant* due to the continuing loss of rural agricultural/grazing lands to other local and regional uses including urban development, natural resources development, resource protection and conservation, outdoor recreation, and military uses.

Utilities

Impacts from Alternative 1 on utilities would be less than significant. Southern California Edison transmission facilities located in the northwest portion of the west study (approximately 50 miles [70 km]) could remain in place and would be avoided by the proposed training operations. To accommodate regional renewable energy projects and improve existing transmission capacity, it is anticipated that existing lines would be upgraded and additional transmission lines may be added within the existing Southern California Edison transmission corridor in the future. The proposed Chevron Energy Solution's

Lucerne Valley Solar Project would result in construction of an alternative energy project in the vicinity of the west study area but the site is not within the west area; the applicable EIS identified no significant land use impacts for that project. Alternative 1 would result in less than significant cumulative land use impacts related to utilities rights-of-way.

Sensitive Land Uses

For Alternative 1, the 65 decibel (dB) Community Noise Equivalent Level (CNEL) and above noise contours for the airfield and the 65 dB Onset-Rate Adjusted Monthly Community Noise Equivalent Level ($CNEL_{mr}$) and above noise contours for airspace would be fully contained within the acquisition study areas and would therefore have less than significant impacts on sensitive land uses. The 62 C-weighted decibel (dBC) CNEL contour for the ordnance environment would extend beyond the boundaries of the Combat Center; however, there are no sensitive noise receptors within the areas affected. As indicated in Section 5.4.9, *Noise*, only three projects would have the potential to cumulatively add to the overall noise environment in a significant manner. The potential noise impacts of those projects would largely occur within the Combat Center, and the relatively low noise levels created by each of these projects, when taken in combination, would result in less than significant land use impacts related to noise outside the installation.

5.4.1.2 Alternative 2

Plans and Policies

Alternative 2 would be inconsistent with the Johnson Valley OHV Area Management Plan because it would prohibit OHV recreation on approximately 101,000 acres (44,515 hectares) of acquired lands in the Johnson Valley. Other impacts related to inconsistency with plans and policies would be less than significant. The inconsistency with the OHV plan would be significant and unavoidable, however, it would occur on an individual-case basis (i.e., is a regulatory or planning issue) and is not cumulative in nature.

Land Status and Ownership

Relocation impacts from Alternative 2 would not be significant because the acquisition study area is essentially uninhabited and therefore, minimal or no residential and non-residential relocations would occur. The additive effect of relocation impacts from the past, present, and reasonably foreseeable actions together with Alternative 1 is expected to be less than significant for the local area.

Recreation

No specific findings for recreation have been made for the land use analysis other than for consistency with plans and policies, as discussed above. Cumulative impacts on recreation use are addressed in Section 5.4.2, *Recreation*.

Mining

There are no active mines producing ore in the west and south study areas and therefore land use impacts related to mining would be less than significant. Patented mines and existing mining claims and leases would be acquired as described for Alternative 1. Cumulative land use impacts would be the same as for Alternative 1, i.e., less than significant.

Grazing

Grazing impacts for Alternative 2 would be less than significant because no grazing occurs on the Johnson Valley Allotment due to the nine mile rule and, despite loss of approximately 11,663 acres

(4,708 hectares) within the Ord Mountain Allotment, the remaining area of the allotment outside the west study area could still be grazed. Impacts to grazing are considered to be less than significant on a project-level basis but *cumulatively significant* due to the continuing loss of rural agricultural/grazing lands to other local and regional uses including urban development, natural resources development, resource protection and conservation, outdoor recreation, and military uses.

Utilities

Impacts from Alternative 2 on utilities would be less than significant. Southern California Edison transmission facilities located in the west study area (approximately 21 miles [34 km]) could remain in place and would be avoided by the proposed training operations. To accommodate regional renewable energy projects and improve existing transmission capacity, it is anticipated that existing lines would be upgraded and additional transmission lines may be added within the existing Southern California Edison transmission corridor in the future. The proposed Chevron Energy Solution's Lucerne Valley Solar Project would result in construction of an alternative energy project in the vicinity of the west study area but the site is not within the west area; the applicable EIS identified no significant land use impacts for that project. Alternative 2 would result in less than significant cumulative land use impacts related to utilities rights-of-way.

Sensitive Land Uses

Noise impacts to sensitive land uses under Alternative 2 would be similar to those described for Alternative 1, and would result in less than significant cumulative noise-related land use impacts.

5.4.1.3 Alternative 3

Plans and Policies

Alternative 3 would potentially be inconsistent with the CDCA Plan's multiple use objectives that allow mining access and with two active, permitted mines in the Bristol Lake area if these mines were closed due to a case-by-case analysis of compatibility with training activities that would be required if this alternative were implemented. This potential inconsistency with the CDCA plan would be significant, however, it would occur on an individual-case basis (i.e., is a regulatory or planning issue) and is not cumulative in nature.

Land Status and Ownership

Relocation impacts from Alternative 3 would not be significant because the east study area is essentially uninhabited and therefore, minimal or no residential and non-residential relocations would occur. The additive effect of relocation impacts from the past, present, and reasonably foreseeable actions together with Alternative 3 is expected to be less than significant for the local area.

Recreation

No specific findings for recreation have been made for the land use analysis other than for consistency with plans and policies, as discussed above. Cumulative impacts on recreation use are addressed in Section 5.4.2, *Recreation.*

Mining

Two active, permitted mines in the Bristol Lake area could be closed if a case-by-case analysis of training activities found that the mines would not be compatible with proposed training activities; this would represent a potentially significant and unavoidable land use impact. Cumulative land use impacts related

to mining would be less than significant even with mine closure, because there are other regional sources for the minerals produced by these mines (see Section 4.12, *Geological Resources*).

Agriculture

Alternative 3 would be incompatible with approximately 1,600 acres (648 hectares) of existing agricultural operations contained in the Cadiz Inc. landholdings in the northern portion of the east study area. Project-level impacts would be less than significant because this loss of agricultural use would represent less than 2% of the county-wide acreage in agricultural production. Although impacts to agriculture are considered to be less than significant on a project-level basis they are considered to be *cumulatively significant* due to the continuing loss of rural agricultural lands to other local and regional uses including urban development, natural resources development, resource protection and conservation, outdoor recreation, and military uses.

Utilities

Impacts from Alternative 3 on utilities would be less than significant. Southern California Edison transmission facilities located in the west study area (approximately 21 miles [34 km]) could remain in place and would be avoided by the proposed training operations. To accommodate regional renewable energy projects and improve existing transmission capacity, it is anticipated that existing lines would be upgraded and additional transmission lines may be added within the existing Southern California Edison transmission corridor in the future. The proposed Chevron Energy Solution's Lucerne Valley Solar Project would result in construction of an alternative energy project in the vicinity of the west study area but the site is not within the west area; the applicable EIS identified no significant land use impacts for that project. Alternative 3 would result in less than significant cumulative land use impacts related to utilities rights-of-way.

Sensitive Land Uses

Noise impacts to sensitive land uses under Alternative 3 would be similar to those described for Alternative 1, and would result in less than significant cumulative noise-related land use impacts.

5.4.1.4 Alternative 4

Plans and Policies

Alternative 4 would be inconsistent with the Johnson Valley OHV Area Management Plan because, even with shared use, it would reduce access to lands used for OHV recreation in the Johnson Valley. Other impacts related to inconsistency with plans and policies would be less than significant. The inconsistency with the OHV plan would be significant and unavoidable, however, it would occur on an individual-case basis (i.e., is a regulatory or planning issue) and is not cumulative in nature.

Land Status and Ownership

Relocation impacts from Alternative 4 would not be significant because the acquisition study area is essentially uninhabited and therefore, minimal or no residential and non-residential relocations would occur. The additive effect of relocation impacts from the past, present, and reasonably foreseeable actions together with Alternative 4 is expected to be less than significant for the local area.

Recreation

No specific findings for recreation have been made for the land use analysis other than for consistency with plans and policies, as discussed above. Cumulative impacts on recreation use are addressed in Section 5.4.2, *Recreation*.

Mining

There are no active mines producing ore in the west and south study areas and therefore land use impacts related to mining would be less than significant. Patented mines, existing mining claims and leases in the area would be acquired on a case-by-case basis, in accordance with applicable regulations. Patented iron mines in the west study area could be closed if a case-by-case analysis of training activities found that the mines would not be compatible with proposed training activities. If the mines are producing ore this would represent a potentially significant and unavoidable land use impact. Cumulative land use impacts related to mining would be less than significant even with mine closure, because there are other regional sources for potential iron mine development.

Grazing

Grazing impacts for Alternative 4 would be less than significant because no grazing occurs on the Johnson Valley Allotment due to the nine mile rule and, despite loss of approximately 25,222 acres (10,207 hectares) within the Ord Mountain Allotment, the remaining area of the allotment outside the west study area could still be grazed. Impacts to grazing are considered to be less than significant on a project-level basis but *cumulatively significant* due to the continuing loss of rural agricultural/grazing lands to other local and regional uses including urban development, natural resources development, resource protection and conservation, outdoor recreation, and military uses.

Utilities

Impacts from Alternative 4 on utilities would be less than significant. Southern California Edison transmission facilities located in the northwest portion of the west study (approximately 50 miles [70 km]) could remain in place and would be avoided by the proposed training operations. To accommodate regional renewable energy projects and improve existing transmission capacity, it is anticipated that existing lines would be upgraded and additional transmission lines may be added within the existing Southern California Edison transmission corridor in the future. The proposed Chevron Energy Solution's Lucerne Valley Solar Project would result in construction of an alternative energy project in the vicinity of the west study area but the site is not within the west area; the applicable EIS identified no significant land use impacts for that project. Alternative 4 would result in less than significant cumulative land use impacts related to utilities rights-of-way.

Sensitive Land Uses

Noise impacts to sensitive land uses under Alternative 4 would be similar to those described for Alternative 1, and would result in less than significant cumulative noise-related land use impacts.

5.4.1.5 Alternative 5

Plans and Policies

Alternative 5 would be inconsistent with the Johnson Valley OHV Area Management Plan because, even with shared use, it would reduce access to lands used for OHV recreation in the Johnson Valley. Other impacts related to inconsistency with plans and policies would be less than significant. The inconsistency with the OHV plan would be significant and unavoidable, however, it would occur on an individual-case basis (i.e., is a regulatory or planning issue) and is not cumulative in nature.

Land Status and Ownership

Relocation impacts from Alternative 5 would not be significant because the acquisition study area is essentially uninhabited and therefore, minimal or no residential and non-residential relocations would

occur. The additive effect of relocation impacts from the past, present, and reasonably foreseeable actions together with Alternative 5 is expected to be less than significant for the local area.

Recreation

No specific findings for recreation have been made for the land use analysis other than for consistency with plans and policies, as discussed above. Cumulative impacts on recreation use are addressed in Section 5.4.2, *Recreation*.

Mining

The impacts for Alternative 5 would be the same as for Alternative 4: less than significant.

Grazing

Grazing impacts for Alternative 5 would be less than significant because no grazing occurs on the Johnson Valley Allotment due to the 9 mile rule and, despite loss of approximately 25,222 acres (10,207 hectares) within the Ord Mountain Allotment, the remaining area of the allotment outside the west study area could still be grazed. Impacts to grazing are considered to be less than significant on a project-level basis but *cumulatively significant* due to the continuing loss of rural agricultural/grazing lands to other local and regional uses including urban development, natural resources development, resource protection and conservation, outdoor recreation, and military uses.

Utilities

Impacts from Alternative 5 on utilities would be less than significant. Southern California Edison transmission facilities located in the northwest portion of the west study (approximately 50 miles [70 km]) could remain in place and would be avoided by the proposed training operations. To accommodate regional renewable energy projects and improve existing transmission capacity, it is anticipated that existing lines would be upgraded and additional transmission lines may be added within the existing Southern California Edison transmission corridor in the future. The proposed Chevron Energy Solution's Lucerne Valley Solar Project would result in construction of an alternative energy project in the vicinity of the west study area but the site is not within the west area; the applicable EIS identified no significant land use impacts for that project. Alternative 5 would result in less than significant cumulative land use impacts related to utilities rights-of-way.

Sensitive Land Uses

Noise impacts to sensitive land uses under Alternative 5 would be similar to those described for Alternative 1, and would result in less than significant cumulative noise-related land use impacts.

5.4.1.6 Alternative 6

Plans and Policies

Alternative 6 would be inconsistent with the Johnson Valley OHV Area Management Plan because, even with shared use, it would reduce access to lands used for OHV recreation in the Johnson Valley. This incompatibility with the OHV plan would be significant and unavoidable, however, it would occur on an individual-case basis (i.e., is a regulatory or planning issue) and is not cumulative in nature (i.e., less than significant).

Land Status and Ownership

Relocation impacts from Alternative 6 would not be significant because the acquisition study area is essentially uninhabited and minimal or no residential and non-residential relocations would occur. The

additive effect of relocation impacts from the past, present, and reasonably foreseeable actions together with Alternative 6 are expected to be less than significant for the local area.

Recreation

No specific findings for recreation have been made for the land use analysis other than for consistency with plans and policies, as discussed above. Cumulative impacts on recreation use are addressed in Section 5.4.2, *Recreation*.

Mining

No active mines are located in the west and south study areas. Patented mines and existing mining claims and leases would be acquired as described for Alternative 1. Cumulative land use impacts would be the same as for Alternative 1, i.e., less than significant.

Grazing

Grazing impacts for Alternative 6 would be less than significant because no grazing occurs on the Johnson Valley Allotment due to the nine mile rule and, despite loss of approximately 11,500 acres (4,654 hectares) within the Ord Mountain Allotment, the remaining area of the allotment outside the west study area could still be grazed. Impacts to grazing are considered to be less than significant on a project-level basis but cumulatively significant due to the continuing loss of rural agricultural/grazing lands to other uses including urban development, natural resources development, resource protection and conservation, outdoor recreation, and military uses.

Utilities

Alternative 6 would be less than significant because it would exclude the Southern California Edison transmission facilities (i.e., the facilities included in the northwest portion of the west study area for Alternative 1). To accommodate regional renewable energy projects and improve existing transmission capacity, it is anticipated that existing lines in the area would be upgraded and additional transmission lines may be added within the existing Southern California Edison transmission corridor in the future. The proposed Chevron Energy Solution's Lucerne Valley Solar Project would result in construction of an alternative energy project in the vicinity of the west study area but the site is not within the west area; the applicable EIS identified no significant land use impacts for that project. Alternative 6 would result in less than significant cumulative impacts on utilities rights-of-way.

Sensitive Land Uses

Noise impacts to sensitive land uses under Alternative 6 would be similar to those described for Alternative 1, and would result in less than significant cumulative noise-related land use impacts.

5.4.2 Recreation

5.4.2.1 Alternative 1

Implementation of Alternative 1 would significantly impact recreation. Access to and use of approximately 91% of the Johnson Valley OHV Area would be lost, representing a significant impact. The remaining 9% of land would be available year-round. The resource is unique to the region, given its combination of vast open space, large variety of desert views and scenic vistas, and unique geologic formations. In addition, as described in Section 4.2 and Appendix M, the displacement of recreational activities (especially OHV activities) to the remaining portion of the Johnson Valley OHV Area and other OHV areas in southern California would generate indirect impacts to recreational opportunities

throughout the region (see Tables 4.2-3 through 4.2-5). At certain OHV areas and designated routes in the general vicinity of the Combat Center (see Section 4.2 and Appendix M for specifics) such indirect impacts would be significant because of the large proportion of displaced activity that would be expected to shift to these areas, and the anticipated increase in rider density and corresponding decrease in the quality of the recreational experience. At other areas that are more distant or otherwise less likely to attract large amounts of displaced OHV activity, the indirect impact to recreational resources and opportunities are expected to be less than significant. In summary, Alternative 1 would result in significant direct and indirect impacts to recreational resources in and around the west study area.

From 1982 to 2001, OHV use was one of the fastest growing categories of outdoor activity in the country (Cordell *et al.* 2008). There was a consistent upward trend in number of OHV participants between 1999 and 2003, during which time the estimated number of OHV participants increased 37%, from 37.6 to 51.6 million people. A slight decrease was beginning to show in late 2003 and this trend continued through 2007, to just over 44.4 million people participating in OHV recreation. Overall, these numbers represent approximately an 18% increase in the number of OHV participants between 1999 and 2007 (Cordell *et al.* 2008). From 1999 to 2007, California had, on average, the highest number of OHV participants in the country, with 4.99 million OHV users accounting for 11.6% of the U.S. total (Cordell *et al.* 2008). This is more than 1.5 times the number of participants in second-ranked Texas (Cordell *et al.* 2008).

As illustrated in Figures 5-2 and 5-3, from 1980 to 2000, California OHV registrations increased 108%, and attendance at California's State Vehicular Recreation Areas increased 52% between 1985 and 2000 (BLM 2005; California State Parks 2002).

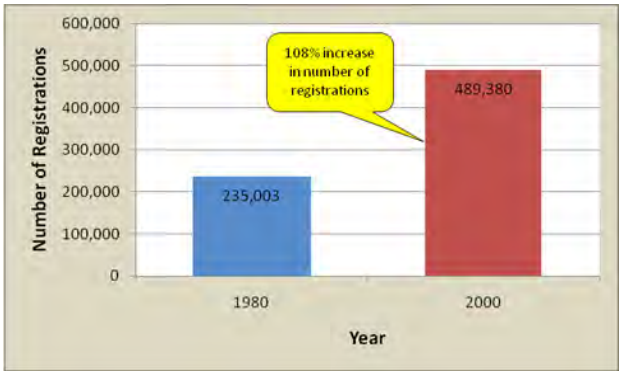


Figure 5-2 OHV "Green Sticker" Registrations

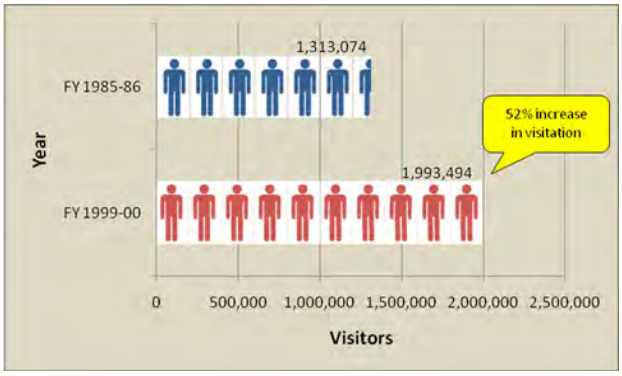


Figure 5-3 Increased Visitation to State Vehicular Recreation Areas

However, as shown in Figure 5-4, between 1980 and 2000, the number of acres available for OHV use in California's deserts has decreased by 48% (from 13.5 million acres to 7 million acres) (BLM 2005; California State Parks 2002). During this same period the number of street licensed 4-wheel drive vehicles increase by 74% in California (Figure 5-5) (California State Parks 2002).

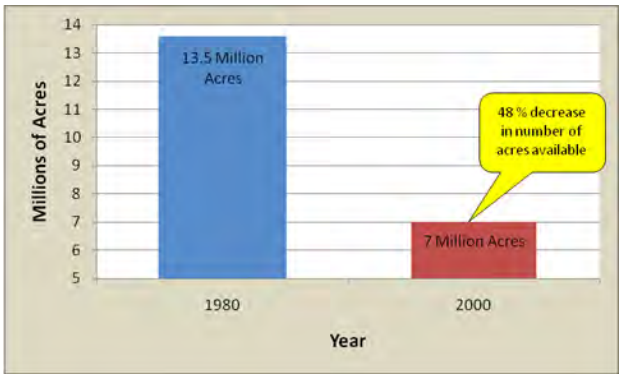


Figure 5-4 Acres Available to "Green Sticker" Vehicles in the California Desert

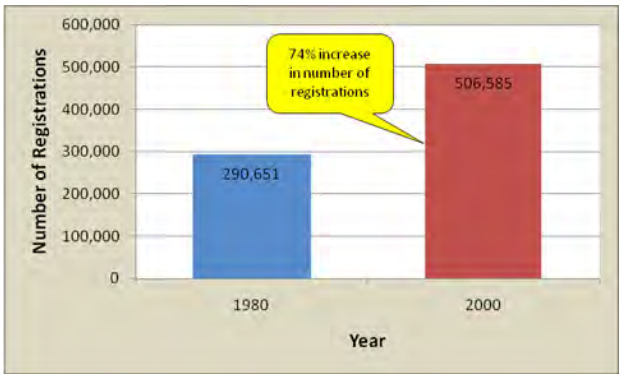


Figure 5-5 Street Licensed 4-Wheel Drive Vehicle Registrations

Data provided by the Motorcycle Industry Council, also illustrates the increase in OHV use since 1990 (Table 5-2). In addition, other forms of recreation often depend on OHVs for access to recreation areas, such as camping, hiking, hunting, and rock hounding (BLM 2005).

Table 5-2. Average Off-Highway Miles by Model Type (1990-2008)

OHV Model Type	Average Off-Highway Miles by Model Type				
	1990	1998	2003	2008	% Change 2003 to 2008
Dual/Off-Highway/Competition (Net)	329	291	336	430	28%
ATVs	263	*	282	418	48%
Total	294	*	295	421	43%
Motorcycle Type:					
Dual	276	345	335	444	33%
Off-Highway/Competition (Net)	362	270	336	426	27%
Off-Highway	313	222	235	408	74%
Competition	396	305	455	446	-2%

Note: *1998 survey did not include ATVs.
ATV = all-terrain vehicle; OHV = off-highway vehicle

Source: Motorcycle Industry Council 2010. Disclosed with permission of the Motorcycle Industry Council from the 2008 Motorcycle/ATV Owner Survey©2009.

Based on existing data, it is clear that OHV use in the region is increasing and at the same time the land available for OHV use is decreasing. The loss of available land would be further amplified with the loss of access to and use of a majority of the Johnson Valley OHV Area under Alternative 1.

Several of the past, present, and reasonably foreseeable actions discussed above would result in additional people living in the region, which would place additional demands on regional recreational opportunities. These projects include the increase in personnel and dependents at the Combat Center (Sections 5.3.1.1 and 5.3.1.2), general community development and growth (Section 5.3.2), and commercial and residential development within the City of Twentynine Palms (Section 5.3.2.7). Demands on existing recreational areas in the region would be expected to increase as a result of the additional people living within the area. Since there would be a significant impact with respect to OHV access and use within the area, cumulative impacts of Alternative 1 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would also be significant.

Senate Bill 2921 of the California Desert Protection Act of 2010 would minimize and potentially offset some of the recreation cumulative effects, including cumulative effects to the OHV community. This bill would primarily protect additional Mojave Desert lands for conservation and recreation purposes and

would permanently protect OHV use on designated trails in over 1 million acres of BLM limited use areas. In addition, this legislation would give five BLM open areas in San Bernardino County official congressional designations as OHV areas. Rasor OHV Area, Stoddard Wells OHV Area, El Mirage OHV Area, Spangler Hills OHV Area, and a portion of the Johnson Valley OHV Area are proposed to be congressionally designated OHV areas. Implementation of these proposed designations would be beneficial to recreational resources in the region and would potentially minimize and offset some of the cumulative effects to recreation in the region. However, cumulative impacts under Alternative 1 would remain significant.

5.4.2.2 Alternative 2

Implementation of Alternative 2 would significantly impact recreation. Access to and use of approximately 54% of the Johnson Valley OHV Area would be lost, representing a significant impact. The remaining 46% of land would be available year-round. The cumulative impacts of Alternative 2 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1, with the exception that the amount of recreation land lost and the number of displaced recreational users would be less than Alternative 1 (see Tables 4.2-1 through 4.2-5). Rasor OHV Area, Stoddard Wells OHV Area, El Mirage OHV Area, Spangler Hills OHV Area, and a portion of the Johnson Valley OHV Area are proposed to be congressionally designated OHV areas. Implementation of these proposed designations would be beneficial to recreational resources in the region and would potentially minimize and offset some of the cumulative effects to recreation in the region. Therefore, Alternative 2 would result in significant cumulative impacts, albeit less than those described for Alternative 1.

5.4.2.3 Alternative 3

Implementation of Alternative 3 would not significantly impact recreation. The east and south study areas do not receive frequent recreational use, and the areas are not unique to the region. In addition, comparable recreational opportunities are available in surrounding areas. Several of the past, present, and reasonably foreseeable actions discussed above would result in additional people living in the region, which would place additional demands on regional recreational opportunities. These projects include the increase in personnel and dependents at the Combat Center (Sections 5.3.1.1 and 5.3.1.2), general community development and growth (Section 5.3.2), and commercial and residential development within the City of Twentynine Palms (Section 5.3.2.7). Demands on existing recreational areas in the region would be expected to increase as a result of the additional people living within the area. However, since there would not be a significant impact with respect to recreation access and use within the area, cumulative impacts of Alternative 3, in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3, would not be significant.

5.4.2.4 Alternative 4

Implementation of Alternative 4 would significantly impact recreation. Access to and use of the Johnson Valley OHV Area would be lost during approximately 2 months each year, representing a significant impact. The Johnson Valley OHV Area would be available the other 10 months per year when not used for military training. The cumulative impacts of Alternative 2 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1, with the exception that the amount of recreation land lost and the number of displaced recreational users would be significantly less than Alternative 1 (see Tables 4.2-1 through 4.2-5). Rasor OHV Area, Stoddard Wells OHV Area, El Mirage OHV Area, Spangler Hills OHV Area, and a portion of the Johnson Valley OHV Area are proposed to be congressionally designated OHV areas. Implementation of these proposed

designations would be beneficial to recreational resources in the region and would potentially reduce and offset some of the cumulative effects to recreation in the region. Overall, Alternative 4 would result in significant cumulative impacts, albeit much less than those described for Alternative 1.

5.4.2.5 Alternative 5

Cumulative impacts would be the same with implementation of Alternative 5 as described under Alternative 4. Rasor OHV Area, Stoddard Wells OHV Area, El Mirage OHV Area, Spangler Hills OHV Area, and a portion of the Johnson Valley OHV Area are proposed to be congressionally designated OHV areas. Implementation of these proposed designations would be beneficial to recreational resources in the region and would potentially reduce and offset some of the cumulative effects to recreation in the region. Therefore, Alternative 5 would result in significant cumulative impacts, albeit much less than those described for Alternative 1.

5.4.2.6 Alternative 6

Implementation of Alternative 6 would significantly impact recreation. Access to and use of approximately 56% of the Johnson Valley OHV Area would be lost, representing a significant impact. The remaining 44% of land would be available for all or a majority of the year. Approximately 38,000 acres (15,378 hectares) under the Restricted Public Access Area (RPAA) would also be available for recreational use for approximately 10 months of the year. The resource is unique to the region, given its combination of vast open space, large variety of desert views and scenic vistas, and unique geologic formations. In addition, the displacement of recreational users to the remaining portion of the Johnson Valley OHV Area and other OHV areas would impact recreational opportunities throughout the region to varying degrees depending upon the amount of displaced activity that would occur at each area (refer to Appendix M). The cumulative impacts of Alternative 6 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1, with the exception that the amount of recreation land lost and the number of displaced recreational users would be significantly less than Alternative 1 (see Tables 4.2-1 through 4.2-5). Rasor OHV Area, Stoddard Wells OHV Area, El Mirage OHV Area, Spangler Hills OHV Area, and a portion of the Johnson Valley OHV Area are proposed to be congressionally designated OHV areas. Implementation of these proposed designations would be beneficial to recreational resources in the region and would potentially minimize and offset some of the cumulative effects to recreation in the region. Therefore, Alternative 6 would result in significant cumulative impacts, albeit less than those described for Alternative 1.

5.4.3 Socioeconomics and Environmental Justice

5.4.3.1 Alternative 1

Alternative 1 would have less than significant direct economic impacts related to the proposed land acquisition and the partial displacement of recreational visitors and film industry activities in the west study area. This partial displacement of visitors would reduce the related sales and tax revenue countywide by an estimated $700,000 (or -7.8% compared to baseline) and in the local area by $3.6 million (or -60% compared to baseline). Such a reduction would represent a more substantial impact for smaller individual businesses in the community of Lucerne Valley than in larger towns and cities in the area that are more economically diverse. Helping to offset the lost sales would be the positive influence of spending by the 70 new employees hired by the Combat Center, such that the net change in total direct and indirect sales would be an increase of $4.5 million in sales, $3.1 million in income, and 90 jobs. Overall, the economic impacts from Alternative 1 would be less than significant.

When considered in conjunction with the projects identified in Section 5.3, Alternative 1 would have beneficial cumulative impacts to local and regional economic conditions. There is little to no overlap or correlation between the set of identified projects and the proposed action in terms of project timing or the sectors of the economy most directly affected, since most of the past, present, and reasonably foreseeable actions are construction projects that would directly stimulate business and economic activity in construction-related industries within the next 5 years, while the proposed action would feature very little construction and would directly influence recreational spending and retail/accommodation/food services industries, beginning near the end of that 5-year timeframe. However, all of the projects would help fuel and sustain the local and regional economy by providing jobs, business revenue, personal income, and fueling indirect multiplier effects in various interconnected sectors.

Senate Bill 2921 would have potentially the most direct overlap and cumulative influence relative to Alternative 1 in that it would increase the number and variety of recreational opportunities in the region, which would likely attract visitors that might otherwise be displaced out of the area by the acquisition of the west study area in Johnson Valley, thereby offsetting some of the more localized sales/revenue impacts on local businesses and communities. In general, all aspects of the local economy stand to benefit from the collective implementation of the past, present, and reasonably foreseeable actions, and the timing of the various projects would not place unsupportable burdens on infrastructural considerations such as housing supply, utility and public services capacities, etc. In addition, given the size and complexity of the regional economy, the potential beneficial cumulative effects of these projects would be less than significant.

5.4.3.2 Alternative 2

Direct, indirect, and overall economic impacts from Alternative 2 would be very similar to Alternative 1, except that the direct reduction in recreational and film industry spending would be considerably lower (from both a regional and a local perspective) under Alternative 2, and the overall net impacts would be more beneficial. Overall, the economic impacts from Alternative 2 would be less than significant.

When considered in conjunction with the projects identified in Section 5.3, Alternative 2 would have beneficial cumulative impacts to local and regional economic conditions, for essentially the same reasons described above for Alternative 1. The past, present, and reasonably foreseeable actions would collectively provide direct stimulus to local and regional economic activity and the increased number and variety of recreational opportunities resulting from SB 2921 would offset some of the more localized sales/revenue impacts on local businesses and communities. In general, all aspects of the local economy stand to benefit from the collective implementation of the past, present, and reasonably foreseeable actions, and the timing of the various projects would not place unsupportable burdens on infrastructural considerations such as housing supply, utility and public services capacities, etc. In addition, given the size and complexity of the regional economy, the potential beneficial cumulative effects of these projects would be less than significant.

5.4.3.3 Alternative 3

Direct, indirect, and overall economic impacts from Alternative 3 would be very similar to Alternative 1, except that loss of an estimated 150 jobs at displaced businesses in the east study areas would cause a small net combined (direct and indirect) decrease in regional sales, income, and employment of approximately $10 million, $4.4 million, and 135 jobs, respectively. Impacts of this scale relative to the local and regional economy would be less than significant.

When considered in conjunction with the projects identified in Section 5.3, Alternative 3 could have a significant cumulative adverse impact on the regional economy. This impact would occur if implementation of Alternative 3 were to preclude the development of the planned Cadiz Inc. Groundwater Conservation, Recovery, and Imported Water Storage project, assuming that the Cadiz project would otherwise be developed in the east study area as currently planned. A 2011 economic impact report (Husing 2011), prepared on behalf of the Cadiz project proponents, estimated that the 4-year construction of the project would generate 5,986 jobs, $326 million in labor and proprietor income, nearly $900 million in overall economic activity, and $38 million in state and local taxes. These results were neither evaluated nor substantiated as part of this EIS. In response to the Draft of this EIS, Cadiz Inc. commented that the company does not believe that compatibility between their planned project and Alternative 3 could be achieved. If land use compatibility could not be achieved, and if implementation of Alternative 3 was the only reason that the Cadiz Inc. project was not developed as planned, then the cumulative economic impact of Alternative 3 to the regional economy could be adverse and significant. This EIS did not attempt to quantify this economic impact or verify the findings of the Husing 2011 economic study.

5.4.3.4 Alternative 4

Direct, indirect, and overall economic impacts from Alternative 4 would be very similar to Alternative 1, except that the direct reduction in recreational and film industry spending would be considerably lower (from both a regional and a local perspective) under Alternative 4, and the overall net impacts would be more beneficial. Overall, the economic impacts from Alternative 4 would be less than significant.

When considered in conjunction with the projects identified in Section 5.3, Alternative 4 would have beneficial cumulative impacts to local and regional economic conditions, for essentially the same reasons described above for Alternative 1. The past, present, and reasonably foreseeable actions would collectively provide direct stimulus to local and regional economic activity and the increased number and variety of recreational opportunities resulting from SB 2921 would offset some of the more localized sales/revenue impacts on local businesses and communities. In general, all aspects of the local economy stand to benefit from the collective implementation of the past, present, and reasonably foreseeable actions, and the timing of the various projects would not place unsupportable burdens on infrastructural considerations such as housing supply, utility and public services capacities, etc. In addition, given the size and complexity of the regional economy, the potential beneficial cumulative effects of these projects would be less than significant.

5.4.3.5 Alternative 5

Direct, indirect, and overall economic impacts from Alternative 5 would be very similar to Alternative 1, except that the direct reduction in recreational and film industry spending would be considerably lower (from both a regional and a local perspective) under Alternative 5, and the overall net impacts would be more beneficial. Overall, the economic impacts from Alternative 5 would be less than significant.

When considered in conjunction with the projects identified in Section 5.3, Alternative 5 would have beneficial cumulative impacts to local and regional economic conditions, for essentially the same reasons described above for Alternative 1. The past, present, and reasonably foreseeable actions would collectively provide direct stimulus to local and regional economic activity and the increased number and variety of recreational opportunities resulting from SB 2921 would offset some of the more localized sales/revenue impacts on local businesses and communities. In general, all aspects of the local economy stand to benefit from the collective implementation of the past, present, and reasonably foreseeable actions, and the timing of the various projects would not place unsupportable burdens on infrastructural considerations such as housing supply, utility and public services capacities, etc. In addition, given the

size and complexity of the regional economy, the potential beneficial cumulative effects of these projects would be less than significant.

5.4.3.6 Alternative 6

Direct, indirect, and overall economic impacts from Alternative 6 would be very similar to Alternative 1. The direct reduction in recreational and film industry spending would be considerably lower (from both a regional and a local perspective) under Alternative 6, and the overall net impacts would be more beneficial, compared to Alternative 1. Overall, the economic impacts from Alternative 6 would be less than significant.

When considered in conjunction with the projects identified in Section 5.3, Alternative 6 would have beneficial cumulative impacts to local and regional economic conditions, for essentially the same reasons described above for Alternative 1. The past, present, and reasonably foreseeable actions would collectively provide direct stimulus to local and regional economic activity and the increased number and variety of recreational opportunities resulting from SB 2921 would offset some of the more localized sales/revenue impacts on local businesses and communities. In general, all aspects of the local economy stand to benefit from the collective implementation of the past, present, and reasonably foreseeable actions, and the timing of the various projects would not place unsupportable burdens on infrastructural considerations such as housing supply, utility and public services capacities, etc. In addition, given the size and complexity of the regional economy, the potential beneficial cumulative effects of these projects would be less than significant.

5.4.4 Public Health and Safety

5.4.4.1 Alternative 1

Aircraft-related Activities

Implementation of Alternative 1 would have less than significant impacts to public health and safety due to aircraft operations (including accidents, mid-air collisions, and wildlife/bird strikes) and aircraft-delivered ordnance. Under Alternative 1, which involves exclusive military use of the relevant project areas, airspace management procedures and flight safety measures that are applicable to both Marine Corps and civilian aviation would be in effect. In addition, the 65-dB CNEL contour for aircraft activities would be fully contained within the proposed boundaries of the Combat Center and no persons off-base would be exposed to CNEL greater than or equal to 65 dB CNEL. Some of the projects listed in Section 5.3 would include use of airspace in and around the Combat Center. However, when considered cumulatively with the projects listed in Section 5.3, Alternative 1 would have less than significant impacts to public health and safety due to military aircraft operations, as sufficient management and flight safety measures would be in place.

Potential exists for unauthorized trespassers (e.g., scrappers) in the west study area to encounter UXO and other hazards from aircraft-delivered ordnance. There are no projects listed in Section 5.3 that would contribute additional impacts of this type. For Alternative 1, exclusive military use of the area, airspace management procedures that are applicable to both Marine Corps and civilian aviation, and implementation of current safety measures and protocols are in place.

Therefore, in conjunction with other past, present, and reasonably foreseeable projects, Alternative 1 would have less than significant cumulative impacts to public health and safety due to aircraft operations (including accidents, mid-air collisions, noise, and bird strikes) and aircraft-delivered ordnance.

Ground Training Activities (ordnance use, energy hazards, and transportation)

Implementation of Alternative 1 would have less than significant impacts to public health and safety from ordnance use due to the exclusive military use of these areas and implementation of current and additional safety measures. Explosive ordnance disposal (EOD), range clearance operations, hazards, and referenced plans currently used, and those that would be implemented, would protect the public from any significant impacts from UXO. In addition, the 62-dBC CNEL contour for ordnance activities would be mostly contained within the proposed boundaries of the Combat Center; and there are no sensitive noise receptors within the areas exposed to CNEL greater than or equal to 62 dBC CNEL. There are no projects listed in Section 5.3 that would contribute additional impacts of this type.

Implementation of Alternative 1 would have no impacts to public health and safety from energy hazards. Proposed communication towers would be placed on top of a ridge, far enough away from ordnance use and ground training activities to avoid interference. Several projects listed in Section 5.3 may have a communication component. However, these projects were studied and found to have less than significant impacts to public health and safety.

The potential for increases in accidents with military vehicles on public roads would increase under Alternative 1; however, the minimal increase in traffic volume would not cause a change in level of service (LOS) ratings (see Section 4.6, *Transportation and Circulation*) and consequently, the potential impacts to public health and safety would be less than significant. Some of the projects listed in Section 5.3 would be expected to result in increases in vehicle traffic primarily associated with increases in personnel. These potential cumulative impacts to transportation would increase the potential for accidents corresponding with an increase in traffic; however, the anticipated increases would be minor as the population increases would be less than significant.

Therefore, in conjunction with other past, present, and reasonably foreseeable projects, Alternative 1, would have less than significant impacts to public health and safety due to ground training activities (including ordnance use, energy hazards, and transportation).

Other Safety Issues (mining, protection of children, and energy response)

Implementation of Alternative 1 would have beneficial impacts to public health and safety with respect to mining issues, as physical closure of mines would further limit potential unauthorized access by the public. Abandoned mines are present within the acquisition study areas for this alternative. Standard Operating Procedures (SOPs) are in place for the management of abandoned mines within the training areas. Increased public notification surrounding the mines would potentially minimize potential impacts to the public.

Implementation of Alternative 1 would have less than significant impact on public health and safety and would have no impacts to the protection of children. Alternative 1 would also comply with Executive Order (EO) 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, which states that each federal agency must, to the extent permitted by law and appropriate and consistent with the agency's mission: a) make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and b) ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks (62 *Federal Register* 1985, 1997). There are no schools, parks, residences, or other areas in the vicinity of the training ranges where children would congregate. All on-base housing and school or playground locations are located in the Mainside Area of the Combat Center, well removed from any training activities and associated hazards. All other projects listed in Section 5.3 would also be

required to comply with EO 13045; therefore, in conjunction with other past, present, and reasonably foreseeable projects, Alternative 1 would have less than significant cumulative impacts to human health or the environment and, thus, would not create disproportionate risks to children.

Implementation of Alternative 1 would have less than significant impacts to emergency response services for the Combat Center or the surrounding community. The potential for wildland fires may increase with the increase in human and equipment activity; however, the risks would be the same as under current conditions at the Combat Center where the environment is similar and timely emergency response and fires historically have not posed a significant problem. In conjunction with projects listed in Section 5.3, sufficient emergency response capacity is present within the surrounding community and within the Combat Center to accommodate the expected increase in human and equipment activities. As a result, Alternative 1, in conjunction with other projects listed in Section 5.3, would have less than significant cumulative impacts to public health and safety on mining, protection of children, and emergency response.

Hazardous Materials and Hazardous/Solid Waste

Implementation of Alternative 1 would have beneficial impacts since public access to contaminated sites would be reduced or eliminated and would have less than significant impacts to other components associated with hazardous materials and hazardous/solid waste. Projects identified in Sections 5.3, in conjunction with Alternative 1, would be expected to have a cumulative impact to hazardous materials use and the generation of solid and hazardous wastes. In particular, construction activities typically generate solid waste which may be separated to Construction and Demolition landfills. However, sufficient capacity is in place to accommodate solid waste. In addition, existing plans and procedures are in place to manage hazardous materials and waste at the Combat Center. These plans would need to be updated accordingly to account for any new hazardous materials and/or hazardous waste streams resulting from the cumulative impact of the listed projects. Modifications to existing permits and hazardous waste generation status would not be anticipated; therefore, cumulative impacts from hazardous materials and hazardous/solid waste would be less than significant.

5.4.4.2 Alternative 2

The cumulative impacts of Alternative 2 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1, with the exception that the amount of land acquired for Combat Center operations would be less than Alternative 1. Similar to Alternative 1, cumulative impacts under Alternative 2 would be less than significant.

5.4.4.3 Alternative 3

The cumulative impacts of Alternative 3 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1, with the exception that the east study area would be acquired for Combat Center operations versus the west study area under Alternative 1. Similar to Alternative 1, cumulative impacts under Alternative 3 would be less than significant.

5.4.4.4 Alternative 4

Aircraft-related Activities

Alternative 4 would involve the same land acquisition as for Alternative 1 (west and south study areas) but would permit restricted public use of the west study area during approximately 10 months of the year when Marine Expeditionary Brigade (MEB) exercises would not be occurring. During periods of

restricted public access, military aircraft would continue to utilize the newly established airspace. The public would potentially be exposed to 65 dB or greater noise levels during RPAA periods for intermittent and infrequent periods. Since military aircraft would continue to utilize the newly established airspace, the potential for aircraft accidents to impact the public is greater than under Alternative 1 during periods of restricted public access. The numbers of people utilizing the RPAA would be limited and scattered throughout the area under normal conditions, as a result, the potential for aircraft accidents to impact the public would be less than significant.

Some of the projects listed in Section 5.3 would include use of airspace in and around the Combat Center. Under Alternative 4, aircraft-delivered ordnance would be used only within the current Combat Center boundaries (see Figures 2-8c and 2-8d). Accordingly, no impacts to public health and safety would be associated with aircraft-delivered ordnance under Alternative 4. There are no projects listed in Section 5.3 that would contribute additional impacts of this type.

Ground Training Activities (ordnance use, energy hazards, and transportation)

Implementation of Alternative 4 would result in less than significant impacts to public health and safety from ordnance use due to the potential presence of munitions constituents, debris, equipment, or other hazards that may have gone undetected during post-exercise range sweeps and EOD range clearance operations within the RPAA. Explosive ordnance disposal, range clearance operations, hazards, and referenced plans currently used, and those that would be implemented as described in Chapter 2, would protect the public from any significant impacts from UXO. There are no projects listed in Section 5.3 that would contribute additional impacts of this type.

The 62 dBC CNEL contour for ordnance activities would be mostly contained within the proposed boundaries of the Combat Center; and there are no sensitive noise receptors within the areas exposed to CNEL greater than or equal to 62 dBC CNEL. There are no projects listed in Section 5.3 that would contribute additional impacts of this type.

Implementation of Alternative 4 would have less than significant impacts to public health and safety from energy hazards. Proposed communication towers would be placed on top of a ridge, far enough away from ordnance use and ground training activities to avoid interference. Several projects listed in Section 5.3 may have a communication component. However, these projects were studied and found to have less than significant impacts to public health and safety.

The potential for increases in accidents with military vehicles on public roads would increase under Alternative 4; however, the minimal increase in traffic volume would not cause a change in LOS ratings (see Section 4.6, *Transportation and Circulation*) and consequently, the potential impacts to public health and safety would be less than significant. Some of the projects listed in Section 5.3 would be expected to result in increases in vehicle traffic primarily associated with increases in personnel. These potential cumulative impacts to transportation would increase the potential for accidents corresponding with an increase in traffic; however, the anticipated increases would be minor as the population increases would not be significant.

Therefore, under Alternative 4 the cumulative impacts to public health and safety in association with ground training operations would remain significant with respect to ordnance use but would be less than significant with respect to ordnance use, energy hazards, and transportation.

Other Safety Issues (mining, protection of children, emergency response)

Implementation of Alternative 4 would have less than significant impacts to public health and safety as a result of mines. Abandoned mines are present within the acquisition study areas for this alternative.

Standard Operating Procedures are in place for the management of abandoned mines within the training areas. Increased public notification surrounding the mines would potentially minimize potential impacts to the public. There are no projects listed in Section 5.3 that would contribute additional impacts of this type.

Implementation of Alternative 4 would have less than significant impacts to the protection of children. Alternative 4 would also comply with EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, which states that each federal agency must, to the extent permitted by law and appropriate and consistent with the agency's mission: a) make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and b) ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks (62 *Federal Register* 1997).

There are no schools, parks, residences, or other areas in the vicinity of the training ranges where children would congregate. All on-base housing and school or playground locations are located in the Mainside Area of the Combat Center, well removed from any training activities and associated hazards. No disproportionate participation by children in activities within the RPAA would be expected. All other projects listed in Section 5.3 would also be required to comply with EO 13045; therefore, in conjunction with other past, present, and reasonably foreseeable projects Alternative 4 would have less than significant cumulative impacts to human health or the environment and, thus, would not create disproportionate risks to children.

Implementation of Alternative 4 would have less than significant impacts to emergency response services for the Combat Center or the surrounding community. The potential for wildland fires may increase with the increase in human and equipment activity; however, the risks would be the same as under current conditions at the Combat Center where the environment is similar and timely emergency response and fires historically have not posed a significant problem. In conjunction with projects listed in Section 5.3, sufficient emergency response capacity is present within the surrounding community and within the Combat Center, to accommodate the expected increase in human and equipment activities.

Therefore, Alternative 4, in conjunction with other projects listed in Section 5.3, would have less than significant cumulative impacts to public health and safety on mining, protection of children, and emergency response.

Hazardous Materials and Hazardous/Solid Waste

Cumulative impacts with respect to hazardous materials and hazardous/solid waste, would be similar to those described under Alternative 1, and would be less than significant.

5.4.4.5 Alternative 5

The cumulative impacts of Alternative 5 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 4, with the exception that the amount of land acquired for Combat Center operations would be less than Alternative 4. Similar to Alternative 4, cumulative impacts under Alternative 5 would be less than significant.

5.4.4.6 Alternative 6

Cumulative impacts of Alternative 6 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be similar to those described under Alternative 4, with the exception that the RPAA under Alternative 6 would be smaller, thus reducing the potential for significant public

health and safety impacts from ordnance use. Similar to Alternative 4, cumulative impacts under Alternative 6 would be less than significant.

5.4.5 Visual Resources

5.4.5.1 Alternative 1

Implementation of Alternative 1 would have a less than significant impact to visual resources. The areas proposed for acquisition would be used exclusively by the military, therefore any land disturbance would not be visible and any signs of training (e.g., dust clouds and aircraft) would be short-term and would occur over a specified timeframe. The primary visual receptors for the proposed action would be those traveling on SR 247, which borders the west study area, and those that live adjacent to the south study area. The areas potentially affected by the proposed action are far removed spatially from the past, present, and reasonably foreseeable actions listed in Section 5.3; therefore, very few visual receptors would be impacted doubly by implementation of the proposed action in conjunction with the identified past, present, and reasonably foreseeable actions in the area. Furthermore, all development projects in the area would be in accordance with city and county general plans, therefore, any visual impacts from the past, present, and reasonably foreseeable actions would be negligible. Consequently, when considered cumulatively, the proposed alternatives and past, present, and reasonably foreseeable actions would not have a significant impact on visual resources in the project area.

5.4.5.2 Alternative 2

Implementation of Alternative 2 would have a less than significant impact to visual resources. The areas proposed for acquisition would be used exclusively by the military, therefore any land disturbance would not be visible and any signs of training (e.g., dust clouds and aircraft) would be short-term and would occur over a specified timeframe. The primary visual receptors for the proposed action would be those recreating in the area that would remain the Johnson Valley OHV area (primarily in the Rock Pile camping/staging area), which borders the west study area, and those that live adjacent to the south study area. The cumulative impacts of Alternative 2 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be similar to Alternative 1, and therefore, not significant.

5.4.5.3 Alternative 3

Implementation of Alternative 3 would have a less than significant impact to visual resources. The areas proposed for acquisition would be used exclusively by the military, therefore any land disturbance would not be visible and any signs of training (e.g., dust clouds and aircraft) would be short-term and would occur over a specified timeframe. The primary visual receptors for the proposed action would be those traveling on Amboy Road, which bisects the east study area, and those that live adjacent to the south study area. The cumulative impacts of Alternative 3 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be similar to Alternative 1, and therefore, not significant.

5.4.5.4 Alternative 4

Implementation of Alternative 4 would have a less than significant impact to visual resources. The south study area proposed for acquisition under Alternative 4 would be used exclusively by the military; therefore, any land disturbance from the proposed training activities would not be visible. Any visible signs of the proposed training activities would be short-term and would occur over a specified timeframe. The proposed west study area would be used for military training purposes approximately 2 months per year and available for OHV use for 10 months per year. Furthermore, there would be adverse, but not

significant, impacts to soils resulting from training. The degraded soils would result in adverse, but not significant, visual impact for users of the Johnson Valley OHV area. The primary visual receptors for the proposed action would be those traveling on Amboy Road (which parallels the eastern installation boundary), those recreating in the Johnson Valley OHV area during the 10 months when it would be available to the public, and those that live adjacent to the south study area. The cumulative impacts of Alternative 4 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be similar to Alternative 1, and therefore, not significant.

5.4.5.5 Alternative 5

Implementation of Alternative 5 would have a less than significant impact to visual resources. Under Alternative 5, the proposed west study area would be used for military training purposes approximately 2 months per year and available for OHV use for 10 months per year. There would be adverse, but not significant, impacts to soils resulting from training; the degraded soils would result in adverse, but not significant, visual impact for users of the Johnson Valley OHV area. The primary visual receptors for the proposed action would be those traveling on Amboy Road (which parallels the eastern installation boundary) and those recreating in the Johnson Valley OHV area during the 10 months when it would be available to the public. The cumulative impacts of Alternative 5 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be similar to Alternative 1, and therefore, not significant.

5.4.5.6 Alternative 6

Implementation of Alternative 6 would have a less than significant impact to visual resources. The south study area proposed for acquisition under Alternative 6 would be used exclusively by the military; therefore, any land disturbance from the proposed training activities would not be visible. Any visible signs of the proposed training activities would be short-term and would occur over a specified timeframe. The proposed west study area would be used for military training purposes approximately 2 months per year and available for OHV use for 10 months per year. There would be adverse, but not significant, impacts to soils resulting from training; the degraded soils would result in adverse, but not significant, visual impact for users of the Johnson Valley OHV area. The primary visual receptors under Alternative 6 would be those recreating in the Johnson Valley OHV area or traveling on SR 247, which borders the west study area. The cumulative impacts of Alternative 5 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be similar to Alternative 1, and therefore, not significant.

5.4.6 Transportation and Circulation

5.4.6.1 Alternative 1

Implementation of Alternative 1 would have no significant impacts to transportation and circulation. Although there would be temporal overlap with the construction of permanent facilities and infrastructure to support the Grow the Force Initiative (Section 5.3.1.2), construction-related impacts associated with this action would be negligible and temporary (60 days). Personnel increases associated with the Grow the Force Initiative would likely increase traffic volumes within the City of Twentynine Palms and the Mainside roadway network. The new spur road and traffic signals that are to be installed as a component of this action would likely mitigate any potential impacts associated with increased vehicle traffic, and result in beneficial (but not significant) impacts to transportation and circulation within Mainside. Commercial and residential development projects within the City of Twentynine Palms that are proposed to occur within the next 5 to 10 years (Section 5.3.2.7) as part of standard planning and community

growth would likely increase traffic volumes within the City of Twentynine Palms, primarily on Adobe Road. Any increase in traffic volumes associated with Alternative 1 would be minor and temporally negligible, and there are no off-base construction activities that would affect transportation and circulation. Therefore, cumulative impacts of Alternative 1 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would not be significant.

5.4.6.2 Alternative 2

Implementation of Alternative 2 would have no significant impacts to transportation and circulation. The cumulative impacts of Alternative 2 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1, and therefore, not significant.

5.4.6.3 Alternative 3

Implementation of Alternative 3 would have significant impacts to transportation and circulation because of the temporary closures of North Amboy Road. Because of the location and short span of these closures, there would be no additive impacts with other past, present, and reasonably foreseeable projects listed in Section 5.3. Therefore, although the impacts of Alternative 3 would not be cumulative with other projects, the impacts of Alternative 3 alone would constitute a significant cumulative impact.

5.4.6.4 Alternative 4

Implementation of Alternative 4 would have no significant impacts to transportation and circulation. The cumulative impacts of Alternative 4 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1, and therefore, not significant.

5.4.6.5 Alternative 5

Implementation of Alternative 5 would have no significant impacts to transportation and circulation. The cumulative impacts of Alternative 5 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1, and therefore, not significant.

5.4.6.6 Alternative 6

Implementation of Alternative 6 would have no significant impacts to transportation and circulation. The cumulative impacts of Alternative 6 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1, and therefore, not significant.

5.4.7 Airspace Management

5.4.7.1 Alternative 1

Implementation of the Alternative 1 airspace proposals with the increased aircraft operations would have minimal to significant impacts on other airspace uses in the region. The extent of such impacts would depend on the daily time periods MEB exercises and other training activities would take place, as well as the operational levels, and those airspace areas and altitudes in which flight activities would be most concentrated. Federal Aviation Administration (FAA) data suggest the greater potential for significant impacts would be on Instrument Flight Rules (IFR) air traffic transiting along those jet routes and airways located within or adjacent to the airspace proposed for the Johnson Valley MOA and its overlying ATCAA, and Restricted Area R-XXXX. General aviation aircraft operating under Visual Flight Rules (VFR) within this region would be affected by the additional limitations implementation of the proposed airspace actions would have on their current use of this airspace. During those daily time periods this airspace is active, VFR aircraft could not enter R-XXXX and would require greater vigilance while

transiting the new/modified MOA airspace. As previously noted, the FAA will conduct additional analysis to meet its regulatory requirement. Procedures for coordinating and scheduling airspace use currently outlined in formal agreements between the Combat Center and the FAA would continue to be an effective mechanism for managing cooperative use of the Center's airspace complex.

This alternative would have minimal impact on aircraft operations at the public airports in the surrounding region. Several of these airports have instrument approach procedures to individual runways that are used, as necessary, when weather conditions or other factors may require their use. In some cases, the beginning point (initial approach fix) for these approaches extends near or within the outer boundaries of the proposed airspace. Any impacts this proposed airspace may have on these procedures would also be addressed by the FAA, Marine Corps, and airport operators. Several private airfields are also located within or in close proximity to the proposed Johnson Valley and CAX MOAs, Restricted Area R-XXXX, and the modified Sundance MOA. These airfields are unattended and generally have limited aircraft operations. For that reason, impacts on these airfields would be minimal. Marine Corps outreach to all public airport operators, private airfield owners, and general aviation pilot groups would continue to seek means of minimizing any impacts the existing and proposed airspace may have on their operations.

No pending or proposed airspace or airport actions were identified by the FAA, airport operators, or other concerns during the scoping process that would be considered in the overall cumulative impacts of the Combat Center airspace proposals. Any future proposals in the region would require coordination and consultation with the FAA, at which time potential cumulative impacts such proposals may have on both civil and military airspace use in this region would be minimized.

5.4.7.2 Alternative 2

Implementation of the Alternative 2 airspace proposals would have impacts similar to those discussed for Alternative 1 except for the reduced boundaries of the Johnson Valley MOA and Restricted Area R-XXXX. Reduction of these boundaries would also minimize impacts on those airways, jet routes, and private airfields that would be located outside this airspace under this alternative. As stated for Alternative 1, the FAA and Marine Corps would address airspace impacts and mitigations during the EIS and aeronautical review processes. Marine Corps outreach programs would also address other impacts on the aviation community with airport operators, airfield owners, and pilot groups. No airspace or airport proposed actions were identified for consideration of cumulative impacts with this alternative.

5.4.7.3 Alternative 3

Implementation of the Alternative 3 airspace proposals would have minimal to significant impacts on airspace use and management in the region. As discussed for Alternative 1, the extent of such impacts would depend on the daily use of this airspace by MEB exercises and other training activities. Since this airspace proposal does not include the Johnson Valley MOA and restricted area proposed for Alternative 1, there would be less impact on the airways, jet routes, public airports, and private airfields located west of the existing Combat Center complex. Impacts would be on use of those airways, jet routes, VFR transit routes, and airports/airfields located near or within the eastern portions of the Combat Center complex proposed for Restricted Areas R-XXXXA and B.

Impacts and mitigation measures to be considered for this airspace proposal would be addressed by the FAA and Marine Corps during the EIS and aeronautical study review processes. Continued Marine Corps outreach to airport operators and general aviation pilot groups would seek means of minimizing any impacts on this aviation community. No other airspace or airport proposals were identified during the

scoping process that would be considered in the overall cumulative impacts for the airspace proposed under this alternative.

5.4.7.4 Alternative 4

Implementation of the Alternative 4 airspace proposals would have the same impacts on airspace use and management as described for Alternative 1. Therefore, actions to be taken by the FAA and Marine Corps to address such impacts would be the same as discussed for that alternative. No other airspace or airport proposals were identified for consideration of cumulative impacts.

5.4.7.5 Alternative 5

Implementation of the Alternative 5 airspace proposals would have the same impacts on airspace use and management as described for Alternative 1. Therefore, actions to be taken by the FAA and Marine Corps to address such impacts would be the same as discussed for that alternative. No other airspace or airport proposals were identified for consideration of cumulative impacts.

5.4.7.6 Alternative 6

Implementation of the Alternative 6 airspace proposals would have the same impacts on airspace use and management as described for Alternative 1. Therefore, actions to be taken by the FAA and Marine Corps to address such impacts would be the same as discussed for that alternative. No other airspace or airport proposals were identified for consideration of cumulative impacts.

5.4.8 Air Quality

5.4.8.1 Alternative 1

Criteria Pollutants

The region of influence (ROI) considered in this air quality cumulative analysis for criteria pollutants includes areas adjacent to the Combat Center and proposed acquisition study areas and potentially the entire Mojave Desert Air Basin (MDAB). Cumulative impacts resulting from Alternative 1, in conjunction with impacts from other projects discussed in Section 5.3, would potentially occur during proposed construction and operational activities.

Air quality impacts from proposed construction activities would occur from combustive emissions due to the use of fossil fuel-fired construction equipment and fugitive dust (PM_{10}/particulate matter less than 2.5 microns in diameter [$PM_{2.5}$]) emissions due to the use of vehicles on bare soils. Proposed construction activities would produce emissions that would remain below applicable conformity and NEPA emission significance thresholds. Any concurrent emissions-generating action that occurs in the vicinity of proposed construction activities would potentially contribute to the ambient impact of these emissions. However, since proposed construction would produce minor amounts of emissions, the combination of proposed construction and future project air quality impacts would not contribute to an exceedance of an ambient air quality standard. Implementation of recommended fugitive dust control measures would ensure that air emissions from proposed construction activities would produce less than significant cumulative air quality impacts.

Air quality impacts associated with proposed operational activities would occur from 1) combustive emissions due to the use of ordnance, fossil fuel-fired tactical vehicle/tactical support equipment, and aircraft, and 2) fugitive dust emissions due to the operation of vehicles and equipment on exposed soil. Proposed operational activities would generate emissions that would exceed the annual conformity *de minimis* threshold for volatile organic compounds (VOC), nitrogen oxides (NO_x), and PM_{10} within the

MDAB project region. A conformity determination was prepared to demonstrate that the net increase in VOC, NO_x, and PM_{10} emissions from Alternative 6 would conform to the State Implementation Plan (SIP). The results of these analyses determined that emissions from Alternative 6 would not contribute to an exceedance of the National Ambient Air Quality Standards (NAAQS) for O_3 or PM_{10}. Proposed VOC, NO_x, and PM_{10} emissions from Alternative 1 are nearly identical in strength and location of operation to those estimated for Alternative 6. Therefore, the conclusions from the conformity determination for Alternative 6 also would apply to Alternative 1. As a result, VOC, NO_x, and PM_{10} emissions from Alternative 1 would produce less than significant cumulative air quality impacts.

Regarding emissions of carbon monoxide (CO), sulfur dioxide (SO_2), and $PM_{2.5}$, proposed operations would emit these pollutants across the entire Combat Center. Due to this large area of operation, their ambient concentrations would be well diluted when transported beyond the existing and proposed boundaries of the Combat Center. Emissions of these pollutants from other future sources and projects in the region would occur far enough away from the Combat Center such that they also would result in low ambient levels (as shown in Table 3.8-2). As a result, the combination of proposed operational emissions of CO, SO_2, and $PM_{2.5}$ and future project air quality impacts would not contribute to an exceedance of an ambient air quality standard. Therefore, proposed operational emissions of CO, SO_2, and $PM_{2.5}$ would produce less than significant cumulative impacts to these pollutant levels.

The dispersion modeling and emissions comparison analyses for Alternative 1 determined that proposed operational emissions would produce very low ambient pollutant impacts to the nearby Joshua Tree National Park pristine Class I area. The nominal increase in ambient pollutant levels that would occur from proposed emissions within this area, in combination with emissions from other future sources and projects in the region, would produce less than significant impacts to 1) air quality values, and 2) visibility impairment within the Joshua Tree National Park. Therefore, proposed emissions would produce less than significant cumulative air quality impacts to the Joshua Tree National Park.

Greenhouse Gases

The potential effects of proposed greenhouse gas (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 of significance for GHG emissions. Therefore, in the absence of an formally-adopted thresholds of significance for GHGs, this EIS compares GHG emissions that would occur from Alternative 1 to the U.S. net GHG baseline inventory of 2009 (U.S. Environmental Protection Agency [USEPA] 2011) to determine the relative increase in proposed GHG emissions. Appendix G presents estimates of GHG emissions that would occur from each project alternative.

Table 5-3 summarizes the net change in annual GHG emissions that would occur from the operation of Alternative 1 Projected GHG emissions from Alternative 1 were compared to the 2009 GHG emissions inventories for the Combat Center and the U.S. baseline. Net emissions from Alternative 1 would equate to approximately 34.5% of the carbon dioxide equivalent (CO_2e) emissions for the Combat Center in 2009. As shown in Table 5-3 the ratio of annual CO_2e emissions from Alternative 1 to the CO_2e emissions associated with the net U.S. sources in 2009 is approximately 0.04/5,618 million metric tons, or about 0.0007% of the U.S. CO_2e emissions inventory. Since GHG emissions from Alternative 1 would equate to minimal amounts of the U.S inventory, they would not substantially contribute to global climate change. Emissions of GHGs from future sources and projects in the region would contribute to GHG

impacts from Alternative 1. However, these emissions also would equate to minimal amounts of the U.S GHG inventory. Therefore, GHG emissions from Alternative 1 would produce less than significant cumulative impacts to global climate change.

A more exact estimate of the increase in GHGs from the project alternatives would require an understanding of the net change in fuel usages associated with the proposed exercises compared to existing operations. For example, many of the sources associated with the proposed exercises otherwise would operate at some level in other locations of the country or abroad. Therefore, it is expected that the actual increase in GHGs from Alternative 1 would be somewhat less than those presented in Table 5-3.

Table 5-3. Annual GHG Emissions Resulting from the Implementation of Alternative 1

Scenario/Activity	Metric Tons per Year(1)			
	CO_2	CH_4	N_2O	CO_2e
U.S. 2009 Baseline Emissions (10^6 metric tons)(4)	**-**	**-**	**-**	**5,618.2**
Alternative 1				
Project Construction	142	0.02	0.00	143
Aircraft Operations	35,106	1.1	1.0	35,437
Tactical Vehicles	3,558	0.4	0.0	3,582
Tactical Support Equipment	778	0.2	0.1	804
Personnel On-road Commutes	165	---	---	165
On-site Energy Generation	665	0.01	0.00	665
Reduction of Emissions in Acquired Lands (2)	(413)	(0.6)	(0.0)	(426)
Total Net Change - Alternative 1 (3)	**40,364**	**1.78**	**1.12**	**40,582**
Combat Center 2009 Baseline Emissions (No-Action Alternative)(5)	**112,576**	**64.4**	**1.4**	**115,633**
Proposed Emissions as a % of U.S. Emissions	**-**	**-**	**-**	**0.0007**

Notes: (1) $CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 310)$.
(2) Equal to 23/10% reductions in total west/south areas emissions.
(3) Excludes construction emissions, as this activity would finish in year prior to initiation of MEB Exercises.
(4) Source: U.S. Environmental Protection Agency 2011.
(5) Baseline emissions do not include the co-gen facility.
CO_2 = carbon dioxide; CH_4 = methane; N_2O = nitrous oxide; CO_2e = carbon dioxide equivalent.

Although Alternative 1 would only cause negligible cumulative impacts associated with global climate change, this important topic warrants discussion of Marine Corps and Department of the Navy (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 greenhouse gases.

Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, was adopted in October 2009, and provides early strategic guidance to federal agencies in the management of GHG emissions. The early strategy directs the agencies to increase renewable energy use to achieve general GHG emission reductions. According to the provisions of EO 13514, federal agencies will be required to develop a 2008 baseline for scope 1 and 2 GHG emissions, and to develop a percentage reduction target for agency-wide reductions of scope 1 and 2 GHG emissions by fiscal year (FY) 2020. As part of this effort, federal agencies will evaluate sources of GHG emissions, and develop, implement, and annually update an integrated Strategic Sustainability Performance Plan that will prioritize agency actions based on lifecycle return on investment. The intent is to evaluate GHG emissions on a lifecycle basis and to identify feasibility of sustainability strategies on that basis. The Department of Defense (DoD) is currently developing its Strategic Sustainability Performance Plan that will guide Marine Corps initiatives to reduce GHG emissions.

The Commandant of the Marine Corps' *Facilities Energy and Water Management Program Campaign Plan* (2009) declares the intent to implement measures to conserve energy and to reduce GHG 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. This plan requires 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.

Marine Corps Installations West (MCIWEST) has undertaken a study to evaluate and address GHG emissions, documented in the draft *Greenhouse Gas Assessment for Marine Corps Installations West* (MCIWEST 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 Combat Center. The study provides the basis for recommended GHG management policies at MCIWEST.

On October 16, 2009, the Secretary of the Navy, Ray Mabus, announced five energy targets for the Navy and Marine Corps. The five energy targets are summarized below:

- When awarding contracts, appropriately consider energy efficiency and the energy footprint as additional factors in acquisition decisions.
- By 2012, demonstrate a Green Strike Group composed of nuclear vessels and ships powered by biofuel. By 2016, sail the Strike Group as a Great Green Fleet composed of nuclear ships, surface combatants equipped with hybrid electric alternative power systems running on biofuel, and aircraft running on biofuel.
- By 2015, cut petroleum use in its 50,000 non-tactical commercial fleet in half, by phasing in hybrid, flex fuel and electric vehicles.
- By 2020, produce at least half of shore based installations' energy requirements from alternative sources. Also, 50 percent of all shore installations will be net zero energy consumers.
- By 2020, half of DoN's total energy consumption for ships, aircraft, tanks, vehicles and shore installations will come from alternative sources.

As part of its efforts to encourage the development of alternative fuels, on January 22, 2010 the DoN and the Department of Agriculture signed a Memorandum of Understanding (MOU) to encourage the development of advanced biofuels and other renewable energy systems.

As part of its programs to meet the federal sustainability goals, the DoN and the Marine Corps are developing and implementing energy conservation programs, as well as participating in the development of renewable energy projects designed to reduce dependence on fossil fuels. Table 5-4 provides a summary of the renewable energy projects that have been implemented, are in the process of being implemented, or are planned for future implementation within the jurisdiction of MCIWEST. In addition, emission reductions that will be achieved through implementation of these projects have been calculated based on emission factors from the California Climate Action Protocol (California Climate Action Registry 2009). Each of the DoN energy initiatives identified in Table 5-4 are anticipated to reduce emissions of greenhouse gases over a 25-year life cycle.

As shown in Table 5-4, currently implemented and planned renewable energy projects that will be implemented within the next two years would reduce emissions of GHGs by 248,705 metric tons over the life cycle of the renewable projects. The DoN renewable energy initiatives are not proposed to compensate for "ton for ton" emissions reductions to directly compensate for GHG emissions produced by the Proposed Action, but do provide an early response to EO 13514 to factor GHG management into DoN proposals and impact analyses. These initiatives, and other GHG reductions programs, will provide concurrent reductions in emissions that will occur at the same time as the Proposed Action.

Table 5-4. Marine Corps Renewable Energy Projects within Marine Corps Installations West Region

Location	Type	Status	MW	Capacity Factor	MWh Annual	kWh Life Cycle[1]	CO_2 Emissions, Metric tons/life cycle	CH_4 Emissions, Metric tons/life cycle	N_2O Emissions, Metric tons/life cycle	CO_2e Emissions, Metric tons/life cycle
Operational Before 2009										
Combat Center	Photovoltaic	Operational 1999	0.015	0.20	26.28	657,000	289	0.0022	0.0012	289
Combat Center	Photovoltaic	Operational 2002	0.163	0.20	285.58	7,139,400	3,137	0.0239	0.0132	3,141
Marine Corps Base Camp Pendleton	Photovoltaic	Operational Aug 2004	0.047	0.20	82.34	2,058,600	904	0.0069	0.0038	906
Combat Center	Photovoltaic	Operational Sep 2004	1.100	0.20	1,927.20	48,180,000	21,168	0.1614	0.0891	21,199
Marine Corps Base Camp Pendleton	Photovoltaic	Operational Apr 2005	0.032	0.20	56.06	1,401,600	616	0.0047	0.0026	617
Marine Corps Base Camp Pendleton	Photovoltaic	Operational May 2005	0.038	0.20	66.05	1,651,260	725	0.0055	0.0031	727
Marine Corps Base Camp Pendleton	Photovoltaic	Operational Jun 2007	0.014	0.20	25.23	630,720	277	0.0021	0.0012	278
Marine Corps Base Camp Pendleton	Photovoltaic	Operational Jun 2007	0.029	0.20	50.60	1,264,944	556	0.0042	0.0023	557
Marine Corps Base Camp Pendleton	Photovoltaic	Operational Jun 2007	0.029	0.20	50.60	1,264,944	556	0.0042	0.0023	557
Marine Corps Base Camp Pendleton	Photovoltaic	Operational Jun 2008	0.030	0.20	52.56	1,314,000	577	0.0044	0.0024	578
Marine Corps Base Camp Pendleton	Photovoltaic	Operational Jul 2008	0.075	0.20	131.40	3,285,000	1,443	0.0110	0.0061	1,445
Marine Corps Base Camp Pendleton	Photovoltaic (Streetlighting)	Operational	0.010	0.20	17.52	438,000	192	0.0015	0.0008	193
Marine Corps Base Camp Pendleton	Photovoltaic (Streetlighting)	Operational	0.060	0.20	104.24	2,606,100	1,145	0.0087	0.0048	1,147
Operational FY 2009										
Marine Corps Recruit Depot San Diego	Photovoltaic	Operational Jan 2009	0.225	0.20	394.20	9,855,000	4,330	0.0330	0.0182	4,336
Marine Corps Logistics Base Barstow	Wind	Operational Mar 2009	1.500	0.30	3,942.00	98,550,000	43,298	0.3301	0.1823	43,362
Marine Corps Air Station Yuma	Photovoltaic (Thin Film)	Operational May 2009	0.007	0.20	12.26	306,600	135	0.0010	0.0006	135
Combat Center	Photovoltaic (Streetlighting)	Operational Jun 2009	0.001	0.20	2.54	63,510	28	0.0002	0.0001	28
Combat Center	Photovoltaic	Operational Jun 2009	0.050	0.20	87.60	2,190,000	962	0.0073	0.0041	964
Combat Center	Photovoltaic	Operational Jun 2009	0.050	0.20	87.60	2,190,000	962	0.0073	0.0041	964
Combat Center	Photovoltaic	Operational Jun 2009	0.050	0.20	87.60	2,190,000	962	0.0073	0.0041	964
Marine Corps Base Camp Pendleton	Photovoltaic	Operational Jul 2009	0.050	0.20	87.60	2,190,000	962	0.0073	0.0041	964
Marine Corps Air Station Yuma	Photovoltaic (Thin Film)	Operational Aug 2009	0.020	0.20	35.04	876,000	385	0.0029	0.0016	385
Marine Corps Air Station Yuma	Photovoltaic (Thin Film)	Operational Sep 2009	0.032	0.20	56.06	1,401,600	616	0.0047	0.0026	617
On Line 2010										
Combat Center	Photovoltaic	Operational Oct 2009	0.074	0.20	129.65	3,241,200	1,424	0.0109	0.0060	1,426

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Table 5-4. Marine Corps Renewable Energy Projects within Marine Corps Installations West Region

Location	Type	Status	MW	Capacity Factor	MWh Annual	kWh Life Cycle1	CO_2 Emissions, Metric tons/life cycle	CH_4 Emissions, Metric tons/life cycle	N_2O Emissions, Metric tons/life cycle	CO_2e Emissions, Metric tons/life cycle
Combat Center	Photovoltaic	Operational Oct 2009	0.074	0.20	129.65	3,241,200	1,424	0.0109	0.0060	1,426
Combat Center	Photovoltaic	Operational Oct 2009	0.074	0.20	129.65	3,241,200	1,424	0.0109	0.0060	1,426
Combat Center	Photovoltaic	Operational Oct 2009	0.048	0.20	84.10	2,102,400	924	0.0070	0.0039	925
Combat Center	Photovoltaic	Operational Oct 2009	0.048	0.20	84.10	2,102,400	924	0.0070	0.0039	925
Combat Center	Photovoltaic	Operational Oct 2009	0.048	0.20	84.10	2,102,400	924	0.0070	0.0039	925
Marine Corps Air Station Miramar	Photovoltaic	On Line Nov 2009	0.030	0.20	52.56	1,314,000	577	0.0044	0.0024	578
Marine Corps Base Camp Pendleton	Photovoltaic	On Line Nov 2009	0.050	0.20	87.60	2,190,000	962	0.0073	0.0041	964
Marine Corps Base Camp Pendleton	Photovoltaic	On line Dec 2009	0.050	0.20	87.60	2,190,000	962	0.0073	0.0041	964
Marine Corps Base Camp Pendleton	Photovoltaic	On line Dec 2009	0.005	0.20	8.76	219,000	96	0.0007	0.0004	96
Combat Center	Photovoltaic	On line Dec 2009	0.043	0.20	75.34	1,883,400	827	0.0063	0.0035	829
Combat Center	Photovoltaic	On line Dec2009	0.030	0.20	52.56	1,314,000	577	0.0044	0.0024	578
Marine Corps Air Station Yuma	Photovoltaic (Panels)	On Line Jan 2010	0.032	0.20	55.54	1,388,460	610	0.0047	0.0026	611
Marine Corps Air Station Yuma	Photovoltaic (Thin Film)	On Line Mar 2010	0.033	0.20	56.94	1,423,500	625	0.0048	0.0026	626
Marine Corps Air Station Miramar	Photovoltaic (Streetlighting)	On Line Mar 2010	0.020	0.20	35.04	876,000	385	0.0029	0.0016	385
Marine Corps Air Station Miramar	Photovoltaic (Streetlighting)	On Line Mar 2010	0.020	0.20	35.04	876,000	385	0.0029	0.0016	385
Marine Corps Air Station Pendleton	Photovoltaic	On Line Mar 2010	0.075	0.20	131.40	3,285,000	1,443	0.0110	0.0061	1,445
Marine Corps Air Station Pendleton	Photovoltaic	On Line Mar 2010	0.053	0.20	92.86	2,321,400	1,020	0.0078	0.0043	1,021
Marine Corps Air Station Miramar	Photovoltaic	On Line Apr 2010	0.210	0.20	367.92	9,198,000	4,041	0.0308	0.0170	4,047
Combat Center	Photovoltaic	On line Jun 2010	0.116	0.20	203.23	5,080,800	2,232	0.0170	0.0094	2,236
Combat Center	Photovoltaic	On line Jun 2010	0.034	0.20	59.57	1,489,200	654	0.0050	0.0028	655
Combat Center	Photovoltaic	On line Jun 2012	0.034	0.20	59.57	1,489,200	654	0.0050	0.0028	655
Combat Center	Photovoltaic	On line Jun 2013	0.034	0.20	59.57	1,489,200	654	0.0050	0.0028	655
Combat Center	Photovoltaic	On line Jun 2014	0.034	0.20	59.57	1,489,200	654	0.0050	0.0028	655
Marine Corps Base Camp Pendleton	Photovoltaic	On line Jun 2010	0.066	0.20	115.63	2,890,800	1,270	0.0097	0.0053	1,272
Marine Corps Base Camp Pendleton	Photovoltaic	On line Jun 2010	0.252	0.20	441.50	11,037,600	4,849	0.0370	0.0204	4,857
Combat Center	Photovoltaic	On line Jul 2010	0.484	0.20	847.97	21,199,200	9,314	0.0710	0.0392	9,328
On Line 2011										
Marine Corps Air Station Yuma	Photovoltaic (Streetlighting)	Planned Jan 2011	0.010	0.20	17.52	438,000	192	0.0015	0.0008	193
Marine Corps Air Station Yuma	Photovoltaic	Planned Jan 2011	0.022	0.20	38.54	963,600	423	0.0032	0.0018	424

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Table 5-4. Marine Corps Renewable Energy Projects within Marine Corps Installations West Region

Location	Type	Status	MW	Capacity Factor	MWh Annual	kWh Life Cycle[1]	CO_2 Emissions, Metric tons/life cycle	CH_4 Emissions, Metric tons/life cycle	N_2O Emissions, Metric tons/life cycle	CO_2e Emissions, Metric tons/life cycle
Marine Corps Air Station Yuma	Photovoltaic	Planned Jan 2011	0.022	0.20	38.54	963,600	423	0.0032	0.0018	424
Marine Corps Air Station Yuma	Photovoltaic	Planned Jan 2011	0.032	0.20	56.06	1,401,600	616	0.0047	0.0026	617
Marine Corps Air Station Miramar	Photovoltaic (Streetlighting)	Planned Jan 2011	0.100	0.20	175.20	4,380,000	1,924	0.0147	0.0081	1,927
Combat Center	Photovoltaic	Planned Jan 2011	0.077	0.20	134.90	3,372,600	1,482	0.0113	0.0062	1,484
Combat Center	Photovoltaic	On Line Jun 2011	0.116	0.20	203.23	5,080,800	2,232	0.0170	0.0094	2,236
Combat Center	Photovoltaic	On line Jun 2011	0.034	0.20	59.57	1,489,200	654	0.0050	0.0028	655
Marine Corps Air Station Miramar	Photovoltaic	Planned Jun 2011	0.250	0.20	438.00	10,950,000	4,811	0.0367	0.0203	4,818
Marine Corps Base Camp Pendleton	Photovoltaic	On line Jun 2011	0.050	0.20	87.60	2,190,000	962	0.0073	0.0041	964
Marine Corps Base Camp Pendleton	Photovoltaic	On line Jun 2011	1.200	0.20	2,102.40	52,560,000	23,092	0.1761	0.0972	23,126
Marine Corps Recruit Depot San Diego	Photovoltaic	On Line Jun 2011	0.500	0.20	876.00	21,900,000	9,622	0.0734	0.0405	9,636
Marine Corps Air Station Miramar	Photovoltaic	On Line Aug 2011	0.350	0.20	613.20	15,330,000	6,735	0.0514	0.0284	6,745
Marine Corps Air Station Miramar	Photovoltaic (Streetlighting)	On Line Aug 2011	0.020	0.20	35.04	876,000	385	0.0029	0.0016	385
Marine Corps Air Station Yuma	Photovoltaic (Streetlighting)	Planned Jan 2011	0.010	0.20	17.52	438,000	192	0.0015	0.0008	193
On Line 2012 and beyond										
Marine Corps Base Camp Pendleton	Photovoltaic	On Line Jun 2012	1.200	0.20	2,102.40	52,560,000	23,092	0.1761	0.0972	23,126
Marine Corps Recruit Depot San Diego	Photovoltaic	On Line Jun 2012	0.975	0.20	1,708.20	42,705,000	18,763	0.1431	0.0790	18,790
Marine Corps Air Station Miramar	Photovoltaic	Planned Jun 2013	0.500	0.20	876.00	21,900,000	9,622	0.0734	0.0405	9,636
Combat Center	Photovoltaic	Planned Grow the Force Military Construction FY12	1.000	0.20	1,752.00	43,800,000	19,244	0.1467	0.0810	19,272
Total Life Cycle GHG Emission Reductions, Metric Tons							**248,341**	**1.8936**	**1.0457**	**248,705**

Notes: [1]Project life cycle for all projects assumed to be 25 years.
CH_4 = methane; CO_2 = carbon dioxide; CO_2e = carbon dioxide equivalent; FY = Fiscal Year; GHG = greenhouse gas; kWh = kilowatt hour; MW = megawatt; MWh = megawatt hour; N_2O = nitrous oxide

In addition to these programs, the DoN is coordinating with development of renewable energy programs on its installations. The California Desert area, in which some of the F-35B training ranges and airspace lie, has been identified by the California Energy Commission as a region that presents opportunities for the development of renewable resource projects as part of the California Governor's Energy Action Plan II, which sets a goal of producing 33 percent of California's electrical needs with renewable energy by 2020. At Naval Air Weapons Station China Lake, the Navy has established a Geothermal Program Office that is coordinating in the private development of geothermal resources to provide energy from the Coso geothermal resource. In addition, the BLM has identified applications for 69 wind energy projects and 57 solar energy projects within its California Desert District. Development of these projects and other projects would reduce emissions from fossil-fuel fired power plants and supply energy from renewable resources as identified in the DoN energy targets.

As part of its programs to meet the federal sustainability goals, the Combat Center reduced energy intensity (energy usage per square foot) by 2.07% in one year during 2007, through a $5 million investment in energy improvements, including conversion from evaporative coolers to chilled water systems with energy management and control systems, re-commissioning 15 inoperable solar water heating systems, and installing lighting and photocell controls. As stated in Section 3.8 of this EIS, the Combat Center commissioned a 1.5 megawatt system of photovoltaic power generation in 2003 and an additional megawatt of capacity is currently under construction (Combat Center 2010). The Combat Center is also evaluating the feasibility of operating electrical wind generation, geothermal energy, and solar thermal water heating systems on-site. Lastly, the Combat Center consumed about 110,000 gallons of biodiesel in 2007, which resulted in lower GHG emissions compared to the use of regular diesel fuel (U.S. Army Corps of Engineers [USACE] and Combat Center 2008). These examples illustrate the leadership role that the Marine Corps and DoN play in achieving energy reductions that will contribute to the national effort to mitigate global climate change. As the Commandant of the Marine Corps has said, "As Marines, we take pride in providing the best value to the Nation. This extends to energy conservation aboard our facilities."

Climate Change Adaptation

In addition to assessing the GHG emissions that would come from the Proposed Action and the potential, albeit negligible, impact on climate change, the analysis must also assess how climate change might impact the Proposed Action and what adaptation strategies could be developed in response. This is a global issue for DoD. As is clearly outlined in the Quadrennial Defense Review Report of February 2010, the DoD would need to adjust to the impacts of climate change on our facilities and military capabilities should such change occur. DoD already provides environmental stewardship at hundreds of installations throughout the U.S. and around the world, working diligently to meet resource efficiency and sustainability goals as set by relevant laws and executive orders. Although the U.S. has significant capacity to adapt to potential climate change, it would pose challenges for civil society and DoD alike, particularly in light of the nation's extensive coastal infrastructure. In 2008, the National Intelligence Council judged that more than 30 U.S. military installations would face elevated levels of risk from potentially rising sea levels. DoD's operational readiness hinges on continued access to land, air, and sea training and test space. Consequently, the DoD must complete a comprehensive assessment of all installations to assess the potential impacts of predicted climate change on its missions and adapt as required.

The Quadrennial Defense Review Report goes on to illustrate that DoD would work to foster efforts to assess, adapt to, and mitigate the impacts of climate change. Within the U.S., the DoD would leverage

the Strategic Environmental Research and Development Program, a joint effort among DoD, the Department of Energy, and the USEPA, to develop climate change assessment tools.

For the Combat Center, adaptation issues requiring evaluation and consideration could revolve around aridity associated with the Southwest. The U.S. Global Climate Research Program report, *Global Climate Change Impacts in the U.S.* (2009), predicts that the Southwest could face droughts, scarcity of water supplies, increased temperature, drought, and wildfire. Reduced availability of freshwater is likely to occur, with implications for bases and communities in the arid Southwest. Water is essential for maintenance and personnel, so strategies dealing with drought would need to be implemented. As discussed in Section 4.13.2.2 and 5.4.13, the Combat Center is preparing an Installation Energy and Sustainability Strategy (IESS) that will address long-term conservation and potable water supply.

As climate science advances, the DoN would regularly reevaluate climate change risks and opportunities at the bases in order to develop policies and plans to manage its effects on the operating environment, missions, and facilities. Managing the national security effects of climate change would require DoN to work collaboratively, through a whole-of-government approach, with local, state, and federal agencies.

Special Conservation Measures

The project activities would produce less than significant impacts to global climate change. However, to minimize GHG emissions during proposed training exercises, the Marine Corps proposes a special conservation measure (SCM) that would maximize the use of biodiesel in equipment and vehicles at the Combat Center, where feasible, in place of ultra-low sulfur diesel or aviation fuels. The CO_2e emission factor for 100% biodiesel is about 7% lower than ultra-low sulfur diesel. However, since biodiesel is a biogenic and renewable fuel, state protocols do not require the reporting of their GHG emissions (California Climate Action Registry 2009). The Combat Center currently uses a fuel that is a blend of 20/80% biodiesel/diesel by weight (B20). Hence, use of this fuel would result in a GHG credit of 20% compared to the use of conventional diesel fuel.

5.4.8.2 Alternative 2

Criteria Pollutants

Cumulative impacts of criteria pollutants from construction and operation of Alternative 2 would be nearly identical to those estimated for Alternative 1. As a result, air pollutant emissions from Alternative 2 would produce less than significant cumulative air quality impacts.

Greenhouse Gases

Cumulative impacts of GHG emissions from construction and operation of Alternative 2 would be identical to those estimated for Alternative 1. Therefore, GHG emissions from Alternative 2 would produce less than significant cumulative impacts to global climate change.

Special Conservation Measures

Special conservation measures would be the same as described for Alternative 1.

5.4.8.3 Alternative 3

Criteria Pollutants

Cumulative impacts of criteria pollutants from construction and operation of Alternative 3 would be nearly identical to slightly higher than those estimated for Alternative 1. Emissions of PM_{10} from the

operation of Alternative 3 would result in significant cumulative impacts to NAAQS levels. All other effects would produce less than significant cumulative air quality impacts.

Greenhouse Gases

Cumulative impacts of GHG emissions from construction and operation of Alternative 3 would be identical to those estimated for Alternative 1. Therefore, GHG emissions from Alternative 3 would produce less than significant cumulative impacts to global climate change.

Special Conservation Measures

Special conservation measures would be the same as described for Alternative 1.

5.4.8.4 Alternative 4

Criteria Pollutants

Cumulative impacts of criteria pollutants from construction and operation of Alternative 4 would be nearly identical to those estimated for Alternative 1. As a result, air pollutant emissions from Alternative 4 would produce less than significant cumulative air quality impacts.

Greenhouse Gases

Cumulative impacts of GHG emissions from construction and operation of Alternative 4 would be identical to those estimated for Alternative 1. Therefore, GHG emissions from Alternative 4 would produce less than significant cumulative impacts to global climate change.

Special Conservation Measures

Special conservation measures would be the same as described for Alternative 1.

5.4.8.5 Alternative 5

Criteria Pollutants

Cumulative impacts of criteria pollutants from construction and operation of Alternative 5 would be nearly identical to those estimated for Alternative 1. As a result, air pollutant emissions from Alternative 5 would produce less than significant cumulative air quality impacts.

Greenhouse Gases

Cumulative impacts of GHG emissions from construction and operation of Alternative 5 would be identical to those estimated for Alternative 1. Therefore, GHG emissions from Alternative 5 would produce less than significant cumulative impacts to global climate change.

Special Conservation Measures

Special conservation measures would be the same as described for Alternative 1.

5.4.8.6 Alternative 6

Criteria Pollutants

Cumulative impacts of criteria pollutants from construction and operation of Alternative 6 would be nearly identical to those estimated for Alternative 1. As a result, air pollutant emissions from Alternative 6 would produce less than significant cumulative air quality impacts.

Greenhouse Gases

Cumulative impacts of GHG emissions from construction and operation of Alternative 6 would be identical to those estimated for Alternative 1. Therefore, GHG emissions from Alternative 6 would produce less than significant cumulative impacts to global climate change.

Special Conservation Measures

Special conservation measures would be the same as described for Alternative 1.

5.4.9 Noise

5.4.9.1 Alternative 1

Three projects have the potential to cumulatively add to the overall noise environment in a significant manner with Alternative 1: F-35B West Coast Basing, MV-22 West Coast Basing, and the alternatives considered in the Aerial Maneuver Zone (AMZ) MV-22 EA. The cumulative overlap of these projects is discussed below.

- The F-35B would not be based at the Combat Center but would transit from its West Coast base (e.g., Marine Corps Air Station Miramar and/or Marine Corps Air Station Yuma) or from other bases to the Combat Center and would participate in exercises and training at the Combat Center. F-35B airspace operations resulting from the proposed West Coast Basing, albeit for a timeframe before full completion of the West Coast Basing, were considered in this EIS as part of the action alternatives.
- The MV-22 would not be based at the Combat Center but would transit from Marine Corps Air Station Miramar and Marine Corps Air Station Camp Pendleton to the Combat Center and EAF and would participate in exercises and training at the Combat Center and operate at the EAF. The relative low-altitude regime of the MV-22 would cause additional noise exposure (less than 65 dB $CNEL_{mr}$) within the Combat Center primarily within 1,000 feet of the Lavic Lake and Lead Mountain landing zones but none off-range.
- The AMZ EA considered additional landing zones and training activity for the MV-22 at the Combat Center. The MV-22 would cause additional noise exposure (greater than or equal to 65 dB $CNEL_{mr}$) within the Combat Center at or in proximity to the proposed landing zones (e.g., Lead Mountain) but none off-range.

The incremental contribution of each of these actions, when taken in combination with Alternative 1, are not anticipated to expose any additional off-range civilians to CNEL/$CNEL_{mr}$ greater than or equal to 65 dB . Cumulative noise impacts to land use, public health and safety, and wildlife are discussed in Section 5.4.1, *Land Use*, Section 5.4.4, *Public Health and Safety*, and Section 5.4.10, *Biological Resources*, respectively.

5.4.9.1 Alternative 2

The projects that have the potential to cumulatively add to the overall noise environment in a significant manner with Alternative 2 are identical to those described under Alternative 1. The cumulative effect of Alternative 2 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1 and would not cause additional off-range civilians to be exposed to CNEL/$CNEL_{mr}$ greater than or equal to 65 dB.

5.4.9.2 Alternative 3

The projects that have the potential to cumulatively add to the overall noise environment in a significant manner with Alternative 3 are identical to those described under Alternative 1. The cumulative effect of Alternative 3 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1 and would not cause additional off-range civilians to be exposed to CNEL/$CNEL_{mr}$ greater than or equal to 65 dB.

5.4.9.3 Alternative 4

The projects that have the potential to cumulatively add to the overall noise environment in a significant manner with Alternative 4 are identical to those described under Alternative 1. The cumulative effect of Alternative 4 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1 and would not cause additional off-range civilians to be exposed to CNEL/$CNEL_{mr}$ greater than or equal to 65 dB.

5.4.9.4 Alternative 5

The projects that have the potential to cumulatively add to the overall noise environment in a significant manner with Alternative 5 are identical to those described under Alternative 1. The cumulative effect of Alternative 5 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1 and would not cause additional off-range civilians to be exposed to CNEL/$CNEL_{mr}$ greater than or equal to 65 dB.

5.4.9.5 Alternative 6

The projects that have the potential to cumulatively add to the overall noise environment in a significant manner with Alternative 6 are identical to those described under Alternative 1. The cumulative effect of Alternative 6 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1 and would not cause additional off-range civilians to be exposed to CNEL/$CNEL_{mr}$ greater than or equal to 65 dB.

5.4.10 Biological Resources

Of the past, present, and reasonably foreseeable actions listed in Section 5.3 above, none of the projects associated with the Combat Center (Section 5.3.1) would have considerable contributions to cumulative impacts to biological resources. In the case of construction projects, these would occur in already developed portions of the installation, and would involve no loss of habitat and minimal indirect effects such as noise or dust generation. In the case of changes in aircraft type (e.g., converting to F-35B, MV-22), the new aircraft would replace existing fixed- or rotary-wing aircraft and would not result in an overall increase in flights. Therefore, impacts from these actions would be limited to potential differences in noise generation by the new aircraft, which would not be expected to be substantial.

Within the Combat Center boundaries, some cumulative impacts could originate from non-military land uses. Since the boundary of the Combat Center is not entirely fenced (or the existing fence can be breached) and signs that indicate restricted access are few and frequently stolen, trespassing does occur regularly by OHV users and scrappers, among others. However, impacts resulting from these unauthorized entries are not expected to be cumulatively significant.

Therefore, the cumulative impacts to biological resources described below would result from the combination of the impacts from the proposed action, together with large-scale energy development and related infrastructure, as well as general residential and commercial development in the vicinity.

5.4.10.1 Alternative 1

Wildlife and Protected and Special Status Species

The recently revised recovery plan (USFWS 2011) suggests that Desert Tortoise populations have continued to decline. The proposed action under Alternative 1 would have significant impacts to the federally threatened desert tortoise due to death or displacement from military training. Potentially improved conservation management that would occur as a result of extending the Combat Center Integrated Natural Resources Management Plan (INRMP) and Biological Opinion to the acquired lands would not fully mitigate this new take. Closure of the vast majority of Johnson Valley OHV Area would provide a beneficial offset to impacts in the west study area, but would also result in indirect impacts to desert tortoises in other regional OHV areas that would accommodate the displaced OHV users. A total of 128,711 acres (52,088 hectares) of occupied non-critical desert tortoise habitat would also be disturbed under this alternative. Less than significant impacts would occur to other special status species such as the Mojave fringe-toed lizard, burrowing owl, and LeConte's thrasher, due to direct mortality or injury and loss of habitat.

Urbanization continues to have a major cumulative impact on desert tortoise, other wildlife species, and the habitats on which they depend. Expansion of the cities and towns in the south central Mojave, as well as the regional infrastructure to serve them (e.g., roadways, transmission lines, etc.), has resulted in the continued loss of open space and the degradation of riparian and natural areas that historically supported populations of common, unique, or rare species. Riparian, desert wash, and Joshua tree woodland habitats are gradually being displaced by development, wildlife movement corridors have been modified to the extent that the dispersal and movement of wildlife is curtailed or limited, and expanding population centers are degrading the habitat values where urban and wilderness areas interface. While not all land in these areas provides suitable desert tortoise habitat, the projected urbanization in the Morongo Basin would reduce available habitat and continue to fragment desert tortoise habitat.

Specifically, cumulative impacts to wildlife species are as follows:

- Loss of desert tortoise habitat and degradation of habitat, especially near urbanized areas.
- Loss of habitat and habitat quality for all West Mojave Desert species, especially near existing urbanized areas.
- Significant loss of soil stability as increased activity takes place on unoccupied private and public lands, reducing forage and cover.
- Increases in weedy annuals, resulting in potential increases in fire hazards that would destroy wildlife habitats.

The most commonly proposed large projects in the vicinity of the proposed action consist of solar energy development. As of 2009, right-of-way applications for renewable energy projects in the West Mojave Planning Area included more than 500,000 acres (202,343 hectares) (BLM and California Energy Commission 2010). Effects on wildlife species from these projects would include mortality from grading, construction, or vehicle use; avoidance behavior; and some habitat loss. Potential mortality from the foreseeable projects and the proposed action would not be expected to substantively affect special status populations in the area. However, translocation of desert tortoises associated with solar developments can be substantial (estimated at 100 tortoises for the 8,230-acre Calico project north of the Combat Center [BLM and California Energy Commission 2010]). No critical habitat would be directly affected by the proposed action, and loss of critical habitat due to the indirect effects of displaced OHV activity is not

expected to result in a substantial cumulative loss of that habitat. The construction of renewable energy facilities and infrastructure may also impact the species through reduction of suitable desert tortoise habitat.

The placement of solar facilities and support structures can also disrupt sand supply corridors, resulting in loss of dunes and changes in dune sand composition (ESA PWA 2011). These effects can result in loss of habitat for Mojave fringe-toed lizards, which depend on dunes composed of fine wind-blown sand. The proposed action does not include placement of substantial structures, as only limited target arrays and ground excavations would occur. Further, reduction in OHV use of sand dunes in the project area would reduce an existing source of disturbance to sand dune habitat. Therefore, the proposed action would not have a significant cumulative impact on sand transport or wind-blown sand habitats. It is unlikely that there would be a cumulative effect from avoidance behavior during construction of renewable energy projects due to distances between projects and varied construction schedules. Animals can move within open spaces surrounding and between these projects. Reduced overall habitat in the general area, however, may cause increased competition. These effects would be adverse and long-term and could alter special status species population abundances, but are not expected to cause an actionable cumulative effect, such as potential extirpation or change in status.

Implementation of Alternative 1 could also cause an increase in human access into the remaining desert tortoise habitat by virtue of an increase in the number of roads. An increase in population may increase the number of desert tortoises illegally collected, harmed, struck, and killed by vehicles on roads, and mortality due to gunshot and OHV activities, particularly near cities and towns. Increased human presence may also lead to elevated predation from species that do well in urban fringe environments such as ravens, loggerhead shrikes, roadrunners, and dogs.

The proposed action and past, present, and reasonably foreseeable actions in the vicinity have the potential to increase the amount of food available through human disposal (e.g., landfills, dumpsters, and litter) to common ravens, which are known predators of juvenile desert tortoises. Past actions in the vicinity of the proposed project (e.g., development, urbanization, litter, recreation) have resulted in considerable incremental adverse impacts to desert tortoises resulting from common raven predation. Although natural events such as drought and fire have also adversely impacted desert tortoise populations, no natural event has been linked to population increases of common ravens and their predation of desert tortoises. However, raven population increases, if they occur, are expected to be small, and food supplies are not expected to change appreciably in portions of the project area where desert tortoises may occur. Therefore, the proposed land acquisition and airspace establishment is not expected to result in a cumulatively considerable increase in predation of the desert tortoise by common ravens.

Populations of special status plants within the vicinity of the proposed action would potentially be damaged or lost during construction of solar or wind energy projects, or during installation of infrastructure required to support such projects (i.e., transmission lines, roads). The only plant species with federal status known to occur in the cumulative geographic area is the whitemargin beardtongue. One population is known within the vicinity of the proposed action just north of the Lavic Lake Training Area, outside the Combat Center boundary. Although no energy projects are yet proposed for this location (the Calico Solar Project is near, but does not overlap), if projects were to occur in the future, impacts could include loss of special status plants and seed banks; soil disturbance; and introduction or spread of non-native or noxious plant species. It is highly likely that other as-yet unmapped special status plant species occur in the cumulative area, and that populations of these species would be adversely effected by the past, present, and reasonably foreseeable actions that have been identified.

Cumulative impacts to wildlife and protected and special status species could be partially offset by the beneficial effects that would result from restricting public and private access to these lands. Full restriction of public access to acquired lands would occur under Alternative 1. Beneficial effects of public access closure could include reduction of livestock grazing, urban development, agricultural development, mining, illegal refuse dumping, collection of tortoises for food, pets, or commercial trade, or the illegal release of captive tortoises. Although this exclusion may simply displace some OHV activity to other biologically sensitive locations, it is likely that the unavailability of this location would result in less OHV activity in the Mojave Desert. Acquisition of the south study area would preclude development of one pending solar energy development (Figure 5-1). Future implementation of the proposed West Mojave Plan would also have beneficial effects on the desert tortoise and their habitat in the West Mojave Planning Area, as it would restrict development in high-quality tortoise habitat.

In summary, implementation of Alternative 1, in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3, would have potentially significant cumulative impacts to desert tortoises, and potentially other special status and non-special status wildlife species, due to a loss of habitat for wildlife, disruption of potential movement and geneflow corridors, and loss of vegetation cover.

Vegetation

The proposed action under Alternative 1 would have less than significant impacts to slow-recovering plant communities such as creosote bush scrub, as the vast majority of the intact creosote bush scrub in the ROI would remain relatively undisturbed relative to existing conditions. These impacts, however, would present a cumulatively considerable contribution to regional loss of creosote bush scrub.

Cumulative impacts would result in a corresponding reduction in native plant cover and an increase in non-native species. The disturbance creates an environment in which only a select number of pioneering early-succession species survive or colonize. Native vegetation may be lost or be unable to survive as conditions change, which could result in changes in the fire regime, with increased risk and intensity of wildfire.

Implementation of Alternative 1, in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3, would have potentially significant cumulative impacts to vegetation due to loss of vegetation cover and conversion to non-native species.

5.4.10.2 Alternative 2

Wildlife and Protected and Special Status Species

As with Alternative 1, Alternative 2 would cumulatively contribute to the regional decline of the desert tortoise. Take from military training would be nearly the same as under Alternative 1, and continued OHV activity in the portions of the west study area not acquired would also result in take of tortoises. Closure of part of Johnson Valley OHV Area would also result in indirect impacts to desert tortoises in other regional OHV areas which would accommodate the displaced OHV users. Disturbance to a total of 117,329 acres (47,481 hectares) of occupied non-critical desert tortoise habitat would also occur under this alternative.

However, cumulative impacts to wildlife and protected and special status species could be partially offset by the beneficial effects that would result from restricting public and private access to these lands. Full restriction of public access to a large portion of the Johnson Valley OHV Area would occur under Alternative 2. Although, as noted above, this exclusion would displace some OHV activity to other

biologically sensitive locations, it is likely that the unavailability of this location would result in somewhat OHV activity in the Mojave Desert overall.

Overall, Alternative 2's contribution to cumulative impacts to the desert tortoise, other special status species, and wildlife would be greater than for Alternative 1.

Vegetation

As with Alternative 1, Alternative 2 would cumulatively contribute to the regional loss of creosote bush scrub. However, as described above for wildlife and protected and special status species, these cumulative impacts could be partially offset by the beneficial effects that would result from restricting public and private access to these lands. Displacement of OHV users to other regional OHV areas would be expected to result in indirect adverse effects to vegetation in those areas, however.

5.4.10.3 Alternative 3

Wildlife and Protected and Special Status Species

As with Alternative 1, Alternative 3 would cumulatively contribute to the regional decline of the desert tortoise. Take from military training would be lower than under Alternative 1 due to the lower density of tortoises in the east study area, but because the west study area would not be acquired, continued OHV activity in the Johnson Valley OHV area would result in additional cumulative take of tortoises. Disturbance to a total of 98,571 acres (39,890 hectares) of occupied non-critical desert tortoise habitat would also occur under this alternative. Indirect impacts to desert tortoises in other regional OHV areas from displacement of OHV users would not occur, however.

Under Alternative 3, impacts to Nelson's bighorn sheep would be significant due to military training in the Ship Mountains where a population of this species is known to occur. This impact would be mitigable through species surveys and improved exercise design. With this mitigation, the project's contribution to cumulative impacts to this species would be negligible.

Under Alternative 3, impacts to Harwood's eriastrum would occur in the east study area. This species has a global distribution restricted to the southeast corner of California, and it is known from only 14 documented locations (California Energy Commission 2010). Therefore, any impacts to this species would be cumulatively significant. However, with implementation of mitigation measures to avoid this species, the project's contribution to cumulative impacts to this species would be negligible. Cumulative impacts to other special status species and wildlife species would be as described for Alternative 1.

Cumulative impacts to wildlife and protected and special status species could be partially offset by the beneficial effects that would result from restricting public and private access to these lands. Full restriction of public access to the acquired lands would occur under Alternative 3; however, public access to the east study area is not currently intensive, so the beneficial offset of this closure would not be as great as that resulting from closure of the west study area under Alternative 1. Closure would preclude development of two pending solar energy developments in the east study area and one in the south study area, which would provide beneficial offsets to the project's cumulative impacts to wildlife and special status species.

Overall, Alternative 3's contribution to cumulative impacts to the desert tortoise, other special status species, and wildlife would be less than for Alternative 1.

Vegetation

As with Alternative 1, Alternative 3 would cumulatively contribute to the regional loss of creosote bush scrub. However, as described above for wildlife and protected and special status species, these cumulative impacts could be partially offset by the beneficial effects that would result from restricting public and private access to these lands.

5.4.10.4 Alternative 4

Wildlife and Protected and Special Status Species

As with Alternative 1, Alternative 4 would cumulatively contribute to the regional decline of the desert tortoise. Take from military training would be much lower than for Alternative 1 because the west study area would not be used for MEB Building Block training. Less disturbance to occupied non-critical desert tortoise habitat would also occur (117,941 acres [47,729 hectares]). Indirect effects to desert tortoises and other species in regional OHV areas would be minimal, as the Johnson Valley OHV Area would be unavailable for only 2 months per year. However, by allowing continued public OHV activity in the west study area when military training is not occurring, substantial take of desert tortoises from OHV impacts in this area would continue.

Overall, Alternative 4's contribution to cumulative impacts to the desert tortoise, other special status species, and wildlife would be less than for Alternative 1.

Vegetation

As with Alternative 1, Alternative 4 would cumulatively contribute to the regional loss of creosote bush scrub. The continuation of recreational OHV activity in the west study area when military training is not occurring would increase this contribution, as the beneficial effects from closure of the Johnson Valley OHV Area would be reduced.

5.4.10.5 Alternative 5

Wildlife and Protected and Special Status Species

As with Alternative 1, Alternative 5 would cumulatively contribute to the regional decline of the desert tortoise. Take from military training would be much lower than for Alternative 1 because the west study area would not be used for MEB Building Block training and the south study area would not be acquired. Less disturbance to occupied non-critical desert tortoise habitat would also occur (104,153 acres [42,149 hectares]). Pending solar development in the south study area would potentially be allowed to proceed under this alternative, which would contribute to cumulative impacts to desert tortoises and loss of habitat. Indirect effects to desert tortoises and other species in regional OHV areas would be minimal, as the Johnson Valley OHV Area would be unavailable for only 2 months per year. However, by allowing continued public OHV activity in the west study area when military training is not occurring, substantial take of desert tortoises from OHV impacts in this area would continue.

Overall, Alternative 5's contribution to cumulative impacts to the desert tortoise, other special status species and wildlife would be less than for Alternative 1.

Vegetation

As with Alternative 1, Alternative 5 would cumulatively contribute to the regional loss of creosote bush scrub. The continuation of recreational OHV activity in the west study area when military training is not occurring would increase this contribution, as the beneficial effects from closure of the Johnson Valley

OHV Area would be reduced. However, indirect impacts to vegetation in other regional OHV areas would be minimal, as the Johnson Valley OHV Area would be unavailable for only 2 months per year.

5.4.10.6 Alternative 6

Wildlife and Protected and Special Status Species

As with Alternative 1, Alternative 6 would cumulatively contribute to the regional decline of the desert tortoise. Take from military training would be very similar to that under Alternative 1, but because the OHV activity would continue to occur in the RPAA when military training is not occurring, the beneficial effects from closure of the Johnson Valley OHV Area would be reduced. Disturbance to a total of 125,265 acres (50,693 hectares) of occupied non-critical desert tortoise habitat would also occur under this alternative. However, displacement of OHV users from Johnson Valley to other regional OHV areas would be less than under Alternative 1, so indirect impacts to desert tortoises and other wildlife would be reduced.

Overall, Alternative 6's contribution to cumulative impacts to the desert tortoise, other special status species and wildlife would be somewhat greater than for Alternative 1.

Vegetation

As with Alternative 1, Alternative 6 would cumulatively contribute to the regional loss of creosote bush scrub. The continuation of recreational OHV activity in the RPAA when military training is not occurring would increase this contribution, as the beneficial effects from closure of the Johnson Valley OHV Area would be reduced. However, indirect impacts to vegetation in other regional OHV areas would be reduced as compared to Alternative 1, as the Johnson Valley OHV Area would be remain more fully available to OHV users.

5.4.11 Cultural Resources

Cumulative effects to cultural resources, taken as an aggregate within the acquisition study area, result from past, present, and future actions that destroy these resources or degrade or diminish the qualities that make them significant, especially those characteristics and attributes that make them eligible for listing in the NRHP. Effects to cultural resources generally (but not exclusively) result from physical impacts to the ground surface. These can include OHV traffic, land and energy development, and traffic resulting from land-based military maneuvers.

5.4.11.1 Alternative 1

Implementation of Alternative 1 has the potential to directly and indirectly affect cultural resources eligible for listing in the NRHP. For resources important to Native Americans, the BLM's Native American Element of the CDCA Plan concludes that "many impacts to resources of Native American value are not amenable to mitigation. Desecration or sacrilege of religiously significant sites cannot be mitigated as can many adverse effects on material resources …(BLM 1980: P-20b (4) B)." Through update of the Programmatic Agreement (PA) and implementation of the Integrated Cultural Resources Management Plan (ICRMP), both of which would be completed in consultation with the State Historic Preservation Office (SHPO) and Native American tribes, the Combat Center would strive to reduce impacts related to the proposed action through avoidance, minimization, and mitigation. Mitigation measures will be developed in consultation with SHPO, the Tribes, and interested parties. In addition, the ICRMP would be modified and developed in consultation with SHPO and the Native American Tribes

that have an interest in lands under the jurisdiction of the Marine Corps. Consequently, impacts from the proposed action would be less than significant.

None of the projects identified in Section 5.3.2 would geographically overlap with Alternative 1 to cumulatively affect resources within the west study area. Proponents of the past, present, and future actions discussed in Section 5.3 also have requirements to comply with state and federal laws relating to protection of cultural resources, including consultations with the SHPO and Native American tribes to identify ways to avoid, minimize, or mitigate adverse effects on cultural resources. Such strategies may reduce but would not necessarily eliminate impacts below a level of significance. Accordingly, implementation of the proposed action, when combined with the effects of the past, present, and future actions in the region, would result in a significant cumulative effect on cultural resources and a potential net loss of some types of cultural resources (e.g., archeological sites).

5.4.11.2 Alternative 2

Implementation of Alternative 2 has the potential to directly and indirectly affect cultural resources eligible for listing in the NRHP. The cumulative impacts of Alternative 2 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1.

5.4.11.3 Alternative 3

Implementation of Alternative 3 has the potential to directly and indirectly affect cultural resources eligible for listing in the NRHP. The cumulative impacts of Alternative 3 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1.

5.4.11.4 Alternative 4

Implementation of Alternative 4 has the potential to directly and indirectly affect cultural resources eligible for listing in the NRHP. Resources within the RPAAs have the potential to be cumulatively impacted by both proposed training activities and OHV activities. The cumulative impacts of Alternative 4 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1.

5.4.11.5 Alternative 5

Implementation of Alternative 5 has the potential to directly and indirectly affect cultural resources eligible for listing in the NRHP. Resources within the RPAAs have the potential to be cumulatively impacted by both proposed training activities and OHV activities. The cumulative impacts of Alternative 5 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1.

5.4.11.6 Alternative 6

Implementation of Alternative 6 has the potential to directly and indirectly affect cultural resources eligible for listing in the NRHP. Resources within the RPAAs have the potential to be cumulatively impacted by both proposed training activities and OHV activities. The cumulative impacts of Alternative 6 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1.

5.4.12 Geological Resources

5.4.12.1 Alternative 1

The majority of the projects listed above in Section 5.3 (e.g., construction projects at the Combat Center, the wind and solar energy projects in the surrounding area, and development within the City of Twentynine Palms) would involve ground disturbance. As such, they have the potential to disrupt soil surfaces and cause compaction and erosion of soils in the ROI. As ground-disturbing projects, they also have the potential to damage paleontological resources that may be present. The Environmental Impact Report/EIS for the Cadiz Groundwater Storage and Dry-Year Supply Program found that the project would have significant, unavoidable adverse impacts to paleontological resources that were determined to be present within the project footprint for the water pipeline. Implementation of Alternative 1 would have less than significant impacts to soils and paleontological resources because such resources would be managed according to existing Combat Center Natural Resources and Environmental Affairs (NREA) programs designed to protect such resources and minimize impacts to them. In conjunction with other past, present, and foreseeable future projects in the region, Alternative 1 would marginally increase the potential for impacts to these resources, but such impacts are expected to be less than significant.

Only one of the projects listed in Section 5.3, SB 2921 CDPA of 2010, would potentially impact the future availability of mineral resources in San Bernardino County. Iron ore deposits and sand and gravel on lands covered by the CDPA of 2010 would no longer be available for mineral development. Implementation of Alternative 1 would also reduce access to these potential future sources of iron ore and construction aggregate in the west and south study areas. As described in Section 2.6, under Alternative 1 the Marine Corps would acquire the patented and unpatented claims associated with the Morris Lode and Bessemer Mines, which are known to coincide with areas proposed for exclusive military use. All other owners of patented or unpatented mining claims within the boundaries of these alternatives would be offered fair market value for their claims or, depending on the location of the claim(s) relative to proposed MEB training locations or other factors, may be afforded reasonable access to their claims. Decisions on whether to provide access to a claim would be made on a case-by-case basis by the Marine Corps.

The cumulative impact to the availability of iron ore from acquisition of the Morris Lode and Bessemer Mines would be less than significant because other sources of iron ore would remain accessible outside the west study area and the areas covered by the CDPA. The west and south study areas are not current or historical sources of construction aggregate. To assume that these two particular locations would ever need to be developed as sources of aggregate would be too speculative. Therefore, the cumulative impact to the availability of construction aggregate materials would be less than significant.

5.4.12.2 Alternative 2

The cumulative impacts to soils, paleontological resources, and mineral resources (iron ore and construction aggregate) in the ROI with implementation of Alternative 2 would be the same as described for Alternative 1, less than significant.

5.4.12.3 Alternative 3

The cumulative impacts to soils and paleontological resources in the ROI with implementation of Alternative 3 would be the same as described for Alternative 1, less than significant. With respect to mineral resources, the east and south study areas are not current or historical sources of construction aggregate materials. Even if a case-by-case real estate analysis were to determine that the existing chloride mines are not compatible with military operations, other chloride deposits would remain

available outside the east study area and the area covered by the CDPA.. Therefore, the cumulative impact to the availability of chloride minerals and construction aggregate materials would be less than significant.

5.4.12.4 Alternative 4

The cumulative impacts to soils, paleontological resources, and mineral resources (iron ore and construction aggregate) in the ROI with implementation of Alternative 4 would be the same as described for Alternative 1, less than significant. If case by case analysis finds iron mines are compatible with military operations and are not acquired, there would be no impact to iron ore resources.

5.4.12.5 Alternative 5

The cumulative impacts to soils, paleontological resources, and mineral resources (iron ore construction aggregate) in the ROI with implementation of Alternative 5 would be the same as described for Alternative 4, less than significant.

5.4.12.6 Alternative 6

The cumulative impacts to soils, paleontological resources, and mineral resources (iron ore and construction aggregate) in the ROI with implementation of Alternative 6 would be the same as described for Alternative 1, less than significant.

5.4.13 Water Resources

5.4.13.1 Alternative 1

Alternative 1 would have less than significant impacts to groundwater quality and groundwater flow patterns, and no impact to groundwater recharge. Alternative 1 also would have a less than significant impact to potable water quality and groundwater supply at the Combat Center with implementation of the SCM (completion and implementation of the IESS). As discussed in Sections 3.13 and 4.13, the groundwater withdrawal rate from the Surprise Spring Basin exceeds the recharge rate, resulting in the current overdraft conditions. Any other current or future projects that rely on groundwater in the Surprise Spring basin for a source of drinking water could exacerbate the current overdraft conditions. The condition can be mitigated to the extent that other sources of drinking water are developed and substituted for planned groundwater withdrawals, such as importing water, extraction and treatment of groundwater from other basins, conservation, and additional recycling of water.

The combined increase of 2,425 personnel and associated dependents at the Combat Center is planned to occur over a 4-year period from 2008 to 2011. In 2009, the total number of personnel at the Combat Center increased by 2,100 from 2008, while the potable water use declined by 400 AF. This is consistent with the trend from 2000 to 2009 where personnel levels have increased at the Combat Center coincident with a decline in potable water use. Therefore, the increase in personnel, as of 2009, has not caused an increasing rate of withdrawal from the Surprise Spring subbasin because of increased efficiency of potable water use at the Combat Center, and the Combat Center has been able to mitigate the impacts of increasing the end strength on water supplies.

Twentynine Palms Water District plans to increase its groundwater pumping from the Mesquite subbasin of the Twentynine Palms Valley Basin. One of the main objectives of the Combat Center's water-management strategies is to replace groundwater pumpage of potable water in the Surprise Spring subbasin with groundwater pumpage of non-potable water in the Deadman and Mainside subbasins within the Twentynine Palms Valley Basin (Li and Martin 2011). The cumulative impact of the TPWD

groundwater pumping increase in the Twentynine Palms Valley Basin, combined with an increase in Combat Center production from Alternative 1 in the same groundwater basin, could result in declines in hydraulic head that would eventually decrease the amount of natural groundwater discharge from the basin through the mesquite tree evapotranspiration around the ecologically sensitive Mesquite Lake (dry). Under these conditions, it would be important to monitor groundwater levels in the Twentynine Palms Valley Basin to ensure faults provide a barrier to groundwater between the Twentynine Palms Valley subbasins and that increased groundwater pumping does not impact the ecologically sensitive Mesquite Lake (dry).

Therefore, cumulative impacts of Alternative 1 in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be potentially significant in the absence of a long-term plan for managing the potable water supply to the region. As discussed in Section 4.13.1, the Combat Center is currently evaluating options for developing sustainable water supplies consistent with the IESS.

5.4.13.2 Alternative 2

The cumulative impacts of Alternative 2 to water resources in conjunction with other past, present, and reasonably foreseeable projects listed in Section 5.3 would be identical to Alternative 1 and potentially significant in the absence of a long-term plan for managing the potable water supply to the region. However, it is expected that the IESS would be implemented to provide long-term sustainability in water management practices.

5.4.13.3 Alternative 3

The Alternative 3 acquisition study area includes approximately 17,280 acres (7,000 hectares) of Cadiz Inc. landholdings. Cadiz Inc. is the main water user in the Cadiz Valley Area. Cadiz Inc. currently cultivates approximately 1,500 acres (600 hectares) of their 9,000 acres (3,600 hectares) that are zoned for agriculture. Agriculture is considered a beneficial use of water in the state of California. Alternative 3 would eliminate or curtail this agricultural operation and the Cadiz Inc. access to portions of its existing water supply system. Therefore, Alternative 3 would have significant impacts to Cadiz Inc. groundwater supplies.

Implementation of Alternative 3 would also interfere with or preclude the Cadiz Valley Water Conservation, Recovery and Storage Project because the alternative would overlap in the east study area with the footprint of the proposed well field and recharge basins. The Cadiz Valley Water Conservation, Recovery, and Storage Project is intended to provide new water supply for several southern California water providers.

While acquisition of the Cadiz Inc. land may be beneficial for the water supply on the Combat Center, it would have a regionally significant impact because it would inhibit Cadiz Inc. from instituting the Cadiz Valley Water Conservation, Recovery, and Storage Project. In general, the state of California faces a long-term water supply crisis because the supply of imported water from the Colorado River and the Bay Delta is becoming less reliable due to multi-year droughts and environmental issues. Alternative 3 may interfere with this project and thereby hinder southern California water agencies efforts to find solutions to future water supply shortages.

5.4.13.4 Alternative 4

The cumulative impacts of Alternative 4 to water resources in conjunction with other past, present, and reasonably foreseeable projects would be identical to Alternative 1 and potentially significant in the

absence of a long-term plan for managing the potable water supply to the region. However, it is expected that the IESS would be implemented to provide long-term sustainability in water management practices.

5.4.13.5 Alternative 5

The cumulative impacts of Alternative 5 to water resources in conjunction with other past, present, and reasonably foreseeable projects would be identical to Alternative 1 and potentially significant in the absence of a long-term plan for managing the potable water supply to the region. However, it is expected that the IESS would be implemented to provide long-term sustainability in water management practices.

5.4.13.6 Alternative 6

The cumulative impacts of Alternative 6 to water resources in conjunction with other past, present, and reasonably foreseeable projects would be identical to Alternative 1 and potentially significant in the absence of a long-term plan for managing the potable water supply to the region. However, it is expected that the IESS would be implemented to provide long-term sustainability in water management practices.

5.5 SUMMARY OF CUMULATIVE IMPACTS

Table 5-5 presents a summary of cumulative impacts for the proposed alternatives.

Table 5-5. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Land Use	SI Recreation and OHV Use • No additional cumulative impacts identified. See Recreation below for additional Recreation-specific impacts. Grazing • Continuing loss of rural agricultural/grazing lands to other local/regional uses. LSI Land Status and Ownership • Minimal impacts would occur under this alternative. Additive effect of relocation is expected to be less than significant for the local area. Mining • No active producing mines in acquisition study areas. Patented mines would be acquired in accordance with applicable regulations. Existing claims and leases in area would be acquired on a case-by-case basis in accordance with applicable regulations. Sensitive Land Uses • Noise modeling takes into consideration ambient noise levels. • Applicable noise contours would remain within the acquisition study areas. Utilities • Existing utilities remain in place. • Past, present, and reasonably foreseeable actions nearby identified no SI. NI Plans and Policies • Inconsistency with Johnson Valley OHV Plan would be a significant and unavoidable impact, however the impact is not cumulative in nature and therefore there is no cumulative impact.	SI Recreation and OHV Use • Same as Alternative 1. Grazing • Same as Alternative 1. LSI Mining • Same as Alternative 1. Land Status and Ownership • Same as Alternative 1. Sensitive Land Uses • Same as Alternative 1. Utilities • Same as Alternative 1. NI Plans and Policies • Same as Alternative 1.	SI Recreation and OHV Use • Same as Alternative 1. Agriculture • Continuing loss of rural agricultural/grazing lands to other local/regional uses. SI and loss of 1,600 acres of cultivated agricultural lands. LSI Mining • Future case-by-case real estate analysis may find that two active chloride mines would be incompatible with training activities and, if so, would require closure. There are other regional sources for the minerals produced by these mines, therefore, if closed would result in less than significant cumulative impact. Land Status and Ownership • Same as Alternative 1. Sensitive Land Uses • Same as Alternative 1. Utilities • Existing utilities could remain in place; however, there would be LSI related to future granting of utilities rights-of-way. NI Plans and Policies • Inconsistency with CDCA Plan would be a significant and unavoidable impact, however the impact is not cumulative in nature and therefore there is no cumulative impact.	SI Recreation and OHV Use • Same as Alternative 1. Grazing • Same as Alternative 1. LSI Mining • Same as Alternative 1 if patented mines are determined to be incompatible with military operations and acquired. Land Status and Ownership • Same as Alternative 1. Sensitive Land Uses • Same as Alternative 1. Utilities • Same as Alternative 1. NI Plans and Policies • Same as Alternative 1. Mining • If patented mines are determined to be compatible with military operations and not acquired.	SI Recreation and OHV Use • Same as Alternative 1. Grazing • Same as Alternative 1. LSI Mining • Same as Alternative 4. Land Status and Ownership • Same as Alternative 1. Sensitive Land Uses • Same as Alternative 1. Utilities • Same as Alternative 1. NI Plans and Policies • Same as Alternative 1. NI Mining • Same as Alternative 4.	SI Recreation and OHV Use • Same as Alternative 1. Grazing • Same as Alternative 1. LSI Mining • Same as Alternative 1. Land Status and Ownership • Same as Alternative 1. Sensitive Land Uses • Same as Alternative 1. Utilities • Avoids Southern California Edison transmission lines. • Past, present, and reasonably foreseeable actions nearby identified no SI. NI Plans and Policies • Same as Alternative 1.

Continued on next page

Table 5-5. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Recreation	SI • OHV use in the region is increasing while land available for OHV use is decreasing. • Several of the past, present, and reasonably foreseeable actions would increase the regional population, increasing users in recreational areas. • There is an expected increase in demand on recreational resources now and into the future. • SB 2921 and CDPA 2010 would minimize and potentially offset some recreation cumulative effects.	SI • Same as Alternative 1. • Land acquisition in the west study area would be slightly less than under Alternative 1, therefore, impacts would be slightly less.	NI • Although there is an expected increased demand on the local recreational resources, the acquisition study areas are not frequently used for recreation and are not unique to the region.	SI • Same as Alternative 1. • Land acquisition in the west study area and the number of displaced users would be significantly less than under Alternative 1, therefore, impacts would be slightly less.	SI • Same as Alternative 4.	SI • Same as Alternative 4.
Socioeconomics and Environmental Justice	LSI • Beneficial combined impact (direct and indirect) to local and regional economic conditions with jobs, revenue, income, and indirect multiplier effects. • Little to no overlap/correlation between past, present, and reasonably foreseeable actions and the proposed action. • SB 2921 would increase number and variety of recreational opportunities in the region attracting visitors, thereby offsetting some localized sales/revenue impacts on local businesses and communities.	LSI • Same as Alternative 1. • However, economic impacts from this alternative would be less than Alternative 1 and the overall net impacts would be more beneficial.	SI • Significant adverse impact to the regional economy if development of the planned Cadiz Inc. Groundwater Conservation, Recovery, and Imported Water Storage project in the east study area was precluded by implementation of Alternative 3. LSI • Same as Alternative 1. • Loss of jobs at displaced businesses in the east study area would cause a small net combined decrease in sales, income, and employment. However, past, present, and reasonably foreseeable actions and SB 2921 would offset the marginal adverse impacts.	LSI • Same as Alternative 1. • However, economic impacts from this alternative would be less than Alternative 1 and the overall net impacts would be more beneficial.	LSI • Same as Alternative 1. • However, economic impacts from this alternative would be less than Alternative 1 and the overall net impacts would be more beneficial.	LSI • Same as Alternative 1 • However, economic impacts from this alternative would be less than Alternative 1 and the overall net impacts would be more beneficial.

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Table 5-5. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Public Health and Safety	LSI Aircraft-related Accidents and Noise • Sufficient management and flight safety measures would be in place for all projects. Aircraft-delivered Ordnance • LSI for the proposed action. • There are no past, present, and reasonably foreseeable actions that would contribute additional impacts of this type. Ground Training Activities • The area would be used exclusively by the military. • Current and additional safety measures would be implemented. • Past, present, and reasonably foreseeable actions nearby identified no SI from energy hazards. • Minor increases in traffic from past, present, and reasonably foreseeable actions would increase the potential for traffic accidents. Other Safety Issues • There are no areas where children would congregate near the acquisition study areas. • Emergency response capacity is present to accommodate the expected increase in activities. • Physical closure and management of mines would have beneficial impacts to the public. Hazardous Materials and Hazardous/Solid Waste • Public access to contaminated sites would be reduced or eliminated. Sufficient capacity and procedures are in place to accommodate solid waste, and manage hazardous materials and waste. Plans would be updated to manage any new hazardous materials or waste streams.	LSI • Aircraft Activities, Accidents, and Noise, Aircraft-delivered Ordnance, Ground Training Activities, Other Safety Issues, Emergency Response, and Hazardous Materials and Hazardous/Solid Waste - Impacts would be the same as for Alternative 1. • Amount of land acquired would be less than Alternative 1. • Mines/Contaminated Sites – Impacts would be the same as for Alternative 1. NI • Ground Training (Energy Hazards), Other Safety Issues (Protection of Children) – Impacts would be the same as for Alternative 1.	LSI • Aircraft Activities, Accidents, and Noise, Aircraft-delivered Ordnance, Ground Training Activities, Other Safety Issues, Emergency Response, and Hazardous Materials and Hazardous/Solid Waste - Impacts would be the same as for Alternative 1. • East study area would be acquired instead of the west study area. • Mines/Contaminated Sites – Impacts would be the same as for Alternative 1. NI • Ground Training (Energy Hazards), Other Safety Issues (Protection of Children) – Impacts would be the same as for Alternative 1.	LSI Aircraft-related Accidents • Current procedures regarding prevention/response to aircraft-related accidents would continue. Ground Training Activities • Aircraft and Ground-delivered Ordnance – presence of munitions constituents during periods of restricted public access results in a LSI to public health and safety with identified SCMs and other specific RPAA management measures. No cumulative projects would contribute to this impact. • Energy hazards would be less than significant because proposed communications towers would be far enough away from ordnance use and ground training activities. • Minor increases in traffic from past, present, and reasonably foreseeable actions would increase the potential for traffic accidents. Other Safety Issues • There are no areas where children would congregate near the acquisition study areas. • Emergency response capacity is present to accommodate the expected increase in activities. • Mines/Contaminated Sites – Impacts would be the same as for Alternative 1. Hazardous Materials and Hazardous/Solid Waste • Impacts would be the same as for Alternative 1.	LSI • Aircraft Accidents, Ground Training Activities, Emergency Response, Other Safety Issues, Hazardous Materials and Hazardous/Solid Waste – Impacts would be the same as Alternative 4. • Aircraft and Ground-delivered Ordnance – Impacts would be the same as Alternative 4 for aircraft and ground-delivered ordnance. • Mines/Contaminated Sites – Impacts would be the same as for Alternative 1.	LSI • Aircraft Accidents, Ground Training Activities, Emergency Response, Other Safety Issues, Hazardous Materials and Hazardous/Solid Waste – Impacts would be the same as Alternative 4). • Aircraft and Ground-delivered Ordnance – Impacts would be less than Alternative 4, but still less than significant. • Mines/Contaminated Sites – Impacts would be the same as for Alternative 1.

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Table 5-5. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Visual Resources	NI • LSI visual impacts from proposed action; land disturbance would be short-term. • Very few, if any, visual receptors would be impacted doubly by past, present, and reasonably foreseeable actions due to the spatial distance between the proposed action and past, present, and reasonably foreseeable actions. • All new development would be in accordance with city/county general plans.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	LSI • Same as Alternative 1.
Transportation & Circulation	NI • NI from the proposed action. • On-base past, present, and reasonably foreseeable actions would overlap but impacts would be negligible. Grow the Force project would mitigate any potential impacts. • Any off-base increases in traffic are part of standard planning and community development.	NI • Same as Alternative 1.	NI • Same as Alternative 1. • Due to short span and location of Amboy Road closures there would be no cumulative impact.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	NI • Same as Alternative 1.
Airspace Management	NI • No pending or proposed cumulative airspace or airport action were identified. • All future airspace proposals in the region would require consultation with the FAA.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	NI • Same as Alternative 1.

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Table 5-5. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Air Quality	LSI • Proposed VOC, CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$ emissions would not contribute to an exceedance of an air quality standard due to cumulative impacts. • Proposed emissions would produce very low impacts to ambient pollutant levels within nearby Class I area. • GHG emissions would result in minimal additions to the U.S. inventory, resulting in less than significant cumulative impacts to global climate change.	LSI • Same as Alternative 1.	SI • Same as Alternative 1, except that proposed emissions of PM_{10} would contribute to significant cumulative impacts due to exceeding NAAQS levels. LSI Cumulative impacts of VOC, CO, NO_x, SO_2, and $PM_{2.5}$ emissions would be slightly higher than Alternative 1.	LSI • Same as Alternative 1.	LSI • Same as Alternative 1.	LSI • Same as Alternative 1.
Noise[1]	• The incremental contribution of each of these actions, when taken in combination with Alternative 1, are not anticipated to expose any additional off-range civilians to CNEL/CNELmr greater than or equal to 65 dB . • Cumulative noise impacts to land use, public health and safety, and wildlife are discussed in Section 5.4.1, *Land Use*, Section 5.4.4, *Public Health and Safety*, and Section 5.4.10, *Biological Resources*, respectively.	• Same as Alternative 1.	• Same as Alternative 1.	• Same as Alternative 1.	• Same as Alternative 1.	• Same as Alternative 1.

Note: [1]The Noise sections of the EIS describe only the potential changes in noise levels under each alternative. The significance of any noise-related impacts is assessed as a function of the environmental resources that may be affected by noise (e.g., biological resources, land use, etc.). Therefore, noise-related impacts are assessed as appropriate in the relevant impact sections for those other resources.

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Table 5-5. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Biological Resources	SI • Project impacts, when considered with solar and wind energy projects, would cumulatively impact desert tortoises and non-critical desert tortoise habitat contributing to regional decline of the population. • The same projects would result in a cumulative impact on native plant ecosystems through grading, mowing, etc. combined with adverse effects to native plant ecosystems due to loss of plant cover and likely proliferation of non-native species from the proposed action. • Closure of most of Johnson Valley OHV Area would cumulatively impact desert tortoises, wildlife, and vegetation in the region.	SI • Cumulative impacts to desert tortoise from concentration of military training into a smaller portion of the west study area would increase the intensity of disturbance in that area as compared to Alternative 1. Similarly, recreational OHV activity would be concentrated into a smaller Johnson Valley OHV Area, resulting in increased intensity of use there. When combined with solar and wind energy projects in the region, would cumulatively impact desert tortoises and their habitat to a greater extent than Alternative 1. SI Cumulative impacts to wildlife, vegetation, and native plant ecosystems (e.g., creosote bush scrub) due to loss of plant cover and likely proliferation of non-native species. For the reasons described for desert tortoise, these cumulative impacts would be greater than for Alternative 1.	SI • Cumulative impacts to desert tortoise from continued OHV recreation in the Johnson Valley OHV Area would further contribute to cumulative impacts to desert tortoises, as would solar and wind energy development in the region. Because the east study area is host to low tortoise densities and subjectively poorer habitat, cumulative impacts to tortoises from this alternative would be less than under Alternative 1. • No closure of Johnson Valley OHV Area, so reduced cumulative impacts to desert tortoises, wildlife, and vegetation in those areas as compared to other alternatives. SI Cumulative impacts to wildlife, vegetation, and native plant ecosystems (e.g., creosote bush scrub) due to loss of plant cover and likely proliferation of non-native species.	SI • Cumulative impacts to desert tortoises from continued OHV recreation in west study area; impacts somewhat lower than for Alternative 1. • Closure of Johnson Valley OHV Area for two months a year would cumulatively impact desert tortoises, wildlife, and vegetation in other regional OHV areas, but much less than under Alternative 1. • Cumulative impacts to wildlife, vegetation, and native plant ecosystems from loss of plant cover and proliferation of non-native species; impacts lower than for Alternative 1 since OHV activity would be reduced and intensity of military activities in the west study area would be lower. SI • Cumulative impacts to desert tortoises from continued OHV recreation in the west study area. Overall contribution to cumulative impacts somewhat lower than for Alternative 1. • Closure of Johnson Valley OHV Area for two months of the year would cumulatively impact desert tortoises, wildlife, and vegetation in other regional OHV areas, but much less than under Alternative 1. • Cumulative impacts to wildlife, vegetation, and native plant ecosystems (e.g., creosote bush scrub) due to loss of plant cover and likely proliferation of non-native species. Overall contribution to cumulative impacts somewhat lower than for Alternative 1 because displacement of OHV activity would be reduced and intensity of military activities in the west study area would be lower.	SI • Cumulative impacts to desert tortoises from continued OHV recreation in the west study area. Overall contribution to cumulative impacts lower than for Alternative 1 and the lowest of project alternatives because displacement of OHV activity would be reduced, the south study area would not be acquired, and intensity of military activities in the west study area would be lower. • Closure of Johnson Valley OHV Area for two months of the year would cumulatively impact desert tortoises, wildlife, and vegetation in other regional OHV areas, but much less than under Alternative 1. SI Cumulative impacts to wildlife, vegetation, and native plant ecosystems (e.g., creosote bush scrub) due to loss of plant cover and likely proliferation of non-native species. Overall contribution to cumulative impacts lower than for Alternative 1 for the same reasons noted for desert tortoise above.	SI • Concentration of military training into a smaller portion of west study area would increase intensity of disturbance as compared to Alternative 1. Recreational OHV activity would be concentrated into a smaller Johnson Valley OHV Area, resulting in increased intensity of use there. When combined with energy projects in the region, would cumulatively impact desert tortoises to a greater extent than Alternative 1. • Closure of 40% of Johnson Valley OHV Area would impact desert tortoises, wildlife, and vegetation in other regional OHV areas. However, these would be less than under Alternative 1. SI • Cumulative impacts to wildlife, vegetation, and native plant ecosystems due to loss of plant cover and likely proliferation of non-native species. For the reasons described for desert tortoise, these cumulative impacts would be greater than for Alternative 1.

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Table 5-5. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Cultural Resources	SI • Proponents of the proposed action and any past, present, and reasonably foreseeable actions have to comply with federal laws relating to protection of cultural resources. • However, cumulatively, there would be a potential net loss of some types of cultural resources.	SI • Same as Alternative 1.	SI • Same as Alternative 1.	SI • Same as Alternative 1.	SI • Same as Alternative 1.	SI • Same as Alternative 1.
Geological Resources	LSI • Past, present, and reasonably foreseeable actions would involve ground disturbance, with potential to disrupt soil surface, cause compaction and erosion of soil, and damage paleontological resources. • Alternative 1 would marginally increase the potential for impacts to these resources, but such impacts are expected to be less than significant. • Alternative 1 and one reasonably foreseeable action may reduce access to potential future sources of iron ore and construction aggregate in the area. Cumulative impacts to the availability of both are expected to be less than significant.	LSI • Same as Alternative 1.	LSI • Alternative 3 and one reasonably foreseeable action may reduce access to potential future sources of chloride minerals and construction aggregate in the area. Cumulative impacts to the availability of both are expected to be less than significant. • Cumulative impacts to soils and paleontological resources would be the same as for Alternative 1.	LSI • Same as Alternative 1.	LSI Same as Alternative 1.	LSI • Same as Alternative 1.
Water Resources	LSI • Alternative 1 could combine with other past, present, and reasonably foreseeable future actions to cumulatively impact groundwater resources and cause a decline in potable water in the absence of a long-term plan for managing the potable water supply in the region.	LSI • Same as Alternative 1.	SI • The proposed action would inhibit Cadiz Inc. from instituting their Cadiz Valley Water Project. It would also reduce their agricultural operations and limit access to the existing agricultural water supply.	LSI • Same as Alternative 1.	LSI • Same as Alternative 1.	LSI • Same as Alternative 1.

Legend: CDCA = California Desert Conservation Area; CDPA = California Desert Protection Act; CO = carbon monoxide; FAA = Federal Aviation Administration; GHG = greenhouse gas; LSI = Less than significant impact; NI = No impact; OHV=Off-highway vehicle; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; RPAA= Restricted Public Access Area; SB = Senate Bill; SCM = special conservation measure; SI = Significant impact; SO_2 = sulfur dioxide.

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CHAPTER 6.
SUMMARY OF PROJECT IMPACTS, MITIGATION MEASURES, AND CUMULATIVE IMPACTS

6.1 COMPARISON OF ENVIRONMENTAL IMPACTS

This Environmental Impact Statement (EIS) analyzes the potential environmental consequences of implementing the proposed action. Table 6-1 presents a summary of environmental consequences for the proposed alternatives and the No-Action Alternative. Table 6-2 summarizes the mitigation measures that are recommended for each alternative. Table 6-3 presents a summary of the potential cumulative impacts for the proposed alternatives in conjunction with other identified past, present, and foreseeable projects.

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Table 6-1. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Land Use	SI Plans and Policies • SI and inconsistent with the Johnson Valley OHV Area Management Plan because of loss of access to approximately 91% of the Johnson Valley OHV Area. • SI for not furthering the purpose of EO 11644 to control OHV use to protect resources or minimize conflicts among the various uses of those lands. LSI Plans and Policies • LSI and inconsistent with other plans and policies including CDCA Plan grazing provisions and designated allotments, Upper Johnson Valley Yucca Ring ACEC, and San Bernardino County residential land use designations. Land Status and Ownership • Acquisition of 201,657 acres of federal, non-federal, and state lands. • Minimal (i.e., less than 10) or no relocation of residential and non-residential properties. Mining • No active mines. • Mining claims and abandoned mines are present. • Acquisition of patented and unpatented claims associated with Bessemer and Morris Lode Mines. • Acquisition of other patented and unpatented mining claims if not able to provide reasonable access to the claim. Grazing • Loss of 16.3% of the active Ord Mountain Allotment, but grazing feasible on the remaining portion. • Acquisition and loss of portions of the inactive Johnson Valley Allotment, but no grazing is allowed or planned.	SI Plans and Policies • SI and inconsistent with the Johnson Valley OHV Area Management Plan because of loss of access to approximately 54% of the Johnson Valley OHV Area. • SI for not furthering the purpose of EO 11644 to control OHV use to protect resources or minimize conflicts among the various uses of those lands. LSI Plans and Policies • LSI and inconsistent with other plans and policies including CDCA Plan grazing provisions and designated allotments, and San Bernardino County residential land use designations. Land Status and Ownership • Acquisition of 134,863 acres of federal, non-federal, and state lands. • Minimal (i.e., less than 10) or no relocation of residential and non-residential properties. Mining • Same as Alternative 1. Grazing • Loss of 7.5% of the active Ord Mountain Allotment, but grazing feasible on the remaining portion. • Acquisition and loss of portions of the inactive Johnson Valley Allotment, but no grazing is allowed or planned.	SI Plans and Policies • SI and inconsistent with CDCA Plan multiple use provisions, including access to two active mines, and with San Bernardino County agricultural land use designations on 1,600 acres under cultivation. Mining • SI due to potential for a future case-by-case real estate analysis to find that two active mines would be incompatible with training activities and would require acquisition and closure. LSI Mining • Two active mines, mining claims, and abandoned mines are present. • Acquisition of mines and mining claims if not able to provide reasonable access to the mine or claim. Land Status and Ownership • Acquisition of 198,580 acres of federal, non-federal, and state lands. • Minimal (i.e., less than 10) or no relocation of residential and non-residential properties. Utilities • Southern California Gas Company high pressure pipelines could remain in place and operate.	SI Plans and Policies • SI and inconsistent with the Johnson Valley OHV Area Management Plan because of loss of open access to 91% of the Johnson Valley OHV Area; includes restricted public access of the west study area 10 months per year. LSI Plans and Policies • LSI and inconsistent with other plans and policies including CDCA Plan grazing provisions and designated allotments, Upper Johnson Valley Yucca Ring ACEC, and San Bernardino County residential land use designations. Land Status and Ownership • Acquisition of 201,657 acres of federal, non-federal, and state lands. • Minimal (i.e., less than 10) or no relocation of residential and non-residential properties. Mining • No active mines. • Mining claims and abandoned mines are present. • Acquisition of mines and mining claims if not able to provide reasonable access to the mine or claim. LSI Grazing • Loss of 16.3% of the active Ord Mountain Allotment, but grazing feasible on the remaining portion. • Acquisition and loss of portions of the inactive Johnson Valley Allotment, but no grazing is allowed or planned. Utilities • 43 miles of Southern California Edison transmission lines are located in the acquisition study area and could remain in place and operate.	SI Plans and Policies • Same as Alternative 4. LSI Plans and Policies • Same as Alternative 4. Land Status and Ownership • Acquisition of 180,353 acres of federal, non-federal, and state lands. • Minimal (i.e., less than 10) or no relocation of residential and non-residential properties. Grazing • Same as Alternative 4. Utilities • Same as Alternative 4. Sensitive Land Uses • All of the 65 dB CNEL contour for airfield-related activities, most of the 65 dB $CNEL_{mr}$ contour for airspace-related activities, and most of the 62 dBC CNEL contour for ordnance would be located within the proposed Combat Center boundaries. No sensitive noise receptors located in areas where CNEL contours extend outside of proposed boundaries. LSI Mining • Same as Alternative 4. NA Recreation and OHV Use • Same as Alternative 1.	SI Plans and Policies • Similar to Alternatives 4 and 5 except acreage of the RPAA is reduced; access to roughly 56% of the Johnson Valley OHV Area would be lost. LSI Plans and Policies • Same as Alternative 4. Land Status and Ownership • Acquisition of 167,971 acres of federal, non-federal, and state lands. • Minimal (i.e., less than 10) or no relocation of residential and non-residential properties. Mining • Same as Alternative 1. Grazing • Loss of 7.4% of the active Ord Mountain Allotment, but grazing feasible on the remaining portion. • Acquisition and loss of portions of the inactive Johnson Valley Allotment, but no grazing is allowed or planned. Sensitive Land Uses • All of the 65 dB CNEL contour for airfield-related activities, all of the 65 dB $CNEL_{mr}$ contour for airspace-related activities, and most of the 62 dBC CNEL contour for ordnance activities, would be located within the proposed Combat Center boundaries. No sensitive noise receptors located in areas where CNEL contours extend outside of proposed boundaries. NI Utilities • Avoids Southern California Edison transmission lines. NA Recreation and OHV Use • Same as Alternative 1.	NI • Existing conditions would remain unchanged, and no impacts to land use would occur.

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Table 6-1. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Land Use (continued)	LSI Utilities • 43 miles of Southern California Edison transmission lines could remain in place and operate. Sensitive Land Uses • All of the 65 dB CNEL contour for airfield-related activities, all of the 65 dB $CNEL_{mr}$ contour for airspace-related activities, and most of the 62 dBC CNEL contour for ordnance activities would be located within the proposed Combat Center boundaries. No sensitive noise receptors located in areas where CNEL contours extend outside of proposed boundaries. • Wilderness areas in vicinity of the Combat Center were designed by the CDPA of 1994. The designation was not intended to limit military overflights. The current INRMP would be amended to address new management actions related to land acquisition and airspace utilization. NA Recreation and OHV Use • No additional land use findings are made for recreation other than those related to plans and policies discussed above. See Recreation below.	LSI Utilities 21 miles of Southern California Edison transmission lines are located in the west acquisition study area and could remain in place and operate. Sensitive Land Uses • All of the 65 dB CNEL contour for airfield-related activities, most of the 65 dB $CNEL_{mr}$ contour for airspace-related activities, and most of the 62 dBC CNEL contour for ordnance activities, would be located within the proposed Combat Center boundaries. No sensitive noise receptors located in areas where CNEL contours extend outside of proposed boundaries. NA Recreation and OHV Use • Same as Alternative 1.	LSI Sensitive Land Uses • All of the 65 dB CNEL contour for airfield-related activities, all of the 65 dB $CNEL_{mr}$ contour for airspace-related activities, and most of the 62 dBC CNEL contour for ordnance activities, would be located within the proposed Combat Center boundaries. No sensitive noise receptors located in areas where CNEL contours extend outside of proposed boundaries. Agriculture • LSI and incompatible due to loss of 1,600 acres of cultivated agricultural lands; the 1,000 acres cultivated by Cadiz Inc. represents less than 2% of the agricultural acreage in San Bernardino County. NA Recreation and OHV Use • Same as Alternative 1.	LSI Sensitive Land Uses • All of the 65 dB CNEL contour for airfield-related activities, all of the 65 dB $CNEL_{mr}$ contour for airspace-related activities, and most of the 62 dBC CNEL contour for ordnance activities, would be located within the proposed Combat Center boundaries. No sensitive noise receptors located in areas where CNEL contours extend outside of proposed boundaries. NA Recreation and OHV Use • Same as Alternative 1.			
Recreation	SI • Access to and use of 91% of the Johnson Valley OHV Area would be lost. This resource is unique to the region. • Eliminating OHV use on lands to be acquired under Alternative 1 would not further the purpose of EO 11644 to control OHV use to protect resources or minimize conflicts among the various uses of those lands.	SI • Access to and use of approximately 54% of the Johnson Valley OHV Area would be lost, representing a SI. • Eliminating OHV use on lands to be acquired under Alternative 2 would not further the purpose of EO 11644 to control OHV use to protect resources or minimize conflicts among the various uses of those lands.	LSI • The east study area is not unique to the region, comparable recreation opportunities are available in surrounding areas, and this area does not receive frequent recreational use. • Potential illegal riding impacts would be similar to Alternative 1. SCMs would be the same as Alternative 1.	SI • Access to and use of the Johnson Valley OHV Area would be lost during approximately 2 months each year. This resource is unique to the region. • Significant impacts would be somewhat offset and minimized through the proposed restricted public access of the Johnson Valley OHV Area during approximately 10 months of the year when not used for military training.	SI • Impacts would be the same as under Alternative 4. LSI • Potential illegal riding impacts would be similar to Alternative 1. SCMs would be the same as Alternative 1.	SI • Access to and use of approximately 56% of the Johnson Valley OHV Area would be lost. This resource is unique to the region. • The remaining 44% of the Johnson Valley OHV Area would be available for public recreation 10 months per year (for the portion acquired as RPAA) or all of the year (for the area not acquired).	NI • Existing conditions would remain unchanged, and no impacts to recreation would occur.

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Table 6-1. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Recreation (continued)	SI • Displacement of recreational activities to other recreation areas and OHV routes would indirectly impact the recreational opportunities at those alternative areas through potential overcrowding, reduced capacity to support organized events, diminished user satisfaction and quality of the recreational experience, and more rapid deterioration of trails. LSI • Although implementation of SCMs would reduce the occurrence of illegal OHV use in public and private lands, an increase in illegal riding would likely still occur. Indirect impacts to the County of San Bernardino Law Enforcement Division may also occur if additional resources are required to respond to the increase in illegal activity as a result of this action. Implementation of SCMs 1-3, discussed under Section 4.2.2.1, would reduce these potentially significant impacts to a less than significant level.	SI • Although not all of Johnson Valley OHV Area would be lost, approximately 30% of the acres available for open OHV recreation in the region would be lost. • Displacement of recreational activities to the remaining portion of the Johnson Valley OHV Area and to certain other OHV areas and OHV routes would directly and indirectly impact recreational opportunities through potential overcrowding, reduced capacity to support organized events, diminished user satisfaction and quality of the recreational experience, and more rapid deterioration of trails. LSI • Potential illegal riding impacts would be similar to Alternative 1. SCMs would be the same as Alternative 1.		SI • This alternative meets the purposes of EO 11644 to control OHV use to protect resources, promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands. • Displacement of recreational activities to alternative OHV areas and routes (though substantially reduced relative to other alternatives because of restricted public access permitted approximately 10 months each year) would directly and indirectly impact recreational opportunities through potential overcrowding, reduced capacity to support organized events, diminished user satisfaction and quality of the recreational experience, and more rapid deterioration of trails. • With implementation of mitigation measures REC-1 and REC-2 (in addition to recreation SCMs identified in Chapter 2 and Section 4.2.2.1), impacts to the OHV community and other recreational opportunities would be marginally reduced but would still be significant. LSI • Potential illegal riding impacts would be similar to Alternative 1. SCMs would be the same as Alternative 1.		SI • This alternative meets the purposes of EO 11644 to control OHV use to protect resources, promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands. • Displacement of recreational activities to the remaining portion of the Johnson Valley OHV Area and to certain alternative OHV areas and routes (though substantially reduced relative to Alternative 1) would directly and indirectly impact recreational opportunities through potential overcrowding, reduced capacity to support organized events, diminished user satisfaction and quality of the recreational experience, and more rapid deterioration of trails.. • With implementation of mitigation measures REC-1 and REC-2 (in addition to recreation SCMs identified in Chapter 2 and Section 4.2.2.1), impacts to the OHV community and other recreational opportunities would be marginally reduced but would still be significant. LSI • Potential illegal riding impacts would be similar to Alternative 1. SCMs would be the same as Alternative 1.	
Socioeconomics and Environmental Justice	LSI • Direct impact from acquisition of 141 privately-owned parcels: includes 1 occupied residence, abandoned mines, vacant parcels, and no operating businesses. Land owners would be fairly compensated/provided relocation assistance	LSI • Direct impact from acquisition of private property: same as Alternative 1 but fewer private properties would be acquired (81 parcels). • Direct regional impact from lost sales and tax revenue (<$300,000 or -3.4% compared to baseline) related to reduced recreational and film industry spending.		LSI • Direct regional impact from lost sales and tax revenue ($320,000 or -3.7% compared to baseline) related to reduced recreational and film industry spending. • Direct local impact from lost sales and tax revenue ($1 million or -16.4% compared to baseline) related to reduced recreational and film industry spending.	LSI • Socioeconomic impacts of Alternative 5 would be essentially the same as Alternative 4, with very minor changes in the size of specific dollar amounts.	LSI • Direct impact from acquisition of private property: same as Alternative 1 but fewer private properties would be acquired (105 parcels). • Direct regional impact from lost sales and tax revenue (<$216,000 or -2.5% compared to baseline) related to reduced recreational and film industry spending.	NI • NI with regard to local sources of business revenue and associated income and jobs from recreational visits and film industry use. NI to the economic vitality of small local businesses

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Table 6-1. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Socioeconomics and Environmental Justice (continued)	LSI • Direct regional impact from lost sales and tax revenue ($700,000 or -7.8% compared to baseline) from reduced recreational/film industry spending. • Direct local impact, lost sales and tax revenue ($3.6 million or -60% compared to baseline) from reduced recreational/film industry spending. • Beneficial combined impact (direct and indirect) from net gain in regional sales ($4.5 million), income ($3.1 million), and employment (90 jobs), as influence of Combat Center personnel increase would offset the loss in recreational and film industry spending. Sufficient capacity exists to absorb the added demand for housing and community services. • Direct impact on individual small businesses dependent on limited recreational visitor spending. Smaller firms may fail due to reduced revenue tied to reduced recreational opportunities in Johnson Valley. • Direct impact from reduction ($34,435 or 0.006% of county total) in property tax revenues to local jurisdiction from the acquisition of private land. • Future indirect impact from acquisition of the Morris Lode Mine, which has an approved Conditional Use Permit and Reclamation plan, but where there are currently no mining operations occurring (and possibly other similar mines) in the west study area if acquisition prevents/ delays future development of a local source of iron ore. • Property values are not anticipated to decrease directly/ indirectly from increased noise. • Indirect impact (higher fuel costs) related to civil aviation impacts are expected to occur.	LSI • Direct local impact from lost sales and tax revenue ($1.4 million or -24% compared to baseline) related to reduced recreational and film industry spending. • Beneficial combined impact (direct and indirect) from net gain in regional sales ($5.2 million), income ($3 million), and employment (87 jobs), as influence of Combat Center personnel increase would offset the loss in recreational and film industry spending. Sufficient capacity exists to absorb the added demand for housing and community services. • Direct impact on individual small businesses that are dependent on limited recreational visitor spending. May cause some smaller firms to fail as a result of reduced revenues tied to reduced recreational opportunities in Johnson Valley. • Direct impact from reduction ($25,677 or 0.004% of county total) in property tax revenues to local jurisdiction from the acquisition of private land. • Impacts to mining, property values, and civilian impacts are the same as Alternative 1. • Less than significant economic impact to livestock ranching and farming industries due to the loss of some land for grazing. NI • Same as Alternative 1.	LSI • Direct impact from acquisition of private property (103 private parcels): includes 2 mining operations and 1 agricultural/ water venture potentially purchased and displaced, resulting in a direct loss of an estimated 150 jobs. Land owners would be fairly compensated/provided relocation assistance. • Direct regional impact from lost sales and tax revenue ($24,221 or -0.3% compared to baseline) related to reduced recreational and film industry spending. • Direct local impact from lost sales and tax revenue ($48,458 or -0.8% compared to baseline) related to reduced recreational and film industry spending. • Direct local impact from lost sales and tax revenue ($48,458 or -0.8% compared to baseline) related to reduced recreational and film industry spending. • Combined impact (direct and indirect) from net loss in regional sales ($10 million), income ($4.4 million), and employment (-135 jobs) as a result of displaced businesses (lost jobs only partially offset by new Combat Center jobs) and reduced recreational spending. • Direct impact from reduction ($161,000 or 0.027% of county total) in property tax revenues to local jurisdiction from the acquisition of private land. • Impacts to property values and civilian impacts are the same as Alternative 1. NI • NI associated with cost of providing community services to the project area. • No Environmental Justice impacts.	LSI • Direct impact from acquisition of 141 privately-owned parcels: same as Alternative 1. • Beneficial combined impact (direct and indirect) from net gain in regional sales ($7.1 million), income ($3.9 million), and employment (108 jobs), as influence of Combat Center personnel increase would offset the loss in recreational and film industry spending. Sufficient capacity exists to absorb the added demand for housing and community services. • Direct impact on individual small businesses that are dependent on recreational visitor spending. May cause some smaller firms to fail as a result of reduced revenues tied to reduced recreational opportunities in Johnson Valley. • Impacts to mining, property values, and civilian impacts are the same as Alternative 1. • Less than significant economic impact to livestock ranching and farming industries due to the loss of some land for grazing. NI • Same as Alternative 1.	LSI • Beneficial combined impact (direct and indirect) from net gain in regional sales ($7.5 million), income ($4 million), and employment (110 jobs), as influence of Combat Center personnel increase would offset the loss in recreational and film industry spending. Sufficient capacity exists to absorb the added demand for housing and community services. • Direct impact on individual small businesses that are dependent on limited recreational visitor spending. May cause some smaller firms to fail as a result of reduced revenues tied to reduced recreational opportunities in Johnson Valley. • Small direct reduction ($28,456 or 0.005% of county total) in property tax revenues to local jurisdiction from the acquisition of private land. • Impacts to mining, property values, and civilian impacts are the same as Alternative 1. • Less than significant economic impact to livestock ranching and farming industries due to the loss of some land for grazing. NI • Same as Alternative 1.	LSI • Direct local impact from lost sales and tax revenue ($1.5 million or-24.7% compared to baseline) related to reduced recreational and film industry spending. • Beneficial combined impact (direct and indirect) from net gain in regional sales ($7.5 million), income ($4 million), and employment (110 jobs), as influence of Combat Center personnel increase would offset the loss in recreational and film industry spending. Sufficient capacity exists to absorb the added demand for housing and community services. • Direct impact on individual small businesses that are dependent on limited recreational visitor spending. May cause some smaller firms to fail as a result of reduced revenues tied to reduced recreational opportunities in Johnson Valley. • Small direct reduction ($28,456 or 0.005% of county total) in property tax revenues to local jurisdiction from the acquisition of private land. • Impacts to mining, property values, and civilian impacts are the same as Alternative 1. • Less than significant economic impact to livestock ranching and farming industries due to the loss of some land for grazing. NI • Same as Alternative 1.	that rely on such spending, though such spending is not substantial at a regional economic scale.

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Table 6-1. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Socioeconomics and Environmental Justice (continued)	• Less than significant economic impact to livestock ranching and farming industries due to the loss of some land for grazing. NI • NI associated with cost of providing community services to the project area. • NI on regional or statewide sales of OHVs. • No Environmental Justice impacts						
Public Health and Safety	LSI • Aircraft Activities – Current procedures regarding prevention/response to aircraft-related accidents would continue. Existing plans and procedures related to aircraft-delivered ordnance would be updated to include the new training areas. No off-base receptors would be exposed to noise greater than or equal to 65 dB CNEL. • Ground Training Activities – Range clearance procedures associated with ordnance use would be updated to include the new training areas. Vehicle accidents associated with training operations would be minor. • Emergency Response – Sufficient capacity is present.	LSI • Aircraft Activities, Ground Training Activities, Other Safety Issues, Ground Transportation, Emergency Response, Displaced Recreation, and Hazardous Materials and Hazardous/Solid Waste – Impacts would be similar to those described for Alternative 1. NI • Ground Training (Energy Hazards), Other Safety Issues (Protection of Children) – Impacts would be the same as for Alternative 1. BI • Other Safety Issues (Mines/Contaminated Sites) – Impacts would be the same as for Alternative 1.	LSI • Aircraft Activities, Ground Training Activities, Other Safety Issues, Emergency Response, and Hazardous Materials and Hazardous/Solid Waste – Impacts would be similar to those described for Alternative 1. • Temporary road closures for training would be coordinated with local jurisdictions and authorities and tank crossings would be installed to ensure less than significant impacts. • Mapping and avoiding high-pressure natural gas pipelines would be performed as part of the ground training activities. NI • Ground Training (Energy Hazards), Other Safety Issues (Protection of Children) – Impacts would be the same as for Alternative 1. BI • Other Safety Issues (Contaminated Sites) – Impacts would be the same as for Alternative 1.	LSI • Aircraft Accidents – Current procedures regarding prevention/response to aircraft-related accidents would continue. Existing plans and procedures related to aircraft-delivered ordnance would be updated to include the new training areas • Emergency Response – Sufficient capacity is present. • Displaced Recreation – Indirect impacts associated with the displacement of recreational activities (particularly OHV use) to other recreational areas and designated routes would potentially result in a minimal increase in safety risks associated with OHV use at these other areas. • Other Safety Issues – Physical closure of mines would limit potential unauthorized access by the public. Access by USMC, employees, civilians, invitees and trespassers would be limited by signage and other notice procedures. Contaminated sites would be clearly marked and mapped to minimize public access. No known environmental health or safety risk occur that may disproportionately affect children.	LSI • Aircraft Accidents, Emergency Response, Other Safety Issues, Hazardous Materials and Hazardous/Solid Waste – Impacts would be the same as Alternative 4. • Aircraft and Ground-delivered Ordnance – Impacts would be the same as Alternative 4. • Displaced Recreation – Indirect impacts associated with the displacement of recreational activities (particularly OHV use) to other recreational areas and designated routes would potentially result in a minimal increase in safety risks associated with OHV use at these other areas. NI • Aircraft-delivered Ordnance – Ordnance would be used only within the current Combat Center boundaries, so no impacts to public health and safety would occur. • Ground Training (Energy Hazards) – Impacts would be the same as for Alternative 1. BI • Other Safety Issues (Contaminated Sites) – Impacts would be the same as for Alternative 1.	LSI • Aircraft Accidents, Emergency Response, Other Safety Issues, Hazardous Materials and Hazardous/Solid Waste – Impacts would be the same as Alternative 1 (exclusive military use areas) and Alternative 4 (RPAA). • Aircraft and Ground-delivered Ordnance – Impacts would be the same as Alternative 4. • Displaced Recreation - Indirect impacts associated with the displacement of recreational activities (particularly OHV use) to other recreational areas and designated routes would potentially result in a minimal increase in safety risks associated with OHV use at these other areas. NI • Ground Training (Energy Hazards) – Impacts would be the same as for Alternative 1. BI • Other Safety Issues (Contaminated Sites) – Impacts would be the same as for Alternative 1.	NI • Regular training activities (vehicle use, aircraft use, firing of ammunition, UXO and munitions, generation of hazardous and non-hazardous wastes, and resource use) within the boundaries of the Combat Center would remain the same. • Existing safety risks from pursuit of recreational activities in the acquisition study areas would remain the same.

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Table 6-1. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Public Health and Safety (continued)	LSI • Displaced Recreation – Indirect impacts associated with the displacement of recreational activities (particularly OHV use) would result in increased use of certain other recreational areas and designated routes, potentially resulting in periodic increases in the density of the riding population and an associated marginal increase in the safety risks associated with OHV use. OHV activities are inherently hazardous, participants are typically very cognizant of the risks involved, and responsible riders would be expected to adjust their speed and other factors according to the prevailing riding conditions at any given time, including the density of other riders present. The anticipated increase in safety risk attributable to additional riders displaced from Johnson Valley would be minimal at any particular point in time. • Hazardous Materials and Hazardous/Solid Waste – No change to permits, hazardous waste generator status would occur. Adequate solid waste capacity is present. Access by USMC, employees, civilians, invitees and trespassers would be limited by signage and other notice procedures. Public access to contaminated sites would be restricted due to the exclusive military use resulting in a positive impact. NI • Ground Training (Energy Hazards), Other Safety Issues (Protection of Children) – NI due to energy hazards or protection of children.			• Aircraft/Ground-delivered Ordnance – In the RPAA, the public could potentially come in contact with munitions undetected during UXO and EOD clearance operations. Implementation of SCMs (e.g., range sweeps, public education and permitting) would reduce risk to a less than significant level in the RPAA. NI • Aircraft-delivered Ordnance – Ordnance would be used only within the current Combat Center boundaries, so no impacts to public health and safety would occur. • Ground Training (Energy Hazards) – Impacts would be the same as for Alternative 1. BI • Other Safety Issues (Contaminated Sites) – Impacts would be the same as for Alternative 1.			

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Table 6-1. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Public Health and Safety (continued)	BI • Other Safety Issues (Mines/Contaminated Sites) – Physical closure of mines would further limit potential unauthorized access by the public. Public access to contaminated sites would be reduced or eliminated.						
Visual Resources	LSI • No visual impacts at KVPs. • Impacts would be short-term and specific timeframe. • Proposed acquisition study areas would be used exclusively by the military; any land disturbance would not be visible. • Less than significant loss of scenic/unique vistas in Johnson Valley.	LSI • No or LSI visual impacts at KVPs. • Impacts would be short-term and specific timeframe. • Proposed acquisition study areas would be used exclusively by the military; any land disturbance would not be visible. • Less than significant loss of scenic/unique vistas in Johnson Valley.	LSI • No or LSI visual impacts at KVPs. • Impacts would be short-term and specific timeframe. • Proposed acquisition study areas would be used exclusively by the military; any land disturbance would not be visible.	LSI • No or LSI visual impacts at KVPs. • Impacts would be short-term and specific timeframe. • Less than significant loss of scenic/unique vistas in Johnson Valley.	LSI • LSI visual impacts at KVPs. • Impacts would be short-term and specified timeframe. • Visual impacts to soils in RPAA. • Less than significant loss of scenic/unique vistas in Johnson Valley.	LSI • LSI visual impacts at KVPs. • Impacts would be short-term. • Visual impacts to soils in RPAA, smaller RPAA than Alternative 5. • Less than significant loss of scenic/unique vistas in Johnson Valley.	NI • Existing conditions would remain unchanged, and no impacts to visual resources would occur.
Transportation & Circulation	LSI • No major public roads would be impacted. • Traffic volume(s) could increase by 84 vehicle trips per day during MEB training. • The marginal temporary traffic increase due to MEB mobilization would not create significant impacts.	LSI • Impacts would be the same as under Alternative 1 (though a smaller portion of the west study area would be acquired).	SI • Public access to North Amboy Road would be lost during initial phases of MEB training. • Potential mitigation measure TRAN-1 was identified to lessen the potential effects of closing North Amboy Road to through traffic. However, it is expected that impacts to transportation and circulation would still be significant since there are no other paved roads in the vicinity of North Amboy Road. LSI • Impacts associated with construction of tank crossings on North Amboy Road would be short-term and minimal.	LSI • Impacts would be nearly identical to Alternative 1, but would allow for public access to the west study area 10 months per year.	LSI • Impacts would be identical to Alternative 4 with the exception that the south study area would not be acquired under this alternative.	LSI • Impacts would be nearly identical to Alternative 1, but would allow for public access to the southern portion of the west study area 10 months per year.	NI • Existing conditions would remain unchanged, and no impacts to transportation and circulation would occur.
Airspace Management	SI • Minimal to moderate impacts on Victor airway and moderate to significant impacts on jet route IFR air traffic within or adjacent to new and modified SUA. • Minimal to moderates impacts on routes used by general aviation VFR aircraft.	SI • Impacts for the reduced airspace configuration proposed for this alternative would be generally the same as Alternative 1.	SI • Impacts for the airspace configuration proposed for this alternative would be generally the same as Alternative 1 with the impacts occurring in the eastern areas where MOA/ATCAAs would be converted to restricted airspace.	SI • Impacts would be the same as Alternative 1.	SI • Impacts would be the same as Alternative 1.	SI • Impacts would be the same as Alternative 1.	NI • Current measures would continue to be used to mitigate any impacts on civil aviation.

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Table 6-1. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Airspace Management (continued)	• Minimal to moderate impacts on public airports and instrument approach procedures within close proximity to SUA. • Minimal to moderate impacts on private airfields within, beneath, or bordering SUA.						
Air Quality	LSI • The increase in VOC, CO, NO_x, SO_2, PM_{10}, and PM2.5 emissions from proposed activities would produce LSI. • Air emissions would produce LSI to 1) air quality values, and 2) visibility impairment within the Joshua Tree National Park pristine Class I area.	LSI • Impacts would be the same as Alternative 1.	SI • The increase in operational emissions of PM_{10} would produce SI due to exceeding NAAQS levels. LSI • All other impacts would be the same as Alternative 1.	LSI • Impacts would be the same as Alternative 1.	LSI • Impacts would be the same as Alternative 1.	LSI • Impacts would be the same as Alternative 1.	NI • No new impacts compared to existing conditions.
Noise[1]	• Aircraft Noise – Overflights would increase and occur at lower altitudes than baseline conditions. The 65 dBA CNEL and $CNEL_{mr}$ contours for the airfield and airspace operations, respectively, would be contained within the range boundary and no populations would be exposed to CNEL (or $CNEL_{mr}$) ≥ 65 dBA.	• Aircraft Noise – Overflights would increase and occur at lower altitudes than baseline conditions. The 65 dBA CNEL contours for the airfield operations would be contained within the range boundary and no populations or POIs would be exposed to CNEL ≥ 65 dBA. The 65-70 dB $CNEL_{mr}$ contour band would overlap almost 400 uninhabited acres (162 hectares) outside the range boundary, but with no affected population or POIs.	• Aircraft Noise – Overflights would increase and occur at lower altitudes than baseline conditions. The 65 dBA CNEL contours for the airfield operations would be contained within the range boundary and no populations or POIs would be exposed to CNEL ≥ 65 dBA. The 65 dBA $CNEL_{mr}$ contours for the airspace operations would be contained within the range boundary and no populations would be exposed to $CNEL_{mr}$ ≥ 65 dBA.	• Aircraft Noise – Overflights would increase and occur at lower altitudes than baseline conditions. The 65 dBA CNEL contours for the airfield operations would be contained within the range boundary and no populations or POIs would be exposed to CNEL ≥ 65 dBA. The 65 dBA $CNEL_{mr}$ contours for the airspace operations would be contained within the range boundary and no populations would be exposed to $CNEL_{mr}$ ≥ 65 dBA.	• Aircraft Noise – Overflights would increase and occur at lower altitudes than baseline conditions. The 65 dBA CNEL contours for the airfield operations would be contained within the range boundary and no populations or POIs would be exposed to CNEL ≥ 65 dBA. The 65-70 dB $CNEL_{mr}$ contour band for airspace noise would extend approximately 128 acres (52 hectares) beyond the range boundary but no resident populations or POIs would be exposed to $CNEL_{mr}$ ≥ 65 dBA due to airspace activity.	• Aircraft Noise – Overflights would increase and occur at lower altitudes than baseline conditions. The 65 dBA CNEL and $CNEL_{mr}$ contours for the airfield and airspace operations, respectively, would be contained within the range boundary and no populations or POIs would be exposed to CNEL (or $CNEL_{mr}$) ≥ 65 dBA.	• Aircraft Noise – Conditions would be identical to baseline conditions for aircraft noise. No persons located outside the Combat Center boundaries would be exposed to CNEL or $CNEL_{mr}$ greater than or equal to 65 dBA due to aircraft noise.

Note: [1]The Noise sections of the EIS describe only the potential changes in noise levels under each alternative. The significance of any noise-related impacts is assessed as a function of the environmental resources that may be affected by noise (e.g., biological resources, land use, etc.). Therefore, noise-related impacts are assessed as appropriate in the relevant impact sections for those other resources.

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Table 6-1. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Noise[1] (continued)	• Ordnance Noise – The 62-70 dBC CNEL contour would extend beyond the range boundary to encompass 7,391 acres (2,991 hectares) but would not affect the land use compatibility of any of the 50 applicable points of interest (POIs). The land area subject to a medium potential for noise complaints would increase by 35% compared to baseline and would encompass an estimated 1,098 more people. The area subject to high potential for noise complaint would decrease by 11.7% compared to baseline, but would not include any populations. Seven POIs would be subject to a medium potential for ordnance noise complaints. The probability of damage from ordnance vibrations would be less than 0.0001%.	• Ordnance Noise – The 62dBC CNEL contour would extend beyond the range boundary to encompass 7,003 acres (2,834 hectares), but would not affect the land use compatibility of the applicable POIs. The land area subject to a medium potential for noise complaints would increase by 32.6% compared to baseline and would include an estimated 3,072 people (compared to 2,293 persons for the baseline). The area with high potential for generating noise complaints would increase by 206.4% relative to the baseline condition but would not contain any resident population. Seven POIs would be subject to a medium potential for ordnance noise complaints. The probability of damage from ordnance vibrations would be less than 0.0001%.	• Ordnance Noise – The 62-70 dBC CNEL contour would extend beyond the range boundary on 10,861 acres (4,395 hectares) but would not affect the land use compatibility of any of the 50 applicable POIs. The land area subject to a medium potential for noise complaints would increase by 65.3% compared to baseline and would encompass an estimated 581 more people. The area subject to high potential for noise complaint would increase by 118.7% compared to baseline, but would not include any populations. Nine POIs would be subject to a medium potential for ordnance noise complaints while one POI (Old Woman Mountains (wilderness)) would be subject to a high potential for ordnance noise complaints. The probability of damage from ordnance vibrations would be less than 0.0001%.	• Ordnance Noise – The 62-70 dBC CNEL contour would extend beyond the range boundary on 4,572 acres (1,850 hectares) but would not affect the land use compatibility of any of the 50 applicable POIs. The land area subject to a medium potential for noise complaints would increase by 7.8% compared to baseline and would encompass an estimated 1,434 more people. The area subject to high potential for noise complaint would increase by 30% compared to baseline, but would not include any populations. Five POIs would be subject to a medium potential for ordnance noise complaints. The probability of damage from ordnance vibrations would be less than 0.0001%.	• Ordnance Noise – The 62-70 dBC CNEL contour would extend beyond the range boundary on 5,150 acres (2,084 hectares) but would not affect the land use compatibility of any of the 50 applicable POIs. The land area subject to a medium potential for noise complaints would increase by 5.9% compared to baseline and would encompass an estimated 842 more people. The area subject to high potential for noise complaint would increase by 31.8% compared to baseline, but would not include any populations. Five POIs would be subject to a medium potential for ordnance noise complaints. The probability of damage from ordnance vibrations would be less than 0.0001%.	• Ordnance Noise – The 62-70 dBC CNEL contour would extend beyond the range boundary on 2,106 acres (852 hectares; 408 acres less than the No-Action Alternative) and would not potentially affect the land use compatibility of any of the 51 applicable POIs. The land area subject to a medium potential for noise complaints would increase by 21.2% compared to baseline and would encompass an estimated 1,478 more people. The area subject to high potential for noise complaint would increase by 59% compared to baseline, but would not include any populations. Six POIs would pose a medium potential for ordnance noise complaints. The probability of damage from ordnance vibrations would be less than 0.0001%.	• Ordnance Noise – The area within the CNEL 62 dBC ordnance noise contour that would be outside the boundaries of the Combat Center complex would be 2,514 acres (1,017 hectares), primarily along the northeast boundary. The CNEL 70 dBC noise contour would not extend outside the Combat Center complex. Four POIs would be subject to a medium potential for ordnance noise complaints.

Note: [1]The Noise sections of the EIS describe only the potential changes in noise levels under each alternative. The significance of any noise-related impacts is assessed as a function of the environmental resources that may be affected by noise (e.g., biological resources, land use, etc.). Therefore, noise-related impacts are assessed as appropriate in the relevant impact sections for those other resources.

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Table 6-1. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Biological Resources	SI Protected - Federally Threatened or Endangered Species • SI to and potential take of 733 to 3,837 (590 to 978 in the acquisition study areas) federally threatened adult desert tortoises from military training. Indirect impacts to tortoises and critical habitat in other regional OHV areas and designated routes would be greater than for other alternatives because of a larger amount of displacement under Alternative 1. SI-M Other Status Species • SI-M to small crucifixion thorn populations in Blacktop, Emerson Lake, and southern Lavic Lake Training Areas as a result of crushing or ordnance explosion. Mitigated through implementation of the potential mitigation measure BIO-1 to avoid this population through exercise design, and/or protect it with fencing. LSI Protected - Federally Threatened or Endangered Species • 128,711 acres of non-critical desert tortoise habitat may experience LSI. Species With Other Federal Status • LSI to Mojave fringe-toed lizards from Marine and vehicle movement and ordnance explosion. • LSI to resident special status and migratory birds from loss of vegetation and physical disturbance or displacement. • LSI to special status bat species from ordnance explosion and potential Marine movement in vicinity of current/potentially occupied mines and caves. •	SI Protected - Federally Threatened or Endangered Species • SI to desert tortoises from military training similar to Alternative 1, but slightly reduced due to the smaller west study area. Potential take of 608 to 3,298 adult desert tortoises (466 to 761 in the acquisition study areas). Indirect impacts to tortoises outside the acquisition study areas from displacement and concentration of OHV users. Overall impact greater than for Alternative 1. SI-M Other Status Species • SI-M to small crucifixion thorn populations as described for Alternative 1. Mitigated through implementation of the potential mitigation measure BIO-1. LSI Protected - Federally Threatened or Endangered Species • 117,329 acres of non-critical desert tortoise habitat may experience LSI. Species With Other Federal Status • LSI to Mojave fringe-toed lizards similar to Alternative 1. Less land would be acquired, but the land excluded from acquisition was not found to host any Mojave fringe-toed lizards during surveys. • LSI to resident special status and migratory birds and other federal status species similar to Alternative 1. • LSI to special status bat species, Nelson's bighorn sheep and whitemargin beardtongue similar to Alternative 1.	SI Protected - Federally Threatened or Endangered Species • SI to desert tortoises from military training; lower than other alternatives due to lower desert tortoise density in the east study area, estimated potential take of 215 to 2,960 adult desert tortoises (107 to 240 in the acquisition study areas). No indirect impacts from displacement of OHV users of Johnson Valley OHV Area. No beneficial offset from its closure. Overall impact somewhat lower than for Alternative 1. SI-M Species with Other Federal Status • SI-M to Nelson's bighorn sheep in the Ship Mountains from ordnance explosion during MEB final exercises and MEB Building Block training. • SI-M to populations of Harwood's eriastrum in the east study area in Cadiz Dunes. Other Status Species • SI-M to small crucifixion thorn populations as described for Alternative 1. Mitigated through implementation of the potential mitigation measure BIO-1. • SI-M to populations of Harwood's eriastrum in the east study area in Cadiz Dunes. LSI Protected - Federally Threatened or Endangered Species • 98,571 acres of non-critical desert tortoise habitat may experience LSI. Species With Other Federal Status • LSI to Mojave fringe-toed lizards as routes of travel and ordnance explosion would be remote from known populations.	SI Protected - Federally Threatened or Endangered Species • SI to desert tortoises from military training substantially reduced from Alternative 1 due to the lack of MEB Building Block training in the west study area. Potential take of 500 to 3,628 adult desert tortoises (346 to 592 in the acquisition study areas). Public access to the west study area would eliminate beneficial offset to impacts from military activities, but would mostly eliminate indirect impacts to tortoises within other regional OHV areas. Overall, net impact to tortoises somewhat lower than Alternative 1. SI-M Other Status Species • SI-M to small crucifixion thorn populations as described for Alternative 1. Mitigated through implementation of the potential mitigation measure BIO-1. LSI Protected - Federally Threatened or Endangered Species • LSI to non-critical potential desert tortoise habitat from military exercises reduced from Alternative 1, as a result of differences in the maneuver design. 117,941 acres of non-critical desert tortoise habitat may experience LSI. Species With Other Federal Status • LSI to Mojave fringe-toed lizards similar to Alternative 1. Adverse effects to this species' loose sand habitat would continue from public access and OHV recreation. • Impacts to all other federal status species same as Alternative 1.	SI Protected - Federally Threatened or Endangered Species • SI to desert tortoises from military training substantially reduced from Alternative 1 due to the lack of MEB Building Block training in the west study area and not acquiring the south study area. Potential take of 472 to 3,186 adult desert tortoises (324 to 562 in the acquisition study areas). Public access to the west study area would eliminate the beneficial offset to impacts from military activities, but would mostly eliminate indirect impacts to tortoises within other regional OHV areas. Some indirect impacts to specific OHV alternative areas in the vicinity would be expected to occur during the 2 months per year of exclusive military use of the west study area. Overall, net impact somewhat lower than Alternative 1 and the lowest of all action alternatives. SI-M Other Status Species • SI-M to small crucifixion thorn populations as described for Alternative 1. Mitigated through implementation of the potential mitigation measure BIO-1. LSI Protected - Federally Threatened or Endangered Species • LSI to non-critical potential desert tortoise habitat from military exercises reduced from Alternative 1, from differences in the maneuver design. 104,153 acres of desert tortoise habitat may experience LSI.	SI Protected - Federally Threatened or Endangered Species • SI to desert tortoises similar to Alternative 1. Potential take of 645 to 3,769 adult desert tortoises (503 to 834 in the acquisition study areas). Public access to the RPAA would reduce potential beneficial offset from cessation of OHV recreation. Overall, impact to tortoises greater than Alternative 1 and other action alternatives. Indirect impacts to tortoise populations and critical habitat from displaced OHV activity at other regional OHV areas and designated routes would be similar to Alternative 1, but substantially reduced based on a much lower amount of displaced activity under Alternative 6. SI-M Other Status Species • SI-M to small crucifixion thorn populations as described for Alternative 1. Mitigated through implementation mitigation measure BIO-1. LSI Protected - Federally Threatened or Endangered Species • Impacts to non-critical desert tortoise habitat reduced slightly from Alternative 1 due to differences in the maneuver design. 125,265 acres of desert tortoise habitat may experience LSI. Public access to the RPAA would reduce potential beneficial offset from cessation of OHV recreation.	NI • No impacts to biological resources would occur; however, adverse effects from public access and OHV activity in the west study area would continue.

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Table 6-1. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Biological Resources (continued)	• LSI to Nelson's bighorn sheep on the Combat Center and on the lands underlying the proposed airspace establishment. • LSI to whitemargin beardtongue. LSI Other Status Species • LSI to spectacle fruit populations. • Indirect impact of displaced OHV use on species and occupied habitat in more distant OHV areas located outside the ROI. Vegetation • LSI to vegetation and creosote ring UPAs from physical damage and destruction from training. • LSI to native plant communities from proliferation of non-native plant species due to anthropogenic dispersal and increased risk of fire. Ecosystems • LSI to plant community ecosystems from increased risk of fire, changes in fire frequency regime, and wildlife mortality. • LSI to cryptobiotic soils from Marine and vehicle movement, ordnance explosion, and helicopter landings. • LSI to caves and mines, aquatic habitats, and playas. Wildlife • LSI to non-special status wildlife species, including mammals, amphibians, reptiles, and birds from training activities.	LSI Other Status Species • LSI to spectacle fruit populations would be the same as described for Alternative 1. • Indirect impact of displaced OHV use on species and occupied habitat in more distant OHV areas located outside the ROI. Vegetation • LSI similar to Alternative 1 and would be further reduced due to the smaller acreage. Ecosystems • LSI to cryptobiotic soils similar Alternative 1 and would be further reduced due to the smaller acreage. • LSI to caves and mines, aquatic habitats, and playas similar to Alternative 1. Wildlife • LSI to wildlife similar to Alternative 1.	LSI Species With Other Federal Status • LSI to resident special status and migratory birds similar to Alternative 1. • LSI to other species with other federal status less than Alternative 1, due to lower density of these species. Other Status Species • LSI to spectacle fruit populations would be the same as described for Alternative 1. Vegetation • LSI to plant communities from physical disturbance, but less than Alternative 1, due to less sensitive vegetation in the east study area. This area does not experience high level of OHV activity, change in disturbance from existing conditions greater. Ecosystems • LSI to plant community ecosystems similar to Alternative 1. Lower densities of creosote bush scrub are present; area does not experience high level of OHV activity, disturbance to vegetation greater than in the west study area. • LSI to cryptobiotic soils similar to Alternative 1. Lower levels of soil disturbance compared to the west study area, so impacts to cryptobiotic soils greater than for the other alternatives. • LSI to playas, since vehicles would not likely enter Bristol Dry Lake for risk of stranding. • LSI to caves and mines and aquatic habitats similar to Alternative 1. Wildlife • LSI similar to Alternative 1 and reduced due to the lower habitat diversity.	LSI Other Status Species • LSI to spectacle fruit populations same as Alternative 1. • Indirect impact of displaced OHV use on species and occupied habitat in more distant OHV areas located outside the ROI. Vegetation • LSI to vegetation less than Alternative 1. Potential beneficial effects resulting from cessation of recreational OHV activity would not occur. • LSI to creosote ring UPAs similar to Alternative 1. Adverse effects may continue to occur from public access in the west study area. Ecosystems • LSI to ecosystems similar to Alternative 1. Impacts to sensitive ecosystems (playas, cryptobiotic soils, and caves) would not be offset as much as in Alternatives 1, 2, and 3 because of public use. Wildlife • LSI to wildlife similar to Alternative 1.	LSI Species With Other Federal Status • LSI to Mojave fringe-toed lizards similar to Alternative 1. Adverse effects to this species' loose sand habitat would continue from public access/ OHV recreation. • Impacts to all other federal status species same as Alternative 1. Other Status Species • LSI to spectacle fruit populations same as Alternative 1. • Indirect impact of displaced OHV use on species and occupied habitat in more distant OHV areas located outside the ROI. Vegetation • LSI to vegetation less than Alternative 1. Potential beneficial effects resulting from cessation of recreational OHV activity would not occur. • LSI to creosote ring UPAs similar to Alternative 1. Adverse effects may continue to occur from public access in the west study area. Ecosystems • LSI to ecosystems similar to Alternative 1. Impacts to sensitive ecosystems (playas, cryptobiotic soils, and caves) would not be offset as much as in Alternatives 1, 2, and 3 because of public use. Wildlife • LSI to wildlife similar to Alternative 1.	LSI Species With Other Federal Status • LSI to Mojave fringe-toed lizards, but greater than Alternative 1 because the area currently occupied by Mojave fringe-toed lizards in the west study area would remain open to OHV recreation for much of the year. • Impacts to all other species with other federal status similar to Alternative 1. Other Status Species • LSI to spectacle fruit populations same as Alternative 1. • Indirect impact of displaced OHV use on species and occupied habitat in more distant OHV areas located outside the ROI. Vegetation • Impacts less than Alternative 1. Public access to RPAA would continue, beneficial offsets from cessation of recreational OHV activity less than Alternative 1. • LSI to creosote ring UPAs similar to Alternative 1. Adverse effects would continue from public access and OHV recreation in the RPAA. Ecosystems • LSI to ecosystems similar to Alternative 1. Impacts to sensitive ecosystems (playas, cryptobiotic soils, and caves) would not be offset as much as in Alternatives 1, 2, and 3 because of public use. Wildlife • LSI to wildlife similar to Alternative 1.	

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Table 6-1. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Cultural Resources	LSI • Direct and indirect impacts may result from weapons fire, MEB operations, group and individual traffic, battalion movements, aviation WDZ, and construction. • SCMs and other measures would be implemented to avoid or reduce impacts to resources. NI No impact anticipated from airspace establishment.	LSI/NI • Impacts would be the same as Alternative 1.	LSI/NI • Impacts would be the same as Alternative 1.	LSI/NI • Impacts would be the same as Alternative 1, with the addition of continued impacts from OHV use during the 10 months of allowed public use of Johnson Valley OHV area. OHV damage would be lessened during the other two months of the year.	LSI/NI • Impacts would be the same as Alternative 4.	LSI/NI • Impacts would be the same as Alternative 4.	LSI • Existing conditions would remain unchanged. Impacts from OHV use in the Johnson Valley OHV Area would continue for all 12 months in the year.
Geological Resources	LSI • Soils: Direct impacts from disturbance of soil crusts and soil compaction, dispersion of soil particles as dust due to explosive contact, and shearing/mixing of soil profiles, as a result of military vehicle operations, ordnance delivery, and infantry training. • Soils: Direct impacts (surface disturbance, erosion, and compaction) from continued OHV activity concentrated in smaller area. • Soils: Indirect impacts to water and air quality from military activities on acquired land and OHV use concentrated in smaller area on land not acquired. • Mineral resources: Direct impact and indirect impacts due to loss of ore production if the Morris Lode Mine in the west study area is producing ore and is purchased and closed. • Mineral resources: Indirect impact if alluvial sand and gravel on BLM lands are no longer available for potential sale as a construction aggregate.	LSI • Soils: Direct and indirect impacts from military activities would be the same as for Alternative 1, except they would occur over a smaller portion of the west study area. • Soils: Direct impacts (surface disturbance, erosion, and compaction) from continued OHV activity concentrated in smaller area. • Soils: Indirect impacts to water and air quality from military activities on acquired land and OHV use concentrated in smaller area on land not acquired. • Mineral resources: Direct and indirect impacts would be the same as for Alternative 1. • Paleontological resources: Direct impact would be the same as for Alternative 1. NI • Mineral resources: Direct and indirect impacts would be the same as for Alternative 1. • Seismicity: Impacts would be the same as for Alternative 1.	LSI • Soils: The impacts due to military activities would be the same as for Alternative 1, except that they would occur in the east study area. • Soils: Direct and indirect impacts from continuation of active mining operations and/or mine closure. • Soils: Direct impacts to access of agricultural soils in the east study area, due to overlap of planned direct and indirect fire SDZs with existing agricultural operations. • Indirect impacts to water and air quality associated with military activities would be the same as for Alternative 1, except they would occur in the east study area. • Mineral resources: Direct and indirect impacts if two active and producing calcium chloride mines in the east study area are purchased and closed. • Mineral resources: Indirect impact if alluvial sand and gravel on BLM lands are no longer available for potential sale as construction aggregate.	LSI • Soils: Direct and indirect impacts to soils from military activities would be the same as under Alternative 1, except that the impacts from military activities would occur for approximately only 60 days per year as opposed to up to 160 days per year under Alternative 1. • Soils: Direct impacts associated with OHV use (surface disturbance, compaction, erosion) would occur during 10 months of restricted public access. • Soils: Indirect impacts to water and air quality due to transport of soil material mobilized by water and air, resulting from both military activities and OHV use. • Soils: Direct and indirect impacts from continuation of active mining operations and/or mine closure. • Mineral resources: if the Morris Lode Mine in the west study area is producing ore and is found to be incompatible with military operations and is purchased and closed, direct and indirect impacts would be the same as for Alternative 1. • Paleontological resources: Direct impact would be the same as for Alternative 1.	LSI • Soils: Direct and indirect impacts to soils from military activities and potential mining activities/closure would be the same as for Alternative 4. • Soils: Direct and indirect impacts associated with OHV use would be the same as for Alternative 4. • Mineral resources: Direct and indirect impacts would be the same as for Alternative 4. • Paleontological resources: Direct impacts would be the same as for Alternative 1. NI • Mineral resources: Impacts to would be the same as for Alternative 4. • Seismicity: Impacts would be the same as for Alternative 1.	LSI • Soils: Direct and indirect impacts from military activities would be the same as for Alternative 1, except they would occur over a smaller portion of the west study area. For up to 160 days, there would be impacts from military activities on (108,530 acres [43,921 hectares]) as opposed to 180,353 acres [72,987 hectares] under Alternative 1. Impacts from military activities would occur for 60 days within the RPAA (38,137 acres [15,434 hectares]). • Soils: Direct impacts from OHV use (surface disturbance, compaction, erosion) would increase within the RPAA area available for use (44% of existing Johnson Valley OHV area open 10 months per year, 24% of existing area open year round). • Soils: Indirect impacts from OHV use (impacts to water and air quality due to transport of soil material mobilized by water and air) would increase within the area available for use (44% of existing Johnson Valley OHV area open 10 months per year, 24% of existing area open year round).	NI • Existing conditions would remain unchanged. Direct impacts to soils from continued OHV activity in the Johnson Valley OHV Area would continue.

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Table 6-1. Comparison of Environmental Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)	No-Action Alternative
Geological Resources (continued)	LSI • Paleontological resources: Direct impact (damage/destruction from ordnance/vehicle traffic, digging infantry positions) to fossils if present in training areas in alluvial soils. NI • Mineral resources: No direct or indirect impacts to mineral resources if there is no ore production from the Morris Lode Mine in the west study area. No direct or indirect impacts from purchase of patented and unpatented mining claims and closure of abandoned mines. No direct or indirect impacts to mineral resources in the Combat Center and the south study area. • Seismicity: There is currently no evidence linking earthquake activity with the use of explosives, therefore proposed training activities would not affect seismic activity in the Mojave Desert.		LSI • Paleontological resources: Direct impact (damage/destruction from ordnance/vehicle traffic, digging infantry positions) to fossils if present in training areas in alluvial soils. NI • Mineral resources: No direct or indirect impacts to mineral resources if active calcium chloride mines in the east study area continue production. No direct or indirect impacts from purchase of patented and unpatented mining claims and/or closure of abandoned mines. No direct or indirect impacts to mineral resources in the Combat Center and the south study area. • Seismicity: Impacts would be the same as for Alternative 1.	NI • Mineral resources: If the Morris Lode Mine is not producing ore, or is found to be compatible with military operations, the impacts to mineral resources would be the same as for Alternative 1. • Mineral resources: Direct and indirect impacts from purchase of patented and unpatented mining claims and closure of abandoned mines in the west study area would be the same as for Alternative 1. • Direct and indirect impacts to mineral resources in the Combat Center and the south study area would be the same as for Alternative 1. • Seismicity: Impacts would be the same as for Alternative 1.		LSI • Mineral resources: Direct and indirect impacts would be the same as for Alternative 1. • Paleontological resources: Direct impacts would be the same as for Alternative 1. NI • Mineral resources: direct and indirect resources would be the same as for Alternative 1. • Seismicity: Impacts would be the same as for Alternative 1.	
Water Resources	LSI • Water demands associated with the proposed action, as well as the long-term needs for potable water supply at the Combat Center, would be addressed by implementation of the IESS, which is an SCM for this project. With implementation of the SCM, Alternative 1 would have NI to groundwater recharge and LSI to groundwater quality and groundwater flow patterns. NI • There would be no impacts to local water wells from ordnance use.	LSI • Impacts and SCMs would be the same as for Alternative 1. NI • Impacts would be the same as for Alternative 1.	LSI • Impacts and SCMs would be the same as for Alternative 1. NI • Impacts would be the same as for Alternative 1.	LSI • Impacts and SCMs would be the same as for Alternative 1. NI • Impacts would be the same as for Alternative 1.	LSI • Impacts and SCMs would be the same as for Alternative 1. NI • Impacts would be the same as for Alternative 1.	LSI • Impacts and SCMs would be the same as for Alternative 1. NI • Impacts would be the same as for Alternative 1.	LSI • With implementation of the IESS, continued water usage at current rates would result in LSI to the long-term water supply.

Legend: ACEC = Area of Critical Environmental Concern; ATCAA = Air Traffic Control Assigned Airspace; BI = Beneficial impact; CDCA = California Desert Conservation Area; CNEL = Community Noise Equivalent Level; $CNEL_{mr}$ = Onset-Rate Adjusted Monthly Community Equivalent Noise Level; CNPS = California Native Plant Society; CO = carbon monoxide; dB = decibel; dBC = C-weighted decibel; EO = Executive Order; EOD = explosive ordnance disposal; IESS = Installation Energy and Sustainability Strategy; IFR = Instrument Flight Rules; KVP = Key viewpoint; LSI = Less than significant impact; MAGTF = Marine Air Ground Task Force; MOA = Military Operations Area; NA = Not Applicable; NAAQS = National Ambient Air Quality Standards; NI = No impact; NO_x = nitrogen oxides; OHV=Off-highway vehicle; PM_{10} = particulate matter less than 10 microns in diameter; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; RPAA= Restricted Public Access Area; SCM = special conservation measure; SI = Significant impact; SI-M = Significant impact mitigable to less than significant; SO_2 = sulfur dioxide; SUA = Special Use Airspace; UPA = Unusual Plant Assemblage; UXO = unexploded ordnance; VFR = Visual Flight Rules; VOC = volatile organic compound; WDZ = Weapons Danger Zone; MEB = Marine Expeditionary Brigade.

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6.2 SUMMARY OF POTENTIAL MITIGATION MEASURES

A summary potential mitigation measures for each resource area is presented in Table 6-2 below.

Table 6-2. Summary of Potential Mitigation Measures

#	Applicable Alternative(s)	Potential Mitigation Measure
Land Use (LU)		
There are no potential mitigation measures for Land Use.		
Recreation (REC)		
REC-1	4-6	The Marine Corps, in cooperation with the BLM, would establish a RPAA Management Group that would be charged with preparing and implementing a Recreation Management Plan for the RPAA. This Recreation Management Plan would be a component of the INRMP per MCO 5090.2A, Section 11204 (Outdoor Recreation) and would fulfill the requirements of EO 11644. The Recreation Management Plan would include a recreational carrying capacity analysis that addresses recreational use, user profile, demand preferences, conflicts, and conditions consistent with other applicable natural resource and environmental laws.
REC-2	4-6	The RPAA Management Group would meet at least once a year to discuss the suitability of procedures to facilitate recreational use of the RPAA. The RPAA Management Group would seek information from representatives of relevant State agencies, private OHV interest groups, event managers, conservationists, and others as needed and appropriate. Through this process, the Recreation Management Plan would be continuously improved to balance Marine Corps training needs with recreational demand. The RPAA Management Group would also consider the potential use of portions of the Exclusive Military Use area for limited recreational use on a case-by-case basis for organized OHV race events.
Socioeconomics and Environmental Justice (SOC)		
There are no potential mitigation measures for Socioeconomics and Environmental Justice.		
Public Health and Safety (PHS)		
There are no potential mitigation measures for Public Health and Safety.		
Visual Resources (VIS)		
There are no potential mitigation measures for Visual Resources.		
Transportation and Circulation (TRAN)		
TRAN-1	3	Marine Air Ground Task Force Training Command would coordinate with the City of Twentynine Palms, the County of San Bernardino, and other local authorities to provide as much advance notice as possible for the two days per year that North Amboy Road would be closed. Notices of exact dates and approximate times would be provided to city and county transportation officials weeks in advance so as to prepare for altered circulation patterns. Proper signage and warnings would be placed along I-40 and National Trails Highway to the north, and in the City of Twentynine Palms to the south to alert drivers of the road closures.
Airspace Management (AM)		
AM-1	1-6	Potential mitigation measures to minimize the impacts of this alternative airspace configuration would be determined by the FAA and Marine Corps in conjunction with an aeronautical study to be completed by the FAA on the preferred alternative. Continued Marine Corps outreach to airport operators and general aviation pilot groups would seek means of minimizing impacts on this aviation community.

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Table 6-2. Summary of Potential Mitigation Measures

#	Applicable Alternative(s)	Potential Mitigation Measure
Air Quality (AQ)		
There are no potential mitigation measures for Air Quality.		
Noise (NOI)		
There are no potential mitigation measures for Noise.		
Biological Resources (BIO)		
Special conservation measures described for the proposed action (refer to Section 2.8.4) to extend the desert tortoise protections specified in the existing INRMP and existing Combat Center Biological Opinion to the acquired lands would partially offset impacts to desert tortoises for any of the action alternatives. Further offset would occur through the implementation of requirements set forth by USFWS in a Biological Opinion for the proposed project.		
BIO-1	1,2,4,5,6	As feasible, avoid the small populations of crucifixion thorn in the Blacktop, Lavic Lake, and Emerson Lake Training Areas through exercise design and/or installation of protective fencing, before commencement of ground-disturbing training activities.
BIO-2	3	Prepare an updated survey for Nelson's bighorn sheep in the east study area, focusing on usage of the Ship Mountains. The results of this survey would then be utilized by MAGTF Training Command in coordination with NREA to modify the timing of military training exercises in the vicinity of the Ship Mountains or the locations of targets for ordnance delivery, such that disturbance to this population would be minimized to the extent possible without compromising the military mission.
BIO-3	3	Monitoring of Harwood's eriastrum would be included in the updated INRMP, and surveys for presence of this species on the Combat Center and acquired lands would be included as periodic surveys under the INRMP. Targeted surveys to delineate boundaries of the populations north of Cadiz Dry Lake would be performed. Based on the results of these surveys, this population would be avoided through exercise design or protected by fencing, as most effective.
Cultural Resources (CUL)		
The Combat Center ICRMP would be modified to include acquired lands in consultation with SHPO and the Native American Tribes that have an interest in lands under the jurisdiction of the Marine Corps. The current ICRMP expires in 2014, and the new ICRMP would be updated to incorporate any applicable potential mitigation measures as determined during consultation with SHPO.		
Geological Resources (GEO)		
There are no potential mitigation measures for Geological Resources.		
Water Resources (WAT)		
There are no potential mitigation measures for Water Resources.		

Notes: BLM = Bureau of Land Management; EO = Executive Order; FAA = Federal Aviation Administration; I = Interstate; ICRMP = Integrated Cultural Resources Management Plan; INRMP = Integrated Natural Resources Management Plan; MAGTF = Marine Air Ground Task Force; MCO = Marine Corps Order; NREA = Natural Resources and Environmental Affairs; OHV = off-highway vehicle; RPAA = Restricted Public Access Area; SHPO = State Historic Preservation Office.

6.3 SUMMARY OF CUMULATIVE IMPACTS

A summary of cumulative impacts for each resource area is presented in Table 6-3 below.

Table 6-3. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Land Use	SI Recreation and OHV Use • No additional cumulative impacts identified. See Recreation below for additional Recreation-specific impacts. Grazing • Continuing loss of rural agricultural/grazing lands to other local/regional uses. LSI Land Status and Ownership • Minimal impacts would occur under this alternative. Additive effect of relocation is expected to be less than significant for the local area. Mining • No active producing mines in acquisition study areas. Patented mines would be acquired in accordance with applicable regulations. Existing claims and leases in area would be acquired on a case-by-case basis in accordance with applicable regulations. Sensitive Land Uses • Noise modeling takes into consideration ambient noise levels. • Applicable noise contours would remain within the acquisition study areas. Utilities • Existing utilities remain in place. • Past, present, and reasonably foreseeable actions nearby identified no SI. NI Plans and Policies • Inconsistency with Johnson Valley OHV Plan would be a significant and unavoidable impact, however the impact is not cumulative in nature and therefore there is no cumulative impact.	SI Recreation and OHV Use • Same as Alternative 1. Grazing • Same as Alternative 1. LSI Mining • Same as Alternative 1. Land Status and Ownership • Same as Alternative 1. Sensitive Land Uses • Same as Alternative 1. Utilities • Same as Alternative 1. NI Plans and Policies • Same as Alternative 1.	SI Recreation and OHV Use • Same as Alternative 1. Agriculture • Continuing loss of rural agricultural/grazing lands to other local/regional uses. SI and loss of 1,600 acres of cultivated agricultural lands. LSI Mining • Future case-by-case real estate analysis may find that two active chloride mines would be incompatible with training activities and, if so, would require closure. There are other regional sources for the minerals produced by these mines, therefore, if closed would result in less than significant cumulative impact. Land Status and Ownership • Same as Alternative 1. Sensitive Land Uses • Same as Alternative 1. Utilities • Existing utilities could remain in place; however, there would be LSI related to future granting of utilities rights-of-way. NI Plans and Policies • Inconsistency with CDCA Plan would be a significant and unavoidable impact, however the impact is not cumulative in nature and therefore there is no cumulative impact.	SI Recreation and OHV Use • Same as Alternative 1. Grazing • Same as Alternative 1. LSI Mining • Same as Alternative 1 if patented mines are determined to be incompatible with military operations and acquired. Land Status and Ownership • Same as Alternative 1. Sensitive Land Uses • Same as Alternative 1. Utilities • Same as Alternative 1. NI Plans and Policies • Same as Alternative 1. Mining • If patented mines are determined to be compatible with military operations and not acquired.	SI Recreation and OHV Use • Same as Alternative 1. Grazing • Same as Alternative 1. LSI Mining • Same as Alternative 4. Land Status and Ownership • Same as Alternative 1. Sensitive Land Uses • Same as Alternative 1. Utilities • Same as Alternative 1. NI Plans and Policies • Same as Alternative 1. NI Mining • Same as Alternative 4.	SI Recreation and OHV Use • Same as Alternative 1. Grazing • Same as Alternative 1. LSI Mining • Same as Alternative 1. Land Status and Ownership • Same as Alternative 1. Sensitive Land Uses • Same as Alternative 1. Utilities • Avoids Southern California Edison transmission lines. • Past, present, and reasonably foreseeable actions nearby identified no SI. NI Plans and Policies • Same as Alternative 1.

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Table 6-3. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Recreation	SI • OHV use in the region is increasing while land available for OHV use is decreasing. • Several of the past, present, and reasonably foreseeable actions would increase the regional population, increasing users in recreational areas. • There is an expected increase in demand on recreational resources now and into the future. • SB 2921 and CDPA 2010 would minimize and potentially offset some recreation cumulative effects.	SI • Same as Alternative 1. • Land acquisition in the west study area would be slightly less than under Alternative 1, therefore, impacts would be slightly less.	NI • Although there is an expected increased demand on the local recreational resources, the acquisition study areas are not frequently used for recreation and are not unique to the region.	SI • Same as Alternative 1. • Land acquisition in the west study area and the number of displaced users would be significantly less than under Alternative 1, therefore, impacts would be slightly less.	SI • Same as Alternative 4.	SI • Same as Alternative 4.
Socioeconomics and Environmental Justice	LSI • Beneficial combined impact (direct and indirect) to local and regional economic conditions with jobs, revenue, income, and indirect multiplier effects. • Little to no overlap/correlation between past, present, and reasonably foreseeable actions and the proposed action. • SB 2921 would increase number and variety of recreational opportunities in the region attracting visitors, thereby offsetting some localized sales/revenue impacts on local businesses and communities.	LSI • Same as Alternative 1. • However, economic impacts from this alternative would be less than Alternative 1 and the overall net impacts would be more beneficial.	SI • Significant adverse impact to the regional economy if development of the planned Cadiz Inc. Groundwater Conservation, Recovery, and Imported Water Storage project in the east study area was precluded by implementation of Alternative 3. LSI • Same as Alternative 1. • Loss of jobs at displaced businesses in the east study area would cause a small net combined decrease in sales, income, and employment. However, past, present, and reasonably foreseeable actions and SB 2921 would offset the marginal adverse impacts.	LSI • Same as Alternative 1. • However, economic impacts from this alternative would be less than Alternative 1 and the overall net impacts would be more beneficial.	LSI • Same as Alternative 1. • However, economic impacts from this alternative would be less than Alternative 1 and the overall net impacts would be more beneficial.	LSI • Same as Alternative 1 • However, economic impacts from this alternative would be less than Alternative 1 and the overall net impacts would be more beneficial.

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Table 6-3. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Public Health and Safety	LSI Aircraft-related Accidents and Noise • Sufficient management and flight safety measures would be in place for all projects. Aircraft-delivered Ordnance • LSI for the proposed action. • There are no past, present, and reasonably foreseeable actions that would contribute additional impacts of this type. Ground Training Activities • The area would be used exclusively by the military. • Current and additional safety measures would be implemented. • Past, present, and reasonably foreseeable actions nearby identified no SI from energy hazards. • Minor increases in traffic from past, present, and reasonably foreseeable actions would increase the potential for traffic accidents. Other Safety Issues • There are no areas where children would congregate near the acquisition study areas. • Emergency response capacity is present to accommodate the expected increase in activities. • Physical closure and management of mines would have beneficial impacts to the public. Hazardous Materials and Hazardous/Solid Waste • Public access to contaminated sites would be reduced or eliminated. Sufficient capacity and procedures are in place to accommodate solid waste, and manage hazardous materials and waste. Plans would be updated to manage any new hazardous materials or waste streams.	LSI • Aircraft Activities, Accidents, and Noise, Aircraft-delivered Ordnance, Ground Training Activities, Other Safety Issues, Emergency Response, and Hazardous Materials and Hazardous/Solid Waste - Impacts would be the same as for Alternative 1. • Amount of land acquired would be less than Alternative 1. • Mines/Contaminated Sites – Impacts would be the same as for Alternative 1. NI • Ground Training (Energy Hazards), Other Safety Issues (Protection of Children) – Impacts would be the same as for Alternative 1.	LSI • Aircraft Activities, Accidents, and Noise, Aircraft-delivered Ordnance, Ground Training Activities, Other Safety Issues, Emergency Response, and Hazardous Materials and Hazardous/Solid Waste - Impacts would be the same as for Alternative 1. • East study area would be acquired instead of the west study area. • Mines/Contaminated Sites – Impacts would be the same as for Alternative 1. NI • Ground Training (Energy Hazards), Other Safety Issues (Protection of Children) – Impacts would be the same as for Alternative 1.	LSI Aircraft-related Accidents • Current procedures regarding prevention/response to aircraft-related accidents would continue. Ground Training Activities • Aircraft and Ground-delivered Ordnance – presence of munitions constituents during periods of restricted public access results in a LSI to public health and safety with identified SCMs and other specific RPAA management measures. No cumulative projects would contribute to this impact. • Energy hazards would be less than significant because proposed communications towers would be far enough away from ordnance use and ground training activities. • Minor increases in traffic from past, present, and reasonably foreseeable actions would increase the potential for traffic accidents. Other Safety Issues • There are no areas where children would congregate near the acquisition study areas. • Emergency response capacity is present to accommodate the expected increase in activities. • Mines/Contaminated Sites – Impacts would be the same as for Alternative 1. Hazardous Materials and Hazardous/Solid Waste • Impacts would be the same as for Alternative 1.	LSI • Aircraft Accidents, Ground Training Activities, Emergency Response, Other Safety Issues, Hazardous Materials and Hazardous/Solid Waste – Impacts would be the same as Alternative 4. • Aircraft and Ground-delivered Ordnance – Impacts would be the same as Alternative 4 for aircraft and ground-delivered ordnance. • Mines/Contaminated Sites – Impacts would be the same as for Alternative 1.	LSI • Aircraft Accidents, Ground Training Activities, Emergency Response, Other Safety Issues, Hazardous Materials and Hazardous/Solid Waste – Impacts would be the same as Alternative 4). • Aircraft and Ground-delivered Ordnance – Impacts would be less than Alternative 4, but still less than significant. • Mines/Contaminated Sites – Impacts would be the same as for Alternative 1.

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Table 6-3. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Visual Resources	NI • LSI visual impacts from proposed action; land disturbance would be short-term. • Very few, if any, visual receptors would be impacted doubly by past, present, and reasonably foreseeable actions due to the spatial distance between the proposed action and past, present, and reasonably foreseeable actions. • All new development would be in accordance with city/county general plans.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	LSI • Same as Alternative 1.
Transportation & Circulation	NI • NI from the proposed action. • On-base past, present, and reasonably foreseeable actions would overlap but impacts would be negligible. Grow the Force project would mitigate any potential impacts. • Any off-base increases in traffic are part of standard planning and community development.	NI • Same as Alternative 1.	NI • Same as Alternative 1. • Due to short span and location of Amboy Road closures there would be no cumulative impact.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	NI • Same as Alternative 1.
Airspace Management	NI • No pending or proposed cumulative airspace or airport action were identified. • All future airspace proposals in the region would require consultation with the FAA.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	NI • Same as Alternative 1.	NI • Same as Alternative 1.

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Table 6-3. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Air Quality	LSI • Proposed VOC, CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$ emissions would not contribute to an exceedance of an air quality standard due to cumulative impacts. • Proposed emissions would produce very low impacts to ambient pollutant levels within nearby Class I area. • GHG emissions would result in minimal additions to the U.S. inventory, resulting in less than significant cumulative impacts to global climate change.	LSI • Same as Alternative 1.	SI • Same as Alternative 1, except that proposed emissions of PM_{10} would contribute to significant cumulative impacts due to exceeding NAAQS levels. LSI Cumulative impacts of VOC, CO, NO_x, SO_2, and $PM_{2.5}$ emissions would be slightly higher than Alternative 1.	LSI • Same as Alternative 1.	LSI • Same as Alternative 1.	LSI • Same as Alternative 1.
Noise[1]	• The incremental contribution of each of these actions, when taken in combination with Alternative 1, are not anticipated to expose any additional off-range civilians to CNEL/CNELmr greater than or equal to 65 dB . • Cumulative noise impacts to land use, public health and safety, and wildlife are discussed in Section 5.4.1, *Land Use*, Section 5.4.4, *Public Health and Safety*, and Section 5.4.10, *Biological Resources*, respectively.	• Same as Alternative 1.	• Same as Alternative 1.	• Same as Alternative 1.	• Same as Alternative 1.	• Same as Alternative 1.

Note: [1]The Noise sections of the EIS describe only the potential changes in noise levels under each alternative. The significance of any noise-related impacts is assessed as a function of the environmental resources that may be affected by noise (e.g., biological resources, land use, etc.). Therefore, noise-related impacts are assessed as appropriate in the relevant impact sections for those other resources.

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Table 6-3. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Biological Resources	SI • Project impacts, when considered with solar and wind energy projects, would cumulatively impact desert tortoises and non-critical desert tortoise habitat contributing to regional decline of the population. • The same projects would result in a cumulative impact on native plant ecosystems through grading, mowing, etc. combined with adverse effects to native plant ecosystems due to loss of plant cover and likely proliferation of non-native species from the proposed action. • Closure of most of Johnson Valley OHV Area would cumulatively impact desert tortoises, wildlife, and vegetation in the region.	SI • Cumulative impacts to desert tortoise from concentration of military training into a smaller portion of the west study area would increase the intensity of disturbance in that area as compared to Alternative 1. Similarly, recreational OHV activity would be concentrated into a smaller Johnson Valley OHV Area, resulting in increased intensity of use there. When combined with solar and wind energy projects in the region, would cumulatively impact desert tortoises and their habitat to a greater extent than Alternative 1. SI Cumulative impacts to wildlife, vegetation, and native plant ecosystems (e.g., creosote bush scrub) due to loss of plant cover and likely proliferation of non-native species. For the reasons described for desert tortoise, these cumulative impacts would be greater than for Alternative 1.	SI • Cumulative impacts to desert tortoise from continued OHV recreation in the Johnson Valley OHV Area would further contribute to cumulative impacts to desert tortoises, as would solar and wind energy development in the region. Because the east study area is host to low tortoise densities and subjectively poorer habitat, cumulative impacts to tortoises from this alternative would be less than under Alternative 1. • No closure of Johnson Valley OHV Area, so reduced cumulative impacts to desert tortoises, wildlife, and vegetation in those areas as compared to other alternatives. SI Cumulative impacts to wildlife, vegetation, and native plant ecosystems (e.g., creosote bush scrub) due to loss of plant cover and likely proliferation of non-native species.	SI • Cumulative impacts to desert tortoises from continued OHV recreation in west study area; impacts somewhat lower than for Alternative 1. • Closure of Johnson Valley OHV Area for two months a year would cumulatively impact desert tortoises, wildlife, and vegetation in other regional OHV areas, but much less than under Alternative 1. • Cumulative impacts to wildlife, vegetation, and native plant ecosystems from loss of plant cover and proliferation of non-native species; impacts lower than for Alternative 1 since OHV activity would be reduced and intensity of military activities in the west study area would be lower. SI • Cumulative impacts to desert tortoises from continued OHV recreation in the west study area. Overall contribution to cumulative impacts somewhat lower than for Alternative 1. • Closure of Johnson Valley OHV Area for two months of the year would cumulatively impact desert tortoises, wildlife, and vegetation in other regional OHV areas, but much less than under Alternative 1. • Cumulative impacts to wildlife, vegetation, and native plant ecosystems (e.g., creosote bush scrub) due to loss of plant cover and likely proliferation of non-native species. Overall contribution to cumulative impacts somewhat lower than for Alternative 1 because displacement of OHV activity would be reduced and intensity of military activities in the west study area would be lower.	SI • Cumulative impacts to desert tortoises from continued OHV recreation in the west study area. Overall contribution to cumulative impacts lower than for Alternative 1 and the lowest of project alternatives because displacement of OHV activity would be reduced, the south study area would not be acquired, and intensity of military activities in the west study area would be lower. • Closure of Johnson Valley OHV Area for two months of the year would cumulatively impact desert tortoises, wildlife, and vegetation in other regional OHV areas, but much less than under Alternative 1. SI Cumulative impacts to wildlife, vegetation, and native plant ecosystems (e.g., creosote bush scrub) due to loss of plant cover and likely proliferation of non-native species. Overall contribution to cumulative impacts lower than for Alternative 1 for the same reasons noted for desert tortoise above.	SI • Concentration of military training into a smaller portion of west study area would increase intensity of disturbance as compared to Alternative 1. Recreational OHV activity would be concentrated into a smaller Johnson Valley OHV Area, resulting in increased intensity of use there. When combined with energy projects in the region, would cumulatively impact desert tortoises to a greater extent than Alternative 1. • Closure of 40% of Johnson Valley OHV Area would impact desert tortoises, wildlife, and vegetation in other regional OHV areas. However, these would be less than under Alternative 1. SI • Cumulative impacts to wildlife, vegetation, and native plant ecosystems due to loss of plant cover and likely proliferation of non-native species. For the reasons described for desert tortoise, these cumulative impacts would be greater than for Alternative 1.

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Table 6-3. Summary of Cumulative Impacts

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Cultural Resources	SI • Proponents of the proposed action and any past, present, and reasonably foreseeable actions have to comply with federal laws relating to protection of cultural resources. • However, cumulatively, there would be a potential net loss of some types of cultural resources.	SI • Same as Alternative 1.	SI • Same as Alternative 1.	SI • Same as Alternative 1.	SI • Same as Alternative 1.	SI • Same as Alternative 1.
Geological Resources	LSI • Past, present, and reasonably foreseeable actions would involve ground disturbance, with potential to disrupt soil surface, cause compaction and erosion of soil, and damage paleontological resources. • Alternative 1 would marginally increase the potential for impacts to these resources, but such impacts are expected to be less than significant. • Alternative 1 and one reasonably foreseeable action may reduce access to potential future sources of iron ore and construction aggregate in the area. Cumulative impacts to the availability of both are expected to be less than significant.	LSI • Same as Alternative 1.	LSI • Alternative 3 and one reasonably foreseeable action may reduce access to potential future sources of chloride minerals and construction aggregate in the area. Cumulative impacts to the availability of both are expected to be less than significant. • Cumulative impacts to soils and paleontological resources would be the same as for Alternative 1.	LSI • Same as Alternative 1.	LSI Same as Alternative 1.	LSI • Same as Alternative 1.
Water Resources	LSI • Alternative 1 could combine with other past, present, and reasonably foreseeable future actions to cumulatively impact groundwater resources and cause a decline in potable water in the absence of a long-term plan for managing the potable water supply in the region.	LSI • Same as Alternative 1.	SI • The proposed action would inhibit Cadiz Inc. from instituting their Cadiz Valley Water Project. It would also reduce their agricultural operations and limit access to the existing agricultural water supply.	LSI • Same as Alternative 1.	LSI • Same as Alternative 1.	LSI • Same as Alternative 1.

Legend: CDCA = California Desert Conservation Area; CDPA = California Desert Protection Act; CO = carbon monoxide; FAA = Federal Aviation Administration; GHG = greenhouse gas; LSI = Less than significant impact; NI = No impact; OHV=Off-highway vehicle; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; RPAA= Restricted Public Access Area; SB = Senate Bill; SCM = special conservation measure; SI = Significant impact; SO_2 = sulfur dioxide.

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CHAPTER 7.
OTHER NEPA CONSIDERATIONS

This chapter addresses additional considerations required by the National Environmental Policy Act (NEPA) and possible conflicts between the action and the objectives of land use plans, policies, and controls; irreversible and irretrievable commitment of resources; and short-term vs. long-term productivity. The cumulative impacts analysis is presented in Chapter 5.

7.1 POSSIBLE CONFLICTS BETWEEN THE PROPOSED ACTION AND THE OBJECTIVES OF LAND USE PLANS, POLICIES, AND CONTROLS FOR THE AREA CONCERNED

The action alternatives have been assessed to determine its consistency and compliance with applicable environmental regulations and other plans, policies, and controls. This analysis indicates that the action alternatives would not conflict with the objectives of applicable federal regulations, but many of the alternatives (depending on the alternative selected) would be inconsistent with the Johnson Valley Off-Highway Vehicle (OHV) Area Management Plan, the Ord Mountain Grazing Allotment, Upper Yucca Valley Area of Critical Environmental Concern (ACEC), and San Bernardino County residential and open space land use designations. A summary of applicable environmental regulations and regulatory compliance is provided in Table 7-1 below.

Table 7-1. Summary of Compliance with Plans, Policies, and Controls

Plans, Policies, and Controls	Responsible Agency	Status of Compliance
NEPA of 1969, as amended (42 USC § 4321-4370h); the CEQ implementing regulations (40 CFR Parts 1500-1508); DoN Procedures for Implementing NEPA (OPNAVINST 5090.1C); Marine Corps Environmental Compliance and Protection Manual (MCO P5090.2A, change 2)	DoN/Marine Corps	This EIS has been prepared in accordance with CEQ Regulations implementing NEPA and DoN/Marine Corps NEPA procedures. The preparation of this EIS and the provision for public review are being conducted in compliance with NEPA.
EO 12372 (Intergovernmental Review of Federal Programs) 47 *Federal Register* 30959	DoN/Marine Corps	The DoN/Marine Corps are in the process of consulting with and soliciting comments from state and local officials whose jurisdictions would be affected by the federal action, consistent with this directive.
EO 13423 (Strengthening Federal Environmental, Energy, and Transportation Management)	DoN/Marine Corps	The Combat Center is preparing IESS Plan, consistent with this directive.
EO 13514 (Federal Leadership in Environmental, Energy, and Economic Performance)	DoN/Marine Corps	The Combat Center is preparing an IESS Plan, consistent with this directive.
Energy Independence and Security Act of 2007 (EISA)	DoN/Marine Corps	The Combat Center is preparing an IESS Plan, consistent with this directive.
Energy Policy Act of 2005 (EPACT 2005)	DoN/Marine Corps	The Combat Center is preparing an IESS Plan, consistent with this directive.
CWA, 33 USC §§ 1251 to 1387	USEPA/USACE DoN/Marine Corps	The action alternatives would be implemented in accordance with this act.

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Table 7-1. Summary of Compliance with Plans, Policies, and Controls

Plans, Policies, and Controls	Responsible Agency	Status of Compliance
Safe Drinking Water Act of 1974, 42 USC §§ 300f to 300j-26	USEPA/USACE DoN/Marine Corps	The action alternatives would be implemented in accordance with this act.
CAA, as amended (42 USC § 7401 *et seq.*)	USEPA	The action alternatives would be implemented in accordance with this act. The DoN is consulting with the MDAQMD regarding this action.
ESA (16 USC 1531 *et seq.*)	USFWS DoN/Marine Corps	The action alternatives may adversely affect threatened or endangered species. The DoN consulted with the USFWS regarding this action.
MBTA (16 USC 703-712)	USFWS DoN/Marine Corps	The action alternatives would not likely have a measurable negative effect on migratory bird populations and would be in compliance with this act.
EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) 66 *Federal Register* 3853	DoN/Marine Corps	The action alternatives would not likely have a measurable negative effect on migratory bird populations and would be in compliance with this order.
EO 11990 (Protection of Wetlands) 42 *Federal Register* 26961	USACE DoN/Marine Corps	The action alternatives would not impact wetlands (none are present in the project area) and would be in compliance with EO 11990.
Conservation Programs on Government Lands (Sikes Act) §§ 670a to 670o	DoN/Marine Corps	The DoN currently complies with and implements the Sikes Act through its cooperative programs with state, federal, and local resource agencies to manage natural resources, including sensitive botanical and fish and wildlife resources. The DoN would continue to comply with this program with implementation of any of the action alternatives.
Fish and Wildlife Conservation Act of 1980 (Nongame Act), 16 USC §§ 2901 to 2911	USFWS DoN/Marine Corps	The action alternatives would not interfere with lands identified by the USFWS to foster the conservation of migratory nongame birds.
EO 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) 59 *Federal Register* 7629	DoN/Marine Corps	There would be no disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. The action alternatives would be in compliance with this order.
EO 13045 (Protection of Children from Environmental Health Risks and Safety Risks) 62 *Federal Register* 19885	DoN/Marine Corps	The action alternatives would not disproportionately expose children to environmental health risks or safety risks and would be in compliance with this order.
NHPA, 16 USC §§ 470 to 470x-6	ACHP, SHPO DoN/Marine Corps	The action alternatives would be implemented in accordance with this act. The DoN is consulting with the SHPO regarding this action.

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Table 7-1. Summary of Compliance with Plans, Policies, and Controls

Plans, Policies, and Controls	Responsible Agency	Status of Compliance
Archaeological Resources Protection Act of 1979, 16 USC §§ 470aa to 470mm	ACHP, SHPO DoN/Marine Corps	The action alternatives would be implemented in accordance with this act. The DoN is consulting with the SHPO regarding this action.
NAGPRA, 25 USC §§ 3001 to 3013	DoN/Marine Corps	No objects to which NAGPRA applies are known or have been located within the ROI. If human remains, associated grave goods, or other pertinent resources are uncovered during construction, all NAGPRA guidelines and regulations would be followed. This may include coordination with federally-recognized tribes and the Native American Heritage Commission.
Pollution Prevention Act of 1990, 42 USC §§ 13101-13109	DoN/Marine Corps	The DoN/Marine Corps currently implements procedures to comply with this act and would continue to do so with implementation of any of the action alternatives.
EO 13148 (Greening the Government through Leadership in Environmental Management) 65 *Federal Register* 24595	DoN/Marine Corps	The action alternatives would be implemented in accordance with this order.
EO 12088 (Federal Compliance with Pollution Control Standards) 43 *Federal Register* 47707	DoN/Marine Corps	The action alternatives would be implemented in accordance with this order.
RCRA of 1976, 42 USC §§ 6901 to 6992k	USEPA and DTSC DoN/Marine Corps	The action alternatives would be implemented in accordance with this act.
CERCLA of 1980, 42 USC §§ 9601 to 9675	DoN/Marine Corps	The action alternatives would be implemented in accordance with this act.
EPCRA of 1986, 42 USC §§ 11001 to 11050	DoN/Marine Corps	The DoN/Marine Corps would inform Local Emergency Planning Committees of the action as required to assist them in developing plans to prepare for and respond to chemical emergencies.
Uniform Fire Code (International Fire Code Institute 1997)	DoN/Marine Corps	The DoN/Marine Corps would require construction contractors to conform to Uniform Fire Code guidelines for appropriate construction materials to reduce fire hazards.
Military Munitions Rule 62 *Federal Register* 6621	DoN/Marine Corps	The action alternatives would be implemented in accordance with this rule.
Noise Control Act of 1972 and Quiet Communities Act of 1978, 42 USC §§ 4901 to 4918	DoN/Marine Corps	This EIS provides due consideration to noise impacts, consistent with this act.

Notes: ACHP = Advisory Council on Historic Preservation; CAA = Clean Air Act; CEQ = Council on Environmental Quality; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act; CFR = Code of Federal Regulations; CWA = Clean Water Act; DoN = Department of the Navy; DTSC = Department of Toxic Substance Control; EIS = Environmental Impact Statement; EO = Executive Order; ESA = Endangered Species Act; IESS = Installation Energy Sustainability Strategy; MBTA = Migratory Bird Treaty Act; MCO = Marine Corps Order; MDAQMD = Mojave Desert Air Quality Management District; NAGPRA = Native American Graves Protection and Repatriation Act; NEPA = National Environmental Policy Act; NHPA = National Historic Preservation Act; OPNAVINST = Office of the Chief of Naval Operations Instruction; RCRA = Resource Conservation and Recovery Act; ROI = region of influence; SHPO = State Historic Preservation Office; USACE = U.S. Army Corps of Engineers; USC = United States Code; USEPA = U.S. Environmental Protection Agency; USFWS = U.S. Fish and Wildlife Service

7.2 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

NEPA requires a detailed statement of any irreversible and irretrievable commitments of resources that would be involved in the proposed action should it be implemented. Irreversible and irretrievable resource commitments are related to the use of non-renewable resources and the effects that the use of those resources have on future generations. Irreversible commitments of resources are those that cannot be reversed except over an extremely long period of time. These irreversible effects primarily result from destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species or the disturbance of a cultural site). Implementation of the proposed action would involve irreversible and irretrievable commitments of resources. The level of commitment would be relatively the same regardless of the action alternative selected.

Implementation of the proposed action would involve the consumption of fuel, oil, and lubricants for training activities. The energy consumed for training operations represents a permanent and non-renewable commitment of these resources. However, relatively small quantities of these types of resources would be required. Minor amounts of construction materials (wood, metal, concrete, and asphalt) would be required for the communications towers and road improvements, and would represent a non-renewable commitment of these resources. Alternative 3 would require slightly less resources since only two communication towers would be installed, compared to three towers for all other action alternatives.

7.3 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Short-term uses of the environment associated with any of the action alternatives includes changes to the physical environment and energy, utility use during construction activities, and potable water use during training activities.

Activities associated with the construction of approximately 30 miles (48 kilometers [km]) of unpaved roads and two or three communication towers would involve short-term increases in combustive and fugitive emissions, construction-generated noise, and the use of fossil fuels to power equipment. In addition, expenditures of public funds and the use of labor would be required. Construction-related noise effects would be confined to areas within the Combat Center and/or the acquired lands. These effects would be short-term and would not be expected to result in permanent damage or long-term changes in wildlife productivity or habitat use.

All of the action alternatives largely involve acquisition and use of lands adjacent to the Combat Center, establishment of new military Special Use Airspace (SUA), and modification of existing military SUA. Implementation of any of the action alternatives would require a number of mitigation measures to compensate for impacts to biological resources. Acquisition and/or restoration of off-base parcels of Creosote Bush Scrub and Mojave Yucca plant communities would ensure that high quality habitat is maintained in areas less likely to be affected by training activities.

Training activities under any of the action alternatives would result in increased use of potable groundwater from the Surprise Spring subbasin, which is the only potable water source for the Combat Center. Implementation of any of the proposed action alternatives would increase potable water demand on the Surprise Spring subbasin in proportion to the additional persons at the Combat Center for the

Marine Expeditionary Brigade (MEB) training exercises, which would be similar among the action alternatives. As discussed in Section 4.13, *Water Resources*, the increased potable water demand would represent a 1% increase. Thus, the relative degree of any reduction in long-term water supply for the Combat Center or surrounding communities would be minor; however, over time the increased usage may limit the longer-term availability of potable water in the immediate region.

7.4 UNAVOIDABLE ADVERSE EFFECTS

An Environmental Impact Statement (EIS) must describe any unavoidable adverse environmental effects for which either no mitigation or only partial mitigation is feasible. The impact analysis presented in Chapter 4 of this EIS demonstrates that the action alternatives would result in a range of unavoidable impacts (depending on the alternative selected) related to land use (due to inconsistencies with federal and local land use plans and policies, incompatibility with proposed alternative energy projects and mining claims and leases, and the required relocation of residences and businesses), recreation (due to the loss of recreational use of the Johnson Valley OHV) Area, socioeconomics (due to decreased spending and income from OHV and other recreational activities), public health and safety (due to potential public contact with munitions constituents or other hazards under Alternatives 4, 5, and 6), air quality (due to air emissions from construction and training activities), biological resources (due to the likelihood of training exercise-related incidental take of desert tortoises), cultural resources (due to the potential loss of archeological sites, even if mitigated through data recovery, is an unavoidable and to some extent, unmitigable adverse effect), geological resources (due to compaction of soils, disruption of surface crust, shearing of soil profiles, and soil particle dispersion as dust due to military activities), and water resources (due to decrease in groundwater supply). Summaries of these unavoidable impacts are provided in the respective resource sections of Chapter 4 and in a combined summary table in Chapter 6 (Table 6-1).

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CHAPTER 9.
ACRONYMS AND ABBREVIATIONS

°C	degree Celsius
°F	degree Fahrenheit
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
ACEC	Area of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
ACM	asbestos-containing material
ADT	average daily traffic
AERMOD	American Meteorological Society/ U.S. Environmental Protection Agency Regulatory Model
AESO	Aircraft Environmental Support Office
AF	acre-feet
AGL	above ground level
AGM	air-to-ground missile
AICUZ	Air Installation Compatible Use Zone
ALZ	Assault Landing Zone
AMZ	Aerial Maneuver Zone
APE	Area of Potential Effect
APZ	Accident Potential Zone
AR	Aerial Refueling
ARB	Air Resources Board
ARPA	Archaeological Resources Protection Act
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
ATV	all-terrain vehicle
BA	Biological Assessment
BASH	Bird/Wildlife Aircraft Strike Hazard
BCC	Birds of Conservation Concern
BDU	Bomb Dummy Unit
BECP	Business Emergency and Contingency Plan
BGM	ballistic guided missile
bgs	below ground surface
BLM	Bureau of Land Management
BLU	Bomb Live Unit
BMP	best management practice
BZO	battle sight zero
CAA	Clean Air Act
cal	caliber
Caltrans	California Department of Transportation
CAMOUT	Combined Arms Military Operations on Urban Terrain
CAX	Combined Arms Exercise
CCAA	California Clean Air Act
CCNEL	C-weighted Community Noise Equivalent Level
CDCA	California Desert Conservation Area
CDF	California Department of Forestry
CDFG	California Department of Fish and Game
CDL	Clandestine Drug Lab
CDPA	California Desert Preservation Act
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CH_4	methane
CI	Confidence Interval
CNEL	Community Noise Equivalent Level
$CNEL_{mr}$	Onset-Rate Adjusted Monthly Community Noise Equivalent Level
CNPS	California Native Plant Society
Combat Center	Marine Air Ground Combat Center
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CSA	Combined Statistical Area
CSLC	California State Lands Commission
CSSC	California Species of Special Concern
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
dBC	C-weighted decibel
DME	distance-measuring equipment
DNL	Day-Night Average Sound Level
DoD	Department of Defense
DoN	Department of the Navy
DTSC	Department of Toxic Substance Control
DWMA	Desert Wildlife Management Area
DWR	Department of Water Resources
DZ	Drop Zone
EA	Environmental Assessment
EAF	Expeditionary Airfield
ECP	Environmental Condition of Property
EIFS	Economic Impact Forecasting System
EIS	Environmental Impact Statement
EMF	electromagnetic field
EMR	electromagnetic radiation
EMV	Enhanced Mojave Viper
EO	Executive Order
EOD	explosive ordnance disposal
EPCRA	Emergency Planning and Community Right-to-Know Act
ESA	Endangered Species Act
ESQD	explosive safety quantity distance
FAA	Federal Aviation Administration
FARP	Forward Arming and Refueling Point
FL	Flight Level
FLPMA	Federal Land Policy and Management Act
FONSI	Finding of No Significant Impact
FP	Fully Protected
FPA	Free Production Allowance
FS	feasibility study
FUDS	Formerly Used Defense Sites
FY	Fiscal Year
GBU	guided bomb unit
GHG	greenhouse gas
GIS	Geographic Information System
gpm	gallons per minute
GPS	global positioning system
GWP	Global Warming Potential
HE	high explosive

HERO	Hazards of Electromagnetic Radiation to Ordnance
HMX	cyclotetramethylene tetranitramine
HWMP	Hazardous Waste Management Plan
Hz	hertz
I-	Interstate
ICOP	Integrated Contingency and Operations Plan
ICRMP	Integrated Cultural Resources Management Plan
IESS	Installation Energy and Sustainability Strategy
IFR	Instrument Flight Rules
ILLUM	illuminating
INRMP	Integrated Natural Resources Management Plan
IR	Instrument Flight Rules Route
IRP	Installation Restoration Program
km	kilometer
km^2	square kilometer
KVP	key viewpoint
LA ARTCC	Los Angeles Air Route Traffic Control Center
L_{dnmr}	Onset-Rate Adjusted Monthly Day-Night Average Sound Level
L_{max}	Maximum Sound Level
LOA	Letter of Agreement
LOS	level of service
MAGTF	Marine Air Ground Task Force
MBTA	Migratory Bird Treaty Act
MC	munitions constituents
MCIWEST	Marine Corps Installations West
MCO	Marine Corps Order
MCT	Marine Combat Task
MDAB	Mojave Desert Air Basin
MDAQMD	Mojave Desert Air Quality Management District
MDL	method detection limits
MDRCD	Mojave Desert Resource Conservation District
MEA	Minimum Enroute Altitude
MEB	Marine Expeditionary Brigade
MEDEVAC	medical evacuation
MEF	Marine Expeditionary Force
MEU	Marine Expeditionary Unit
mg/L	milligrams per liter
mi^2	square mile
ML	megaliter
mm	millimeter
MOA	Military Operations Area
MOU	Memorandum of Understanding
MOUT	Military Operations on Urban Terrain
MR_NMAP	Military Operating Area and Range Noise Model
MSL	mean sea level
MSR	Main Supply Route
MTR	Military Training Route
MWD	Metropolitan Water District
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAVFAC	Naval Facilities Engineering Command
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NM	nautical mile
NOI	Notice of Intent
NOTAM	Notice to Airmen
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
nPA	National Programmatic Agreement
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NREA	Natural Resources and Environmental Affairs
NRHP	National Register of Historic Places
NWIS	National Water Inventory System
O_3	ozone
OHV	off-highway vehicle
OPNAVINST	Office of the Chief of Naval Operations Instruction
PA	Programmatic Agreement
PCWQCA	Porter-Cologne Water Quality Control Act
POI	Point of Interest
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
ppb	parts per billion
ppm	parts per million
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
RDX	cyclotrimethylene trinitramine
REVA	Range Environmental Vulnerability Assessment
RI	remedial investigation
RMIS	Recreation Management Information System
RNAV	Area Navigation
RNM	Rotorcraft Noise Model
ROD	Record of Decision
ROI	region of influence
RP	red phosphorus
RPAA	Restricted Public Access Area
RTAA	Range/Training Areas and Airspace
RTV	Rational Threshold Value
RWQCB	Regional Water Quality Control Board
SAR	small arms range
SB	Senate Bill
SCM	special conservation measure
SCP	Spill Contingency Plan
SCS	Soil Conservation Service
SDZ	Surface Danger Zone
SEL	Sound Exposure Level
SELF	Strategic Expeditionary Landing Field
SF	square feet
SHPO	State Historic Preservation Office(r)
SIP	State Implementation Plan
SMARA	Surface Mining and Reclamation Act
SO_2	sulfur dioxide
SO_x	sulfur oxides
SOP	Standard Operating Procedure
SPCC	Spill Prevention, Control, and Countermeasures Plan
SR	State Route
SRL	segregated reduction locus
SUA	Special Use Airspace
SWPPP	Stormwater Pollution Prevention Plan

SWRCB	State Water Resources Control Board
SY	square yard
TDS	total dissolved solids
TETRA	TETRA Technologies, Inc.
TNT	trinitrotoluene
TOW	Tube-launched, Optically tracked, Wire-guided missile
TPWD	Twentynine Palms Water District
TRACRS	Tortoise Research and Captive Rearing Site
TRI	Toxic Release Inventory
TSCA	Toxic Substances Control Act
UAS	Unmanned Aerial System
UPA	Unusual Plant Assemblage
USACE	United States Army Corps of Engineers
USC	United States Code
USCB	United States Census Bureau
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UXO	unexploded ordnance
VFR	Visual Flight Rules
VOC	volatile organic compound
VOR	VHF Omni-Directional Radio-Range
VR	Visual Flight Rules Route
VRM	Visual Resource Management
WDR	Waste Discharge Requirements
WDZ	Weapons Danger Zone
WL	Watch-Listed
WP	white phosphorus
YBP	years before present

CHAPTER 10.
PERSONS AND AGENCIES CONTACTED

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American Motorcycle Association, District 37. J. Grabow, President.

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Colorado River Indian Tribes, Parker, Arizona. Eldred Enos, Chairman.

Community Off-Road Vehicle Watch. P. Klasky, Northern Director.

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Linda Otero. Fort Mojave Native Americans.

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Lucerne Valley Economic Development Association. E. Gommel, Director.

Lucerne Valley Market and Hardware. L. Gommel.

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Twenty Nine Palms Band of Mission Indians, Palm Springs, California. Darrell Mike, Chairman.

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CHAPTER 12.
COMMENTS ON THE DRAFT EIS AND RESPONSES

12.1 INTRODUCTION

The public comment period on the Draft Environmental Impact Statement (EIS) for the Land Acquisition and Airspace Establishment to Support Large-Scale Marine Air Ground Task Force Live Fire and Maneuver Training at Marine Corps Air Ground Combat Center Twentynine Palms, CA provided an opportunity for government agencies, interest groups, and the general public to comment on findings presented in the Draft EIS. All received comments were assessed and considered both individually and collectively during development of this Final EIS. Written responses were prepared for all comments and are included with the comment in Appendix N. A discussion of common comment themes is also contained in Appendix N.

12.2 PUBLIC MEETINGS

The public comment period and public meetings were advertised extensively, using multiple methods to notify the public. In particular, the DoN used five main methods to disseminate notices, which are listed below and discussed in further detail in Sections 12.2.1 to 12.2.4.

- Publication of a notice of availability (NOA) in the *Federal Register*
- Publication of a notice of public meetings (NOPM) in the *Federal Register*
- Advertisements of the NOA and NOPM in local newspapers
- Mass mailing
- Other public media

12.2.1 Notices of Availability

The United States Environmental Protection Agency (USEPA) published an NOA for the Draft EIS in the *Federal Register* on 25 February 2011 (Volume 76, Number 38, Pages 10583-10584), which announced the availability of the Draft EIS. The Department of the Navy published a NOPM in the *Federal Register* on 1 March 2011 (Volume 76, Number 40, Pages 11216-11218). The NOPM announced the availability of the Draft EIS and time, dates and locations of the public meetings. The notice also gave an overview of the proposed action and potential environmental impacts as presented in the Draft EIS. The USEPA published a revision on 13 May 2011 (Volume 76, Number 93, Page 28029) for the *Federal Register* notice published 25 February 2011, which extended the comment period from 11 April 2011 to 26 May 2011.

12.2.2 Newspaper Notification Advertisements

The Marine Corps placed a total of 24 advertisements in a total of eight local and regional newspapers to notify the public of the availability of the Draft EIS and notification of the public meetings. Advertisements were placed in the following newspapers: Desert Sun (daily); San Bernardino Sun (daily); Riverside Press Enterprise (daily); Desert Dispatch (daily); The Desert Trail (weekly - Thursday); Hi-Desert Star (bi-weekly - Wednesday & Saturday); Barstow Log (weekly - Thursday); and Victor Valley Daily Press (daily). The dates of each advertisement are listed in Table 12-1.

Table 12-1. Dates of Newspaper Notification Advertisements for Public Meetings

Newspaper	Dates of Advertisement
Desert Sun	February 25; April 11; April 12, 2011
Riverside Press	February 25; April 12; April 13, 2011
San Bernardino Sun	February 25; April 12; April 13, 2011
Desert Dispatch	February 25; April 13; April 14, 2011
Victor Valley Daily Press	February 25; April 13; April 14, 2011
Hi-Desert Star	February 26; April 6; April 9, 2011
The Desert Trail	March 3; March 31; April 7, 2011
Barstow Log	March 3; April 7; April 14, 2011

12.2.3 Mass Mailing

Notification letters and the Draft EIS, via hard copy or compact disc (CD), were circulated for review and comment to government agencies, elected officials, local organizations, Native American tribes and interested private citizens between 15 February and 4 March 2011. The Draft EIS was also available for general review in information repositories (public libraries), as well as on the project website: www.marines.mil/unit/29palms/las. Additionally, postcard notifications were mailed 18 March 2011 to approximately 11,514 recipients.

12.2.4 Other Public Media

A press release and a public service announcement were distributed by the Marine Corps Air Ground Combat Center Public Affairs Officer when the NOA was published in the *Federal Register* and redistributed one to two weeks before the public meetings.

12.3 PUBLIC MEETING DATES AND LOCATIONS

Public meetings are an important part of the EIS process. The Navy held three informational open house style public meetings to inform the public about the proposed action and the alternatives under consideration, and to provide an opportunity for the public to comment on the proposed action, alternatives, and the adequacy and accuracy of the Draft EIS. Informational posters were displayed and DoD subject matter experts were available during the open house to answer questions on the Draft EIS. Comment forms and a stenographer were available to receive written or oral comments from the public.

The public meetings took place from 12-14 April 2011. Date, scheduled time, and location of the public meetings held were:

- Tuesday, 12 April 2011 at Copper Mountain College in Joshua Tree, CA from 5:00 p.m. to 9:00 p.m.
- Wednesday , 13 April 2011 at the Ontario High School Gym in Ontario, CA from 5:00 p.m. to 9:00 p.m.
- Thursday , 14 April 2011 at the Hilton Garden Inn in Victorville, CA from 5:00 p.m. to 9:00 p.m.

12.4 PUBLIC MEETING ATTENDANCE

Table 12-2 summarizes the number of meeting attendees and number of written and oral comments received at the public meeting.

Table 12-2. Summary of Meeting Attendants and Verbal/Written Statements Received

	Meeting in Joshua Tree	Meeting in Ontario	Meeting in Victorville
Attendance	108	290	256
Number of Written Comments	36	137	185
Number of Oral Comments	2	35	9

12.5 COMMENT SUBMISSION METHODS

The public comment period began on 25 February 2011 and closed on 26 May 2011. Comments were submitted by mail/hand-delivered to NAVFAC, via the EIS website (www.marines.mil/unit/29palms/las), and in written and verbal form at public meetings held from 12 -14 April 2011 in Joshua Tree, Ontario, and Victorville, CA. Comments that were postmarked after 26 May 2011 or, if not postmarked (e.g., comment provided via the public website), received within a few days after the 26 May 2011 end date of the comment period were accepted and included in the review and response process. In accordance with CEQ Regulations (40 CFR 1503), all comments were reviewed and responses were provided to all substantive comments. As appropriate, additional analysis was incorporated into this Final EIS (see Appendix N).

12.6 SUMMARY OF COMMENTS RECEIVED

12.6.1 Official Comments Received During the Public Comment Period

A total of 21,585 comments were received via the three official comment submittal methods (during public meetings, via the website, and by mail or hand-delivery to NAVFAC). Table 12-3 provides a breakdown of the number of comments received through each submission method. A further summary of comments and major issues is presented in Appendix N.

Table 12-3. Summary of Comments Received During Public Review of the Draft EIS

Comment Submission Methods	Number of Comments Received
Public Meetings Written	358
Joshua Tree	*36*
Ontario	*137*
Victorville	*185*
Public Meetings Oral	46
Joshua Tree	*2*
Ontario	*35*
Victorville	*9*
Public Website	2,313
Via mail/hand delivered to NAVFAC	18,868
Total	**21,585**

12.6.2 Additional Comments Received During the Public Comment Period

Although not an advertised method of comment submittal, a number of comments were conveyed directly to the Combat Center either by mail, email, or phone message (a total of 144 comments). All of these comments were collected and reviewed as described in Appendix N, Section 1.3 (*Comment Response Process*) and are discussed further in Appendix N.