Final
Environmental Assessment
for the
United States Marine Corps
Rotary Wing and Tilt-Rotor Training Operations
on Public Lands within Southern California

March 2013

AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

Final
Environmental Assessment
for the

United States Marine Corps
Rotary Wing and Tilt-Rotor Training Operations
on Public Lands within Southern California

March 2013

Executive Summary

The United States Marine Corps (USMC), in cooperation with the United States Forest Service (USFS), has prepared this Environmental Assessment (EA) to assess potential environmental effects from USMC aviation operations on public lands located outside of Department of Defense (DoD)-controlled airspace and located off of DoD-controlled installations and training ranges in southern California. The USMC currently conducts rotary wing operations on public lands managed by the USFS Cleveland National Forest (Trabuco Ranger District) and the Bureau of Land Management (BLM) El Centro Field Office (Figure ES-1). This EA evaluates the effects of continued flight activity (e.g., landing and takeoff operations) by the existing rotary wing inventory (CH-46E, CH-53E, AH-1W/Z, and UH-1N/Y) as well as effects from the newly acquired MV-22B Osprey tilt-rotor aircraft on USFS and BLM managed public lands. This EA takes into account that aging CH-46E aircraft are currently being replaced by the MV-22B, which is a new USMC tilt-rotor aircraft that can operate as a helicopter or turboprop airplane.

The USFS is a Cooperating Agency on this action. The USMC is seeking to obtain special use authorization from the Cleveland National Forest, per current USFS regulations and a 1988 Master Agreement between the DoD and the United States Department of Agriculture (USDA) concerning the use of National Forest System lands for military activity. The USMC is also coordinating with the BLM El Centro Field Office, even though proposed flight activity on BLM managed land would be considered a "casual use level of activity" (BLM Instruction Memorandum No. 2001-030), and requires no further authorization from BLM.

Proposed training operations would primarily be conducted by the west coast-based First Marine Expeditionary Force, Third Marine Aircraft Wing (3D MAW) squadrons based at Marine Corps Air Station (MCAS) Miramar and MCAS Camp Pendleton. Training operations may also originate out of MCAS Yuma, especially during large training exercises. Training would also be conducted by squadrons from other aircraft wings, such as visiting east-coast based Second MAW (2D MAW) squadrons or Fourth MAW (4^{th} MAW) reserve squadrons.

Flight activity proposed in this EA would augment training that is conducted on the region's military installations and ranges, and is expected to account for about 10 percent of the required regional rotary wing and tilt-rotor training. Proposed operations would include conducting practice landing and takeoffs on public lands managed by the USFS Cleveland National Forest and the BLM El Centro Field Office. Landing and takeoffs would take place in designated areas known as Landing Zones (LZs).

ES.1 Purpose of and Need for Proposed Action

The purpose of the proposed action is to allow continued military aviation training operations on USFS and BLM managed lands in southern California that have been used for approximately 40 years by Marine Corps helicopters. The use of these public lands by USMC rotary wing and tilt-rotor squadrons is needed to develop and sustain critical pilot skills by achieving and maintaining required operational training that meet USMC standards for certifications, safety, combat effectiveness, and combat survivability.

There are two key needs for the proposed action:

- *Varied Terrain with Adequate Airspace Conditions*. To meet and maintain high standards of training, 3D MAW and other visiting squadrons must operate in a variety of terrain, climatic conditions, and altitudes that simulate various real world conditions (e.g., access to a variety of low level flight approaches, landing areas, outlying landing fields and other types of air and ground space). Aircrews must learn to quickly recognize, understand, and solve the tactical challenges presented by each of these conditions and be able to conduct all types of required

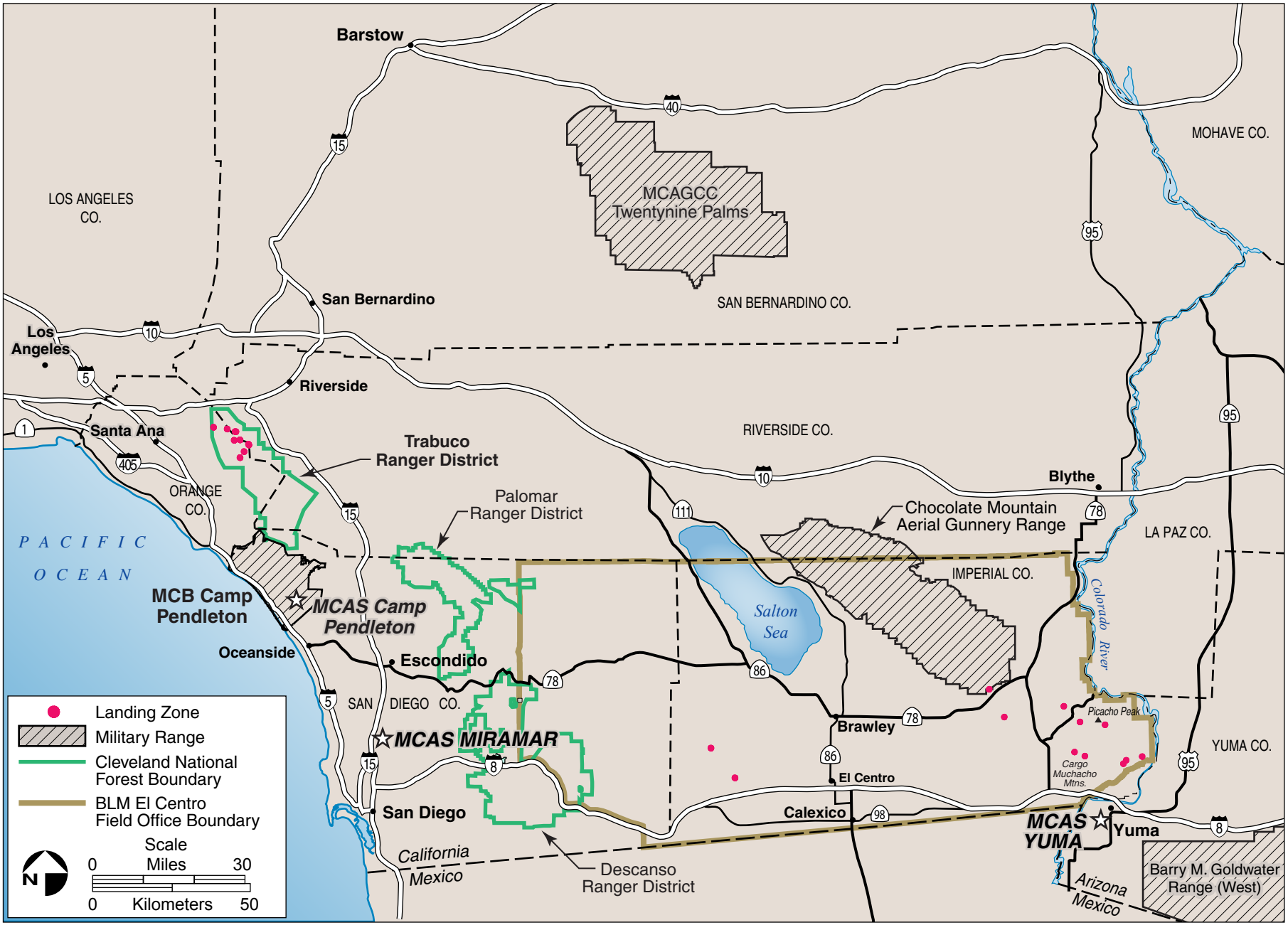


Figure ES-1. Location of Proposed Landing Zones within the Cleveland National Forest, Trabuco Ranger District, and the BLM El Centro Field Office

missions under variable terrain. By training under a variety of environmental conditions and locations with adequate airspace conditions (e.g., lack of air traffic congestion or airspace restrictions), aircrews can maximize training opportunities and ensure that each training flight is challenging, instructional, and not repetitious.

- *Proximity to Air Station.* A basic requirement of aviation training is for training areas to be in reasonable proximity to military air stations if training is to result in combat-ready aircrews. Training in proximity to air stations allows aircrews and aircraft to spend a larger proportion of the limited and expensive flight time available for training on productive activities rather than en route to and from the training area. It also ensures that an aircraft can fly from the air station to a training area, complete a 40-minute training mission, and return to the air station while retaining an acceptable fuel reserve (e.g., enough fuel to accommodate an emergency or weather delay). For the purposes of this EA, reasonable proximity is considered to be about 200 nautical miles (nm) (370 kilometers [km]) for the MV-22B (Department of Navy 2009a), and about 65 nm (120 km) for rotary wing aircraft (Karika, personal communication 2011).

The mountainous environment of the Cleveland National Forest offers high altitude, confined area landing opportunities that are not replicated on USMC installations or training ranges in proximity to the air stations in question. The next closest high altitude military aviation training area with established LZs is associated with the Marine Corps Mountain Warfare Training Center in the Sierra Nevada Mountains near Bridgeport, California; the LZs are located over 300 nm (555 km) from MCAS Camp Pendleton and even farther from MCAS Miramar or MCAS Yuma.

Although there are other nearby military ranges with desert terrain (e.g., Barry M. Goldwater Range West) similar to the public lands managed by the BLM EL Centro Field Office, these ranges often experience crowded airspace conditions and scheduling conflicts with fixed wing training and other advanced training exercises. These airspace conflicts limit opportunities for the types of rotary wing and tilt-rotor training addressed in this EA.

Overall, current DoD installations and ranges are able to fulfill most mission requirements, but they do not offer the full variability needed to simulate real world conditions and often experience crowded airspace conditions. Therefore, continued use of LZs on public lands managed by the USFS Cleveland National Forest and the BLM El Centro Field Office is critical to the quality, variety, and quantity of training and the ability of USMC aviation to maintain readiness.

ES.2 Proposed Action and Alternatives

ES.2.1 Alternative 1

ES.2.1.1 Airspace Operations

Under Alternative 1, USMC aviation would continue existing rotary wing flight activity at the Cleveland National Forest and on BLM El Centro managed lands, except that CH-46E sorties[1] would decline over time and would be replaced by MV-22B sorties. The USMC proposes to conduct an estimated 2,502 annual sorties, which equate to 15,861 individual LZ landings, at the Cleveland National Forest and on BLM El Centro managed lands. Overall, the number of proposed sorties at the Cleveland National Forest is expected to go down about seven percent compared to existing conditions (although the number of individual landings is expected to go up about three percent), and the number of proposed sorties and landings on BLM El Centro managed lands is expected to increase by over 300 percent.

[1] A *sortie* consists of a single military aircraft flight from takeoff through landing. For example, an aircraft entering a specific restricted area, conducting its mission in the airspace, and then exiting the airspace has its activity counted as one sortie.

The largest change in aircraft flight activity is related to the proposed MV-22B sorties. The MV-22B tilt-rotor aircraft is a new type of aircraft for the USMC, with new and different capabilities as compared to the CH-46E helicopter it replaces. With its greater speed and range, the MV-22B would permit tactical training in ways not currently possible using conventional helicopters, including training farther from their homebase without the need for refueling. For this reason, operators of the MV-22B propose to use BLM El Centro managed lands much more than operators of the existing CH-46E helicopter. The operations-related information provided here and elsewhere in the EA is based on the MV-22 Training and Readiness Manual (USMC 2010b), which provides the best information available regarding proposed MV-22B flight activity.

Aircraft would originate from MCAS Miramar, MCAS Camp Pendleton, or MCAS Yuma. Rotary wing aircraft originating from MCAS Miramar and MCAS Camp Pendleton would re-fuel at MCAS Yuma before using the LZs on BLM El Centro managed lands. Rotary wing aircraft originating from MCAS Yuma would re-fuel at MCAS Miramar or MCAS Camp Pendleton before using the LZs at the Cleveland National Forest. With its greater range as a tilt-rotor aircraft, there is no need for the MV-22B to refuel before training at either location.

Aircraft would fly along normal departure routes from an airfield and then along established routes to reach a general LZ area. While transitioning to the LZs from an airfield, the rotary wing usually would fly between 1,000 to 2,000 feet (305 to 610 meters) above ground level, while the tilt-rotor aircraft usually would fly similar to a turboprop airplane between 8,000 to 12,000 feet (2,438 to 3,658 meters) above ground level. Although military missions are normally exempt from Forest Service Manual Policy 2326.03, which discourages flying at least 2,000 feet over the ground surface over designated and recommended National Forest wilderness areas, the USMC would strive to be consistent with this policy, whenever possible.

ES.2.1.2 Flight Activity within the Cleveland National Forest

A 1972 Memorandum of Understanding (MOU) between the United States (U.S.) Navy, Naval Facilities Engineering Command Southwest, and the USFS, California Region established the use of nine LZs for military training within the Cleveland National Forest. Because of the introduction of the MV-22B aircraft to USMC operations, and because an MOU is no longer appropriate for authorizing use of National Forest System lands, the USMC is seeking to obtain special use authorization from the Cleveland National Forest to allow continued use of the established LZs by USMC aviation. This is consistent with a 1988 Master Agreement between the DoD and the USDA, which established policies and procedures for establishing special use authorization for DoD activity on National Forest System lands. This authorization would need to be renewed every twenty years.

Although flight activity may occur over much of the Cleveland National Forest, only specific areas have been designated for landing and takeoff operations. The USMC proposes to use eight of the nine LZs established in the 1972 MOU (LZ Sites 3 and 5 through 11). Additionally, two of these LZs (LZ Site 6 and LZ Site 9) also have alternative landing configurations and thus have been identified as separate LZs for the purpose of this EA (i.e., LZ Site 6 and LZ Site 6 Alt; and LZ Site 9 and LZ Site 9 Alt). LZ Site 4, one of the original nine LZs, is not proposed for continued use at this time because this LZ is located on private in-holdings within the Cleveland National Forest. Therefore, 10 LZs (8 original and 2 alternative configurations) are carried forward for analysis. About 35 sorties would occur per month, based on 422 proposed annual sorties.

To address USFS concerns about dust emissions from aircraft landing and takeoff operations, the proposed action includes implementation of dust abatement measures for undeveloped LZs (i.e., those with exposed soils) and maintenance of paved LZs within the Cleveland National Forest. These measures

have yet to be described in detail, but are expected to consist of application of a non-toxic dust palliative (e.g., semi-permanent glue-like materials) that would reduce the amount of dust mobilized and dispersed by aircraft operations. The USMC will work with the USFS on selection of an appropriate material and on implementation of a suitable monitoring plan. Monitoring would ensure that the dust abatement measures are successful in reducing dust generation to a level that would not adversely affect the area surrounding the LZ and ensure that the dust abatement practices themselves do not result in adverse effects on regulated resources.

ES.2.1.3 Flight Activity within BLM El Centro Managed Lands

The BLM El Centro managed lands offer large expanses of open desert that have been used for USMC landing and takeoff operations over the last 40 years. Unlike the prepared and graded LZs within the Cleveland National Forest, the open desert was conducive to landing operations without any type of land improvement. The USMC estimates that over the past 40 years about 60 LZs were used in the open desert. Of those 60 LZs, 13 designated LZs have been selected for evaluation under the proposed action[2]. About 173 sorties would occur per month, based on 2,080 proposed annual sorties.

The types of landing and takeoff operations addressed under the proposed action are consistent with the definition of "casual use level of activity," according to BLM Instruction Memorandum No. 2001-030 (Attachment 1: Military Activities on the Public Lands, section B.1.f). Casual use of BLM managed public lands is defined by 43 CFR 2920.0-5(k) and 2920.1-1(d) (see also BLM Manual Section 2801.48.A). By definition, casual use activities do not have any adverse safety impacts on other public land uses, and have only a minimal or transient environmental effect on relatively small areas of public lands. Activities that qualify under casual use require no authorization from BLM. Although no written authorization is necessary, the USMC is coordinating with BLM on the proposed action as a casual use level activity as defined by BLM Instruction Memorandum No. 2001-030, Attachment 1.

ES.2.2 No Action Alternative

Under the No Action Alternative, no USMC rotary wing or tilt-rotor operations would occur on public lands managed by the Cleveland National Forest and the BLM El Centro Field Office. It is possible that private companies and other agencies, such as the Sheriff Department, Fire Department, and the U.S. Navy, may continue to use these LZs. Although the No Action Alternative would not meet the purpose and need for the proposed action, its inclusion enables decision makers to compare the environmental consequences of the alternatives. Please note that the No Action Alternative is different from the baseline against which impacts of the proposed action are evaluated; the baseline is the same as the existing conditions (i.e., current operation levels based on 2010 flight activities as described in section 2.1.2, *Current Rotary Wing Flight Activities*).

ES.2.3 Alternatives Considered But Eliminated

ES.2.3.1 Relocate Existing Training to DoD Lands

The USMC considered relocating aircraft operations that occur at the Cleveland National Forest and on BLM El Centro managed lands to a nearby DoD facility. For example, USMC training ranges near MCAS Miramar, MCAS Camp Pendleton, and MCAS Yuma include Marine Corps Base (MCB) Camp Pendleton, the Bob Stump Training Range Complex (Chocolate Mountain Aerial Gunnery Range, Barry M. Goldwater Range West, R-2510, and R-2512), and Marine Corps Air Ground Combat Center (MCAGCC) Twentynine Palms. Other nearby military ranges include Barry M. Goldwater Range East

[2] LZ Canary and LZ PC3 Option, which were addressed in the Public Draft EA, have been subsequently dropped from further consideration.

(U.S. Air Force), the National Training Center at Fort Irwin (U.S. Army), the Yuma Proving Ground (U.S. Army), Naval Air Facility El Centro (U.S. Navy), and the China Lake Naval Weapons Center (U.S. Navy).

USMC aviation is currently conducting training flight activities at MCB Camp Pendleton, the Bob Stump Training Range Complex, and MCAGCC. Additional training at these facilities would not meet the purpose of and need for conducting operations in a variety of terrain and altitudes that mirror real-world conditions. For example, none of these DoD training areas offer similar, unique mountainous conditions (e.g., sloped landings and crosswind landings at high elevation) as the existing LZs at the Cleveland National Forest. Although Barry M. Goldwater Range West may have similar terrain as the public lands managed by the BLM EL Centro Field Office, the crowded airspace conditions and associated scheduling conflicts for the nearby USMC training ranges would make relocating additional operations there infeasible (see also section ES-1, *Purpose of and Need for Proposed Action*).

Regarding non-USMC training ranges, these facilities receive heavy use from other military services and often have primary missions and uses that would conflict with low-flying rotary wing and tilt-rotor flight operations and landings (e.g., tank maneuvers, artillery firing, air-to-ground delivery by jet aircraft, and air-to-air combat). As such, relocating proposed operations to other DoD lands fails to meet the purpose and need and cannot be considered a viable alternative.

ES.2.3.2 Move Existing Training to Other Public Lands

The nature of the USMC training operations requires relatively large training areas with access to suitable LZs that meet the purpose of and need for the proposed action (see section ES-1). Present-day prospects for creating new LZs on public lands are greatly impeded by existing or proposed utility corridors and energy development projects (e.g., solar or wind farms), increased density of adjacent settlements, and long-term commitments of open space areas to other land uses, such as congressionally-designated or proposed wilderness areas and critical habitat for endangered species.

There are other existing public lands that are currently used for USMC aviation operations, but these are located outside the proximity radius for regional squadron activity. For example, aviation training occurs in the Sierra Nevada Mountains near Bridgeport, California, on the Humboldt-Toiyabe National Forest through the Marine Corps Mountain Warfare Training Center. However, this area is located over 300 nm (555 km) from MCAS Camp Pendleton and even farther from MCAS Miramar or MCAS Yuma, and it takes aircraft several hours to transit to this location from southern California and western Arizona. Therefore, this is not a viable alternative for local training.

ES.3 Summary of Impacts

Based on USMC review, the proposed action has little potential to impact Socioeconomics, Ground Traffic and Transportation, Infrastructure and Utilities, Hazardous Materials and Waste, or Environmental Justice. Accordingly, no further discussion of these resource areas will be included in this analysis. For the rest, the environmental consequences associated with implementation of Alternative 1 and the No Action Alternative are presented and compared in Table ES-1. A detailed description of the affected environment and analysis of the environmental consequences is presented in Chapter 3 (*Affected Environment and Environmental Consequences*). As shown is Table ES-1, implementation of any of the alternatives would not result in significant impacts to any resource area.

ES.4 Preferred Alternative

Marine Corps Installations (MCI) West, on behalf of the USMC, has identified Alternative 1 as the preferred alternative because this alternative best reflects the purpose and need for the proposed action. Alternative 1 would allow continued use of public lands managed by the Cleveland National Forest and the BLM El Centro Field Office, which are critical for ongoing military aviation training because these lands offer a variety of training environments necessary to meet mission requirements that are not available on any military installations in the region.

ES.5 Public Participation and Agency Consultation

The purpose of the public participation process was to actively inform the public, organizations, government agencies, federally and non-federally recognized Indian tribes, and elected officials about the proposed action and to receive public input during the various stages of the NEPA process. No comments were received during the public scoping process. The Public Draft EA was released on 2 July 2012, and the USMC held two open house public meetings in July 2012. Eleven comments were received during the 30-day review of the Public Draft EA, and responses to these comments are provided in Appendix F-1.

Additionally, MCI West, in cooperation with BLM and USFS, consulted with federally recognized and non-federally recognized Indian tribes affiliated with lands involved in this action. Furthermore, the USMC, in cooperation with the USFS, completed consultation efforts with the United States Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act and with the California State Historic Preservation Office (SHPO) under Section 106 of the National Historic Preservation Act (see section 2.6, *Agency Consultation and Approvals*, for more information). While not required for LZs located on BLM lands, special use authorization from the USFS is required before the proposed action can proceed on the Cleveland National Forest.

Table ES-1. Summary of Impacts

Resource Area	*Alternative 1*		*No Action Alternative*
	Cleveland National Forest	**BLM El Centro**	
Airspace	Proposed change in operations would not alter any airspace configuration, and it would not impact current or future military and general aviation airspace use. No significant impact would occur.	Proposed change in operations would not alter any airspace configuration, and it would not impact current or future military and general aviation airspace use. No significant impact would occur.	No USMC rotary wing or tilt-rotor training activities would take place, but other agencies may still use the LZs. Therefore, airspace usage would likely continue within the vicinity of the LZs, although at a lower level of use than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.
Noise	Noise exposure under Alternative 1 would either stay the same or decrease compared to existing conditions, and noise drops below 60 dB $CNEL_{mr}$ over surrounding residential communities. Therefore, no significant noise impact would occur.	Although Alternative 1 would result in an approximate 331 percent increase in annual sorties relative to existing conditions, there would be relatively minor changes in noise exposure compared to existing conditions, and noise drops below 60 dB $CNEL_{mr}$ over surrounding residential communities. Therefore, no significant noise impact would occur.	No USMC rotary wing or tilt-rotor training activities would take place, but other agencies may still use the LZs. Therefore, noise from aircraft operations would likely continue within the vicinity of the LZs, although at a lower rate than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.
Land Use and Recreation	Proposed change in operations would be consistent with relevant land use plans (e.g., *Cleveland National Forest Land Management Plan* and proposed amendments), and routine training activities would not result in permanent alteration of the area's recreation opportunity. No significant impact on land use or recreation would occur.	Proposed change in operations would be in conformance with the BLM's mandate to manage BLM land for multiple uses as outlined in the Federal Land Policy and Management Act, and routine training activities would not result in permanent alteration of the area's recreation opportunity. No significant impact on land use or recreation would occur.	No USMC rotary wing or tilt-rotor training activities would take place, but other agencies may still use the LZs. Therefore, minor impacts to recreation due to noise and dust generation would likely continue within the vicinity of the LZs, although at a lower rate than under existing conditions. Depending on the frequency of use by other agencies, this could be a beneficial impact.
Air Quality	Alternative 1 would reduce emissions within each project region, and emissions would not exceed any applicable conformity *de minimis* or USEPA Prevention of Significant Deterioration threshold. No significant air quality impact would occur.	Alternative 1 would reduce emissions within each project region, and emissions would not exceed any applicable conformity *de minimis* or USEPA Prevention of Significant Deterioration threshold. No significant air quality impact would occur.	Elimination of existing USMC helicopter operations would result in minor emission reductions within the Cleveland National Forest, BLM El Centro, and San Diego County project regions. Therefore, the No Action Alternative would produce beneficial but less than significant air quality impacts.

Table ES-1. Summary of Impacts

Resource Area	*Alternative 1*		*No Action Alternative*
	Cleveland National Forest	**BLM El Centro**	
Topography, Geology and Soils	Because Alternative 1 would utilize existing LZs on level ground and in areas generally far removed from perennial surface waters, there would be no significant erosion-related impacts in the Cleveland National Forest.	Because Alternative 1 would utilize existing LZs on level ground and in areas generally far removed from perennial surface waters, there would be no significant erosion-related impacts on BLM El Centro managed lands.	No USMC rotary wing or tilt-rotor training activities would take place, but other agencies may still use the LZs. Therefore, a minimal amount of soil erosion may continue within the vicinity of the LZs, although likely at a lower level than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.
Water Resources	Because Alternative 1 would utilize existing LZs on level ground not subject to high erosion rates and in areas generally far removed from perennial surface waters, there would be no significant water resources impacts from erosion-induced sedimentation in the Cleveland National Forest.	Because Alternative 1 would utilize existing LZs on level ground not subject to high erosion rates and in areas generally far removed from perennial surface waters, there would be no significant water resources impacts from erosion-induced sedimentation on BLM El Centro managed lands.	No USMC rotary wing or tilt-rotor training activities would take place, but other agencies may still use the LZs. Therefore, a minimal amount of soil erosion and associated impacts to water resources may continue within the vicinity of the LZs, although likely at a lower level than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.
Biological Resources	There would be no significant impact on federally listed, state-listed, and other sensitive species from noise and dust generation on and adjacent to LZs.	There would be no significant impact on federally listed, state-listed, and other sensitive species noise and dust generation on and adjacent to LZs.	No USMC rotary wing or tilt-rotor training activities would take place, but other agencies may still use the LZs. The natural environment within both regions would be subject to less frequent rotary wing operations-related noise and dust generation on and adjacent to LZs. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.
Cultural Resources	There would be no effect on a historic property or tribal cultural resource, and no significant impacts would occur under NEPA.	There would be no adverse effect on a historic property or tribal cultural resource, and no significant impacts would occur under NEPA.	No USMC rotary wing or tilt-rotor operations would occur on public lands managed by the Cleveland National Forest and the BLM El Centro Field Office. Therefore, there would be no adverse impact on historic properties or tribal cultural resources.

Table ES-1. Summary of Impacts

Resource Area	*Alternative 1*		*No Action Alternative*
	Cleveland National Forest	**BLM El Centro**	
Public Health and Safety	All safety actions that are in place for existing training flights would continue for the proposed operations. Additionally, the potential for fire is considered low because the Cleveland National Forest LZs are typically heavily disturbed and/or developed and generally void of vegetation. No significant impact would occur.	All safety actions that are in place for existing training flights would continue for the proposed operations. Additionally, the potential for fire is considered low because the BLM LZs are almost entirely void of vegetation and dominated by desert pavement. No significant impact would occur.	No USMC rotary wing or tilt-rotor training activities would take place, but other agencies may still use the LZs. Therefore, public health and safety issues may continue within the vicinity of the LZs, although likely at a lower level than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.
Aesthetics	Aircraft activities at the proposed LZs would occur in low numbers and would be generally dispersed over broad geographic areas. Therefore, routine training activities would not result in permanent alteration of the area's visual environment or high scenic integrity, and there would be no significant impact on visual resources.	The visual effects would be somewhat greater than the current level of impacts due to the larger numbers of sorties. However, the number of sorties per day would still be small and of short duration and would be dispersed over a wide geographic area. Therefore, routine training activities would not result in permanent alteration of the area's visual environment, and there would be no significant impact on visual resources.	No USMC rotary wing or tilt-rotor training activities would take place, but other agencies may still use the LZs. Therefore, minor impacts on visual resources may continue within the vicinity of the LZs, although likely at a lower level than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.

Table of Contents

Executive Summary **ES-1**
Table of Contents ..... **i**
1 Purpose and Need **1-1**
1.1 Introduction 1-1
1.2 Purpose of and Need for Proposed Action 1-3
1.3 Environmental Issues of the Proposed Action 1-4
1.4 Regulatory Setting 1-4
1.5 Public Participation Process 1-5
1.6 Organization of the Document 1-6
2 Description of Proposed Action and Alternatives **2-1**
2.1 USMC Aviation Squadrons under Consideration in this EA 2-1
2.1.1 Description of Rotary Wing and Tilt-Rotor Aircraft 2-1
2.1.2 Current Rotary Wing Flight Activities 2-4
2.2 Proposed Action 2-4
2.2.1 Alternative 1 2-5
2.2.2 No Action Alternative 2-13
2.2.3 Alternatives Considered But Eliminated 2-13
2.3 Resource Areas Eliminated From Detailed Consideration 2-14
2.4 Summary of Impacts 2-15
2.5 Preferred Alternative 2-15
2.6 Agency Consultation and Approvals 2-15
3 Affected Environment and Environmental Consequences **3.1-1**
3.1 Airspace 3.1-1
3.1.1 Affected Environment 3.1-1
3.1.2 Environmental Consequences and Mitigation Measures 3.1-2
3.2 Noise 3.2-1
3.2.1 Definition of Noise 3.2-1
3.2.2 Methodology 3.2-2
3.2.3 Affected Environment 3.2-3
3.2.4 Environmental Consequences and Mitigation Measures 3.2-5
3.3 Land Use and Recreation 3.3-1
3.3.1 Affected Environment 3.3-1
3.3.2 Environmental Consequences and Mitigation Measures 3.3-5
3.4 Air Quality 3.4-1
3.4.1 Affected Environment 3.4-2
3.4.2 Environmental Consequences and Mitigation Measures 3.4-7
3.5 Topography, Geology, and Soils 3.5-1
3.5.1 Affected Environment 3.5-1
3.5.2 Environmental Consequences and Mitigation Measures 3.5-4
3.6 Water Resources 3.6-1
3.6.1 Affected Environment 3.6-1
3.6.2 Environmental Consequences and Mitigation Measures 3.6-3
3.7 Biological Resources 3.7-1
3.7.1 Affected Environment 3.7-1
3.7.2 Environmental Consequences and Mitigation Measures 3.7-30
3.8 Cultural Resources 3.8-1
3.8.1 Affected Environment 3.8-1
3.8.2 Environmental Consequences and Mitigation Measures 3.8-5

3.9 Public Health and Safety 3.9-1
3.9.1 Affected Environment 3.9-1
3.9.2 Environmental Consequences and Mitigation Measures 3.9-4
3.10 Aesthetics 3.10-1
3.10.1 Affected Environment 3.10-1
3.10.2 Environmental Consequences and Mitigation Measures 3.10-2
4 Cumulative Impacts 4-1
4.1 Introduction 4-1
4.2 Past, Present, and Reasonably Foreseeable Future Projects Considered in the Cumulative Analysis 4-1
4.2.1 Military Actions 4-1
4.2.2 United States Forest Service Actions 4-2
4.2.3 Bureau of Land Management Actions 4-4
4.2.4 Orange County Actions 4-6
4.2.5 Riverside County and California Department of Transportation Actions 4-7
4.2.6 City of Corona Actions 4-7
4.3 Potential Cumulative Impacts by Environmental Resource Area 4-8
4.3.1 Airspace 4-8
4.3.2 Land Use and Recreation 4-8
4.3.3 Air Quality 4-9
4.3.4 Water Resources 4-12
4.3.5 Biological Resources 4-12
4.3.6 Cultural Resources 4-13
4.3.7 Aesthetics 4-14
5 Other NEPA Considerations 5-1
5.1 Energy Requirements and Conservation Potential of Alternatives Including the Proposed Action and All Mitigation Measures Being Considered 5-1
5.2 Irreversible or Irretrievable Commitment of Natural or Depletable Resources 5-1
5.3 Relationship Between Local Short-Term Use of the Human Environment and Maintenance and Enhancement of Long-Term Productivity 5-1
5.4 Any Probable Adverse Environmental Effects that Cannot be Avoided and are not Amenable to Mitigation 5-2
6 Persons and Agencies Contacted or Consulted 6-1
Department of Defense 6-1
United States Forest Service 6-1
Bureau of Land Management 6-2
United States Fish and Wildlife Service 6-2
State Historic Preservation Office 6-2
7 List of Preparers 7-1
Lead Agency 7-1
Cooperating Agency 7-1
8 References 8-1
9 Acronyms 9-1

Appendices

A Scoping and Agency Correspondence

A-1 Scoping

A-2 Tribal Consultation

A-3 United States Fish and Wildlife Service

A-4 United States Forest Service

A-5 State Historic Preservation Office

B Air Quality Emission Calculations and Clean Air Act Conformity Analyses

B-1 Air Quality Emissions Calculations

B-2 Clean Air Act Conformity Record of Non-Applicability (RONA)

C Noise

C-1 Aircraft Noise Modeling Data Wyle 2011

C-2 Discussion of Noise and Its Effect on the Environment (Wyle)

D Landing Zone Figures

E Risk of Fire From V-22 Exhaust Memo

F Public Draft EA Comments and Public Outreach

F-1 Public Draft EA Comments and Responses

F-2 Public Outreach Summary (August 2012)

List of Tables

ES-1 Summary of Impacts ES-8
1.4-1 Applicable Federal Regulations, Instructions, and Public Law 1-5
2.1-1 Aircraft Comparison 2-3
2.1-2 Existing Estimated Annual Sorties and Landings on Non-DoD Lands 2-4
2.2-1 Proposed Change in Annual Sorties by Aircraft Type under Alternative 1 2-6
2.2-2 Proposed Change in Annual Landings by Aircraft Type under Alternative 1 2-6
2.2-3 List of Proposed Landing Zones within the Cleveland National Forest 2-9
2.2-4 List of Proposed Landing Zones within BLM El Centro Managed Lands 2-10
2.4-1 Summary of Impacts 2-17
3.1-1 Definitions of Different Classes of Airspace 3.1-2
3.2-1 Maximum $CNEL_{mr}$ at Modeled Landing Zones in Cleveland National Forest for Baseline Conditions 3.2-4
3.2-2 Maximum $CNEL_{mr}$ at Modeled Landing Zones on BLM El Centro Managed Land under Baseline Conditions 3.2-5
3.2-3 Maximum $CNEL_{mr}$ at Modeled Landing Zones in Cleveland National Forest for Alternative 1 ..... 3.2-6
3.2-4 Maximum $CNEL_{mr}$ at Modeled Landing Zones on BLM El Centro Managed Land for Alternative 1 ..... 3.2-8
3.3-1 Description of Land Use Zones within Cleveland National Forest 3.3-3
3.3-2 Special Use Areas in the Vicinity of the Proposed LZs within Lands Managed by the BLM El Centro Field Office 3.3-7
3.4-1 California and National Ambient Air Quality Standards 3.4-1
3.4-2 Annual Emissions from Current Helicopter Operations within the Cleveland National Forest Project Region 3.4-6
3.4-3 Annual Emissions from Current Helicopter Operations within the BLM El Centro Project Region 3.4-7
3.4-4 Annual Emissions from Current Helicopter Operations within the San Diego Air Basin Project Region 3.4-7
3.4-5 Annual Emissions due to the Operation of the USMC Rotary Wing and Tilt-Rotor Training Activities- Alternative 1 ..... 3.4-9
3.5-1 Soil Type Characteristics at Landing Zones within the Cleveland National Forest 3.5-2
3.5-2 Soil Association Characteristics at Landing Zones on BLM El Centro Lands 3.5-3
3.7-1 Vegetation Communities in the Vicinity of the Cleveland National Forest LZs 3.7-2
3.7-2 Special Status Plant Species Potentially Present in the Proposed Project Areas, Cleveland National Forest 3.7-4
3.7-3 Special Status Wildlife Species Potentially Present in Project Areas, Cleveland National Forest 3.7-9
3.7-4 Special Status Plant Species Potentially Present in the Proposed Project Areas, BLM El Centro 3.7-17
3.7-5 Special Status Wildlife Species Potentially Present in Project Areas, BLM El Centro Field Office 3.7-20
3.7-6 Summary of Results for Tortoise Survey Efforts on BLM Managed Lands 3.7-28
3.7-7 Desert Tortoise Sign Key 3.7-29
3.8-1 Newly Recorded Sites Within the Project APE for BLM El Centro 3.8-4
3.9-1 Projected Class A Mishap Rates for Aircraft 3.9-1
3.9-2 Class A Flight Mishaps for MV-22 ..... 3.9-2
3.9-3 Class A Flight Mishaps for Light Attack Helicopters 3.9-2
3.9-4 Class A Flight Mishaps for Medium and Heavy Lift Helicopters 3.9-3
4-1 Annual GHG Emissions from the Proposed Action 4-10

List of Figures

ES-1 Location of Proposed Landing Zones within the Cleveland National Forest, Trabuco Ranger District, and the BLM El Centro Field Office ES-2
1.1-1 Location of Proposed Landing Zones within the Cleveland National Forest, Trabuco Ranger District, and the BLM El Centro Field Office 1-2
2.1-1 Photographs of Rotary Wing and Tilt-Rotor Aircraft 2-2
2.2-1 Location of Proposed Landing Zones within the Cleveland National Forest 2-8
2.2-2 Location of Proposed Landing Zones within BLM El Centro Managed Lands 2-11
3.2-1 Typical A-Weighted Sound Levels of Common Sounds 3.2-2
3.3-1 Location of LZs within the Cleveland National Forest Land Use Zones 3.3-2
3.3-2 Special Use Areas in the Vicinity of the Proposed LZs within Lands Managed by the BLM El Centro Field Office 3.3-6
3.10-1 Time-Lapsed Photographs during a One-Time MV-22 Landing Demonstration at LZ Site 5 ..... 3.10-3

1 Purpose and Need

1.1 Introduction

The United States Marine Corps (USMC), in cooperation with the United States Forest Service (USFS), has prepared this Environmental Assessment (EA) to assess potential environmental effects from USMC aviation operations on public lands located outside of Department of Defense (DoD)-controlled airspace and located off of DoD-controlled installations and training ranges in southern California. The USMC currently conducts rotary wing operations on public lands managed by the USFS Cleveland National Forest (Trabuco Ranger District) and the Bureau of Land Management (BLM) El Centro Field Office (Figure 1.1-1). This EA evaluates the effects of continued flight activity (e.g., landing and takeoff operations) by the existing rotary wing inventory as well as effects from the newly acquired MV-22B Osprey tilt-rotor aircraft on USFS and BLM managed public lands.

The USFS is a Cooperating Agency on this action. The USMC is seeking to obtain special use authorization from the Cleveland National Forest, per current USFS regulations and a 1988 Master Agreement between the DoD and the United States Department of Agriculture (USDA) concerning the use of National Forest System lands for military activity. The USMC is also coordinating with the BLM El Centro Field Office, even though proposed flight activity on BLM managed land would be considered a "casual use level of activity" (BLM Instruction Memorandum No. 2001-030), and requires no further authorization from BLM.

Proposed training operations would primarily be conducted by the west coast-based First Marine Expeditionary Force (I MEF), Third Marine Aircraft Wing (3D MAW) squadrons based at Marine Corps Air Station (MCAS) Miramar and MCAS Camp Pendleton. Additionally, training operations may originate out of MCAS Yuma, especially during large training exercises. Training would also be conducted by squadrons from other aircraft wings, such as visiting east-coast based Second MAW (2D MAW) squadrons or Fourth MAW (4th MAW) reserve squadrons.

Rotary wing and tilt-rotor aircraft under consideration in this EA include the Sea Knight (CH-46E), Super Stallion (CH-53E), Super Cobra (AH-1W)[1], Viper (AH-1Z), Huey (UH-1N)[2], Venom (UH-1Y), and Osprey (MV-22B). This EA takes into account that aging CH-46E aircraft are currently being replaced by the MV-22B, which is a new USMC tilt-rotor aircraft that can operate as a helicopter or turboprop airplane.

Flight activity proposed in this EA would augment training that is conducted on the region's military installations and ranges, and is expected to account for about 10 percent of the required regional rotary wing and tilt-rotor training. Proposed operations would include conducting practice landing and takeoffs on public lands managed by the USFS Cleveland National Forest and the BLM El Centro Field Office. Landing and takeoffs would take place in designated areas known as Landing Zones (LZs), as defined by Joint Publication (JP) 1-02 (i.e., any specified zones used for the landing of aircraft). To be an LZ, an area must be free of vertical obstructions, relatively flat, and able to support the weight of an aircraft without it sinking into the substrate (i.e., soil or snow). Within an LZ, one or more specific landing sites or points can be defined where one aircraft can land and take off safely. Therefore, some LZs can support landing activities by more than one aircraft simultaneously.

[1] AH-1W and AH-1Z are variations on the same model of aircraft, and are sometimes referred collectively in this EA as "AH-1W/Z."
[2] UH-1N and UH-1Y are variations on the same model of aircraft, and are sometimes referred collectively in this EA as "UH-1N/Y."

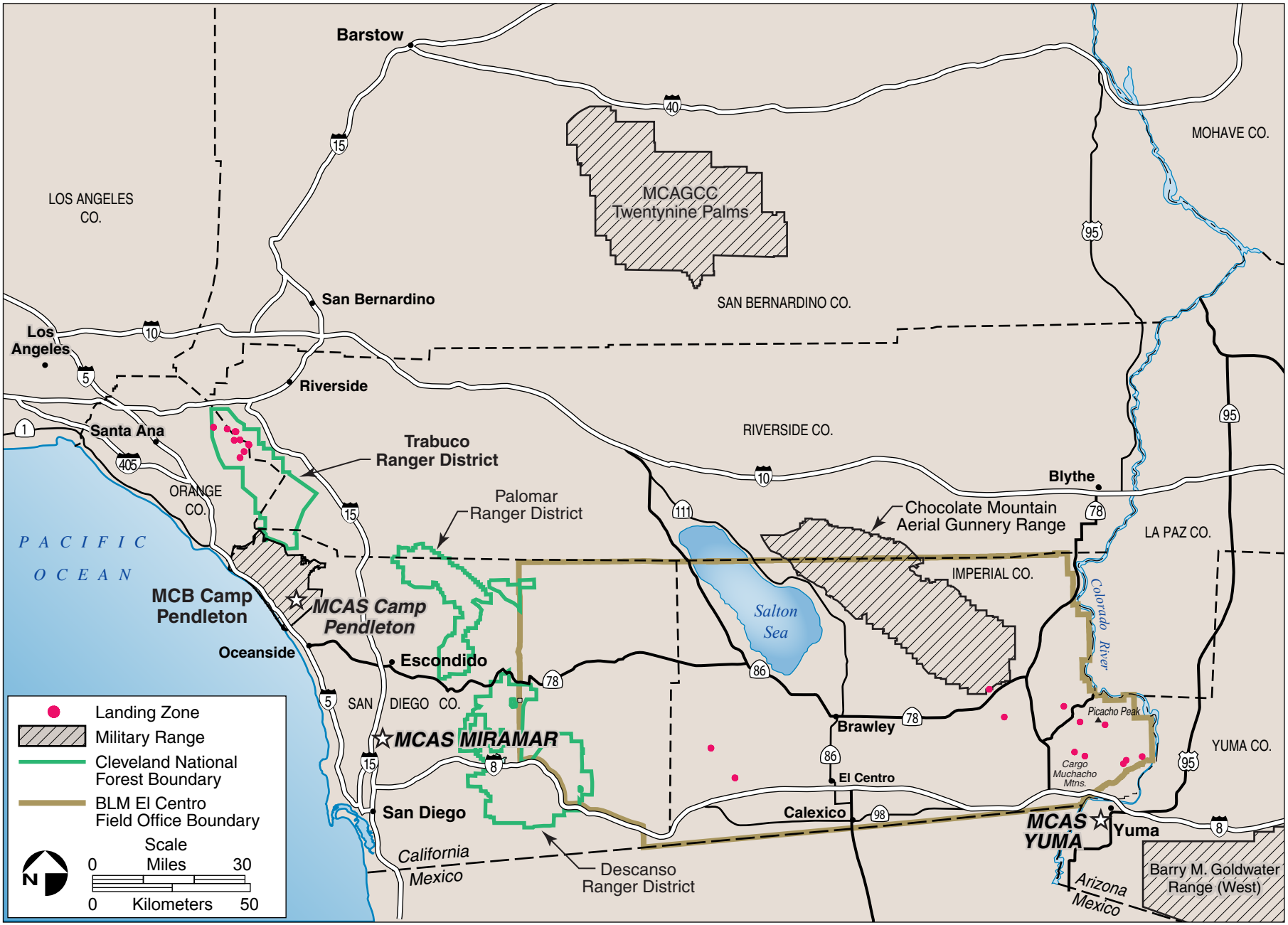


Figure 1.1-1. Location of Proposed Landing Zones within the Cleveland National Forest, Trabuco Ranger District, and the BLM El Centro Field Office

Typical practice landing and takeoff operations consist of a low level approach to the LZ to allow a pilot to visually inspect the area and select a specific landing site that is free of all obstacles (e.g., uneven terrain) and civilians (e.g., recreational users). The pilot lands the aircraft only when the area is determined safe. This type of training enables pilots and flight crews to identify an LZ, transition into an appropriate approach, land, and then subsequently take off in a variety of weather conditions (i.e., rain, lighting, cloud cover) and in different types of terrain. This type of training also can simulate various combat missions. For example, these operations may simulate the discharge or pickup of passengers, evacuation of wounded personnel, and/or the delivery of supplies, although no actual movement of people or supplies would occur at the LZs evaluated under this EA.

Depending on the training scenario, an aircraft may land and take off at an LZ only once or may make multiple passes and landings at the same LZ. An aircraft may also train at several LZs during a single training event, and the training scenario may involve multiple aircraft. Other aircraft operations, which usually are practiced in conjunction with the takeoff and landing operations at LZs, include hover-holds (e.g., hovering above an LZ), general navigation/tactical training, night vision goggle training, and terrain-flight (following the terrain).

The proposed action, alternatives, and the No Action Alternative are described in further detail in Chapter 2.0 of this EA.

1.2 Purpose of and Need for Proposed Action

The purpose of the proposed action is to allow continued military aviation training operations on USFS and BLM managed public lands in southern California that have been used for approximately 40 years by Marine Corps helicopters. The use of these public lands by USMC rotary wing and tilt-rotor squadrons is needed to develop and sustain critical pilot skills by achieving and maintaining required operational training that meet USMC standards for certifications, safety, combat effectiveness, and combat survivability.

There are two key needs for the proposed action:

- *Varied Terrain with Adequate Airspace Conditions*. To meet and maintain high standards of training, 3D MAW and other visiting squadrons must operate in a variety of terrain, climatic conditions, and altitudes that simulate various real world conditions (e.g., access to a variety of low level flight approaches, landing areas, outlying landing fields and other types of air and ground space). Aircrews must learn to quickly recognize, understand, and solve the tactical challenges presented by each of these conditions and be able to conduct all types of required missions under variable terrain. By training under a variety of environmental conditions and locations with adequate airspace conditions (e.g., lack of air traffic congestion or airspace restrictions), aircrews can maximize training opportunities and ensure that each training flight is challenging, instructional, and not repetitious.
- *Proximity* to *Air Station*. A basic requirement of aviation training is for training areas to be in reasonable proximity to military air stations if training is to result in combat-ready aircrews. Training in proximity to air stations allows aircrews and aircraft to spend a larger proportion of the limited and expensive flight time available for training on productive activities rather than en route to and from the training area. It also ensures that an aircraft can fly from the air station to a training area, complete a 40-minute training mission[3], and return to the air station while retaining an acceptable fuel reserve (e.g., enough fuel to accommodate an emergency or weather delay).

[3] Training mission durations may vary depending on how far an aircraft has to travel to reach a training area.

For the purposes of this EA, reasonable proximity is considered to be about 200 nautical miles (nm) (370 kilometers [km]) for the MV-22B (Department of Navy [DoN] 2009a), and about 65 nm (120 km) for rotary wing aircraft (Karika, personal communication 2011).

The mountainous environment of the Cleveland National Forest offers high altitude, confined area landing opportunities that are not replicated on USMC installations or training ranges in proximity to the air stations in question. The next closest high altitude military training area with established LZs is associated with the Marine Corps Mountain Warfare Training Center in the Sierra Nevada Mountains near Bridgeport, California; the LZs are located over 300 nm (555 km) from MCAS Camp Pendleton and even farther from MCAS Miramar or MCAS Yuma.

Although there are other nearby military ranges with desert terrain (e.g., Barry M. Goldwater Range West) similar to the public lands managed by the BLM EL Centro Field Office, these ranges often experience crowded airspace conditions and scheduling conflicts with fixed wing training and other advanced training exercises. These airspace conflicts limit opportunities for the types of rotary wing and tilt-rotor training addressed in this EA.

Overall, current DoD installations and ranges are able to fulfill most mission requirements, but they do not offer the full variability needed to simulate real world conditions and often experience crowded airspace conditions. Therefore, continued use of LZs on public lands managed by the USFS Cleveland National Forest and the BLM El Centro Field Office is critical to the quality, variety, and quantity of training and the ability of USMC aviation to maintain readiness.

1.3 Environmental Issues of the Proposed Action

Environmental issues potentially affected by the proposed action and evaluated in this EA include the following: Airspace; Noise; Land Use and Recreation; Air Quality; Topography, Geology and Soils; Water Resources; Biological Resources; Cultural Resources; Aesthetics; and Public Health and Safety (see also section 2.3, *Resource Areas Eliminated from Detailed Consideration*).

1.4 Regulatory Setting

This EA discusses reasonable alternatives for meeting the purpose of and need for the proposed action; establishes a baseline (i.e., existing environmental conditions) in the vicinity of the proposed action; identifies direct, indirect, and cumulative impacts that might result from the proposed action; and recommends measures to avoid or minimize potential adverse impacts. The decision to be made by the Marine Corps Installations (MCI) West is whether or not to move forward with the proposed action. The decision to be made by the USFS is whether or not to issue special use authorization to the USMC.

This EA has been prepared in accordance with applicable federal regulations, instructions, and public law including but not limited to those provided in Table 1.4-1. The National Environmental Policy Act (NEPA) requires consideration of potential impacts to the environment in the decision-making process for federal actions. Council on Environmental Quality (CEQ) regulations implement the "action forcing" provision of NEPA to ensure that federal agencies comply with NEPA. Marine Corps Order (MCO) P5090.2A (with change 2) provides specific guidance for the USMC in preparing environmental documentation for proposed actions subject to NEPA, and USFS procedures for implementing NEPA are set forth in 32 Code of Federal Regulations (CFR) Part 220.

The proposed action is the continuation of and modification to an ongoing USMC activity. USMC NEPA policy and guidance (MCO P5090.2A Section 12202.1b and USMC NEPA Manual Section 2.1) requires NEPA review of continuing activities when there is a substantial change in the continuing activity (such

as operational tempo, area of use, or equipment) that has the potential for significant environmental impacts.

Table 1.4-1. Applicable Federal Regulations, Instructions, and Public Law

Name	*Regulation*
National Environmental Policy Act of 1969	Public Law 91-190, 42 USC §§ 4321-4370h
Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act	40 CFR Parts 1500-1508
Department of Navy Procedures for Implementing the National Environmental Policy Act	32 CFR Part 775
United States Forest Service Procedures for Implementing NEPA	32 CFR Part 220
Environmental Compliance and Protection Manual Chapter 12	Marine Corps Order P5090.2A, change 2
Military Activities On and Over the Public Lands	Bureau of Land Management Instruction Memorandum No. 2001-030
Clean Air Act, as amended, 42, including 1993 General Conformity Rule	USC §§ 7401-7671q
Clean Water Act	33 USC §§ 1251-1387
Comprehensive Environmental Response Compensation and Liability Act	42 USC §§ 9601-9675
Endangered Species Act	16 USC §§ 1531-1544
Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations, 11 February 1994	Executive Order 12898
Federal Land Policy and Management Act	43 USC §§1701-1785
Federal Leadership in Environmental, Energy, and Economic Performance, 5 October 2009	Executive Order 13514
Floodplain Management, 24 May 1977	Executive Order 11988
Strengthening Federal Environmental, Energy, and Transportation Management	Executive Order 13423
Invasive Species	Executive Order 13112
Migratory Bird Treaty Act	16 USC §§ 703-712
Minimum Standards for Management of Hazardous and Extremely Hazardous Wastes	California Code of Regulations, Title 22
National Historic Preservation Act	16 USC §§ 470-470x-6
Native Americans Graves Protection and Repatriation Act	25 USC §§ 3001-3013 & 40 CFR Part 10
Protection of Children from Environmental Health Risks and Safety Risks, 23 April 1997	Executive Order 13045
Resource Conservation and Recovery Act	42 USC §§ 6901-6992k
Responsibility of Federal Agencies to Protect Migratory Birds, 11 January 2001	Executive Order 13186
Strengthening Federal Environmental, Energy, and Transportation Management, 24 January 2007	Executive Order 13423
Notes: USC = United States Code, CFR = Code of Federal Regulations	

1.5 Public Participation Process

The purpose of the public participation process was to actively inform the public, organizations, government agencies, federally and non-federally recognized Indian tribes, and elected officials about the proposed action and to receive public input during the various stages of the NEPA process. The USFS issued 204 public scoping letters (Appendix A-1) for the proposed action in March 2012 for a 30-day scoping period that ended on 15 April 2012. No comments were received in response to the scoping letters. The Public Draft EA was released on 2 July 2012 for a 30-day review period. The document was available for review at three local libraries and for download on the project website (*www.rotarywingnepa.com*). The USMC

held two open house public meetings in southern California (El Centro and Corona) on 17 and 25 July 2012. The public outreach efforts related to the release of the Public Draft EA are described more fully in Appendix F-2. Additionally, section 2.6 (*Agency Consultation and Approvals*) has more information about coordination and consultation efforts with government agencies and federally and non-federally recognized Indian tribes.

Eleven comments were received during the 30-day review of the Public Draft EA, and responses to these comments are provided in Appendix F-1. The comments addressed concerns about cultural resources, public safety, hazardous materials and waste, and open space. Based on these comments and further input from consultation efforts, the USMC decided to drop LZ Canary and LZ PC3 Option from further consideration. This change is reflected in the Final EA.

1.6 Organization of the Document

This EA is organized as follows: Chapter 1 defines the purpose of and need for the proposed action. Chapter 2 describes the alternatives for accomplishing the proposed action. Chapter 3 describes the affected environment and analyzes the environmental consequences of each alternative. Chapter 4 examines the cumulative impacts of the proposed action in conjunction with other past, present, and reasonably-foreseeable future actions in the area. Chapter 5 addresses various other considerations required by NEPA. The final chapters of the EA include a list of references cited, persons and agencies contacted, and the names of preparers and their qualifications.

2 Description of Proposed Action and Alternatives

The proposed action is use of specific public lands managed by the USFS and BLM for USMC aviation training operations to attain and maintain proficiency in the operational employment of rotary wing and tilt-rotor aircraft.

2.1 USMC Aviation Squadrons under Consideration in this EA

As directed by law (10 United States Code [USC] § 5063), the USMC must be able to field, on virtually immediate notice, a self-sufficient, combined arms combat force that can operate in three dimensions (land, air, and sea) under a single command. The USMC organizes its ground combat divisions and air wings into Marine Air Ground Task Forces (MAGTF). This forms the fundamental cornerstones of modern USMC combat doctrine and is one of the first front-line combat forces that the nation turns to in times of crisis. The training operations addressed under this proposed action would primarily be conducted by 3D MAW, which is the aviation component of the I MEF, the USMC's largest MAGTF. The 3D MAW mission is to provide combat ready expeditionary aviation forces capable of short notice world wide deployment to MAGTF, fleet, and unified commanders. 3D MAW was commissioned in November 1942, and has supported combat efforts during World War II, the Korean War, the Vietnam War, and recent actions in the Middle East. It has also supported humanitarian actions in Somalia, Haiti, India, and Pakistan.

3D MAW currently operates 19 squadrons of rotary wing and tilt-rotor aircraft under two Marine Air Groups (MAGs), including MAG 16 stationed at MCAS Miramar and MAG 39 stationed at MCAS Camp Pendleton. Of the 330 rotary wing and tilt-rotor aircraft in the current 3D MAW inventory, there are 95 AH-1W/Z, 63 UH-1N/Y, 64 CH-53E, and 108 aircraft that have transitioned or are currently transitioning from CH-46E to MV-22B[1]. 3D MAW also operates fixed wing aviation squadrons under MAG 11 and MAG 13 (Hornet - FA-18D/E, Harrier - AV-8B, and Hercules - KC-130), but these fixed wing squadrons are not part of the proposed action.

Although training activities would primarily be conducted by 3D MAW, training would also be conducted by squadrons from other aircraft wings, such as visiting east-coast based 2D MAW squadrons or 4th MAW reserve squadrons. Some training may also originate out of MCAS Yuma, especially during special exercises, like those associated with the Weapons Tactics Instructors (WTI) course. The purpose of the WTI course is to hone the skills of USMC aviation units in weapons delivery, tactics, command and control, and integration of joint forces. Special exercises such as WTI are designed to expose participants to missions that would likely be implemented while deployed, with emphasis on integration, coordination, and tactical execution. However, proposed types of operations at the LZs discussed in this EA would be similar no matter where the aircraft originated or whether the flight activity was part of an individual training exercise or a larger special exercise (i.e., practicing landing and takeoff operations only, but no discharge or pickup of people or supplies).

2.1.1 Description of Rotary Wing and Tilt-Rotor Aircraft

The rotary wing and tilt-rotor aircraft under consideration in this EA include the MV-22B, CH-46E, CH-53E, AH-1W/Z, and UH-1N/Y (Figure 2.1-1, Table 2.1-1).

[1] As of the time of the release of this EA, four CH-46E squadrons have already transitioned to the MV-22B. An additional five squadrons are scheduled to transition to the MV-22B by 2017 (USMC 2010a).

Super Cobra (AH-1W)

Viper (AH-1Z)

Super Stallion (CH-53E)

Sea Knight (CH-46E)

Osprey (MV-22)

Huey (UH-1N)

Venom (UH-1Y)

Figure 2.1-1. Photographs of Rotary Wing and Tilt-Rotor Aircraft

Table 2.1-1. Aircraft Comparison

Aircraft	*Empty Weight (lbs)*	*Payload (lbs)*	*Cruise Speed(kts)*
AH-1W (Super Cobra)	10,750	3,986	131
AH-1Z (Viper)	11,700	5,558	137
UH-1N (Huey)	7,200	3,352	100
UH-1Y (Venom)	11,700	5,930	153
CH-46E (Sea Knight)	11,600	4,000 lbs	120
CH-53E (Super Stallion)	37,500	Internal: 32-55 passengers; External: 36,000 lbs	150
MV-22B (Osprey)	35,000	Internal: 24 passengers; External: 12,500 lbs	240

Notes: lbs=pounds; kts=knots
Source: USMC 2010a; DoN 2009b.

The CH-46E, a medium lift helicopter, is approaching the end of its service life, and is currently being replaced by the MV-22B. The transition between CH-46E and MV-22B is expected to be completed by 2017, based on the current Marine Aviation Plan (USMC 2010a). The mission of the CH-46E and MV-22B squadrons is to support the MAGTF commander by providing assault support transport of combat troops, supplies and equipment, day or night under all weather conditions during expeditionary, joint, or combined operations (USMC 2010a).

The MV-22B tilt-rotor aircraft is a new type of aircraft for the USMC with new and different capabilities as compared to the CH-46E helicopter it replaces. The MV-22B has the ability to fly twice as fast, four times as far, and carry twice the combat load of the less-capable, 1960s-era CH-46E medium lift helicopters (DoN 2009b). The unique tilt-rotor allows the MV-22B to operate as a helicopter or turboprop airplane. This allows the MV-22B to combine the hovering advantages of a helicopter, with the high speed and high altitude cruise capability of a modern turboprop airplane. The MV-22B can carry up to 24 combat-loaded Marines, or 12,500 pounds (6 tons) of cargo, at a cruising speed in excess of 240 knots (276 miles per hour [mph]) (USMC 2010a). It has a flight ceiling of up to 25,000 feet (7,620 meters). Combat support is enhanced by the MV-22B's ability to operate at night, under adverse weather conditions, in confined or isolated areas, and with various internal and external loads. These special capabilities allow the USMC to rapidly insert assault forces into enemy territory while enhancing aircraft and passenger security and survivability.

The CH-53E is a heavy lift helicopter designed to transport heavy equipment and supplies to and from offshore ships as well as support subsequent onshore operations. The CH-53E can carry between 32 and 55 passengers (depending on seat configuration), and is capable of transporting 36,000 pounds (16 tons) of cargo externally, at a cruising speed of about 150 knots (173 mph) (USMC 2010a). The mission of the CH-53E squadrons is to support the MAGTF commander by providing assault support transport of heavy weapons, equipment and supplies (USMC 2010a).

The USMC also occasionally uses the CH-53E and the CH-46E to support the California Department of Forestry and Fire Protection (CAL Fire) with wildfire suppression in wildland areas of San Diego County, upon request (Fire Department News Network 2011). The MV-22B is currently undergoing testing for a fire-bucket (a bucket assembly suspended from an aircraft to carry water for fire-fighting efforts), which would allow it to replace the CH-46E in these wildfire suppression efforts.

The AH-1W/Z and UH-1N/Y are light attack helicopters, whose mission is to support the MAGTF commander by providing offensive air support, utility support, armed escort and airborne supporting arms coordination (USMC 2010a). These attack helicopters carry between two and six weapons stations (USMC 2010a). Attack helicopters generally practice landing and takeoff exercises at LZs less than the other rotary wing aircraft because their primary mission is air support, not transport of people or supplies.

2.1.2 Current Rotary Wing Flight Activities

Two specialized terms are often used to describe flight activities: sortie and operation. A *sortie* consists of a single military aircraft flight from takeoff through landing. For example, an aircraft entering a specific area, conducting its mission in the airspace, and then exiting the airspace has its activity counted as one sortie. An *operation* represents a single movement or individual flight, such as one takeoff, arrival, or touch-down. For example, one aircraft departing and returning would represent two airfield flight operations. Therefore, a single sortie generates two or more operations. The following quantified flight information is based on sortie counts, unless otherwise stated.

USMC rotary wing aircraft currently conduct an estimated 935 annual sorties, which equate to about 4,892 individual LZ landings, at the Cleveland National Forest and on BLM El Centro managed lands (Table 2.1-2). Hover-holds (e.g., hovering above an LZ), general navigation/tactical training, night vision goggle training, and terrain-flight (following the terrain)[2] are practiced in conjunction with the takeoff and landing operations at LZs. Aviation training most often involves one or two rotary wing aircraft, but may include as many as four aircraft landing simultaneously at one LZ (depending on LZ size and configuration). Current and proposed flight activities at the Cleveland National Forest and on BLM El Centro managed lands do not include ground troop movements or training, refueling operations, or the use of flares or ordnance.

Table 2.1-2. Existing Estimated Annual Sorties and Landings on Non-DoD Lands

Aircraft	*Cleveland National Forest*		*BLM El Centro*		*Total*	
	Sorties	*Landings*	*Sorties*	*Landings*	*Sorties*	*Landings*
AH-1W/Z	228	744	49	150	277	894
UH-1N/Y	132	828	31	180	163	1,008
CH-53E	24	140	197	1,110	221	1,250
CH-46E[1]	68	420	206	1,320	274	1,740
Total	452	2,132	483	2,760	935	4,892

Notes:
1. Sortie estimates are based on pre-transition to the MV-22B (see Appendix C [Noise]).
2. Sorties comprise both Confined Area Landing (CAL) and non-CAL type sorties. For this EA, non-CAL sorties include general navigation/tactical training conducted in the vicinity of an LZ, while landing and takeoff operations are considered CAL sorties.
3. Landings are based on the number of estimated landings that take place during each CAL sortie; this estimate differs by aircraft type (see Appendix B [*Air Quality Emissions Calculations*]).

Flight activities are conducted in conformance with Federal Aviation Administration (FAA)-mandated restrictions and Naval Air Training and Operating Procedures Standardization (NATOPS) flight instructions (e.g., Chief of Naval Operations Instruction [OPNAVINST] 3710.7U), which includes regulations regarding public areas and designated wilderness areas. Pilots are restricted from landing within congressionally-designated or proposed wilderness areas or United States Fish and Wildlife Service (USFWS)-designated critical habitat.

All aircraft also operate in accordance with their corresponding NATOPS training manuals. For example, the NATOPS manual on the MV-22B identifies measures and limitations on how the aircraft is flown, including time on the ground and requirements for nacelle rotation when landed to reduce heat effects.

2.2 Proposed Action

The proposed action addressed in this EA is the continued flight activities of USMC aircraft on non-DoD lands, specifically aircraft operations on and over public lands administered by the Cleveland National

[2] Only a minor amount of terrain-following flights are currently conducted by the CH-46E at these locations, and none are proposed for any aircraft under Alternative 1.

Forest and the BLM El Centro Field Office, to attain and maintain proficiency in the operational employment of rotary wing and tilt-rotor aircraft. This section describes the reasonable alternatives for accomplishing the proposed action, which were developed by the USMC in cooperation with the USFS (see Chapter 6, *Persons and Agencies Contacted or Consulted*, for more information). CEQ Regulations for Implementing the Procedural Provisions of NEPA establish a number of policies for federal agencies, including "using the NEPA process to identify and assess the reasonable alternatives to the proposed action that will avoid or minimize adverse effects of these actions on the quality of the human environment" (40 CFR 1500.2 [e]). Therefore, this EA only carries forward for analysis alternatives that could reasonably meet the purpose and need for the proposed action. Alternatives considered but eliminated because they would not meet the purpose of and need for the proposed action are discussed in section 2.2.3 (*Alternatives Considered But Eliminated*).

One action alternative was carried forward for full analysis, as described below.

2.2.1 Alternative 1

2.2.1.1 Use of Landing Zones

Alternative 1 was designed to allow continued military aviation training operations on public lands managed by the USFS Cleveland National Forest and the BLM El Centro Field Office at selected, existing LZs. Specific LZs on these public lands were selected for continued operations based on the following criteria:

- Adequate airspace conditions (e.g., lack of air traffic congestion or airspace restrictions) to support flight operations by rotary wing and tilt-rotor aircraft;
- Avoidance of congressionally-designated or proposed wilderness areas or USFWS-designated critical habitat; and
- Compatibility with land owner uses and/or management plans.

Under Alternative 1, USMC aviation would continue existing rotary wing flight activity at the Cleveland National Forest and on BLM El Centro managed lands, except that CH-46E sorties would decline over time and would be replaced by MV-22B sorties. The USMC proposes to conduct an estimated 2,502 annual sorties, which equate to 15,861 individual LZ landings, at the Cleveland National Forest and on BLM El Centro managed lands (Tables 2.2-1 and 2.2-2). Overall, the number of proposed sorties at the Cleveland National Forest is expected to go down about seven percent compared to existing conditions (although the number of individual landings is expected to go up about three percent), and the number of proposed sorties and landings on BLM El Centro managed lands is expected to increase by over 300 percent.

The largest change in aircraft flight activity is related to the proposed MV-22B sorties. The MV-22B tilt-rotor aircraft is a new type of aircraft for the USMC, with new and different capabilities as compared to the CH-46E helicopter it replaces. The USMC has made reasonable assumptions about the number and types of proposed MV-22B sorties, based on what is currently being performed by medium lift helicopter squadrons, while accounting for noted differences in the aircraft. For example, with its greater speed and range, the MV-22B would permit tactical training in ways not currently possible using conventional helicopters, including training farther from their homebase without the need for refueling (see section 1.2, under bullet *Proximity to Air Station*). For this reason, operators of the MV-22B propose to use BLM El Centro managed lands much more than operators of the existing CH-46E helicopter. The operations-related information provided here and elsewhere in the EA is based on the MV-22 Training and Readiness Manual (USMC 2010b), which provides the best information available regarding proposed MV-22B flight activity.

Table 2.2-1. Proposed Change in Annual Sorties by Aircraft Type under Alternative 1

Aircraft	*Estimated Existing Annual Sorties*	*Estimated Proposed Annual Sorties*	*Proposed Change in Annual Sorties*	*Percent Change*
Cleveland National Forest				
AH-1W/Z	228	154	-74	-32%
UH-1N/Y	132	138	+6	+5%
CH-53E	24	24	-	0%
CH-46E	68	-	-68	N/A
MV-22B[1]	-	106	+106	N/A
Total	452	422	-30	-7%
BLM El Centro				
AH-1W/Z	49	37	-12	-24%
UH-1N/Y	31	33	+2	+6%
CH-53E	197	196	-1	-1%
CH-46E	206	-	-206	NA
MV-22B[1]	-	1,814	+1,814	N/A
Total	483	2,080	+1,597	+331%

Notes:
1. Existing sorties are based on 2010 flight activities; proposed sorties are based on expected 2017 flight activities (after full transition to the MV-22B) (see Appendix C [*Noise*]).

Table 2.2-2. Proposed Change in Annual Landings by Aircraft Type under Alternative 1

Aircraft	*Estimated Existing Annual Landings*	*Estimated Proposed Annual Landings*	*Proposed Change in Annual Landings*	*Percent Change*
Cleveland National Forest				
AH-1W/Z	744	492	-252	-34%
UH-1N/Y	828	852	+24	+3%
CH-53E	140	140	-	0%
CH-46E	420	-	-420	NA
MV-22B[1]	-	721	+721	N/A
Total	2,132	2,205	+73	+3%
BLM El Centro				
AH-1W/Z	150	114	-36	-24%
UH-1N/Y	180	192	+12	+7%
CH-53E	1,110	1,100	-10	-1%
CH-46E	1,320	-	-1,320	NA
MV-22B[1]	-	12,250	+12,250	N/A
Total	2,760	13,656	+10,896	+395%

Notes:
1. Landings are based on the number of estimated landings that take place during each CAL sortie; this estimate differs by aircraft type (see Appendix B [*Air Quality Emissions Calculations*]).

Based on the latest Marine Aviation Plan (USMC 2010a), the number of proposed AH-1W/Z and UH-1N/Y sorties is estimated to fluctuate slightly from existing conditions due to slight changes in aircraft numbers over time, while CH-53E operations would remain similar to existing conditions.

Flight activities would be conducted in conformance with FAA-mandated restrictions, NATOPS instructions, and other applicable regulations, as described in section 2.1.2 (*Current Rotary Wing Flight Activities*). Proposed aircraft training on non-DoD lands covered under this EA would not include ground troop movements or training, refueling operations, or the use of flares or ordnance.

2.2.1.2 Transit Routes

Aircraft would originate from MCAS Miramar, MCAS Camp Pendleton, or MCAS Yuma. Rotary wing aircraft originating from MCAS Miramar and MCAS Camp Pendleton would re-fuel at MCAS Yuma before using the LZs on BLM El Centro managed lands. Rotary wing aircraft originating from MCAS Yuma would re-fuel at MCAS Miramar or MCAS Camp Pendleton before using the LZs at the Cleveland National Forest. With its greater range as a tilt-rotor aircraft, there is no need for the MV-22B to refuel before training at either location.

Aircraft would fly along normal departure routes from an airfield and then along established routes to reach a general LZ area. While transitioning to the LZs from an airfield, rotary wing aircraft usually would fly between 1,000 to 2,000 feet (305 to 610 meters) above ground level, while the tilt-rotor aircraft usually would fly similar to a turboprop airplane between 8,000 to 12,000 feet (2,438 to 3,658 meters) above ground level. Although military missions are normally exempt from Forest Service Manual Policy 2326.03, which discourages flying at least 2,000 feet over the ground surface over designated and recommended National Forest wilderness areas, the USMC would strive to be consistent with this policy, whenever possible.

2.2.1.3 Flight Activity within the Cleveland National Forest

History of Use and Agency Authorization

A 1972 Memorandum of Understanding (MOU) between the United States (U.S.) Navy, NAVFAC SW, and the USFS, California Region established the use of nine LZs for military training. The LZs were prepared and graded in the early 1970s specifically for rotary wing landing exercises. The 1972 MOU was based on a Joint Policy between the USDA and the DoN relating to the use of National Forest lands for Defense Purposes and executed by the two Departments in February 1972.

Because of the introduction of the MV-22B aircraft to USMC operations, and because an MOU is no longer appropriate for authorizing use of National Forest System lands, the USMC is seeking to obtain special use authorization from the Cleveland National Forest to allow continued use of the established LZs by USMC aviation. This is consistent with a 1988 Master Agreement between the DoD and the USDA, which established policies and procedures for establishing special use authorization for DoD activity on National Forest System lands. This is also consistent with 36 CFR Part 251, Subpart B (*Special Uses of Parks, Forests, and Public Property*), which states that "before conducting a special use, individuals or entities must submit a proposal to the authorized officer and must obtain a special use authorization from the authorized officer" (36 CRF § 251.50[a]). This authorization would need to be renewed every twenty years.

Landing Zones

Although flight activity may occur over much of the Cleveland National Forest, only specific areas have been designated for landing and takeoff operations (Figure 2.2-1). The USMC proposes to use eight of the nine LZs established in the 1972 MOU (LZ Sites 3 and 5 through 11). Additionally, two of these LZs (LZ Site 6 and LZ Site 9) also have alternative landing configurations and thus have been identified as separate LZs for the purpose of this EA (i.e., LZ Site 6 and LZ Site 6 Alt; and LZ Site 9 and LZ Site 9 Alt). LZ Site 4, one of the original nine LZs, is not proposed for continued use at this time because this LZ is located on private in-holdings within the Cleveland National Forest. Therefore, 10 LZs (8 original and 2 alternative configurations) are carried forward for analysis.

Overview of LZ Site 3

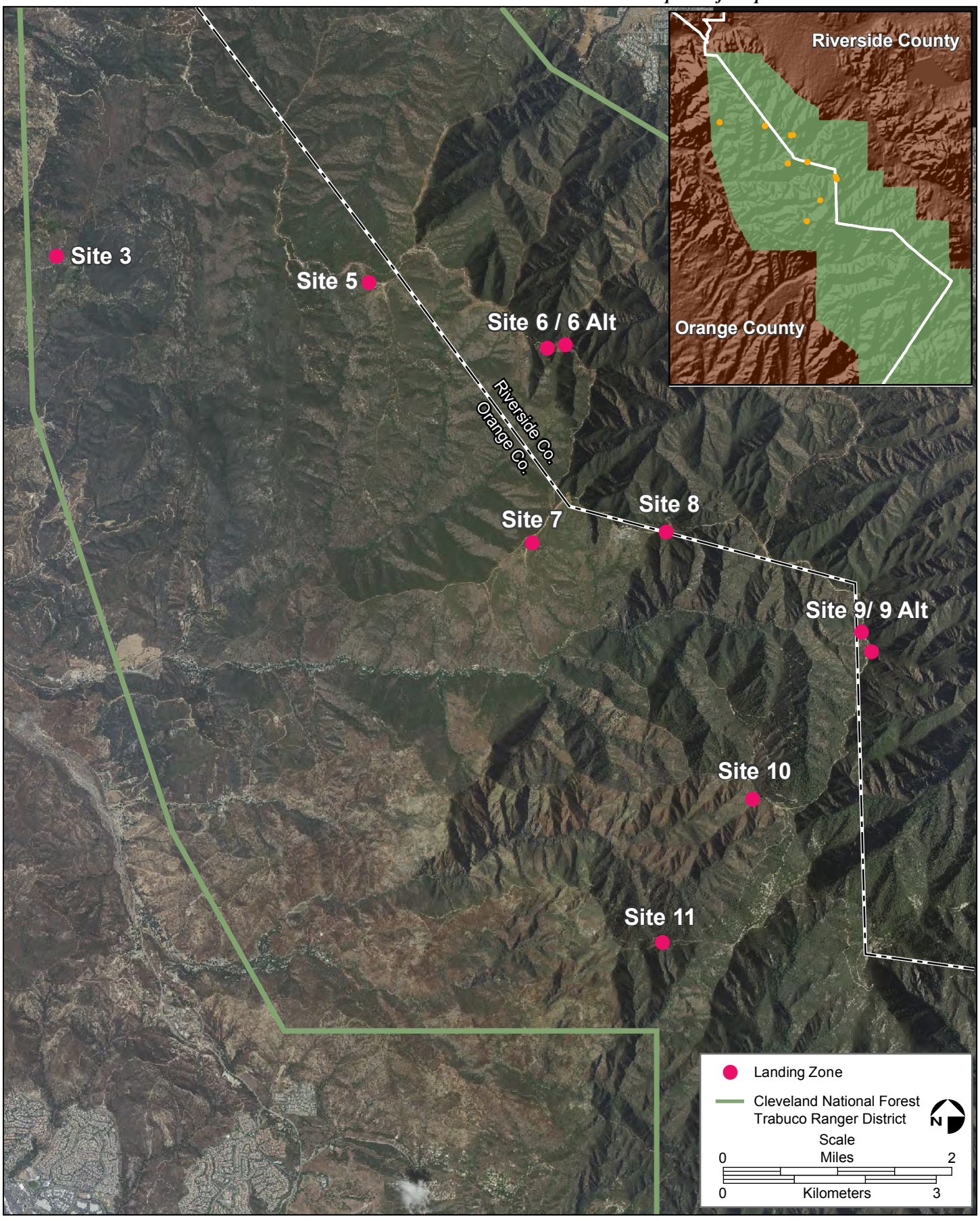


Figure 2.2-1. Location of Proposed Landing Zones within the Cleveland National Forest

The 10 LZs have met the USMC's conventional rotary wing training requirements for close to 40 years, and the USMC has determined these same LZs are suitable for MV-22B operations. Use of existing LZs would minimize potential environmental impacts that could result from the creation of new LZs. No new construction or improvements are planned at any LZ location. The existing LZs offer relatively open areas, with little or no vegetation cover, and lack physical obstructions like trees and utility poles that would present a safety hazard to pilots. Many of the LZs show direct evidence of helicopter use, such as aircraft tie-downs at LZ Site 5 and wind sock poles at LZ Sites 5, 7, 8, 9 Alt, and 11. In particular, LZ Site 6 Alt is composed of a circular paved helicopter landing pad. Close-up figures of all proposed LZs are in Appendix D.

The LZs are located within the Santa Ana Mountains, along the Orange and Riverside County boundary. Nearby residential development has encroached on USFS land over the past 40 years. The Santa Ana Mountains are characterized by narrow ridges with steep slopes and deep canyons. Santiago Peak (5,689 feet/1,734 meters) is the tallest peak in the Santa Ana Range and, along with Modjeska Peak (5,496 feet/1,675 meters), forms what is commonly called Saddleback Ridge. The LZs are located within this mountainous terrain, with elevations ranging from 2,030 to 4,566 feet (619 to 1,392 meters) above mean sea level (MSL) (Table 2.2-3). Maximum temperatures ranges from 84 to 92 degrees Fahrenheit (°F) (29 to 33 degrees Celsius [°C]), while winter lows can range between 32 to 44 °F (0 to 7 °C) (Munz and Keck 1968).

Table 2.2-3. List of Proposed Landing Zones within the Cleveland National Forest

LZ Name	*LZ Size (acreage)*	*Elevation (feet AMSL)*	*USGS Quadrangle Name*	*Proposed Annual Sorties for All Aircraft*
Site 3	0.3	2,030	Black Star Canyon	36
Site 5	0.3	3,946	Corona South	36
Site 6	0.1	3,631	Corona South	170*
Site 6 Alt	0.2	3,553	Corona South	
Site 7	0.3	3,704	Corona South	36
Site 8	0.2	3,805	Corona South	36
Site 9	0.1	4,117	Corona South	36*
Site 9 Alt	0.1	4,258	Santiago Peak	
Site 10	0.1	4,566	Santiago Peak	36
Site 11	0.3	4,225	Santiago Peak	36

Notes:
1. LZ = Landing Zone; AMSL = above mean sea level; USGS = United States Geological Survey
2. *Proposed sorties would likely be split between the main and alternative landing configurations for LZ Site 6/LZ Site 6 Alt and LZ Site 9/LZ Site 9Alt.
3. Proposed annual sorties at each LZ are based on the number of estimated sorties for all aircraft types (see Appendix C [*Noise*]).

Operating Parameters and Flight Protocols

Pilots may practice landing multiple times at an LZ, and may land at multiple LZs during each visit to the Cleveland National Forest. Multiple aircraft may also use an LZ (depending on LZ size and configuration) during a practice landing. About 35 sorties would occur per month, based on 422 proposed annual sorties (Table 2.2-1). Normal flight operations would not include weekends (beginning at noon on Friday and ending at midnight on Sunday) and holidays. Some operations would also be conducted during the evening and night hours (see section 3.2, *Noise*, for more details).

Squadron scheduling personnel would notify Cleveland Emergency Services Dispatch (Cleveland Dispatch) and the Special Use Coordinator to schedule landing operations typically two weeks in advance. Pilots would also contact the Cleveland Dispatch when checking into and out of the area. If unable to make radio contact, a squadron Operations Duty Officer would telephone Cleveland Dispatch and notify when aircraft are inbound and outbound.

All flight operations would follow standard operating procedures for 3D MAW described in Wing Order 3710.39E and/or similar wing orders for visiting squadrons (e.g., Wing Order 3710.39 for 2D MAW). Additionally, on approach to an LZ, pilots would perform clearance passes of each LZ before landing, and pilots would not land, or attempt to land, if civilians are present, consistent with standard avoidance measures used to minimize annoyance of persons on the ground (OPNAVINST 3710.7U subsection 5.5 [*Reducing Flight-Related Disturbances*]).

To address USFS concerns about dust emissions from aircraft landing and takeoff operations, the proposed action includes implementation of dust abatement measures for undeveloped LZs (i.e., those with exposed soils) and maintenance of paved LZs within the Cleveland National Forest. These measures have yet to be described in detail, but are expected to consist of application of a non-toxic dust palliative (e.g., semi-permanent glue-like materials) that would reduce the amount of dust mobilized and dispersed by aircraft operations. The USMC will work with the USFS on selection of an appropriate material and on implementation of a suitable monitoring plan. Monitoring would ensure that the dust abatement measures are successful in reducing dust generation to a level that would not adversely affect the area surrounding the LZ and ensure that the dust abatement practices themselves do not result in adverse effects on regulated resources.

2.2.1.4 Flight Activity within BLM El Centro Managed Lands

History of Use and Agency Authorization

The BLM El Centro managed lands offer large expanses of open desert that have been used for USMC landing and takeoff operations over the last 40 years. Unlike the prepared and graded LZs within the Cleveland National Forest, the open desert was conducive to landing operations without any type of land improvement. The USMC estimates that over the past 40 years about 60 LZs were used in the open desert. Of those 60 LZs, 13 designated LZs have been selected for evaluation under the proposed action (Table 2.2-4, Figure 2.2-2)[3].

Table 2.2-4. List of Proposed Landing Zones within BLM El Centro Managed Lands

LZ Name	*LZ Size (acreage)*	*Elevation (feet AMSL)*	*USGS Quadrangle Name*	*Proposed Annual Sorties for All Aircraft*
Bull	3.8	641	East of Acolita	346
C1	1.8	232	Plaster City NW	114
Cupcake	2.0	782	Picacho Peak	116
Eider	5.9	366	Bard	116
IP1 Option	2.3	921	Quartz Peak	116
Mallard	1.8	685	Araz	116
ME3 Option	13.0	277	Bard	116
MW1	3.2	358	Bard	116*
MW1 Option	5.4	361	Bard	
PC3	0.8	687	Quartz Peak	116
Pelican	0.3	1,952	Picacho Peak	346
Sparrow	13.6	491	Clyde	346
Wolf	31.0	161	Painted Gorge	116

Notes:
1. LZ = Landing Zone; AMSL = above mean sea level; USGS = United States Geological Survey
2. *Proposed sorties would likely be split between the main and optional landing configurations for MW1/MW1 Option.
3. Proposed annual sorties at each LZ are based on the number of estimated sorties for all aircraft types (see Appendix C [*Noise*]).

[3] LZ Canary and LZ PC3 Option, which were addressed in the Public Draft EA, have been subsequently dropped from further consideration.

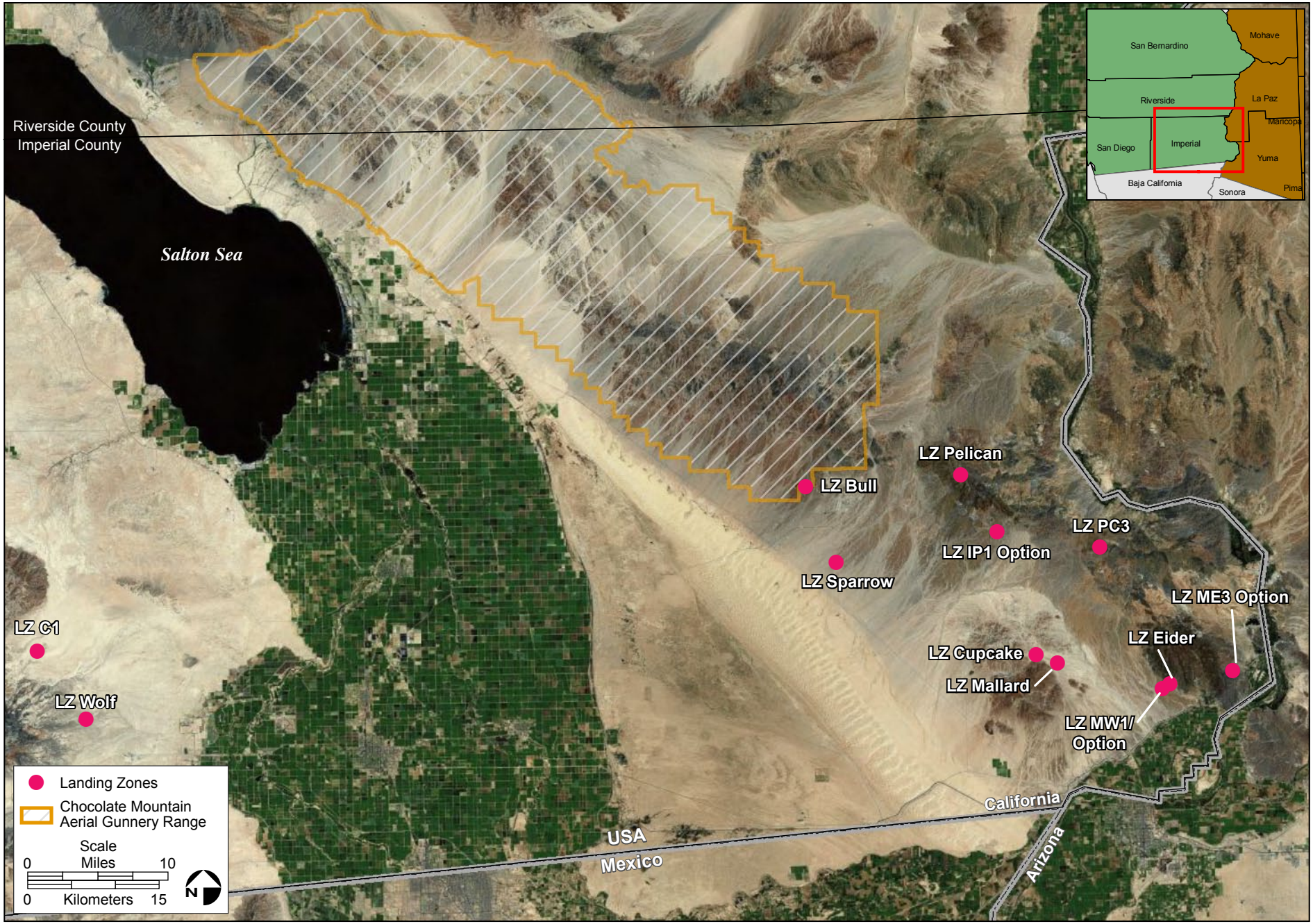


Figure 2.2-2. Location of Proposed Landing Zones within BLM El Centro Managed Lands

The types of landing and takeoff operations addressed under the proposed action are consistent with the definition of "casual use level of activity," according to BLM Instruction Memorandum No. 2001-030 (Attachment 1: Military Activities on the Public Lands, section B.1.f). Casual use of BLM managed public lands is defined by 43 CFR 2920.0-5(k) and 2920.1-1(d) (see also BLM Manual Section 2801.48.A). By definition, casual use activities do not have any adverse safety impacts on other public land uses, and have only a minimal or transient environmental effect on relatively small areas of public lands. Activities that qualify under casual use require no authorization from BLM. Although no written authorization is necessary, the USMC is coordinating with BLM on the proposed action as a casual use level activity as defined by BLM Instruction Memorandum No. 2001-030, Attachment 1.

Landing Zones

As described in the previous section under *History of Use and Agency Authorization*, landing and takeoff operations on BLM El Centro managed lands would be restricted to 13 designated LZs. The USMC has determined that these LZs are suited for proposed operations. No new construction or improvements are needed at any LZ location. Close-up figures of all proposed LZs are in Appendix D.

Overview of LZ Bull

The LZs are located north of the U.S.-Mexico border in the vicinity of El Centro, California, and north-northwest of Yuma, Arizona, in the Colorado and Yuha deserts (subdivisions of the Sonoran Desert). The mean annual temperatures range from 68 to 75 °F (20 to 24 °C). In summer the average maximum temperatures range from 106 to 108 °F (41 to 42 °C) whereas in the winter average minimum temperatures are 37 °F (2.7 °C) (Miles and Goudey 1997). Annual precipitation in true deserts is less than 6 inches (150 millimeters [mm]) and in drier deserts, like the Colorado and Yuha Deserts, rainfall is less than 3 inches (75 mm) (Pavlik 2008).

Overview of LZ Wolf

The geography of this portion of the Sonoran Desert is mostly broad flat valleys with scattered mountains of barren rock. The valleys are dominated by low shrubs, and the mountains support a variety of shrubs and cacti, but the density is typically very sparse. The LZs, themselves, are typically composed of desert pavement[7] with little to no vegetation. This portion of the Sonoran Desert is fairly low in elevation, compared with other subdivisions of the Sonoran Desert, extending from about 4,000 feet (1,219 meters) in elevation to below sea level in some valleys. The elevation of the LZs range from 161 to 1,952 feet (49 to 595 meters) above MSL (see Table 2.2-4).

[7] Desert pavement is formed when, in low moisture environments, silt and sand particles are easily blown away, and the remaining particles form a tightly packed layer of rocks. Large, flat areas of desert pavement without vegetation are a prominent feature of extremely arid landscapes.

Operating Parameters and Flight Protocols

Pilots may practice landing multiple times at an LZ, and may land at multiple LZs during each visit. Multiple aircraft may also use an LZ (depending on LZ size and configuration) during a practice landing. About 173 sorties would occur per month, based on 2,080 proposed annual sorties (see Table 2.2-1). Normal flight operations would not include weekends (beginning at noon on Friday and ending at midnight on Sunday) and holidays. Some operations would also be conducted during the evening and night hours (see section 3.2, *Noise*, for more details). BLM does not require notification before scheduling landing operations because of the "casual use" nature of the activity.

All flight operations would follow standard operating procedures for 3D MAW described in Wing Order 3710.39E and/or similar wing orders for visiting squadrons (e.g., Wing Order 3710.39 for 2D MAW). Additionally, on approach to an LZ, pilots would perform clearance passes of each LZ before landing, and pilots would not land, or attempt to land, if civilians are present, consistent with standard avoidance measures used to minimize annoyance of persons on the ground (OPNAVINST 3710.7U subsection 5.5 [*Reducing Flight-Related Disturbances*]).

2.2.2 No Action Alternative

Under the No Action Alternative, no USMC rotary wing or tilt-rotor operations would occur on public lands managed by the Cleveland National Forest and the BLM El Centro Field Office. It is possible that private companies and other agencies, such as the Sheriff Department, Fire Department, and the U.S. Navy[8], may continue to use these LZs. Although the No Action Alternative would not meet the purpose and need for the proposed action, its inclusion enables decision makers to compare the environmental consequences of the alternatives. Please note that the No Action Alternative is different from the baseline against which impacts of the proposed action are evaluated; the baseline is the same as the existing conditions (i.e., current operation levels based on 2010 flight activities as described in section 2.1.2, *Current Rotary Wing Flight Activities*).

2.2.3 Alternatives Considered But Eliminated

2.2.3.1 Relocate Existing Training to DoD Lands

The USMC considered relocating aircraft operations that occur at the Cleveland National Forest and on BLM El Centro managed lands to a nearby DoD facility. For example, USMC training ranges near MCAS Miramar, MCAS Camp Pendleton, and MCAS Yuma include Marine Corps Base (MCB) Camp Pendleton, the Bob Stump Training Range Complex (Chocolate Mountain Aerial Gunnery Range, Barry M. Goldwater Range West, R-2510, and R-2512), and Marine Corps Air Ground Combat Center (MCAGCC) Twentynine Palms. Other nearby military ranges include Barry M. Goldwater Range East (U.S. Air Force), the National Training Center at Fort Irwin (U.S. Army), the Yuma Proving Ground (U.S. Army), Naval Air Facility El Centro (U.S. Navy), and the China Lake Naval Weapons Center (U.S. Navy).

USMC aviation is currently conducting training flight activities at MCB Camp Pendleton, the Bob Stump Training Range Complex, and MCAGCC. Additional training at these facilities would not meet the purpose of and need for conducting operations in a variety of terrain and altitudes that mirror real-world conditions. For example, none of these DoD training areas offer similar, unique mountainous conditions (e.g., sloped landings and crosswind landings at high elevation) as the existing LZs at the Cleveland National Forest. Although Barry M. Goldwater Range West may have similar terrain as the public lands managed by the BLM EL Centro Field Office, the crowded airspace conditions and associated scheduling

[8] The U.S. Navy and USMC are separate military services under the Department of the Navy.

conflicts for the nearby USMC training ranges would make relocating additional operations there infeasible (see also section 1.2, *Purpose of and Need for Proposed Action*).

Regarding non-USMC training ranges, these facilities receive heavy use from other military services and often have primary missions and uses that would conflict with low-flying rotary wing and tilt-rotor flight operations and landings (e.g., tank maneuvers, artillery firing, air-to-ground delivery by jet aircraft, and air-to-air combat). As such, relocating proposed operations to other DoD lands fails to meet the purpose and need and cannot be considered a viable alternative.

2.2.3.2 Move Existing Training to Other Public Lands

The nature of the USMC training operations requires relatively large training areas with access to suitable LZs that meet the purpose of and need for the proposed action (see section 1.2). Present-day prospects for creating new LZs on public lands are greatly impeded by existing or proposed utility corridors and energy development projects (e.g., solar or wind farms), increased density of adjacent settlements, and long-term commitments of open space areas to other land uses, such as congressionally-designated or proposed wilderness areas and critical habitat for endangered species.

There are other existing public lands that are currently used for USMC aviation operations, but these are located outside the proximity radius for regional squadron activity. For example, aviation training occurs in the Sierra Nevada Mountains near Bridgeport, California, on the Humboldt-Toiyabe National Forest through the Marine Corps Mountain Warfare Training Center. However, this area is located over 300 nm (555 km) from MCAS Camp Pendleton and even farther from MCAS Miramar or MCAS Yuma, and it takes aircraft several hours to transit to this location from southern California and western Arizona. Therefore, this is not a viable alternative for local training.

2.3 Resource Areas Eliminated From Detailed Consideration

Based on USMC review, the proposed action has little potential to impact Socioeconomics, Ground Traffic and Transportation, Infrastructure and Utilities, Hazardous Materials and Waste, or Environmental Justice, as described below. Accordingly, no further discussion of these resource areas is included in the EA analysis.

Socioeconomics: There would be no change in military, government/civilian, and/or contractor support personnel, and there would be no new construction or improvements within the Cleveland National Forest or on BLM lands. Therefore, the proposed action would have no socioeconomic impact on the local communities, and no socioeconomic impacts would occur.

Ground Traffic and Transportation: The proposed aircraft flight activity does not include ground transportation support. Additionally, no new construction or improvements are proposed within the Cleveland National Forest or on BLM lands so there would be no construction-related traffic. Therefore, the proposed action would have no impact on the traveled roadway system, and no impacts to ground transportation would occur.

Infrastructure and Utilities: The proposed aircraft flight activity would not include new construction or improvements within the Cleveland National Forest or on BLM lands and, therefore, there would be no change in any existing infrastructure or utilities. Additionally, the proposed aircraft flight activity would not add any new utility demands at any military installation. Therefore, existing conditions would remain unchanged, and no impacts to infrastructure and utilities would occur.

Hazardous Materials and Waste: The proposed aircraft flight activity would not include new construction or improvements within the Cleveland National Forest or on BLM lands and, therefore, there would be no storage or removal of hazardous materials and waste. In addition, aircraft would not be maintained or fueled at any LZ. Therefore, operational impacts would not occur with respect to hazardous materials in association with proposed aircraft flight activity.

Environmental Justice: The areas around the proposed LZs do not contain a disproportionate number of low-income or minority populations, and no significant adverse public health or environmental hazards would occur as a result of the proposed action. Therefore, the proposed action would not have disproportionate adverse environmental or public health effects on minority or low-income populations.

2.4 Summary of Impacts

The environmental consequences associated with implementation of Alternative 1 and the No Action Alternative are presented and compared in Table 2.4-1. A detailed description of the affected environment and analysis of the environmental consequences is presented in Chapter 3. Cumulative Impacts are discussed in Chapter 4.

2.5 Preferred Alternative

MCI West, on behalf of the USMC, has identified Alternative 1 as the preferred alternative because this alternative best reflects the purpose and need for the proposed action. Alternative 1 would allow continued use of public lands managed by the Cleveland National Forest and the BLM El Centro Field Office, which are critical for ongoing military aviation training because these lands offer a variety of training environments necessary to meet mission requirements that are not available on any military installations in the region.

2.6 Agency Consultation and Approvals

As described in sections 2.2.1.3 (*Flight Activity within the Cleveland National Forest*) and 2.2.1.4 (*Flight Activity within BLM El Centro Managed Lands*), the USMC is coordinating with the USFS and BLM regarding this action. While the USMC is seeking to obtain special use authorization from the Cleveland National Forest, the action requires no further authorization from BLM.

The USMC, in cooperation with BLM and USFS, initiated consultation with federally recognized and non-federally recognized Indian tribes affiliated with lands involved in this action. Seventy-two letters were sent in April 2012 to initiate the consultation process (Appendix A). To date, responses have been received from the Agua Caliente Band of Cahuilla Indians, Augustine Band of Cahuilla Indians, Cabazon Band of Mission Indians, Cocopah Indian Tribe, Pala Band of Mission Indians, Quechan Indian Tribe, Rincon Band of Luiseño Indians, and Soboba Band of Luiseño Indians. The USMC, in cooperation with BLM and USFS, coordinated with interested groups regarding their input and concerns about the proposed action.

The USMC, in cooperation with the USFS and BLM, consulted with the USFWS under Section 7 of the Endangered Species Act (ESA). The USMC requested informal consultation on their biological assessment on 6 August 2012. The USFWS issued a concurrence letter on 4 September 2012 (see Appendix A-3). The USMC provided supplemental information to the USFWS, primarily regarding the implementation of proposed dust abatement measures for undeveloped LZs (i.e., those with exposed soils) within the Cleveland National Forest. In a letter dated 17 December 2012, the USFWS responded that these measures would further avoid and minimize potential effects to federally listed species and,

therefore, they continue to concur that the proposed action is not likely to adversely affect federally listed species (see Appendix A-3).

The USMC, in cooperation with the USFS and BLM, consulted with the California State Historic Preservation Office (SHPO) in accordance with 36 CFR 800, regulations implementing Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended (16 USC 70-470x-6). The California SHPO issued a concurrence letter on 3 October 2012 (see Appendix A-5).

See Chapter 6 (*Persons and Agencies Contacted or Consulted*) for a listing of contacts made during the NEPA process. Correspondence between agencies can also be found in Appendix A.

Table 2.4-1. Summary of Impacts

Resource Area	*Alternative 1*		*No Action Alternative*
	Cleveland National Forest	*BLM El Centro*	
Airspace	Proposed change in operations would not alter any airspace configuration, and it would not impact current or future military and general aviation airspace use. No significant impact would occur.	Proposed change in operations would not alter any airspace configuration, and it would not impact current or future military and general aviation airspace use. No significant impact would occur.	No USMC rotary wing or tilt-rotor training activities would take place, but other agencies may still use the LZs. Therefore, airspace usage would likely continue within the vicinity of the LZs, although at a lower level of use than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.
Noise	Noise exposure under Alternative 1 would either stay the same or decrease compared to existing conditions, and noise drops below 60 dB $CNEL_{mr}$ over surrounding residential communities. Therefore, no significant noise impact would occur.	Although Alternative 1 would result in an approximate 331 percent increase in annual sorties relative to existing conditions, there would be relatively minor changes in noise exposure compared to existing conditions, and noise drops below 60 dB $CNEL_{mr}$ over surrounding residential communities. Therefore, no significant noise impact would occur.	No USMC rotary wing or tilt-rotor training activities would take place, but other agencies may still use the LZs. Therefore, noise from aircraft operations would likely continue within the vicinity of the LZs, although at a lower rate than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.
Land Use and Recreation	Proposed change in operations would be consistent with relevant land use plans (e.g., *Cleveland National Forest Land Management Plan* and proposed amendments), and routine training activities would not result in permanent alteration of the area's recreation opportunity. No significant impact on land use or recreation would occur.	Proposed change in operations would be in conformance with the BLM's mandate to manage BLM land for multiple uses as outlined in the Federal Land Policy and Management Act, and routine training activities would not result in permanent alteration of the area's recreation opportunity. No significant impact on land use or recreation would occur.	No USMC rotary wing or tilt-rotor training activities would take place, but other agencies may still use the LZs. Therefore, minor impacts to recreation due to noise and dust generation would likely continue within the vicinity of the LZs, although at a lower rate than under existing conditions. Depending on the frequency of use by other agencies, this could be a beneficial impact.
Air Quality	Alternative 1 would reduce emissions within each project region, and emissions would not exceed any applicable conformity *de minimis* or USEPA Prevention of Significant Deterioration threshold. No significant air quality impact would occur.	Alternative 1 would reduce emissions within each project region, and emissions would not exceed any applicable conformity *de minimis* or USEPA Prevention of Significant Deterioration threshold. No significant air quality impact would occur.	Elimination of existing USMC helicopter operations would result in minor emission reductions within the Cleveland National Forest, BLM El Centro, and San Diego County project regions. Therefore, the No Action Alternative would produce beneficial but less than significant air quality impacts.

Table 2.4-1. Summary of Impacts

Resource Area	*Alternative 1*		*No Action Alternative*
	Cleveland National Forest	*BLM El Centro*	
Topography, Geology and Soils	Because Alternative 1 would utilize existing LZs on level ground and in areas generally far removed from perennial surface waters, there would be no significant erosion-related impacts in the Cleveland National Forest.	Because Alternative 1 would utilize existing LZs on level ground and in areas generally far removed from perennial surface waters, there would be no significant erosion-related impacts on BLM El Centro managed lands.	No USMC rotary wing or tilt-rotor training activities would take place, but other agencies may still use the LZs. Therefore, a minimal amount of soil erosion may continue within the vicinity of the LZs, although likely at a lower level than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.
Water Resources	Because Alternative 1 would utilize existing LZs on level ground not subject to high erosion rates and in areas generally far removed from perennial surface waters, there would be no significant water resources impacts from erosion-induced sedimentation in the Cleveland National Forest.	Because Alternative 1 would utilize existing LZs on level ground not subject to high erosion rates and in areas generally far removed from perennial surface waters, there would be no significant water resources impacts from erosion-induced sedimentation on BLM El Centro managed lands.	No USMC rotary wing or tilt-rotor training activities would take place, but other agencies may still use the LZs. Therefore, a minimal amount of soil erosion and associated impacts to water resources may continue within the vicinity of the LZs, although likely at a lower level than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.
Biological Resources	There would be no significant impact on federally listed, state-listed, and other sensitive species from noise and dust generation on and adjacent to LZs.	There would be no significant impact on federally listed, state-listed, and other sensitive species noise and dust generation on and adjacent to LZs.	No USMC rotary wing or tilt-rotor training activities would take place, but other agencies may still use the LZs. The natural environment within both regions would be subject to less frequent rotary wing operations-related noise and dust generation on and adjacent to LZs. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.
Cultural Resources	There would be no effect on a historic property or tribal cultural resource, and no significant impacts would occur under NEPA.	There would be no adverse effect on a historic property or tribal cultural resource, and no significant impacts would occur under NEPA.	No USMC rotary wing or tilt-rotor operations would occur on public lands managed by the Cleveland National Forest and the BLM El Centro Field Office. Therefore, there would be no adverse impact on historic properties or tribal cultural resources.

Table 2.4-1. Summary of Impacts

Resource Area	***Alternative 1***		***No Action Alternative***
	Cleveland National Forest	*BLM El Centro*	
Public Health and Safety	All safety actions that are in place for existing training flights would continue for the proposed operations. Additionally, the potential for fire is considered low because the Cleveland National Forest LZs are typically heavily disturbed and/or developed and generally void of vegetation. No significant impact would occur.	All safety actions that are in place for existing training flights would continue for the proposed operations. Additionally, the potential for fire is considered low because the BLM LZs are almost entirely void of vegetation and dominated by desert pavement. No significant impact would occur.	No USMC rotary wing or tilt-rotor training activities would take place, but other agencies may still use the LZs. Therefore, public health and safety issues may continue within the vicinity of the LZs, although likely at a lower level than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.
Aesthetics	Aircraft activities at the proposed LZs would occur in low numbers and would be generally dispersed over broad geographic areas. Therefore, routine training activities would not result in permanent alteration of the area's visual environment or high scenic integrity, and there would be no significant impact on visual resources.	The visual effects would be somewhat greater than the current level of impacts due to the larger numbers of sorties. However, the number of sorties per day would still be small and of short duration and would be dispersed over a wide geographic area. Therefore, routine training activities would not result in permanent alteration of the area's visual environment, and there would be no significant impact on visual resources.	No USMC rotary wing or tilt-rotor training activities would take place, but other agencies may still use the LZs. Therefore, minor impacts on visual resources may continue within the vicinity of the LZs, although likely at a lower level than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.

3 Affected Environment and Environmental Consequences

3.1 Airspace

3.1.1 Affected Environment

3.1.1.1 Airspace Definitions

Airspace is a resource managed by the FAA, which has established policies, designations, and flight rules to protect aircraft in the airfield, en route, and in special use airspace areas identified for military and other governmental activities. Airspace management considers how airspace is designated, used, and administered to best accommodate the individual and common needs for military, commercial, and general aviation. Due to multiple and sometimes competing demands, the FAA considers all aviation airspace requirements in relation to airport operations, federal airways, jet routes, military flight training activities, and other special needs to determine how the National Airspace System can best be structured to satisfy all aviation users.

Aircraft flights are conducted under either visual or instrument flight rules. The following definitions are adapted from the FAA Pilot/Controller Glossary (FAA 2010).

- *Visual Flight Rules (VFR).* A standard set of rules that all pilots, both civilian and military, must follow when not operating under instrument flight rules 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 visual flight rules. 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. Air traffic control agencies ensure separation of all aircraft operating under IFR.

The FAA and the DoD/DoN establish specific requirements for VFR flight, including minimum visibility, and distance from clouds, to ensure that an aircraft operating under VFR has sufficient visibility to ensure safety. Meteorological conditions that meet the minimum requirements for VFR flight are termed visual meteorological conditions. If they are not met, the conditions are considered instrument meteorological conditions, and a flight may only operate under IFR.

The FAA also has designated different classes of airspace, which are defined as either controlled or uncontrolled airspace above the U.S. (Table 3.1-1). Controlled airspace is a term used to encompass different classes of airspace (Class A, B, C, D, and E) with air traffic control service (FAA 2008). The specific class categories further identify supporting airport operations, designated airways affording en route transit from place-to-place, and assigned air traffic control. The classes also dictate pilot qualification requirements, rules of flight that must be followed, and the type of equipment necessary to operate within that airspace.

Uncontrolled airspace (Class G) is the portion of the airspace that has not been designated under one of the controlled airspace designations (FAA 2008). Class G airspace extends from the ground surface to the base of the overlying Class E airspace (see Table 3.1-1). Air traffic control has no authority or responsibility to control traffic within Class G airspace.

Table 3.1-1. Definitions of Different Classes of Airspace

Airspace Class	*Description*
Controlled Airspace	
Class A	Generally extends from 18,000 feet (5,486 meters) MSL and up; unless otherwise authorized, all operations are conducted under IFR.
Class B	Generally extends from the ground surface to 10,000 feet (3,048 meters) MSL surrounding the nation's busiest airports; an air traffic control clearance is required for all aircraft.
Class C	Generally extends from the ground surface to 4,000 feet (1,219 meters) MSL surrounding those airports that have an operational control tower, are serviced by a radar approach control, and have a certain number of IFR operations; each aircraft must establish two-way radio communications with air traffic control before entering this airspace.
Class D	Generally extends from the ground surface to 2,500 feet (762 meters) MSL surrounding those airports that have an operational control tower; unless otherwise authorized, each aircraft must establish two-way radio communications with air traffic control before entering this airspace.
Class E	All other controlled airspace not designated Class A, B, C, or D. Generally extends upward from either the ground surface or a designated altitude to the overlying or adjacent controlled airspace; it generally fills in the gaps between Class B, C, and D airspace at altitudes below 18,000 feet (5,486 meters) MSL. Class E airspace is intended to provide air traffic service and adequate separation for IFR aircraft from other aircraft. Although Class E is controlled airspace, VFR aircraft are not required to maintain contact with air traffic control, but are only permitted to operate in clear conditions.
Uncontrolled Airspace	
Class G	Generally extends from the ground surface to the base of the overlying Class E airspace. Air traffic control has no authority or responsibility to control traffic within Class G airspace

Notes: MSL = mean sea level; IFR = instrument flight rules; VFR = visual flight rules
Source: FAA 2008

3.1.1.2 Airspace Associated with the Proposed Action

The airspace proposed for use in the area of the LZs for both Cleveland National Forest and BLM El Centro is designated as Class G and E. Class G airspace is designated from the ground surface to 700 feet (213 meters) above ground level. Above this, the airspace is classified as Class E from 700 feet up to 18,000 feet (213 to 5,486 meters) above MSL. The Class G airspace over the Cleveland National Forest is slightly east of the Santa Ana Class C airspace that includes John Wayne Airport in Orange County, California; however, proposed operations are not expected to use Class C airspace (see section 3.1.2 below).

Visibility requirements for flights under VFR in Class G airspace are 1 mile (1.6 km) by day, and 3 miles (5 km) by night, for altitudes below 10,000 feet (3,048 meters) MSL. Cloud clearance requirements are to maintain an altitude that is 500 feet (152 meters) below, 1,000 feet (305 meters) above, and 2,000 feet (610 meters) laterally of cloud cover for flights below 10,000 feet (3,048 meters) MSL. By day at 1,200 feet (366 meters) above ground level and below, aircraft must remain clear of clouds, and there is no minimum lateral distance. If these conditions are not met, then flights must operate under IFR. Similar restrictions apply for flights in Class E airspace (FAA 2008).

3.1.2 Environmental Consequences and Mitigation Measures

3.1.2.1 Alternative 1

Under Alternative 1, aircraft would fly along normal departure routes from an airfield and then along established routes to reach a general LZ area. While transitioning to the LZs from an airfield, the rotary wing usually would fly between 1,000 to 2,000 feet (305 to 610 meters) above ground level, while the tilt-rotor aircraft usually would fly similar to a turboprop airplane between 8,000 to 12,000 feet (2,438 to 3,658 meters) above ground level. Although military missions are normally exempt from Forest Service Manual Policy 2326.03, which discourages flying at least 2,000 feet over the ground surface over

designated and recommended National Forest wilderness areas, the USMC would strive to be consistent with this policy, whenever possible. Aircraft would be flying in Class E and G airspace as they transition to the LZs. The pilots would avoid any surrounding Class C or D, such as Class C airspace over John Wayne Airport, or have to get permission from air traffic control before entry.

Aircraft conducting landing and takeoff operations at the Cleveland National Forest and on BLM El Centro managed lands would be flying in Class E and G airspace, as described above. Tilt-rotor and rotary wing aircraft would generally operate under VFR, and the military pilots would be responsible for safe separation between aircraft using "see and avoid" procedures. Pilots flying under VFR assume responsibility for their separation from all other aircraft and are generally not assigned routes or altitudes by air traffic control.

Similar to existing conditions, all flight operations would be conducted in conformance with FAA-mandated restrictions, NATOPS flight instructions (e.g., OPNAVINST 3710.7U), and other standard operating procedures (e.g., Wing Order 3710.39E). Additionally, on approach to an LZ, pilots would perform clearance passes of each LZ before landing, and pilots would not land, or attempt to land, if civilians are present, consistent with standard avoidance measures used to minimize annoyance of persons on the ground (OPNAVINST 3710.7U subsection 5.5 [*Reducing Flight-Related Disturbances*]).

Cleveland National Forest

The main change from existing conditions under Alternative 1 is the decline in CH-46E sorties over time, and the introduction of MV-22B sorties in and over these public lands. The overall number of proposed sorties at the Cleveland National Forest is expected to decrease slightly compared to existing conditions (from 452 to 422 annual sorties), while the number of overall landings is expected to increase slightly (from 2,132 to 2,205 annual landings). This change in proposed operations would not alter the airspace configuration or use over these public lands (i.e., the current alignment, minimum or maximum altitudes, allowable times of use, route widths), and it would not impact current or future military and general aviation uses of the airspace. Therefore no significant impact on airspace use would occur.

BLM El Centro Managed Lands

Similar to operations at the Cleveland National Forest, the main change from existing conditions under Alternative 1 is the decline in CH-46E sorties over time, and the introduction of MV-22B sorties. The overall number of proposed sorties and LZ landings on lands managed by BLM is expected to increase compared to existing conditions (from 483 to 2,080 annual sorties and from 2,760 to 13,656 annual landings). This change in proposed operations would not alter the airspace configuration or use over these public lands (i.e., the current alignment, minimum or maximum altitudes, allowable times of use, route widths), and it would not impact current or future military and general aviation uses of the airspace. Therefore no significant impact on airspace use would occur.

Avoidance, Minimization and/or Mitigation Measures

Because there would be no significant impact on airspace, no avoidance, minimization, and/or mitigation measures are required.

3.1.2.2 No Action Alternative

Under the No Action Alternative, no USMC rotary wing or tilt-rotor operations would occur on public lands managed by the Cleveland National Forest and the BLM El Centro Field Office. However, other agencies, such as the Sheriff Department, Fire Department, and the U.S. Navy, may still use the LZs. Therefore, airspace usage would likely continue within the vicinity of the LZs, although at a lower level of use than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.

3.2 Noise

This section analyzes the potential noise generated by the proposed rotary wing and tilt-rotor activities that may result in a change in the immediate airborne noise environment on public lands managed by the Cleveland National Forest and the BLM El Centro Field Office. Changes in the noise environment may affect wildlife and people, particularly within recreational areas. This section defines *noise* and describes the existing noise sources and levels within the project area.

3.2.1 Definition of Noise

Sound is a physical phenomenon consisting of vibrations that travel through a medium, such as air or water, and are sensed by the human ear. Noise is defined as unwanted or annoying sound that interferes with or disrupts normal human activities. Although exposure to very high noise levels can cause hearing loss, the principal human response to noise is annoyance (see Appendix C). The response of different individuals to similar noise events is diverse and is influenced by the type of noise, the perceived importance of the noise, its appropriateness in the setting, the time of day, the type of activity during which the noise occurs, and the sensitivity of the individual. Noise may also affect wildlife through disruption of resting, foraging, migrating, and other life-cycle activities (noise impacts on wildlife are discussed in section 3.7, *Biological Resources*).

The predominant noise sources associated with the proposed action consist of aircraft operations, both at and around the Cleveland National Forest and BLM El Centro managed lands. Aircraft are not the only sources of noise in an urban or suburban environment, where interstate and local roadway traffic, rail, industrial, and neighborhood sources also contribute to or detract from the everyday quality of life. Nevertheless, aircraft are readily identified by their noise output and are typically given special attention. Consequently, aircraft noise often dominates analyses of environmental impacts. Additional background information on noise, including its effect on many facets of the environment, is provided in Appendix C.

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

A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions (Figure 3.2-1). 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, and 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.

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

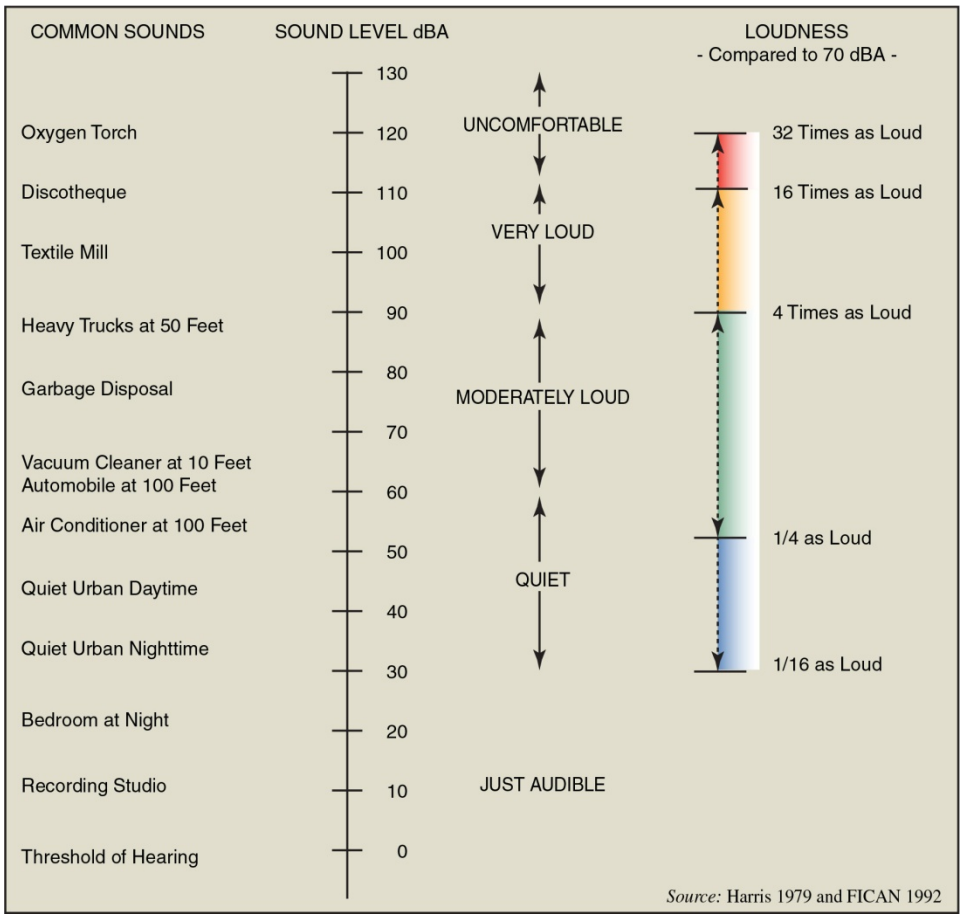


Figure 3.2-1. Typical A-Weighted Sound Levels of Common Sounds

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

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

3.2.2 Methodology

As noise from future aircraft operations cannot be physically measured in the present, this EA computes and estimates the noise generated by aircraft operations. Analysis of aircraft noise exposure and compatible land use around DoD airspace areas are typically accomplished using the Military Operating Area and Range Noise Model (MR_NMAP; Wyle 1997) suite of computer programs. For this EA, the Rotorcraft Noise Model (RNM; Wyle 2010) was also utilized to extract single-event noise levels for input into MR_NMAP. The programs allow 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 Military Operations Area and range or LZ events; operations distributed among parallel tracks for modeling of Military Training Route events; and operations on specific tracks for modeling of unique Military Operations Area, range,

Military Training Route, or target area activity. 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) $CNEL_{mr}$ 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 airspace environments, $CNEL_{mr}$ contours are plotted and/or are tabulated depending on the magnitude of the exposure, from the MR_NMAP program. This EA shows tabulated levels and focuses only on aircraft noise levels (not the non-aircraft ambient) and their change compared to existing conditions. Aircraft noise impacts would be considered potentially significant if the $CNEL_{mr}$ relative to an affected residential population increases at least 1.5 dB compared to the baseline conditions within the alternative's 65 dB $CNEL_{mr}$ contour (Federal Interagency Committee on Noise [FICON] 1992).

$CNEL_{mr}$ is a noise metric based on average daily operations flown in the busiest month, so busy month operations are calculated by dividing the number of annual operations by 12, then multiplying by a busy month factor. For this EA, the busy month factor is 1.4 which means that a busy month contains 140 percent as many operations as an average month.

3.2.3 Affected Environment

This section describes the affected environment due to existing rotary wing training operations on public lands managed by the Cleveland National Forest and the BLM El Centro Field Office. The existing aircraft noise environment is based on the calendar year (CY) 2010 rotary wing operations totaling 935 annual sorties (USMC 2011). These sorties comprise both CAL and non-CAL type sorties. For this EA, non-CAL sorties include general navigation/tactical training conducted in the vicinity of an LZ, while landing and takeoff operations are considered CAL sorties. The existing aircraft noise environment for the Cleveland National Forest and for BLM El Centro managed lands is described in more detail below.

3.2.3.1 Cleveland National Forest

The existing aircraft noise environment at the Cleveland National Forest consists of 452 USMC annual sorties conducting operations at eight LZs (LZ Site 6 / LZ Site 6 Alt and LZ Site 9 / LZ Site 9 Alt were each modeled as a single LZ due to their proximity with each other). Approximately 31 and 6 percent of sorties occur during the CNEL evening and CNEL nighttime periods, respectively.

Currently, helicopter CAL training at the LZs in the Cleveland National Forest operate in small areas near the LZs. While lining up and conducting an approach, helicopters operate at altitudes between 200 and 1,000 feet (61 – 305 meters) above ground level for a duration of approximately 45 minutes within the modeled area. Helicopters approach either with an easterly or westerly heading towards the LZs resulting in an area best described by a rectangle oriented east to west and centered at each LZ. These sorties were distributed within a large rectangular area with a length of 3 nm (6 km) and a width of 2 nm (4 km). In addition to the approach to the LZs, helicopters also descend and land or hover in the direct vicinity of each LZ. The hover or landing portion of the CAL sortie is distributed within a circular area centered at each LZ with a diameter of 750 feet (229 meters). Within this circular area the helicopters operate between the surface and 200 feet (61 meters) above ground level. The altitude distribution and modeled average aircraft speeds are listed in Appendix C.

The current helicopter non-CAL training is conducted in the areas surrounding each LZ, which is represented by the 3 nm (6 km) by 2 nm (4 km) rectangle described above but non-CAL sorties do not include the landing or hover portion. Helicopter non-CAL sorties utilize both the same altitude

distribution between 200 and 1,000 feet (61 - 305 meters) above ground level and the same average aircraft speeds as the CAL sorties but have durations of only 15 minutes within the modeled areas.

Noise Exposure

The $CNEL_{mr}$ was calculated for the eight LZs and associated approach pattern described above. For the baseline scenario, five of the eight LZs experience sound levels greater than or equal to 65 dB $CNEL_{mr}$ as summarized in Table 3.2-1 and detailed in Appendix C. The maximum $CNEL_{mr}$ of 72 dB occurs at LZ Site 6 / LZ Site 6 Alt, while four LZs experience a maximum $CNEL_{mr}$ of 65 dB. The 65 dB $CNEL_{mr}$ contour associated with the CAL and non-CAL operations approximates a circle in shape and does not exceed a diameter of approximately 1,200 feet (366 meters) at each LZ. Outside of this circle, noise contours drop below 65 dB $CNEL_{mr}$, and, in particular, noise drops below 60 dB $CNEL_{mr}$ over surrounding residential communities.

Table 3.2-1. Maximum $CNEL_{mr}$ at Modeled Landing Zones in Cleveland National Forest for Baseline Conditions

LZ Name	*Estimated Existing Annual Sorties*	*Maximum $CNEL_{mr}$*	*Maximum $CNEL_{mr}$ Exposure Band*
Site 3	39	65	65-70
Site 5	39	65	65-70
Site 6 / 6 Alt	179	72	70-75
Site 7	39	65	65-70
Site 8	39	64	60-65
Site 9 / 9 Alt	39	64	60-65
Site 10	39	65	65-70
Site 11	39	64	60-65
Note: The 65 dB $CNEL_{mr}$ contour approximates a circle in shape and does not exceed a diameter of approximately 1,200 feet (366 meters).			

3.2.3.2 BLM El Centro Managed Lands

The existing aircraft noise environment on BLM El Centro managed land consists of 483 USMC annual sorties conducting operations at 12 LZs (LZ MW1 / LZ MW1 Option were modeled as a single LZ due to their proximity with each other). Approximately 46 and 9 percent of sorties occur during the CNEL evening and CNEL nighttime periods, respectively.

Currently, helicopter CAL training at the LZs on BLM El Centro managed land operate in a similar manner as the Cleveland National Forest operations described above except that helicopters approach each LZ from any heading direction. For this reason, the approach area was modeled as a circular area with a radius of 1.5 nm (2.8 km). While operating within these areas, helicopter altitudes vary between 200 and 1,000 feet (61 – 305 meters) above ground level for a duration of approximately 45 minutes. The hover or landing portion of the helicopter sortie is distributed within a circular area centered at each LZ with a diameter of 750 feet (229 meters). Within this smaller circular area the helicopters also operate between the surface and 200 feet (61 meters) above ground level. The altitude distribution and modeled average aircraft speeds are listed in Appendix C.

The current helicopter non-CAL training is conducted in the area surrounding each LZ, which is represented by the 1.5 nm (2.8 km) radius circle described above but does not include the landing or hover portion. Helicopter non-CAL sorties utilize both the same altitude distribution between 200 and 1,000 feet (61 - 305 meters) and the average aircraft speeds as the CAL sorties but have a duration of only 15 minutes within the modeled areas.

Noise Exposure

The $CNEL_{mr}$ was calculated for the 12 LZs and associated approach pattern described above. For the baseline scenario, three LZs experience sound levels greater than or equal to 65 dB $CNEL_{mr}$ as listed in Table 3.2-2 and detailed in Appendix C. The maximum $CNEL_{mr}$ of 68 dB occurs at LZs Bull, Pelican, and Sparrow. The remaining LZs experience maximum $CNEL_{mr}$ of less than 65 dB. For LZs Bull, Pelican, and Sparrow, the 65 dB $CNEL_{mr}$ contour associated with the CAL and non-CAL operations approximates a circle in shape and does not exceed approximately 1,300 feet (396 meters) in diameter at each LZ. Outside of this circle, noise contours drop below 65 dB $CNEL_{mr}$, and, in particular, noise drops below 60 dB $CNEL_{mr}$ over surrounding residential communities.

Table 3.2-2. Maximum $CNEL_{mr}$ at Modeled Landing Zones on BLM El Centro Managed Land under Baseline Conditions

LZ Name	*Estimated Existing Annual Sortie for All Aircraft*	*Maximum $CNEL_{mr}$*	*Maximum $CNEL_{mr}$ Exposure Band*
Bull	80	68	65-70
C1	27	63	60-65
Cupcake	27	62	60-65
Eider	27	63	60-65
IP1 Option	27	60	60-65
Mallard	27	62	60-65
ME3 Option	27	63	60-65
MW1 / MW1 Option	27	64	60-65
PC3	27	63	60-65
Pelican	80	68	65-70
Sparrow	80	68	65-70
Wolf	27	63	60-65
Note: The 65 dB $CNEL_{mr}$ contour approximates a circle in shape and does not exceed approximately 1,300 feet (396 meters) in diameter.			

3.2.4 Environmental Consequences and Mitigation Measures

3.2.4.1 Alternative 1

This section describes the potential noise impacts due to proposed operations associated with Alternative 1. Alternative 1 includes the replacement of the CH-46E with the MV-22B. The MV-22B is expected to conduct 1,920 annual sorties with 55 and 7 percent occurring during CNEL evening and CNEL nighttime, respectively. The AH-1 would experience a decrease in annual sorties, UH-1 operations would experience a slight increase in annual sorties relative to the baseline scenario, and CH-53E operations would remain similar to existing conditions (USMC 2011). The AH-1, UH-1, and CH-53E operations under Alternative 1 were modeled as described above for the existing aircraft noise environment.

The MV-22B would conduct several different tactical approach pattern types, which are classified as CAL sorties, while training at LZs. The tactical approach patterns extend approximately 5 nm (9 km) along the path of approach towards the LZ with widths of approximately 2 nm (4 km). The MV-22B would operate at altitudes between 200 and 3,000 feet (61 – 914 meters) above ground level for a duration of approximately 45 minutes within the modeled areas. The MV-22B would also conduct a hover or landing portion of the CAL sorties at each LZ in the same manner as the helicopters. This is described further below for each training area.

Cleveland National Forest

The MV-22B is expected to conduct 106 annual sorties in the Cleveland National Forest, with approximately 55 and 7 percent occurring during the CNEL evening and nighttime periods, respectively. The MV-22B would utilize areas around LZs in a similar way as existing helicopters except it would require a larger airspace area. MV-22B CAL training was modeled as area-type operations distributed to a rectangle centered on each LZ, with a dimension of 10 nm (19 km) in length from east to west and 2 nm (4 km) in width from north to south. The MV-22B CAL sorties are modeled in this rectangular area with altitudes between 200 and 3,000 feet (61 – 914 meters) above ground level for a duration of approximately 45 minutes. Similar to the helicopters, the MV-22B would approach either with an easterly or westerly heading towards the LZs. In addition to the large approach area, the MV-22B would also descend and land or hover in the direct vicinity of each LZ. The landing or hover portion of the MV-22B sortie is modeled with the same area-type operation as the helicopters, distributed to a circular area centered at each LZ with a diameter of 750 feet (229 meters). Within this circular area the MV-22B would operate between the surface and 200 feet (61 meters) above ground level. The altitude distribution and modeled average aircraft speeds are listed in Appendix C.

The MV-22B non-CAL training would be conducted in the area surrounding each LZ and is modeled by the 10 nm (19 km) by 2 nm (4 km) rectangular area described above, but does not include a low altitude landing or hover portion. MV-22B non-CAL operations utilize both the same altitude distribution between 200 and 3,000 feet (61 – 914 meters) and the same average aircraft speeds as the MV-22B CAL sorties, but with a duration of only 15 minutes within the modeled areas.

The AH-1 would experience a decrease in annual sorties (from 228 to 154) and UH-1 operations would experience a slight increase in annual sorties (from 132 to 138) relative to the baseline scenario (USMC 2011). No change is expected for CH-53E operations. The AH-1, UH-1, and CH-53E operations under Alternative 1 were modeled as described above for the existing aircraft noise environment.

Noise Exposure

The $CNEL_{mr}$ was calculated for the eight LZs and associated approach pattern described above. For the Alternative 1 scenario, only one LZ (LZ Site 6 / LZ Site 6 Alt) would experience sound levels greater than or equal to 65 dB $CNEL_{mr}$ as listed in Table 3.2-3 and detailed in Appendix C. The highest maximum $CNEL_{mr}$ (71 dB) would occur at LZ Site 6 / LZ Site 6 Alt. The remaining seven LZs would experience a maximum $CNEL_{mr}$ below 65 dB. The 65 dB $CNEL_{mr}$ contour at LZ Site 6 / LZ Site 6 Alt associated with the CAL and non-CAL operations approximates a circle in shape and would not exceed approximately 1,200 feet (366 meters) in diameter (see Figure C1-7 in Appendix C for the noise contours at LZ Site 6 / LZ Site 6 Alt). Outside of this circle, noise contours drop below 65 dB $CNEL_{mr}$, and, in particular, noise drops below 60 dB $CNEL_{mr}$ over surrounding residential communities.

Table 3.2-3. Maximum $CNEL_{mr}$ at Modeled Landing Zones in Cleveland National Forest for Alternative 1

LZ Name	*Proposed Annual Sorties for All Aircraft*	*Maximum $CNEL_{mr}$*	*Change in Maximum $CNEL_{mr}$ Relative to Baseline*
Site 3	36	64	-1
Site 5	36	64	-1
Site 6/6 Alt	170	71	-1
Site 7	36	64	-1
Site 8	36	64	0
Site 9/9 Alt	36	64	0
Site 10	36	64	-1
Site 11	36	64	0

Note: The 65 dB $CNEL_{mr}$ contour approximates a circle in shape and would not exceed approximately 1,200 feet (366 meters) in diameter.

Under Alternative 1 relative to the existing conditions, five LZs would experience a decrease in maximum $CNEL_{mr}$ of 1 dB and the remaining three LZs would experience no change in maximum $CNEL_{mr}$. These small decreases are due to the MV-22B being slightly quieter than the CH-46E, while operating in the approach portion of the CAL sorties at altitudes above 200 feet (61 meters) above ground level. Additionally, the decrease in noise exposure at the Cleveland National Forest under Alternative 1 is due to the 7 percent decrease in total annual sorties relative to existing conditions.

The change in noise exposure at the Cleveland National Forest under Alternative 1 would not cause a significant noise impact because noise exposure would either stay the same or decrease compared to existing conditions, and noise drops below 60 dB $CNEL_{mr}$ over surrounding residential communities. Therefore, no significant noise impact would occur.

BLM El Centro Managed Lands

The MV-22B is expected to conduct 1,814 annual sorties over BLM managed lands with approximately 55 and 7 percent occurring during the CNEL evening and CNEL nighttime periods, respectively. The MV-22B is expected to conduct CAL and non-CAL training in a similar manner as the existing helicopters except the MV-22B would require a larger area for approaches to the LZs. The MV-22B CAL sorties would be distributed within a circular area with a radius of 5 nm (9 km). The MV-22B landing or hover portion would be distributed within a circular area with a diameter of 750 feet (229 meters). The MV-22B non-CAL sorties were modeled with the same 5 nm (9 km) radius circular area as the BLM El Centro CAL sorties but without a landing or hover portion.

The AH-1 would experience a decrease in annual sorties (from 49 to 37), UH-1 would experience a slight increase in annual sorties (from 31 to 33), and CH-53E may see a small decrease in annual sorties (from 197 to 196) relative to the baseline scenario (USMC 2011). The AH-1, UH-1, and CH-53E operations under Alternative 1 were modeled as described above for the existing aircraft noise environment.

Noise Exposure

The $CNEL_{mr}$ was calculated for the 12 LZs and associated approach pattern described above. For the Alternative 1 scenario, 11 LZs would experience sound levels greater than or equal to 65 dB $CNEL_{mr}$ as listed in Table 3.2-4 and detailed in Appendix C. The maximum $CNEL_{mr}$ of 72 dB would occur at LZs Bull and Pelican, and the maximum $CNEL_{mr}$ of 71 dB would occur at LZ Sparrow. Eight LZs would experience maximum $CNEL_{mr}$ between 65 dB and 70 dB, and one LZ would remain below 65 dB (LZ IP1 Option). The 65 dB $CNEL_{mr}$ contour associated with the CAL and non-CAL operations approximates a circle in shape and would not exceed approximately 1,300 feet (396 meters) in diameter at each LZ (see Figure C1-8 in Appendix C for the noise contours at an example BLM El Centro LZ). Outside of this circle, noise contours drop below 65 dB $CNEL_{mr}$, and, in particular, noise drops below 60 dB $CNEL_{mr}$ over surrounding residential communities.

In comparing Alternative 1 to baseline conditions, eight LZs would now experience $CNEL_{mr}$ between 65 dB and 70 dB, and three LZs (Bull, Sparrow, and Pelican) would now experience $CNEL_{mr}$ between 70 dB and 75 dB. The typical increase in $CNEL_{mr}$ would vary between 3 dB and 5 dB at each LZ (Table 3.2-4). This increase is primarily a result of the 331 percent increase in annual sorties relative to existing conditions.

Regarding significance, the change in maximum $CNEL_{mr}$ for 11 LZs would exceed 1.5 dB compared to baseline conditions within the alternative's 65 dB $CNEL_{mr}$ contour. However, this change would not affect a residential population because noise drops below 60 dB $CNEL_{mr}$ over surrounding residential communities. Furthermore, regular, repeated, or continuous exposure to aircraft-generated noise by recreational users would be unlikely because routine training operations would vary on a daily basis.

Although disturbance of recreation activities (e.g., hiking, biking, etc.) near the LZs could occur, it would be short-term, consisting of isolated and infrequent landing and takeoff operations (see also section 3.3, *Land Use and Recreation*). Therefore, no significant noise impact would occur.

Table 3.2-4. Maximum $CNEL_{mr}$ at Modeled Landing Zones on BLM El Centro Managed Land for Alternative 1

LZ Name	*Proposed Annual Sorties for All Aircraft*	*Maximum $CNEL_{mr}$*	*Change in Maximum $CNEL_{mr}$ Relative to Baseline*
Bull	346	72	+4
C1	114	68	+5
Cupcake	116	66	+4
Eider	116	67	+4
IP1 Option	116	64	+4
Mallard	116	66	+4
ME3 Option	116	66	+3
MW1 / MW1 Option	116	68	+4
PC3	116	66	+3
Pelican	346	72	+4
Sparrow	346	71	+3
Wolf	116	68	+5

Note: The 65 dB $CNEL_{mr}$ contour approximates a circle in shape and would not exceed approximately 1,300 feet (396 meters) in diameter.

Avoidance, Minimization and/or Mitigation Measures

Because there would be no significant noise impact, no avoidance, minimization, and/or mitigation measures are required.

3.2.4.2 No Action Alternative

Under the No Action Alternative, no USMC rotary wing or tilt-rotor operations would occur on public lands managed by the Cleveland National Forest and the BLM El Centro Field Office. However, other agencies, such as the Sheriff Department, Fire Department, and the U.S. Navy, may still use the LZs. Therefore, noise from aircraft operations would likely continue within the vicinity of the LZs, although at a lower rate than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.

3.3 Land Use and Recreation

3.3.1 Affected Environment

The proposed action and alternatives are located within the USFS (Cleveland National Forest, Trabuco Ranger District) and BLM (El Centro Field Office) jurisdiction. Land use management plans adopted by these jurisdictions identify the type of uses, including recreation, that could occur within the project site. Recreation activities typically include camping, picnicking, hiking, off-highway vehicle (OHV) use, wildlife viewing, hobby prospecting, sightseeing, photography, hunting, painting, bird watching, and biking.

3.3.1.1 Cleveland National Forest

The Cleveland National Forest is located on 420,983 acres (170,366 hectares) within Orange, Riverside, and San Diego Counties. The proposed LZs are located approximately 5 miles (8 km) from Mission Viejo (Highway 241 on east side) to the west and 11 miles (17 km) from Lake Elsinore to the east. The area to the west of the project area is located within Orange County and is within the jurisdiction of the Silverado-Modjeska Specific Plan. The Santa Ana Mountains are the dominant feature within this area. Elevations range from approximately 1,200 feet (366 meters) at the mouth of Silverado Canyon to over 5,600 feet (1,707 meters) at Santiago Peak. Land uses are primarily residential areas concentrated in the canyon bottoms, and residential development has encroached on nearby USFS land over the past 40 years. The area to the east of the project area is located within Riverside County, adjacent to the lands covered by the Temescal Canyon Specific Plan. Land uses within this area consist of mainly conservation and rural open space. Further east, the Interstate-15 corridor includes a variety of suburban residential and rural estate neighborhoods together with industrial uses and extensive areas of existing and potential mineral extraction.

The *Cleveland National Forest Land Management Plan (Forest Plan)* (USFS 2005a) serves as a guide for land management within this national forest. The Forest Plan designates land use zones to lands within the Cleveland National Forest. Land use zones are the primary tools used by the USFS to describe their strategic direction, such as the management intent and suitable uses for areas of the national forest where the zone is used.

There are seven land use zones designated in the Cleveland National Forest (Figure 3.3-1): Developed Area Interface; Back Country; Back Country, Motorized Use Restricted; Back Country, Non Motorized; Critical Biological; Recommended Wilderness; and Existing Wilderness (USFS 2005a). A description of these land use zones is provided in Table 3.3-1.

The proposed aircraft operations would occur at LZs located along the border between Orange and Riverside counties (see Figure 2.2-1). All of the LZs, with the exception of LZ Site 7, are located within areas of the Cleveland National Forest designated by the USFS as Back Country land use zone (Figure 3.3-1). LZ Site 7 is located within the Back Country, Non-Motorized land use zone. The San Mateo Canyon Wilderness is the only land use zone designated as Existing Wilderness within the Trabuco Ranger District, and this area is located approximately 11 miles (18 km) south of the project site. No Critical Biological land use zones are located within the Trabuco Ranger District.

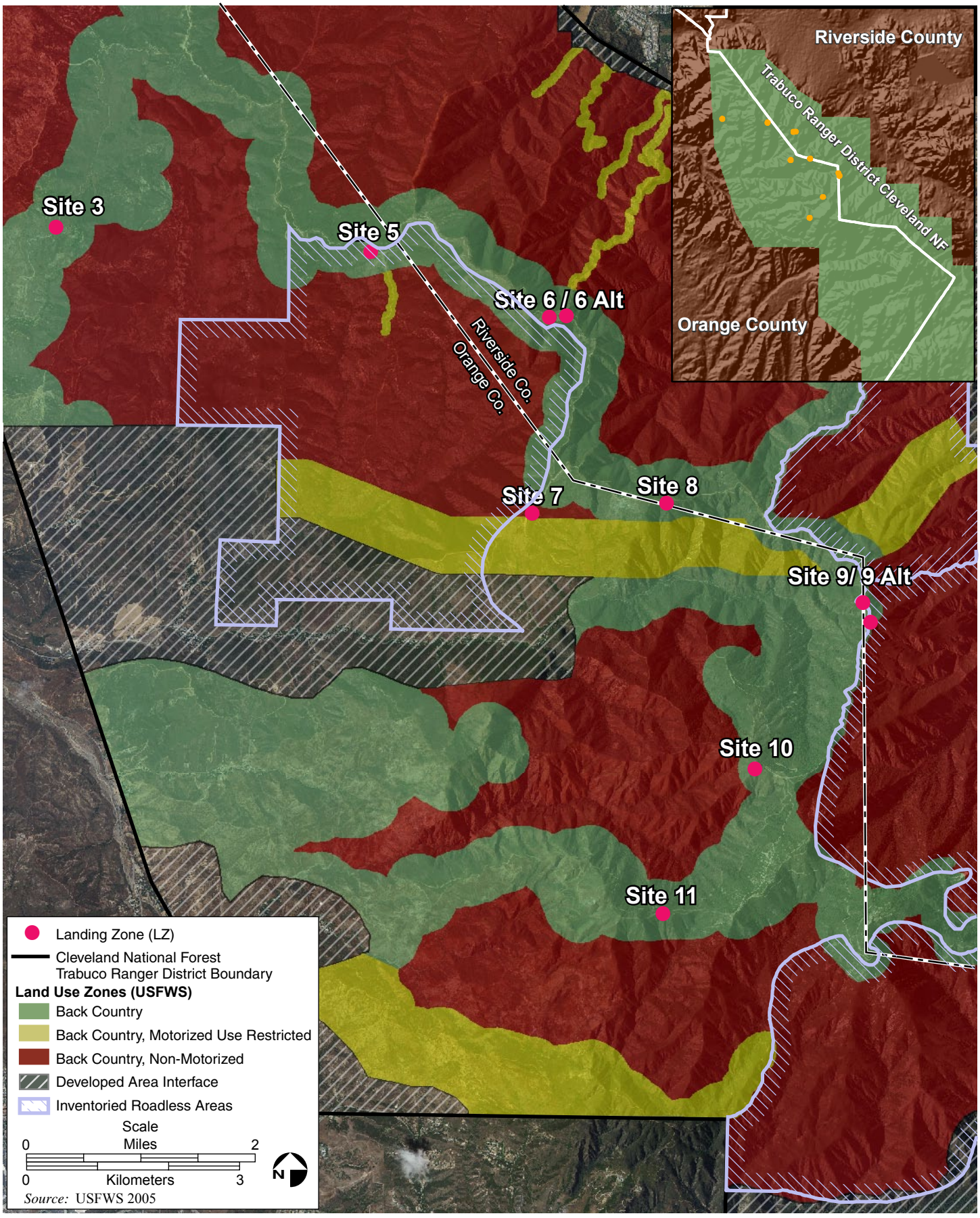


Figure 3.3-1. Locations of LZs within the Cleveland National Forest Land Use Zones

Table 3.3-1. Description of Land Use Zones within Cleveland National Forest

Land Use Zone	*Description*
Developed Area Interface	This zone includes areas adjacent to communities or concentrated developed areas with more scattered or isolated community infrastructure and is managed for motorized public access. A number of highly popular developed recreation facilities, recreation and non-recreation special uses facilities, and national forest administrative facilities may be included in this zone. The characteristic Recreation Opportunity Spectrum (ROS) objectives are Rural and Roaded Natural. The level of human use and infrastructure is typically higher than in other zones. This zone allows a broad range of higher intensity uses. However, the management intent is to limit the level and type of development. Development is limited to a slow increase of carefully designed facilities.
Back Country[1]	This zone includes areas that are generally undeveloped with few roads and is managed for motorized public access on designated roads and trails. The characteristic ROS objectives are Semi-Primitive Motorized with limited areas of Roaded Natural. The level of human use and infrastructure is generally low to moderate. This zone allows a broad range of uses. However, the management intent is to retain the natural character inherent in this zone and limit the level and type of development. Development is limited to a slow increase of carefully designed facilities.
Back Country, Motorized Use Restricted	This zone includes areas that are generally undeveloped with few roads. The level of human use and infrastructure is low to moderate. The characteristic ROS objectives are Semi-Primitive Motorized and Semi-Primitive Non-Motorized. The zone is managed for non-motorized (mechanized, equestrian, and pedestrian) public access for a wide variety of non-motorized dispersed recreation opportunities including camping, hiking, biking, hunting, and fishing. Designated OHV use is not suitable in this zone. The management intent is to retain the natural character of the zone and limit the level and type of development.
Back Country, Non-Motorized[1]	This zone includes areas that are undeveloped with few, if any, roads. The characteristic ROS objective is Semi-Primitive Non-Motorized. The level of human use and infrastructure is low. Developed facilities are minimal and generally limited to trails and signage. The zone is managed for non-motorized (mechanized, equestrian, and pedestrian) public access for a wide variety of non-motorized recreation opportunities including remote area camping, hiking, mountain biking, hunting, and fishing. Designated OHV use is not permitted in this zone. The management intent is to limit the level of development to a low level of increase. Facility construction (except trails) is generally not allowed.
Critical Biological	This zone includes areas to manage for the protection of species-at-risk. Facilities are minimal to discourage human use. The level of human use and infrastructure is low to moderate. The management intent is to retain the natural character and habitat characteristics in this zone and limit the level of human development. Low impact uses, such as hiking, mountain biking, and hunting are generally allowed.
Existing Wilderness	This zone includes Congressionally designated wilderness. Only uses consistent with all applicable wilderness legislation and with the primitive character are allowed in existing wildernesses. The ROS objective is Primitive with limited areas of Semi-Primitive Non-Motorized. The management intent is to administer the zone for the use and enjoyment of people while preserving its wilderness character and natural conditions.
Recommended Wilderness	This zone includes land that the USFS is recommending to Congress for wilderness designation and will be managed in the same manner as existing wilderness. The management intent is to administer this zone for the use and enjoyment of people while preserving its wilderness character and natural conditions.
Note: 1. **Bolded** text indicates land use zones for the proposed LZ sites. *Source*: USFS 2005a	

LZ Sites 5, 9, and 9 Alt are located within the Ladd and Coldwater Inventoried Roadless Areas (IRA), respectively. IRAs are a group of USFS lands without existing roads that have been identified as suitable for roadless area conservation. Road construction or reconstruction is allowed within the Ladd IRA, while no road construction or reconstruction is allowed within the Coldwater IRA. Currently the USFS is proposing to amend the land use zone allocations for specific areas within these IRAs as part of the Southern California National Forests Land Management Plan Amendment (USFS 2012a). This amendment is a result of a settlement agreement approved 3 January 2011 for *California Resources Agency, et al vs. United States Department of Agriculture, and Center for Biological Diversity, et al vs. United States Department of Agriculture*. Although LZ Sites 5, 9, and 9 Alt are located within the Ladd and Coldwater IRAs, the land use zone allocations associated with these sites are not expected to change under the proposed amendment (USFS 2012b).

In addition to land use zones, the Cleveland National Forest is divided into a series of geographical units referred to as *Places*. Each Place has a theme, setting, desired condition, and program emphasis. LZ Sites 3, 5, 7, 9, 9 Alt, 10, 11, and a portion of LZ Site 8 are located within the Silverado Place. The Silverado Place occupies the northwest side of the Trabuco Ranger District from the north national forest boundary down to and including Trabuco Canyon. Canyon communities, open-space links to surrounding communities, and trail-based recreation characterize this Place. The Silverado Place is an important day-use area for Orange County, particularly for hiking and mountain biking. Remote or backcountry camping is prohibited within the Trabuco Ranger District outside of the San Mateo Canyon Wilderness per Forest-Specific Design Criteria CNF S8 (USFS 2005a).

LZ Sites 6, 6 Alt, and a portion of LZ Site 8 are located within the Elsinore Place. The Elsinore Place includes the east-facing slopes of the Santa Ana Mountains and is almost entirely surrounded by urban development. Access to the Elsinore Place is limited. The majority of developed recreation sites (campgrounds and picnic areas) and special-use authorizations on the Trabuco Ranger District and the Wildomar OHV area are located within the Elsinore Place. OHV use, backcountry driving, horseback riding, hiking, mountain biking, hang-gliding, camping, and picnicking occur in this Place. A hang-gliding site exists above Lake Elsinore. Ortega Falls is a popular setting for seasonal waterplay. Recreation occurs throughout the week within the Elsinore Place; however, on weekends and holidays recreation sites along Ortega Highway are generally filled to capacity. Some hiking trails lead to this Place, but due to the lack of public access there are only a few trails located within the Place. Remote or backcountry camping within this Place is prohibited outside of the San Mateo Canyon Wilderness.

3.3.1.2 BLM El Centro Managed Lands

The BLM El Centro Office manages approximately 1.4 million acres (0.6 million hectares) of public lands spread across Imperial and San Diego counties and located within the California Desert Conservation Area (CDCA). The BLM is entrusted with the multiple use management of natural resources on public land, in accordance with the Federal Land Policy and Management Act (FLPMA). Specific, authorized uses are determined in the land use planning process, as prescribed in the FLPMA. The *California Desert Conservation Area Plan* (*CDCA Plan* or *Desert Plan*) is BLM's comprehensive desert-wide management plan for the CDCA (BLM 1980, as amended) prepared under FLPMA. It establishes four multiple-use classes, multiple-use class guidelines, and plan elements for specific resources or activities. The four multiple-use classes are Multiple-Use Class C, Multiple-Use Class L (Limited Use), Multiple-Use Class M (Moderate Use), and Multiple-Use Class I (Intensive Use). Some parcels within the CDCA Plan area have not been placed into multiple-use classes and are unclassified lands. These parcels are managed on a case-by-case basis. The proposed LZs are located in areas designated as unclassified lands.

General recreation activities on BLM-administered land in the CDCA include hobby prospecting, sightseeing, photography, hunting, painting, bird watching, biking, camping, picnicking, hiking, OHV use, and wildlife viewing (BLM 1980). The California Desert attracts several million visitors annually, participating in a wide range of recreational activities as noted above. The sheer landscape diversity provides a variety of settings in which to enjoy the desert's natural beauty and solitude away from the urban settings of southern California.

There are six specially managed use areas in the vicinity of the proposed action, as shown in Figure 3.3-2. The name, designation, and managing agency for each special management area is listed in Table 3.3-2. Several OHV areas are also located in the vicinity of the proposed action (Figure 3.3-2).

3.3.2 Environmental Consequences and Mitigation Measures

This section evaluates impacts of the proposed action on sensitive land uses. Sensitive land uses are defined as land uses that are susceptible to disturbances resulting from a project (e.g., noise, traffic, dust, etc.). For the purposes of this impact assessment, sensitive land uses are defined as residences, educational institutions, recreational facilities, and certain public facilities (e.g., religious facilities, health care facilities).

Land use analysis in this EA includes those that are located within the project site or in the project vicinity that would be affected by the proposed action, especially if they have national, regional, or local importance.

Land Use. The assessment of impacts on land use considers whether changes resulting from implementing the proposed action would displace a current use, change suitability of a location for its current or planned uses, or impede the management of land use resources according to authorized plans. Most of these effects are measured qualitatively, based on values implicit in plans; perceptibility of change; and local or widespread dependence on the affected resource. Where possible, the analysis uses proportional measures (such as time or extent of an effect) to quantify the degree or magnitude of an impact.

Recreation. The evaluation of impacts on recreation uses a similar approach as described above for land use. The analysis considers the anticipated effect of noise on the qualities of recreational areas and user experience based on sensitivity of the area or use, and on the spectrum of available recreational opportunity. It also considers how changes in public access, if any, would affect spatial and temporal availability to areas used for diverse recreational purposes.

3.3.2.1 Alternative 1

Cleveland National Forest

Alternative 1 was designed to allow continued military training operations on public lands managed by the USFS Cleveland National Forest, Trabuco Ranger District. No construction activities (including road reconstruction) are proposed under Alternative 1. Therefore, no construction-related impacts to land use and recreation would occur.

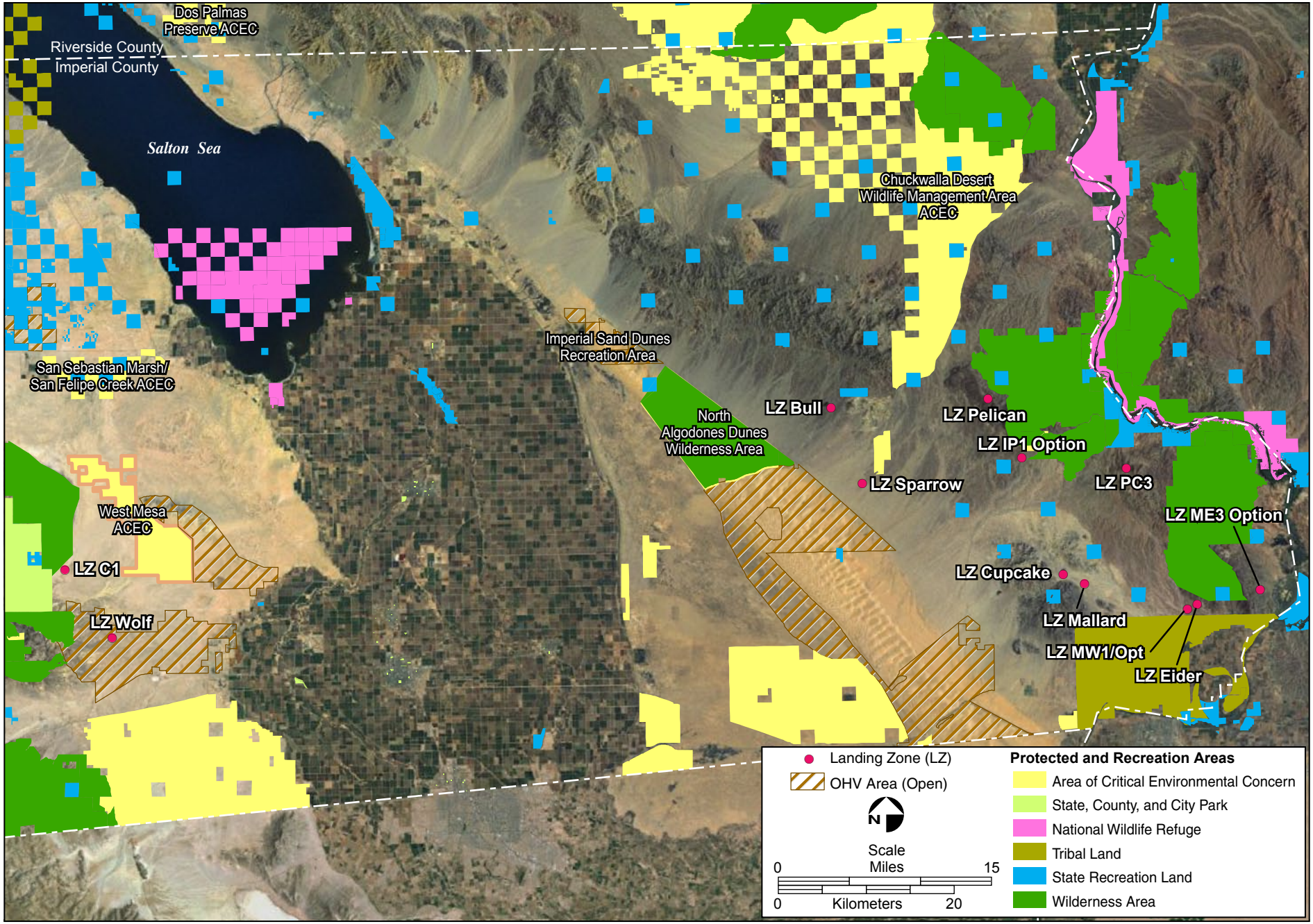


Figure 3.3-2. Special Use Areas in the Vicinity of the Proposed LZs within Lands Managed by BLM El Centro Field Office

Table 3.3-2. Special Use Areas in the Vicinity of the Proposed LZs within Lands Managed by the BLM El Centro Field Office

Special Use Area	*Managing Agency*	*Description*	*Proximity to Proposed Action*
Dos Palmas Preserve Area of Critical Environmental Concern (ACEC)	Cooperatively managed by the BLM, the California Department of Parks, the California Department of Fish and Game, and the Center for Natural Lands Management. BLM is the lead partner agency.	The Dos Palmas Preserve ACEC, located on 15,000 acres (6,070 hectares), was established to protect unique biological and cultural resources. Public visitation is encouraged, with several hiking opportunities available.	39 miles (63 km) from LZ C1; 50 miles from LZ Bull
North Algodones Dunes Wilderness Area	BLM	North Algodones Dunes Wilderness Area is 26,000 acres (10,522 hectares) of large sand dunes. Recreational activities allowed include camping, hiking/backpacking, horseback riding, hunting, and wildlife viewing.	5 miles (8 km) from LZ Bull and LZ Sparrow
Chuckwalla Desert Wildlife Management Area ACEC	BLM	This area was established to protect the federally listed desert tortoise.	4 miles (6 km) from LZ Pelican and LZ Bull
Imperial Sand Dunes Recreation Area	BLM	Imperial Sand Dunes Recreation area is located on 159,072 acres (64,374 hectares). The primary use is camping and OHV use. Other uses include photography, hiking, backpacking, nature studies, walking, hunting, rock collecting, right-of-way use for utility lines, canals and roads, filming, conservation activities, and horseback riding (BLM 2003).	2 miles (3 km) from LZ Sparrow
San Sebastian Marsh/San Felipe Creek ACEC	BLM	This ACEC primarily protects biological resources (i.e., critical habitat for the federally endangered desert pupfish). San Felipe Creek is also a registered National Natural Landmark. San Sebastian Marsh is closed to vehicle use, but open to hiking and is a popular area for nature study.	12 miles (19 km) from LZ C1
West Mesa ACEC	BLM	This ACEC primarily protects cultural and biological resources. The main uses include OHV, camping, hunting, biking, and horseback riding.	4 miles (6 km) from LZ C1
Source: USGS 2010			

Under Alternative 1, the overall number of proposed operations at the Cleveland National Forest is expected to decrease slightly compared to existing conditions (from 452 to 422 annual sorties), while the number of overall landings is expected to increase slightly (from 2,132 to 2,205 annual landings). Proposed operations on USFS land covered under this EA would not include ground troop movements or training, refueling operations, or the use of flares or ordnance. Ground access and travel is not affected by this proposed action; therefore, no direct spatial or temporal impacts to availability of recreational opportunities would

occur under this alternative. In addition, established airspace and existing LZ footprints would not be expanded with implementation of Alternative 1. The USMC would obtain a special use authorization from the Cleveland National Forest, Trabuco Ranger District concerning the use of National Forest System lands for military activity. The continued and newly proposed training operations (i.e., landing and takeoff operations) would be consistent with existing training operations within the Cleveland National Forest and would comply with the established Forest Plan and with proposed Land Management Plan amendments (USFS 2012b). Therefore, no significant impact to land use would occur.

The continued flight activity by the existing rotary wing inventory and new use by the MV-22B aircraft within the Cleveland National Forest would result in aircraft noise and dust generation within the proposed LZs and over adjacent lands during landing and takeoff operations. Because the overall number of proposed annual sorties and annual landings at the Cleveland National Forest is expected to change slightly compared to existing conditions (30 less annual sorties and 73 additional annual landings), Alternative 1 would result in only minor changes in noise exposure and dust generation from existing conditions, as described below.

As described in section 3.2 (*Noise*), the highest noise levels associated with proposed operations would be within about 600 feet (180 meters) of each LZ (see Figure C1-7 in Appendix C for the noise contours at LZ Site 6 / LZ Site 6 Alt). The primary impact of noise from aircraft overflight on human populations would be annoyance. Quietness and naturalness is an intrinsic part of some recreational experiences. Reactions to noise in a recreational setting vary. During routine training, aircraft activities at the proposed LZs would occur in low numbers and would be generally dispersed over broad geographic areas. Regular, repeated, or continuous exposure to aircraft-generated noise would be unlikely because routine training operations would vary on a daily basis. Therefore, the proposed impacts to land use and recreation due to aircraft noise at any individual LZ would be minimal and would be consistent with Forest Plan guidelines and Recreation Opportunity Spectrum (ROS) objectives for Back Country and Back Country, Non-Motorized land use zones.

Regarding dust generation, rotor wash from aircraft landing, takeoff, and hovering operations would result in dust and debris being scattered and becoming airborne in the immediate vicinity of the aircraft, although the extent of this dust disturbance would depend on local soil characteristics, presence of vegetation, and weather conditions. Dust would be visible to recreational users in the general area within sight of the LZ, but the airborne dust would disperse quickly and would likely be visible for only a few minutes (see Figure 3.10-1 in section 3.10, *Aesthetics*).

Although disturbance of recreation activities (e.g., hiking, biking, etc.) near the LZs could occur, it would be short-term, consisting of isolated and infrequent landing and takeoffs operations, and of low intensity (i.e., low numbers of aircraft). On approach to an LZ, pilots would perform clearance passes of each LZ before landing, and pilots would not land, or attempt to land, if civilians are present, consistent with standard avoidance measures used to minimize annoyance of persons on the ground (OPNAVINST 2710.7U subsection 5.5 [*Reducing Flight-Related Disturbances*]). Although recreation within the project area occurs throughout the week, scheduling would result in automatic separation of flight operations from weekend public recreation. Therefore, the potential for impacts on recreation is somewhat reduced. Given these characteristics, routine training activities would not be expected to result in permanent alteration of the area's recreation opportunity; therefore, activities would not result in a significant impact to recreation.

BLM El Centro Managed Lands

Alternative 1 would allow continued military training operations on public lands managed by the BLM El Centro Field Office, including the use of 13 designated LZs. No construction activities are proposed under Alternative 1. Therefore, no construction-related impacts to land use and recreation would occur.

Training operations for rotary wing aircraft would continue at approximate current levels except that CH-46E operations would decline over time (see Table 2.2-1). In addition, 1,814 MV-22B annual sorties would be added, which would increase the total number of annual sorties and LZ landings by over 300 percent compared to existing conditions for this area. Proposed operations on BLM land covered under this EA would not include ground troop movements or training, refueling operations, or the use of flares or ordnance. Ground access and travel is not affected by this proposed action; therefore, no direct spatial or temporal impacts to availability of recreational opportunities would occur under this alternative. In addition, established airspace and existing LZ footprints would not be expanded with implementation of Alternative 1. The types of landing and takeoff operations addressed under Alternative 1 are consistent with BLM's definition of "casual use level of activity." By definition, casual use activities do not have any adverse safety impacts on other public land uses, and have only minimal or transient environmental effect on relatively small areas of public land. Activities that qualify under casual use require no authorization from BLM. The continued and newly proposed training operations (i.e., landing and takeoff operations) would be consistent with existing training operations within land managed by the BLM El Centro Field Office and would be in conformance with the BLM's mandate to manage BLM land for multiple uses as outlined in the FLPMA. Therefore, no significant impact to land use would occur.

The continued flight activity by the existing rotary wing inventory and new use by the MV-22B aircraft within the public lands managed by the BLM El Centro Field Office would result in aircraft noise and dust generation within the proposed LZs and over adjacent lands during landing and takeoff operations. The overall number of proposed annual sorties and landings is expected to increase by over 300 percent compared to existing conditions (from about 483 to 2,080 annual sorties and from 2,760 to 13,656 annual landings). Therefore, Alternative 1 would result in an increase in noise exposure and dust generation compared to existing conditions, as described below.

As described in section 3.2 (*Noise*), the highest noise levels associated with proposed operations would be within about 650 feet (198 meters) of each LZ (see Figure C1-8 in Appendix C for the noise contours at an example BLM El Centro LZ). As described above for the Cleveland National Forest, the primary impact of noise from aircraft overflight on human populations would be annoyance. Quietness and naturalness is an intrinsic part of some recreational experiences. Reactions to noise in a recreational setting vary. During routine training, aircraft activities at the proposed LZs would occur in low numbers and would be generally dispersed over broad geographic areas. Regular, repeated, or continuous exposure to aircraft-generated noise would be unlikely because routine training operations would vary on a daily basis. Therefore, the proposed impacts to land use and recreation due to aircraft noise at any individual LZ would be minimal and would be consistent with BLM guidelines for casual use level of activity.

Regarding dust generation, rotor wash from aircraft landing, takeoff, and hovering operations would result in dust and debris being scattered and becoming airborne in the immediate vicinity of the aircraft, although the extent of this dust disturbance would depend on local soil characteristics, presence of vegetation, and weather conditions. Dust would be visible to recreational users in the general area within sight of the LZ, but the airborne dust would disperse quickly and would likely be visible for only a few minutes (see Figure 3.10-1 in section 3.10, *Aesthetics*).

Although disturbance of recreation activities (e.g., hiking, biking, etc.) near the LZs could occur, it would be short-term, consisting of isolated and infrequent landing and takeoff operations, and of low intensity (i.e., low numbers of aircraft). On approach to an LZ, pilots would perform clearance passes of each LZ before landing, and pilots would not land, or attempt to land, if civilians are present, consistent with standard avoidance measures used to minimize annoyance of persons on the ground (OPNAVINST 2710.7U subsection 5.5 [*Reducing Flight-Related Disturbances*]). Although recreation within the project area occurs throughout the week, scheduling would result in automatic separation of flight operations from weekend public recreation. Therefore, the potential for impacts on recreation is somewhat reduced. Given these

characteristics, routine training activities would not be expected to result in permanent alteration of the area's recreation opportunity; therefore, activities would not result in a significant impact to recreation.

Avoidance, Minimization and/or Mitigation Measures

Because there would be no significant land use or recreation impact, no avoidance, minimization, and/or mitigation measures are required. However, as discussed in section 2.2.1.3 (*Flight Activity within the Cleveland National Forest*), the USMC would work with the USFS to identify and implement appropriate dust abatement measures to minimize fugitive dust emissions. These measures would also reduce the potential for visible dust generation and further reduce the level of visual impacts on recreational users in the Cleveland National Forest.

3.3.2.2 No Action Alternative

Under the No Action Alternative, no USMC rotary wing or tilt-rotor operations would occur on public lands managed by the Cleveland National Forest and the BLM El Centro Field Office. However, other agencies, such as the Sheriff's Department, Fire Department, and the U.S. Navy, may still use the LZs. Therefore, minor impacts to recreation due to noise and dust generation would likely continue within the vicinity of the LZs, although at a lower rate than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.

3.4 Air Quality

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 U.S. Environmental Protection Agency (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 3.4-1.

Table 3.4-1. 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 8-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.

d. Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

O_3 = ozone; CO = carbon monoxide; NO_2 = nitrogen dioxide; SO_2 = sulfur dioxide; PM_{10} = particulate matter less than 10 microns in diameter; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; µg/m^3 = micrograms per cubic meter; mg/m^3 = milligrams per cubic meter

Source: ARB 2010

Toxic air contaminants are compounds 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 these 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.

3.4.1 Affected Environment

Air emissions produced from the proposed action would affect air quality within the proposed Cleveland National Forest and BLM El Centro training areas and aircraft flight routes between these areas and aircraft basing locations in San Diego County. The analysis of proposed aircraft operations is limited to emissions that would 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. Since project helicopters would transit within 3,000 feet (914 meters) above ground level in San Diego County, this analysis considers the impact of emissions generated by this operation within this region, in addition to project impacts within the Cleveland National Forest and BLM El Centro project regions.

Identifying the region of influence 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. For inert pollutants (such as CO or dust particulates), the region of influence is generally limited to a few miles downwind from a source. The region of influence 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 organic compounds, or VOCs. In the presence of solar radiation, the maximum effect of precursor emissions on O_3levels usually occurs several hours after they are emitted and many miles from their source.

3.4.1.1 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 ARB has in turn delegated the responsibility of regulating stationary emission sources to regional air agencies. 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 action.

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 timely attainment of any standard, interim emission reduction, or other milestone. Conformity determinations are required when the annual direct and indirect emissions from a federal action exceed an applicable *de minimis* threshold. Applicable *de minimis* levels vary by pollutant and the severity of nonattainment conditions.

The ARB is responsible for the coordination and administration of both federal and state air pollution control programs within California and implementation of the California Clean Air Act (CCAA). The CCAA required the ARB to establish the CAAQS (see Table 3.4-1). 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.

Greenhouse Gases

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, such as crude oil and coal. Examples of GHGs created and emitted primarily through human activities include fluorinated gases (hydrofluorocarbons and perfluorocarbons) and sulfur hexafluoride. These six GHGs (CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride) 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; California Energy Commission 2009).

The most recent *California Climate Change Scenarios Assessment* predicts that temperatures in California will increase between 3^oF to 10.5^oF (1.7^oC to 5.8^oC) 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, Executive Orders (EOs), and agency policies. The most recent of these are EOs 13423 and 13514 and the *USEPA Final Mandatory Reporting of Greenhouse Gases Rule*. 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. 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 EO 13423 and the Energy Policy Act of 2005, the DoN and USMC have implemented a number of renewable energy projects (NAVFAC 2006). The types of projects currently in operation within the NAVFAC Southwest region include thermal and photovoltaic solar systems, geothermal power plants, and wind generators. The military also purchases one-half of the biodiesel fuel sold in California. The DoN and USMC continue to promote and install new renewable energy projects within the NAVFAC Southwest region.

On 18 February 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 24 May 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 because individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Therefore, the impact of proposed GHG emissions to climate change is discussed in the context of cumulative impacts, as presented in section 4.3.4 of this EA. Appendix B presents estimates of GHG emissions generated by the proposed action.

3.4.1.2 Cleveland National Forest

The Cleveland National Forest project area is located within the South Coast Air Basin (SCAB), which consists of Orange County and the urbanized areas of Los Angeles, Riverside, and San Bernardino Counties. Due to the combined air pollution sources from over 15 million people and meteorological and geographical effects that limit the dispersion of these pollutants, the SCAB can experience high air pollutant concentrations. Primary emissions transported from the SCAB are the main contributors to pollutant levels in the Cleveland National Forest project area. In addition, elevated levels of fugitive dust ($PM_{10}$and $PM_{2.5}$) occasionally occur in localities within the project region due to the operation of vehicles on unpaved surfaces and the erosion of exposed earth surfaces during high wind events.

The USEPA designates all areas of the U.S. as having air quality better than (attainment) or worse than (nonattainment) the NAAQS (USEPA 2011a). A nonattainment designation generally means that a primary NAAQS has been exceeded more than once per year in a given area. With respect to the NAAQS, the SCAB presently is classified as extreme nonattainment for O_3, serious nonattainment for PM_{10}, nonattainment for $PM_{2.5}$, and in attainment for SO_2. The SCAB is also a maintenance area for NO_2 and CO. Based upon these designations, the applicable annual conformity *de minimis* thresholds for the Cleveland National Forest project area are (1) 10 tons of VOCs and NO_x, (2) 70 tons of PM_{10}, and (3) 100 tons of CO and $PM_{2.5}$(40 CFR Section 51.853(b)).

The ARB also designates areas of the state as either in attainment or nonattainment of the CAAQS (ARB 2011). An area is in nonattainment for a pollutant if its CAAQS has been exceeded more than once in three

years. With respect to the CAAQS, the SCAB presently is in extreme nonattainment for O_3 and nonattainment for $PM_{10}$and $PM_{2.5}$.

Air quality within the SCAB and the project region has improved since the inception of air pollutant monitoring in 1976 by the South Coast Air Quality Management District (SCAQMD) (SCAQMD 2012). This improvement is due to the implementation of stationary source emission reduction strategies by the SCAQMD and lower-polluting on-road motor vehicles. This trend towards cleaner air has occurred in spite of continued population growth. For example, the number of days when O_3concentrations monitored in the SCAB exceeded the 8-hour national standard (0.075 ppm) was 234 in 1979 and lowered to 109 in 2010 (SCAQMD 2012).

In the SCAB, the local air agency is the SCAQMD. The SCAQMD has developed air quality plans that are designed to bring the region into attainment of the national and state ambient air quality standards. Through this attainment planning process, the SCAQMD develops the *SCAQMD Rules and Regulations* to regulate stationary sources of air pollution in the SCAB (SCAQMD 2011). The applicable SCAQMD rules that would apply to the proposed action include the following:

- **SCAQMD Rule 402 – Nuisance**. This rule prohibits the discharge of air contaminants or other materials that cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public or have a natural tendency to cause injury or damage to business or property.
- **SCAQMD Rule 403 – Fugitive Dust**. The purpose of this Rule is to control the amount of particulate matter entrained in the atmosphere from man-made sources of fugitive dust. The rule prohibits emissions of fugitive dust from any active operation or disturbed surface area to be visible beyond the property line of an emission source. The rule requires any active operation to utilize applicable best available control measures to minimize fugitive dust emissions within the active operation.
- **SCAQMD Rule 1901 – General Conformity**. This rule implements the provisions of the USEPA General Conformity Rule.

The USFS implements a Land Management Plan for the Cleveland National Forest that includes objectives to promote sustainability and good health (social, economic and ecological) of the national forest (USFS 2005a). This plan proposes the following program strategies that pertain to air quality:

- **Air 1 - Minimize Smoke and Dust**. This strategy proposes to control and reduce smoke and fugitive dust to protect human health, improve safety and/or reduce or eliminate environmental impacts. The strategy would incorporate visibility requirements into project plans.
- **Air2 - Forest Air Quality Emissions**. This strategy would maintain and update the inventory for wildland fire emissions and other forest resource management emissions within the current SIP. The strategy would provide input to the SCAQMD on regional air quality issues for forest protection.

Air emissions due to current USMC rotary wing operations within the Cleveland National Forest project area occur from (1) the combustion of aviation fuel and (2) fugitive dust (PM_{10}/$PM_{2.5}$) generated from pad landings on exposed soils. Operational data used to estimate emissions from current operations are consistent with those evaluated in the noise analyses of this EA (see section 3.2, *Noise*), and include pad landings and cruising operations below 3,000 feet(914 meters) above ground level. Factors needed to derive helicopter engine emission rates were obtained from the Navy Aircraft Environmental Support Office (AESO) (AESO 2000a, 2000b, 2001a, 2001b, 2009a, 2009b, 2009c, and 2011). Fugitive dust

emissions generated by helicopter rotor wash during pad landings were estimated with methods identified in special studies conducted by the USEPA (USEPA 2006), soil conditions described in the project surveys conducted for the proposed LZs (SAIC 2012a, 2012b), and observations of dust emissions generated by helicopters at the existing LZs. Appendix B presents the methods used to estimate emissions from current USMC rotary wing operations within each project region.

Table 3.4-2 summarizes the annual air emission estimates for current USMC rotary wing operations within the Cleveland National Forest project region. These data show that helicopter pad landings generate the majority of combustive emissions from any type of operation. In addition, the main source of PM_{10} emissions occurs from fugitive dust generated by rotor wash on exposed soils.

Table 3.4-2. Annual Emissions from Current Helicopter Operations within the Cleveland National Forest Project Region

Activity Type	*Air Pollutant Emissions (Tons per Year)*					
	VOC	**CO**	**NOx**	**SOx**	**PM10**	**PM2.5**
Transit within the SCAB	0.03	0.29	0.19	0.01	0.11	0.11
Pad Landings	0.17	1.19	1.01	0.06	0.54	0.54
Fugitive Dust	-	-	-	-	0.16	0.02
Cruise (Non CAL Sorties)	0.02	0.26	0.19	0.01	0.11	0.11
Total Emissions	**0.22**	**1.74**	**1.38**	**0.09**	**0.92**	**0.78**
Notes: The above data pertain to aircraft operations that occur below 3,000 feet above ground level.						

3.4.1.3 BLM El Centro Managed Lands

The BLM El Centro project region occurs within the Salton Sea Air Basin (SSAB), which includes all of Imperial County and the southwest third of Riverside County. The arid conditions in the region produce low soil moisture and a high potential for fugitive dust emissions, which is one of the main air pollution issues in the region.

With respect to the NAAQS, the entire Imperial County presently is classified as moderate nonattainment for O_3 and in attainment for CO and SO_2.The western two-thirds of Imperial County, which includes LZs C1 and Wolf in the west and LZs Bull, Pelican, and Sparrow in the east, is in serious nonattainment for PM_{10}. This nonattainment area is known as the Imperial Valley Planning Area (IVPA). Lastly, the south-central portion of Imperial County is in nonattainment for $PM_{2.5}$. This $PM_{2.5}$ nonattainment area is affected by project helicopters that transit between San Diego County and the LZs in eastern Imperial County. Based on these designations, the applicable annual conformity *de minimis* thresholds for these regions are (1) 100 tons of VOCs, NO_x, and $PM_{2.5}$ and (2) 70 tons of PM_{10} (40 CFR Section 51.853(b)).With regard to the CAAQS, the SSAB attains the CAAQS for all criteria pollutants except $O_3$and PM_{10}.

The local air agency in the BLM El Centro project region is the Imperial County Air Pollution Control District (ICAPCD). The ICAPCD has developed air quality plans that are designed to bring the region into attainment of the national and state ambient air quality standards. Through this attainment planning process, the ICAPCD develops the *ICAPCD Rules and Regulations* to regulate stationary sources of air pollution in Imperial County (ICAPCD 2011).

Table 3.4-3 summarizes the annual air emission estimates for current USMC rotary wing operations within the BLM El Centro project region. These data differentiate emissions into three distinct air quality regions of influence within Imperial County: (1) all of Imperial County to determine compliance with all pollutants except PM_{10} and $PM_{2.5}$, (2) the IVPA PM_{10} and $PM_{2.5}$ nonattainment areas, and (3) the non-IVPA PM_{10} and $PM_{2.5}$ attainment areas of eastern Imperial County.

Table 3.4-3. Annual Emissions from Current Helicopter Operations within the BLM El Centro Project Region

Activity Type	*Air Pollutant Emissions (Tons per Year)*					
	VOC	**CO**	**NOx**	**SOx**	**PM10**	**PM2.5**
Transit within Imperial County	0.15	1.42	1.23	0.07	0.51	0.51
Pad Landings	0.53	2.54	2.63	0.16	0.88	0.88
Fugitive Dust	-	-	-	-	2.37	0.36
Cruise (Non CAL Sorties)	0.05	0.35	0.46	0.03	0.15	0.15
Total Emissions - Imperial County (1)	**0.73**	**4.22**	**4.32**	**0.26**	**3.91**	**1.89**
Emissions within the IVPA (2)	**0.46**	**2.88**	**2.86**	**0.17**	**2.39**	**1.25**
Emissions outside the IVPA (3)	**0.27**	**1.34**	**1.47**	**0.09**	**1.52**	**0.64**

Notes: The above data pertain to aircraft operations that occur below 3,000 feet above ground level.
1. Project region for all pollutants except PM10 and PM2.5.
2. Portion of Imperial County that does not attain the NAAQS for PM10 or PM2.5.
3. Portion of Imperial County that attains the NAAQS for PM10 and PM2.5.

3.4.1.4 San Diego Air Basin

The San Diego County project region is synonymous with the San Diego Air Basin (SDAB). With respect to the NAAQS, the SDAB presently is classified as in nonattainment for O_3 and in attainment for all other pollutants. The SDAB is also a maintenance area for CO. Based on these designations, the applicable annual conformity *de minimis* thresholds for this region are 100 tons of VOCs, CO, and NO_x (40 CFR Section 51.853(b)). With regard to the CAAQS, the SDAB attains the CAAQS for all criteria pollutants except O_3, PM_{10}, and $PM_{2.5}$.

The San Diego County Air Pollution Control District (SDCAPCD) has developed air quality plans designed to reduce emissions to a level that will bring the SDAB into attainment of the ambient air quality standards. Control measures for stationary sources proposed in the air quality plans and adopted by the SDCAPCD are incorporated into the *SDCAPCD Rules and Regulations* (SDCAPCD 2011).

Table 3.4-4 summarizes the annual air emission estimates for current project USMC rotary wing aircraft within the SDAB project region. These data pertain to transit activities for flight destinations to both the Cleveland National Forest and BLM El Centro project regions.

Table 3.4-4. Annual Emissions from Current Helicopter Operations within the San Diego Air Basin Project Region

Activity Type	*Air Pollutant Emissions (Tons per Year)*					
	VOC	**CO**	**NOx**	**SOx**	**PM10**	**PM2.5**
Transit to CNF	0.06	0.55	0.36	0.02	0.21	0.21
Transit to Imperial County West LZs	0.02	0.17	0.18	0.01	0.06	0.06
Transit to Imperial County East LZs	0.21	1.50	1.58	0.09	0.51	0.51
Total Emissions	**0.29**	**2.22**	**2.12**	**0.12**	**0.78**	**0.78**

Notes: The above data pertain to aircraft operations that occur below 3,000 feet above ground level.

3.4.2 Environmental Consequences and Mitigation Measures

Project air quality impacts were reviewed for significance compared to federal, state, and local air pollution standards and regulations. For the purposes of the present analysis, if proposed emissions were projected not to exceed an applicable conformity *de minimis* threshold within a project region, then impacts would be less than significant. If proposed emissions were projected to exceed an applicable conformity *de minimis* threshold within a project region, further analysis would be needed to determine whether impacts were significant. In such cases, if emissions conform to the approved SIP, then impacts

would be less than significant. In the case of a criteria pollutant for which a project region attains a NAAQS, the analysis used the USEPA Prevention of Significant Deterioration (PSD) threshold for new major sources of 250 tons per year as an indicator of significance of projected air quality impacts. Although the PSD permitting program is not applicable to mobile sources, PSD thresholds are used as criteria to measure air quality impacts under NEPA.

Air quality impacts from proposed aircraft training operations would occur from the same types of emission sources as those associated with existing helicopter operations. These sources include (1) the combustion of aviation fuel and (2) fugitive dust generated from pad landings on exposed soils. The project air quality impact analyses are based on the net change in emissions between proposed and existing aircraft operations. The analyses focus on the year when replacement of the CH-46E helicopter with the MV-22B aircraft is complete, or 2017.

Emissions from proposed aircraft operations were estimated with the same methods used to calculate emissions from existing helicopter operations. In addition, factors needed to derive proposed MV-22B emission rates were obtained from the AESO (AESO 2001c and 2001d). Appendix B presents the methods used to estimate emissions from aircraft operations proposed under each project alternative.

3.4.2.1 Alternative 1

Table 3.4-5 presents an estimate of the annual emissions that would occur with the implementation of Alternative 1. These data show that implementation would reduce emissions of VOCs and CO within each project region. In addition, Alternative 1 would reduce emissions from aircraft transit operations within the SDAB. This is because the alternative would replace the CH-46E, which transits below 3,000 feet above ground level, with the MV-22B, which would transit well above this level. Lastly, emissions from Alternative 1 would not exceed any applicable conformity *de minimis* or PSD threshold within any project region. Therefore, Alternative 1 would produce less than significant air quality impacts.

Avoidance, Minimization and/or Mitigation Measures

Although emissions from Alternative 1 would not exceed any applicable conformity *de minimis* or PSD threshold within any project region, aircraft pad landings on exposed soils would be a source of localized fugitive dust (PM_{10} and $PM_{2.5}$) in the Cleveland National Forest. As discussed in section 2.2.1.3 (*Flight Activity within the Cleveland National Forest*), the USMC would work with the USFS to identify and implement appropriate dust abatement measures to minimize fugitive dust emissions that could temporarily affect local air quality from aircraft pad landings on exposed soils within the Cleveland National Forest. These measures would ensure the project is consistent with the air quality objectives in the Cleveland National Forest Land Management Plan (USFS 2005a).

3.4.2.2 No Action Alternative

Under the No Action Alternative, elimination of existing USMC helicopter operations would result in minor emission reductions within the Cleveland National Forest, BLM El Centro, and San Diego County project regions on the order of those identified in Tables 3.4-2 through 3.4-4. Therefore, the No Action Alternative would produce beneficial but less than significant air quality impacts.

Table 3.4-5. Annual Emissions due to the Operation of the USMC Rotary Wing and Tilt-Rotor Training Activities- Alternative 1

Project Region/Activity	*Air Pollutant Emissions (Tons per Year)*					
	VOC	**CO**	**NOx**	**SOx**	**PM10**	**PM2.5**
Cleveland National Forest						
Transit within the SCAB	0.01	0.16	0.15	0.01	0.09	0.09
Pad Landings	0.09	0.81	4.09	0.14	0.81	0.81
Fugitive Dust	-	-	-	-	0.41	0.06
Cruise (Non CAL Sorties)	0.01	0.16	0.18	0.01	0.09	0.09
Total Proposed Emissions	**0.11**	**1.13**	**4.42**	**0.16**	**1.41**	**1.05**
Existing Emissions	**0.22**	**1.74**	**1.38**	**0.09**	**0.92**	**0.78**
Total Net Change	**-0.11**	**-0.61**	**3.04**	**0.07**	**0.49**	**0.27**
Conformity *De Minimis* Level	**10**	**100**	**10**	**NA**	**70**	**NA**
Imperial County						
Transit within Imperial County	0.03	0.54	0.97	0.05	-	-
Pad Landings	0.36	2.97	56.68	1.60	-	-
Fugitive Dust	-	-	-	-	-	-
Cruise (Non CAL Sorties)	0.01	0.16	0.77	0.03	-	-
Total Proposed Emissions	**0.40**	**3.67**	**58.42**	**1.68**	-	-
Existing Emissions	**0.73**	**4.22**	**4.32**	**0.26**	-	-
Total Net Change	**-0.33**	**-0.55**	**54.10**	**1.43**	-	-
Conformity *De Minimis* Level	**100**	**NA**	**100**	**NA**	**NA**	**NA**
Imperial County IVPA						
Transit within IVPA	-	-	-	-	0.33	0.33
Pad Landings	-	-	-	-	3.64	3.60
Fugitive Dust	-	-	-	-	15.98	2.40
Cruise (Non CAL Sorties)	-	-	-	-	0.09	0.09
Total Proposed Emissions	-	-	-	-	**20.04**	**6.42**
Existing Emissions	-	-	-	-	**2.39**	**1.25**
Total Net Change	-	-	-	-	**17.65**	**5.17**
Conformity *De Minimis* Level	**NA**	**NA**	**NA**	**NA**	**70**	**100**
Imperial County Non-IVPA						
Transit within Non-IVPA	-	-	-	-	0.02	0.02
Pad Landings	-	-	-	-	2.87	2.84
Fugitive Dust	-	-	-	-	12.63	1.89
Cruise (Non CAL Sorties)	-	-	-	-	0.07	0.07
Total Proposed Emissions	-	-	-	-	15.59	4.83
Existing Emissions	-	-	-	-	**1.52**	**0.64**
Total Net Change	-	-	-	-	**14.07**	**4.19**
Conformity *De Minimis* Level	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
San Diego County						
Transit to CNF	0.02	0.30	0.29	0.02	0.17	0.17
Transit to Imperial County West LZs	0.00	0.05	0.16	0.01	0.05	0.05
Transit to Imperial County East LZs	0.03	0.45	1.36	0.07	0.41	0.41
Total Proposed Emissions	0.06	0.80	1.80	0.09	0.62	0.62
Existing Emissions	0.29	2.22	2.12	0.12	0.78	0.78
Total Net Change	**-0.23**	**-1.42**	**-0.31**	**-0.03**	**-0.15**	**-0.15**
Conformity *De Minimis* Level	**100**	**100**	**100**	**NA**	**NA**	**NA**

Notes: The above data pertain to aircraft operations that occur below 3,000 feet above ground level.
"–" before a number indicates a reduction in emissions.

3.5 Topography, Geology, and Soils

3.5.1 Affected Environment

This section describes the general topography, geology, and soils at the LZs within public lands managed by the Cleveland National Forest and the BLM El Centro Field Office. Topography incorporates the physiographic or surface features of an area and is usually described with respect to elevation, slope, and landforms. Long-term geological, erosional, and depositional processes typically influence topographic relief of an area. The geologic resources of an area consist of all soil and bedrock materials, as well as general geologic hazards. For the purpose of this study, the terms soil and rock refer to unconsolidated and consolidated earth materials, respectively, regardless of depth. Seismicity, which refers to the potential for earthquake activity, is not addressed in this EA because there are no construction or physical structures associated with the proposed action.

3.5.1.1 Cleveland National Forest

Topography

All the LZs within the Cleveland National Forest are located within the Peninsular Ranges of the Southern California Mountains Major Land Resource Area (MLRA), which is an area characterized by east-west trending mountains with elevations ranging from 1,000 to 7,900 feet (305 to 2,408 meters). The highest peaks in this MLRA are approximately 11,500 feet (3,505 meters). In general, mountains are strongly sloping and sharply crested with narrow, alluvium-filled valleys (USDA 2006). The LZs are located within the Santa Ana Mountains, a northwest-trending chain that punctuates the boundary between Orange and Riverside counties. Notable topographic features in the area of the LZs include Santiago Peak (5,689 feet /1,734 meters), Modjeska Peak (5,496 feet/1,675 meters), Bald Peak (3,947 feet/1,203 meters), Pheasant's Peak (3,751 feet/1,143 meters), Bedford Peak (3,691 feet/1,125 meters), Black Star Canyon, and Silverado Canyon.

The LZs in the Cleveland National Forest area are typically on relatively small flat areas, often atop a ridge with steep topography within line of sight. Elevations at the LZs range from a low of 2,030 feet (619 meters) at LZ Site 3 to a high of 4,566 feet (1,392 meters) at LZ Site 10.

Geology

The geologic profile of the Southern California Mountains MLRA consists of uplifted and tilted Cenozoic Era (65.5 million years old to present) marine sediments, with the eastern portion (in the area of the proposed action) consisting of Precambrian (<542 million years old) rocks and Mesozoic Era (251 to 65.5 million years old) volcanics (USDA 2006). Surface geology in the vicinity of the LZs in the Santa Ana Mountains is primarily Upper Jurassic Period (161 to 145 million years old) marine deposits and Jurassic-Triassic Period (251 to 145 million years old) metavolcanic rocks (Rogers 1965).

Soils

Soil types in the area of the LZs[1] are predominantly clay, sandy, or stony loams. Generally, all soils in the area of the LZs are deep, well drained, have high erosion potential, rapid runoff, moderate to moderately rapid permeability, and are slightly to moderately acidic (USDA 1978). General characteristics of the soil series present at the Cleveland National Forest LZs are listed in Table 3.5-1.

[1] For the purposes of suitably addressing potential impacts to soils in the areas of the LZs from the actions of aircraft, a 350-foot (107-meter) buffer was applied for analysis; thus soil types within this distance of the LZs are addressed, even if they are not at a level slope (which is where the LZs themselves would be located).

Table 3.5-1. Soil Type Characteristics at Landing Zones within the Cleveland National Forest

Soil Type	*LZ Name*	*Permeability*	*Erosion Potential (bare soil)*	*Runoff (bare soil)*	*Drainage*
Anaheim clay loam, 15 to 30 percent slopes; 30 to 50 percent slopes	LZ Site 3	Moderately slow	High	Rapid	Well drained
Friant fine sandy loam, 30 to 75 percent slopes	LZ Sites 5, 8, 9, 9 Alt	Moderately rapid	High	Rapid	Well drained
Friant fine sandy loam, 30 to 75 percent slopes and Escondido very fine sandy loam, 15 to 30 percent slopes	LZ Sites 6, 6 Alt, 10	Friant- moderately rapid Escondido – moderate	High (both)	Rapid (both)	Well drained (both)
Friant fine sandy loam, 30 to 75 percent slopes and Escondido very fine sandy loam, 9 to 15 percent slopes	LZ Site 7	Friant- moderately rapid Escondido - moderate	Friant - high Escondido - moderate	Friant - rapid Escondido – medium	Well drained (both)
Blasingame stony loam, 30 to 65 percent slopes	LZ Site 11	Moderately slow	Moderate to high	Medium	Well drained
Source: USDA 1978					

Anaheim soils are the product of material weathered from soft sandstone or shale; the surface layer is a grayish brown clay loam approximately 26 inches (66 centimeters [cm]) thick. Primary vegetation is sage, flat-top buckwheat, sumac, and mustard, with an undercover of annual grasses. Blasingame soils are derived from materials weathered from metamorphic or granitic rocks and typically have a surface layer of brown loam approximately 6 inches (15 cm) thick. Brush is the primary vegetation with some areas of scattered oaks and annual grasses. Escondido soils are comprised of materials weathered from metamorphic sandstones. The surface layer is a brown fine sandy loam approximately 16 inches (41 cm) thick; vegetation is primarily of an oak-grass variety. Friant soils formed in material weathered from fine-grained metasedimentary rock and have a surface layer of brown gravelly fine sandy loam approximately 17 inches (43 cm) thick. California sagebrush, black sage, flat-top buckwheat, and other common brush plants are the dominant vegetation types (USDA 1978).

3.5.1.2 BLM El Centro Managed Lands

Topography

The LZs within BLM El Centro managed lands are located in the Lower Colorado Desert MLRA. Landforms in this MLRA primarily consist of mountains, alluvial fans, alluvial fan remnants, and alluvial valleys (including active drainages and fluvial terraces), and internally-drained basins (including dry lakes and lake terraces). Elevations in this MLRA can range from 275 feet (84 meters) below sea level (in the Salton Trough) to 1,650 feet (503 meters) above MSL in low mountain ranges (USDA 2006). Elevations at the eastern LZs (those east of the Salton Sea) range from a low of 277 feet (84 meters) at LZ ME3 Option to a high of 1,952 feet (595 meters) at LZ Pelican. Elevations in the western LZs (Wolf and C1) range from 161 feet (49 meters) at LZ Wolf to 232 feet (71 meters) at LZ C1. Notable physiographic features in the eastern LZs include the Cargo Muchacho Mountains and Picacho Peak. Notable physiographic features in the area of the western LZs include the Coyote and the Fish Creek Mountains.

Geology

Much of the Lower Colorado Desert MLRA is underlain by Quaternary Period (2.6 million years old to present) alluvial fan deposits, grading from boulder-strewn deposits and coarse desert pavement to finer grained sands, silts, and clays that intermix with valley floor alluvial and basin fill. Lower elevations are often underlain by silty Pleistocene Epoch (2.6 to 0.011 million years old) playa deposits (USDA 2006). Surface geology of the LZs consists of Quaternary alluvium or terrace deposits and Pleistocene nonmarine sediments (Strand 1962; Jennings 1967).

Soils

Soils in the area of the LZs are predominantly fine sands, or sandy or gravelly loams. Generally, all soils in the area of the LZs are deep, have high erosion potential, rapid runoff, moderate to moderately rapid permeability, and are slightly to moderately alkaline (USDA 2007). General characteristics of the soil associations present at the LZs are listed in Table 3.5-2. In the area of the LZs, more detailed soil information is currently not available from the NRCS; soils in such areas are grouped into soil associations, which are combinations of two or more soil series with similar characteristics and/or physical properties.

Table 3.5-2. Soil Association Characteristics at Landing Zones on BLM El Centro Lands

Soil Association	*LZ Name*	*Permeability*	*Erosion Potential (bare soil)*	*Runoff (bare soil)*	*Drainage*
Myoma-Carsitas-Carrizo	Cupcake, Eider, IP1 Option, Mallard, ME3 Option, MW1, MW1 Option, Sparrow	Rapid to very rapid	High	Slow to very slow (except during torrential rain)	Somewhat excessively to excessively drained
Rillito-Gunsight	Bull, Sparrow	Moderate to moderately rapid	Slight to moderate	Slow to medium	Somewhat excessively drained
Rositas-Beeline-Badland[1]	PC3	Moderately rapid to rapid	High	Slow to moderately rapid	Well to somewhat excessively drained
Rositas-Orita-Carrizo-Aco	C1, Wolf	Moderate to rapid	Moderate to high	Negligible to medium	Well to somewhat excessively drained
Rock Outcrop[1]	Pelican	-	-	-	-

Note: 1. Rock Outcrop and Badland are descriptions of surface conditions and not official soil series.
Source: USDA 1977, 1980, 2007, 2011

Myoma soils formed in wind-blown sand derived from alluvium and are a light olive gray, fine sand to a depth of approximately 18 inches (46 cm). Carsitas soils have an olive gray gravelly sand surface layer to a depth of approximately 10 inches (25 cm). Carrizo soils formed in mixed alluvium and have a typical surface layer of light brown very gravelly sand approximately 3 inches (8 cm) thick. The soil surface is covered by roughly seventy percent gravel. Primary vegetation for the Myoma-Carsitas-Carrizo Association is creosote bush, white bursage, mesquite, ephemeral grasses, and forbs (USDA 2007).

Rillito soils are a light brown to light yellowish brown gravelly sandy loam with a surface layer depth of approximately 5 inches (13 cm) that originally formed in mixed alluvium. The surface layer can contain from 5 to 35 percent gravel. Gunsight soils formed from mixed alluvium and have a surface layer that is typically a light brown, very gravelly loam to a depth of approximately 10 inches (25 cm). Dominant

vegetation for the Rillito-Gunsight Association is creosotebush, desert sage, paloverde, saguaro, ironwood, cholla, and triangle bursage (USDA 2007).

Rositas soils formed in sandy wind-blown material and have a reddish-yellow fine sand surface layer to a depth of approximately 9 inches (23 cm). Beeline soils are a light reddish brown, very gravelly sandy loam, approximately 7 inches (18 cm) deep. Primary vegetation for the Rillito-Beeline-Badland Association is creosotebush, bursage, desert buckwheat, barrel cactus, saguaro, and mesquite (USDA 2007).

Orita soils are a light brown, gravelly fine sandy loam that formed in alluvium from mixed sources. Aco soils are a pinkish gray sandy loam with a surface layer of approximately 18 inches (46 cm). Native vegetation for the Rositas-Orita-Carrizo-Aco Association is a sparse cover mainly of creosote bush and white bursage.

3.5.2 Environmental Consequences and Mitigation Measures

3.5.2.1 Alternative 1

Proposed aircraft operations would have no impacts on topography at any of the LZs. In general, soils at the LZs are susceptible to wind erosion. Therefore, a potential impact would result from soil erosion as a result of downdraft (and outwash) forces, collectively known as rotor wash, from rotary wing and tilt-rotor aircraft during landing, taking off, and hovering immediately above the ground. A further consideration of soil erosion is the potential for sediment delivery into nearby waterways (see section 3.6, *Water Resources*).

Cleveland National Forest

The overall number of proposed sorties at the Cleveland National Forest is expected to decrease slightly compared to existing conditions (from 452 to 422 annual sorties), while the number of overall landings is expected to increase slightly (from 2,132 to 2,205 annual landings). The slight increase in landings may result in a slight increase in soil erosion compared to existing conditions, which could result in dust generation that could temporarily affect air quality in the immediate vicinity (see section 3.4, *Air Quality*). However, rotor wash-induced soil erosion has a low potential for resulting in sedimentation and associated impaired water quality of ephemeral creeks and drainages because existing LZs are on level ground (i.e., less susceptible to erosion), and are located in areas generally far removed from perennial surface waters (see section 3.6, *Water Resources*). The USMC would monitor the LZs for indicators of potential soil erosion caused by USMC aircraft and would work with the USFS on the appropriate action to take in accordance with Forest Service Manual 2520 – Watershed Management, as needed. Therefore, there would be no significant erosion-related impacts in the Cleveland National Forest.

BLM El Centro Managed Lands

Because the number of proposed sorties and landings on BLM El Centro managed lands is expected to increase by over 300 percent under Alternative 1, there would be an increase in total soil erosion compared to existing conditions, which could result in dust generation that could temporarily affect air quality in the immediate vicinity (see section 3.4, *Air Quality*). However, as described for the Cleveland National Forest, rotor wash-induced soil erosion has a low potential for resulting in sedimentation and associated impaired water quality of ephemeral creeks and drainages because existing LZs are on level ground (i.e., less susceptible to erosion), and are located in areas generally far removed from perennial surface waters (see section 3.6, *Water Resources*). The USMC would monitor the LZs for indicators of potential soil erosion caused by USMC aircraft and would work with BLM on the appropriate action to take in accordance with BLM Instruction Memorandum No. 2001-030, Supplemental Guidance - Military Activities On and Over the Public Lands, as needed. Therefore, there would be no significant erosion-related impacts on BLM El Centro managed lands.

Avoidance, Minimization and/or Mitigation Measures

Because there would be no significant erosion-related impact, no avoidance, minimization, and/or mitigation measures for impacts to topography, geology, and soils are required. However, as discussed in section 2.2.1.3 (*Flight Activity within the Cleveland National Forest*), the USMC would work with the USFS to identify and implement appropriate dust abatement measures to minimize fugitive dust emissions. These measures would also reduce the potential for soil erosion in the Cleveland National Forest.

3.5.2.2 No Action Alternative

Under the No Action Alternative, no USMC rotary wing or tilt-rotor operations would occur on public lands managed by the Cleveland National Forest and the BLM El Centro Field Office. However, other agencies, such as the Sheriff Department, Fire Department, and the U.S. Navy, may still use the LZs. Therefore, a minimal amount of soil erosion may continue within the vicinity of the LZs, although likely at a lower level than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.

3.6 Water Resources

3.6.1 Affected Environment

This section describes water resources, including surface water, groundwater, and floodplains at the LZs within public lands managed by the Cleveland National Forest and the BLM El Centro Field Office.

Surface water resources include lakes, rivers, and streams and are important for a variety of reasons including irrigation, power generation, recreation, flood control, habitat maintenance, and human health. Under Section 401 of the Clean Water Act (CWA), applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the U.S. must obtain certification from the state in which the discharge would originate, or if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. All projects that have a federal component and may affect state water quality must also comply with CWA Section 401. The State of California, by way of the California Environmental Protection Agency, has legal authority to implement and enforce the provisions of the CWA, while the USEPA (who sets national standards for the quality of wastewater discharges) retains oversight responsibilities. Laws that directly affect water resources planning are primarily contained within the California Water Code; Division 7 of the Code, referred to as the "Porter-Cologne Water Quality Control Act", is directed specifically towards the control of water quality.

Groundwater includes the subsurface hydrologic resources of the physical environment and is often a primary source of fresh water for the general population, especially for those in areas of limited precipitation, and is commonly used for potable water consumption, agricultural irrigation, and industrial applications. The properties of groundwater are often described in terms of depth to aquifer or water table, water quality, and surrounding geologic composition.

Floodplains are defined by EO 11988, *Floodplain Management*, as "the lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum, the area subject to a one percent or greater chance of flooding in any given year." Floodplains and their associated habitats are biologically unique and highly diverse ecosystems providing a rich diversity of aquatic and terrestrial species, as well as promoting stream bank stability and regulating water temperatures. EO 11988 requires federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative.

3.6.1.1 Cleveland National Forest

The LZs in the Cleveland National Forest are located within the South Coast Hydrologic Region, an area covering approximately 10,600 square miles (27,454 square kilometers). This region contains several prominent rivers, including the Sespe, Ventura, Santa Clara, Los Angeles, San Gabriel, and Santa Ana.

There are no waterbodies in the immediate proximity to any of the LZs, due in part to the nature of the LZs themselves (flat patches in otherwise mountainous or steep terrain areas). There are, however, numerous ephemeral, unnamed streams and washes in the canyons below many of the LZs, which carry water primarily after rains from summer thunderstorms. Other waterbodies in the region include Lake Matthews, a reservoir located approximately 10 miles (16 km) to the east that provides much of the water used by the cities and water districts of the Metropolitan Water District of Southern California. Santiago Creek, which drains much of the Santa Ana Mountains, runs to the south of the LZs and feeds into Lake Irvine, a 700-acre (283-hectare) reservoir in Orange County.

With the exception of localized perched aquifers within the larger canyons, there are no aquifers in the mountainous areas of the Santa Ana Mountains where the LZs are located. Groundwater Basins that can be fed by flow from the Santa Ana Mountains include the Upper Santa Ana Valley (Temescal Subbasin), the Coastal Plain of Orange County, the San Juan Valley, and Elsinore (California Department of Water Resources [CDWR] 2007).

The Federal Emergency Management Agency (FEMA) floodplain maps are not available for the LZs located in the Cleveland National Forest; however, based on the varied terrain of the Santa Ana Mountains, the distance of the LZs to a substantial waterbody, and the elevation differences between the LZs and valley drainages, it is reasonable to conclude that there are no 100-year floodplains located in the area of the proposed action.

3.6.1.2 BLM El Centro Managed Lands

The lands managed by the BLM El Centro Field Office are located within the Colorado Basin Hydrologic Region, an area of approximately 20,000 square miles (51,800 square kilometers), considered to be one of California's most arid regions. However, this region contains approximately 900 miles (1,448 km) of streams and rivers and 250,000 acres (101,171 hectares) of lakes. Two waterbodies of significance are located in the Colorado Basin Hydrologic Region, the Salton Sea and the Colorado River. The Salton Sea, which formed between 1905 and 1907 from an accidental release of Colorado River overflow, is approximately 241,000 acres (97,529 hectares) in size. The Salton Sea is California's largest inland water body, and serves as a reservoir for irrigation return water and stormwater from surrounding counties (California Water Resources Control Board [CWRCB] 2007).

Although the eastern LZs (those east of the Salton Sea) do not border directly on any waterbodies, there are numerous unnamed ephemeral streams and washes in the vicinity. Many of these drain to the All-American Canal, an 80-mile (129-km) long aqueduct that transports water from the Colorado River, by way of the Imperial Dam in Yuma, Arizona, to numerous cities in the Imperial Valley to the west. There are also no waterbodies in the vicinity of the western LZs (LZ C1 and LZ Wolf); however, both LZs are located in ephemeral washes that drain from the Coyote Mountains to the west. The closest substantial body of water is the Salton Sea, approximately 15 miles (24 km) northeast of the LZs.

The eastern LZs overlie three groundwater basins, the Amos Valley, the Ogilby Valley, and the Yuma Valley. Water-bearing material in the Amos Valley is Quaternary and Tertiary alluvium with a maximum depth of the valley fill estimated at 550 feet (168 meters). Groundwater quality is marginal to poor for domestic use due to elevated concentrations of fluoride, chloride, sulfate, and total dissolved solids (TDS). Groundwater in the Ogilby Basin is found in Quaternary age alluvium, which is primarily unconsolidated gravel, sand, silt, and clay. Maximum depth is at least 521 feet (159 meters) deep and water quality is compromised by the presence of various salts. Water-bearing material within the Yuma Valley Basin is alluvium, including unconsolidated Quaternary alluvial deposits and the underlying Tertiary alluvial deposits. Maximum depth of the valley fill is at least 200 feet (61 meters). In general, groundwater in this basin is marginal for domestic and irrigation uses because of elevated levels of TDS, chloride, sulfate, and sodium content (CDWR 2003).

The western LZs (C1 and Wolf) overlie the Borrego Valley Groundwater Basin, an alluvium-filled valley underlain by crystalline bedrock. The valley fill consists of three aquifers: upper, middle, and lower. The upper aquifer is comprised of Holocene to Pleistocene age deposits and is 1,000 feet (305 meters) thick at the north end of the basin. The middle and lower aquifers are Pleistocene age continental deposits with thicknesses of up to 700 feet (213 meters) in the middle aquifer and up to 1,800 feet (549 meters) thick in the lower aquifer. Water from the basin can have high TDS and/or nitrate; water samples from some wells have high sodium, sulfate, chloride, iron, or boron concentrations (CDWR 2003).

FEMA floodplain maps are not available for all the eastern LZs, but some of the low-lying portions of ephemeral washes in the area of the LZs are designated as 100-year floodplains (FEMA 1984). The lowest lying areas of the ephemeral washes closest to LZ C1 and LZ Wolf are categorized as 100-year floodplains (FEMA 1984).

3.6.2 Environmental Consequences and Mitigation Measures

3.6.2.1 Alternative 1

Proposed aircraft operations would have no significant impacts on groundwater resources or floodplains. The following analysis addresses potential impacts to surface water.

Cleveland National Forest

The overall number of proposed sorties at the Cleveland National Forest is expected to decrease slightly compared to existing conditions (from 452 to 422 annual sorties), while the number of overall landings is expected to increase slightly (from 2,132 to 2,205 annual landings). As discussed in section 3.5 (*Topography, Geology, and Soils*), the slight increase in landings may result in a slight increase in soil erosion compared to existing conditions. However, the LZs in the Cleveland National Forest are existing LZs (i.e., no new ground disturbance); they are in areas far removed from any perennial surface waters; and they are situated on areas with flat surrounding terrain that are not subject to high erosion rates. Therefore, it is unlikely that significant water quality impacts associated with erosion-induced sedimentation would result from the proposed operations under Alternative 1. Additionally, all proposed aircraft operations would adhere to requirements set forth within applicable Federal, state and local regulations, including the Forest Service Manual 2520 - Watershed Management. Therefore, there would be no significant impact to water resources in the Cleveland National Forest.

BLM El Centro Managed Lands

Because the number of proposed sorties and landings on BLM El Centro managed lands is expected to increase by over 300 percent under Alternative 1, there would be an increase in total soil erosion compared to existing conditions. However, as with the Cleveland National Forest, the LZs on BLM managed lands are existing LZs (i.e., no new ground disturbance); they are in areas far removed from any perennial surface waters; and they are situated on relatively wide areas of flat terrain that are not subject to high erosion rates. Therefore, it is unlikely that significant water quality impacts associated with erosion-induced sedimentation would result from the proposed operations under Alternative 1. Low rainfall typical of the surrounding desert would also limit sediment transport. Additionally, all proposed aircraft operations would adhere to requirements set forth within applicable Federal, state and local regulations, including the BLM Instruction Memorandum No. 2001-030, Supplemental Guidance - Military Activities On and Over the Public Lands. Therefore, there would be no significant impact to water resources on BLM El Centro managed lands.

Avoidance, Minimization and/or Mitigation Measures

Because there would be no significant impact to water resources, no avoidance, minimization, and/or mitigation measures are required. However, as discussed in section 2.2.1.3 (*Flight Activity within the Cleveland National Forest*), the USMC would work with the USFS to identify and implement appropriate dust abatement measures to minimize fugitive dust emissions. These measures would also reduce the potential for soil erosion and associated impacts to water quality in the Cleveland National Forest.

3.6.2.2 No Action Alternative

Under the No Action Alternative, no USMC rotary wing or tilt-rotor operations would occur on public lands managed by the Cleveland National Forest and the BLM El Centro Field Office. However, other agencies, such as the Sheriff Department, Fire Department, and the U.S. Navy, may still use the LZs. Therefore, a minimal amount of soil erosion and associated impacts to water resources may continue within the vicinity of the LZs, although likely at a lower level than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.

3.7 Biological Resources

This section analyzes the potential effects on biological resources from the proposed rotary wing and tilt-rotor activities on public lands managed by the Cleveland National Forest and the BLM El Centro Field Office. This section describes plant and wildlife habitats, sensitive species, and jurisdictional lands within and in the vicinity of the project area.

3.7.1 Affected Environment

The following information is based primarily on the results of botanical and wildlife surveys conducted for the proposed action (SAIC 2012a, 2012b, 2012d, 2012e. 2012f), as well as associated background research (e.g., review of California Natural Diversity Database [CDNNB] and California Native Plant Society [CNPS] Rare Plant Ranking System [RPRS]) and coordination with staff at the USFWS, Cleveland National Forest, and the BLM El Centro Field Office. Additionally, this section is consistent with the project's Biological Assessment (USMC 2012a), and various project-specific USFS documents, including a Biological Evaluation (USMC 2012b), Management Indicator Species Report (SAIC 2012g), Migratory Bird Assessment (SAIC 2012h), and Noxious Weed Risk Assessment (SAIC 2012i).

3.7.1.1 Cleveland National Forest

The LZs in the Cleveland National Forest are located in the Santa Ana Mountains. The northwest portion of the Santa Ana Mountain range starts in the Chino Hills and extends approximately 35 miles (56 km) to the southeast near the Santa Margarita River. The highest summit in the range is Santiago Peak at 5,689 feet (1,734 meters) above MSL, and forms the Saddleback formation with Modjeska Peak. Cleveland National Forest has a Mediterranean climate with warm, dry summers and mild, wet winters. The mean annual precipitation in the Santa Ana Mountains is 15 to 30 inches (38 to 76 cm) per year, with most of the moisture falling as rain in the winter and occasional light snow on the mountain tops.

The LZs are located on exposed ridges or plateaus and are typically underlain by disturbed native soils, gravel, pavement, or other surfaces. See section 3.5 (*Topography, Geology, and Soils*) for additional soil information.

Vegetation

This section summarizes the vegetation communities identified in the vicinity of the Cleveland National Forest LZs, with full descriptions presented in the *Biological Resources Survey Report of Ten Proposed Military Aircraft Landing Zones, U.S. Forest Service Lands, Cleveland National Forest* (SAIC 2012a). Vegetation in the region is classified as CalVeg Zone 7, with four major categories represented in the project area: forested communities, shrub dominated communities, herbaceous communities, and non-vegetated cover types. Table 3.7-1 lists the CalVeg Alliances mapped within the LZs and buffers and associated acreages.

In general, the LZs are located within previously disturbed areas that are devoid of vegetation or support primarily herbaceous species with limited shrubs (SAIC 2012a). All sites have at least some level of disturbance, including occasionally maintained fire breaks, abandoned roads, areas containing paving, and routinely disturbed LZs. For those LZs with vegetation, plants are sparsely distributed and vegetation communities are typically limited to ruderal species or non-native grassland with a limited occurrence of native plants.

Table 3.7-1. Vegetation Communities in the Vicinity of the Cleveland National Forest LZs

Code	*Cover Type*	*Total Acres*	*Total Hectares*
	Forested Communities		
KP	Knobcone pine	0.68	0.28
	Total	**0.68**	**0.28**
	Shrub Dominated Communities		
CA	Chamise alliance	4.80	1.94
CQ	Lower montane mixed chaparral	25.69	10.40
CQT	Lower montane mixed chaparral transition	13.84	5.60
CS	Scrub oak	28.40	11.50
SD	Manzanita chaparral	7.62	3.08
SQ	Soft scrub-mixed chaparral	12.29	4.97
SQT	Soft scrub-mixed chaparral transition	1.64	0.66
SS	California sagebrush	9.81	3.97
	Total	**104.10**	**42.13**
	Herbaceous Communities		
HG	Annual grasses & forbs	3.97	1.61
HM	Perennial grasses & forbs	2.44	0.99
	Total	**6.41**	**2.60**
	Non-Vegetated Classes		
IB	Urban barren soils	3.26	1.32
IBR	Urban related barren soil roads	3.37	1.36
UB	Urban development	0.18	0.07
	Total	**6.81**	**2.75**
	Overall Total	**118.00**	**47.75**

Wildlife and Wildlife Habitats

The plant communities noted above provide habitats of various degrees of quality for wildlife that occur in the vicinity of the proposed LZs. Common bird species throughout the project area include spotted towhee (*Pipilo maculatus*), scrub jay (*Aphelocoma californica*), wrentit (*Chamaea fasciata*), and hummingbirds (Family: Trochilidae). Only a few mammals or mammal signs were observed during general daytime wildlife surveys, including coyote (*Canis latrans*) scat (LZ Site 3), which is expected to range throughout the national forest. Other common mammals expected in the Cleveland National Forest include several species of bats, skunk, bobcat, raccoon, rabbits, and various small rodents.

Sensitive Species

Sensitive species include those that are listed, proposed, or candidates for listing as threatened or endangered under the federal ESA, species that have similar status under the California ESA, species conserved or under management by the USFS, and other species that are of regional concern due to rarity and potential vulnerability to extinction. Sensitive habitats include those that support endangered, threatened or sensitive species and, therefore, are important to the conservation of these species, as well as wetlands and other waters regulated under Sections 401 and 404 of the CWA.

Management Indicator Species are a select list of species chosen by the USFS because their population or habitat trends are believed to indicate the effects of management activities (36 CFR 219.19(a)(1); 36 CFR 219.14), and are chosen as a focus for monitoring (36 CFR 219.19(a)(6)) (USFS 2005a, 2005b; USDA 2012). Species considered for designation as Management Indicator Species are assessed using the following criteria:

- Changes in the species' population or habitat should reflect the effects of national forest management activities; and
- Population or habitat trends for the species must be capable of being effectively and efficiently monitored and evaluated.

Management Indicator Species are monitored as indictors of progress toward achieving desired conditions for biological resources. Management Indicator Species are not included in the list of sensitive plants or animal species that are potentially present in the project area (Tables 3.7-2 and 3.7-3) unless they meet one of the other sensitive classifications.

Plants

In general, habitat surrounding the LZs supports vegetation types with dense scrub and chaparral species that could be suitable for a number of sensitive plant species (Table 3.7-2). Of these, only one federally listed plant, thread-leaved brodiaea (*Brodiaea filifolia*) (listed as federally threatened and state endangered), may occur within the project vicinity near LZ Site 3 based on the known elevational range of the species (76 FR 26 6848-6925) and the presence of suitable habitat (see Table 3.7-2).

Rare plant surveys were conducted in June 2011 within the LZ boundaries and accessible portions of the surrounding native plant communities up to 350 feet (107 meters) away (SAIC 2012b). Not all surrounding areas were accessible as a result of steep slopes on the edges of several of the LZs. In spring (March to May) 2012, additional focused surveys for rare plants, including thread-leaved brodiaea, were conducted concurrently with wildlife surveys at LZ Site 3, LZ Site 5, LZ Site 6, LZ Site 6 Alt, LZ Site 7, and LZ Site 8 (SAIC 2012f). Rare plant surveys included LZs that contained areas with potentially suitable habitats, and methods followed the *USFS Threatened and Endangered Plants Habitat Suitability and Survey Requirements for Brodiaea filifolia*.

No federal or state-listed plant species were observed at any of the LZs during the 2011 and 2012 surveys. However, thread-leaved brodiaea does have the potential to be present within the buffer of LZ Site 3 based on the known elevational range of the species and the presence of suitable grassland habitat. Surveys in 2011 and 2012 did not identify this species as present, but thread-leaved brodiaea spends most of its life comprised only of underground parts. Aboveground parts are present for only a few months out of the year, typically following substantial spring rains, and may not be present above-ground every year, based on conditions. As a result, there is some chance for thread-leaved brodiaea to be present within 350 feet (107 meters) of LZ Site 3 (the LZ itself does not support suitable habitat).

Three additional special status plant species were identified during the 2011 and 2012 surveys: Santiago Peak phacelia (*Phacelia keckii*), included in the CNPS Inventory as California Rare Plant Rank (CRPR) 1B (rare and endangered in California and elsewhere), Coulter's Matilija poppy (*Romneya coulteri*), CRPR 4 (a watch list) and Catalina mariposa lily (*Calochortus catalinae*) (CRPR 4.2, uncommon and fairly endangered in California (SAIC 2012a, 2012f). An individual of Santiago Peak phacelia was found in the surrounding area of LZ Site 10. Because only one individual was found, it was not collected and identification was not confirmed. However, the plant met the description for this species, and it is reported to occur in the vicinity of LZ Site 10 (California Department of Fish and Game [CDFG] 2011a). Coulter's Matilija poppy was observed at several locations throughout the project area, and was sometimes a frequent component of the scrub and chaparral plant communities adjacent to LZs. Catalina mariposa lilies were scattered in the perennial grassland of LZ Site 3 buffer area. Other special status plant species may occur within the project area but were not observed during the 2011 or 2012 surveys (see Table 3.7-2). In addition, Coulter pine (*Pinus coulteri*), a Management Indicator Species, occurs in areas surrounding LZ Site 6 and LZ Site 10 (SAIC 2012g). Other Management Indicator Species, including Engelmann oak (*Quercus engelmannii*), big cone douglas-fir (*Pseudotsuga macrocarpa*), California black oak (*Quercus kelloggii*) and white fir (*Abies concolor*), are not present within the project area. No plant species found on the LZs and/or buffer areas are included in the Federal Noxious Weed List (USDA 2012) or on lists of target species for management prepared for southern California national forests (USFS 2005c).

Table 3.7-2. Special Status Plant Species Potentially Present in the Proposed Project Areas, Cleveland National Forest

Species	*Status Fed/State/CRPR Other*	*Habitat*	*Blooming period*	*Notes*	*Potential for Occurrence*	
					LZ	**Project Buffer**
Federally Listed						
Allium munzii Munz's onion	FE/ST/1B.1/--	Grassy openings in coastal sage scrub, chaparral, juniper woodland and valley and foothill grasslands; mesic exposures or seasonally moist microsites, usually grows on sandstone with carbonate layers, soils and moist, heavy clays from 974 to 3,511 feet (297 - 1,070 meters).	March – May	Reported 4.6 miles (7.4 km) from the project area. No suitable habitat present in project area and species not observed during 2011 and 2012 surveys.	No	No
Astragalus brauntonii Braunton's milkvetch	FE/--/1B.1/--	Chaparral, coastal scrub, and valley and foothill grasslands, recent burns or disturbed areas; usually grows on sandstone with carbonate layers from 13 to 2,100 feet (4 - 640 meters).	January – August	Reported 3.8 miles (6.1 km) from project area. LZs are above elevation range of this species.	No	No
Brodiaea filifolia Thread-leaved brodiaea	FT/SE/1B.1/--	Chaparral (openings), Cismontane woodland, coastal scrub, playas, valley and foothill grassland, vernal pools/often clay at elevations ranging from 100 to 2,500 feet (30 - 765 meters).	March – June	Reported 5 miles (8 km) from the project area. Has the potential to occur in native grasslands adjacent to LZ Site 3 based on suitable habitat and known distribution.	No	Yes
Dudleya cymosa ssp. *ovatifolia* Santa Monica dudleya	FT/--/1B.2/--	Chaparral, coastal scrub; shaded slopes in canyons on sedimentary conglomerates, volcanic or other rocky substrates; primarily on north-facing slopes 680 to 1,640 feet (210 – 500 meters).	March – June	Perennial herb; reported 3 miles (5 km) west of LZ Site 11. Not known to occur in the project area; no suitable habitat observed.	No	No
Non-listed Plants – California Rare Plant Rank (from CNDDB Quad Report)						
Calochortus plummerae Plummer's mariposa-lily	--/--/1B.2/FS-S	Chaparral, foothill woodland, yellow pine forest, coastal sage scrub and valley and foothill grassland; on dry rocky soils below 1,700 feet (518 meters).	May - July	Perennial herb (bulbiferous); several occurrences observed in project area: about 0.5 mile (0.8 km) southeast of LZ Site 5, LZ Site 6 and LZ Site 6 Alt; however, all LZs are higher than species' known range. Suitable habitat is present in buffer area but no plants observed in or near LZs during 2011 and 2012 surveys.	No	Yes

Table 3.7-2. Special Status Plant Species Potentially Present in the Proposed Project Areas, Cleveland National Forest

Species	*Status Fed/State/CRPR Other*	*Habitat*	*Blooming period*	*Notes*	*Potential for Occurrence*	
					LZ	**Project Buffer**
Non-listed Plants – California Rare Plant Rank 1B (from CNDDB Quad Report) (continued)						
Calochortus weedii var. *intermedius* Intermediate mariposa lily	--/--/1B.2/FS-S	Chaparral, coastal scrub, and in valley and foothill grasslands; on dry, rocky, open slopes, rock outcrops, and calcareous soils from 390 - 2,790 feet (120 - 850 meters).	May-July	Perennial herb (bulbiferous); several occurrences reported in project area: about 0.5 miles (0.8 km) west from LZ Sites 9 and 9 Alt. Observed in flower on Bedford Motorway at lower elevation than LZs; all but one of which are higher than species' known range.	No	Yes
Comarostaphylis diversifolia ssp. *diversifolia* Summer holly	--/--/1B.2/FS-S	Chaparral, often in mixed chaparral in California, sometimes post-burn; 90 to 1,810 feet (30 - 550 meters).	May - June	Shrub; reported more than 5 miles (8 km) from the project area. All LZs are higher than species known elevational range.	No	No
Dudleya multicaulis Many-stemmed dudleya	-- / -- /1B.2/FS-S	Chaparral, coastal scrub, valley and foothill grassland; on clay soils from 49 to 2,592 feet (15 - 790 meters). Occurrence reported in Black Star Canyon. All but one LZ is higher than species' known elevation range.	April - July	LZ Site 3 is within elevation range and near known occurrence of this species; suitable habitat is present at LZ Site 3, although species not found during 2011 and 2012 surveys.	No	Yes
Dudleya viscida Sticky dudleya	--/--/1B.2/FS-S	Coastal scrub, coastal bluff scrub, chaparral, on north and south-facing cliffs and banks; 30 to 1,810 feet (10 - 550 meters).	May - June	Perennial herb; reported more than 5 miles (8 km) from the project area. All LZs are higher than species known elevational range.	No	No
Hesperocyparis forbesii Tecate cypress	--/--/1B.1/FS-S	Closed-cone coniferous forest, chaparral; primarily on north-facing slopes, groves often associated with chaparral; 820 to 4,950 feet (250 – 1,500 meters).	June - October	Evergreen tree; several occurrences reported in project area; 1.6 miles (2.6 km) east of LZ Site 11 and 1.2 miles (1.9 km) southeast of LZ Site 10. This tree species would be easily identifiable and was not found in or near LZs during 2011 and 2012 surveys.	No	No

Table 3.7-2. Special Status Plant Species Potentially Present in the Proposed Project Areas, Cleveland National Forest

Species	*Status Fed/State/CRPR Other*	*Habitat*	*Blooming period*	*Notes*	*Potential for Occurrence*	
					LZ	**Project Buffer**
Non-listed Plants – California Rare Plant Rank 1B (from CNDDB Quad Report) (continued)						
Horkelia cuneata var. *puberula* Mesa horkelia	--/--/1B.1/FS-S	Chaparral, cismontane woodland, coastal scrub, sandy or gravelly sites; 230 to 2,660 feet (70 – 810 meters).	February - July	Perennial herb; reported more than 5 miles (8 km) from the project area. Only LZ Site 3 is within elevation range of this species; suitable habitat is present at LZ Site 3, but species not found during 2011 and 2012 surveys.	No	No
Lepechinia cardiophylla Santa Ana (heart-leaved) pitchersage	--/--/1B.2/FS-S	Closed-cone coniferous forest, chaparral, cismontane woodland; 1,800 to 4,500 feet (550 – 1,370 meters).	April - July	Shrub; reported in buffers of LZ Sites 6 and 6 Alt; also 0.2 miles (0.3 km) north of LZ Sites 9 and 9 Alt, less than 0.1 mile (0.2 km) west of LZ Site 5, and less than 0.5 miles (0.8 km) to north east of LZ Site 4. Suitable habitat present in LZ buffers.	No	Yes
Lepidium virginicum var. *robinsonii* Robinson's pepper grass	--/--/1B.2/--	Chaparral, coastal scrub; dry soils, shrubland; 3 to 3,100 feet (1 – 945 meters).	January - July	Annual herb, reported 2.9 miles (4.7 km) west of LZ Site 11. Suitable habitat present in LZ buffers.	No	Yes
Monardella hypoleuca ssp. *lanata* Felt-leaved monardella	--/--/1B.2/FS-S	Chaparral, cismontane woodland; occurs in understory in mixed chaparral, chamise chaparral, and southern oak woodland; sandy soils; 980 to 5,160 feet (300 – 1,575 meters).	June - August	Perennial herb (rhizomatous); reported 1.9 miles (3.1 km) southwest and 1.2 miles (1.9 km) northeast of LZ Site 11, and 0.8 miles (1.3 km) south-southeast of LZ Site 10. Suitable soils not present in LZs or buffer areas.	No	No

Table 3.7-2. Special Status Plant Species Potentially Present in the Proposed Project Areas, Cleveland National Forest

Species	*Status Fed/State/CRPR Other*	*Habitat*	*Blooming period*	*Notes*	*Potential for Occurrence*	
					LZ	**Project Buffer**
Non-listed Plants – California Rare Plant Rank 1B (from CNDDB Quad Report) (continued)						
Monardella macrantha ssp. *hallii* Hall's monardella	--/--/1B.3/FS-S	Broad-leaved upland forest, chaparral, lower montane coniferous forest, cismontane woodland, valley and foothill grassland; dry slopes and ridges in openings; 2,280 to 7,200 feet (695 – 2,195 meters).	June - August	Perennial herb (rhizomatous); reported in project area, 0.7 mile (1.1 km) east of LZ Site 11, and 0.9 mile (1.5 km) south of LZ Site 10. Suitable habitat present in LZ buffers and species reported or observed near several LZ sites.	No	Yes
Nolina cismontane Peninsular nolina	--/--/1B.2/FS-S	Chaparral, coastal scrub; primarily on sandstone and shale substrates, also gabbro; 460 to 4,190 feet (140 – 1,275 meters).	May - July	Perennial evergreen shrub; reported 1.2 miles (1.9 km) south of LZ Site 3. Suitable soils not present in LZs or buffer areas.	No	No
Phacelia keckii Santiago Peak phacelia	--/--/1B.3/FS-S	Closed-cone coniferous forest, chaparral; open areas, sometimes along creeks; 1,780 to 5,250 feet (545 – 1,600 meters).	May - June	Annual herb; reported near LZ Site 5, also 1.9 miles (3.1 km) east of LZ Site 11 and 1.4 miles (2.3 km) southeast of LZ Site 10. Observed in buffer area of LZ Site 10 during 2011 surveys. Suitable habitat present in LZ buffers and species reported or observed near several LZ sites.	No	Yes
Satureja chandleri San Miguel savory	--/--/1B.2/FS-S	Chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland; rocky gabbroic or metavolcanic substrate; 394 to 3,297 feet (120 – 1,005 meters).	March - July	Shrub; reported more than 5 miles (8 km) from the project area. Suitable habitat is present in LZ buffers, but species not found during 2011 and 2012 surveys.	No	No
Symphyotrichum defoliatum San Bernadino aster	--/--/1B.2/--	Meadows and seeps, marshes and swamps, coastal scrub, cismontane woodland, lower montane coniferous forest, grassland; vernally mesic grassland or near ditches, streams and springs, disturbed areas; 7 to 6,700 feet (2 – 2,040 meters).	August - November	Perennial (rhizomatous) herb; reported more than 5 miles (8 km) from the project area. No suitable habitat present in project area.	No	No

Table 3.7-2. Special Status Plant Species Potentially Present in the Proposed Project Areas, Cleveland National Forest

Species	*Status Fed/State/CRPR Other*	*Habitat*	*Blooming period*	*Notes*	*Potential for Occurrence*	
					LZ	**Project Buffer**
Non-listed Plants – California Rare Plant Rank 1B (from CNDDB Quad Report) (continued)						
Tetracoccus dioicus Parry's tetracoccus	--/--/1B.2/FS-S	Chaparral, coastal scrub; stony, decomposed gabbro soil; 490 to 3,300 feet (150 – 1,000 meters).	April - May	Shrub; reported more than 5 miles (8 km) from the project area. Species not found during 2011 and 2012 surveys.	No	No
Tortula californica California screw moss	--/--/1B.2/FS-S	Chenopod scrub, valley and foothill grassland; moss growing on sandy soil; 30 to 4,800 feet (10 – 1,460 meters).	—	Reported more than 5 miles (8 km) from the project area. Species not found during 2011 and 2012 surveys.	No	No
Other Sensitive Plant Species (from CNDDB report)						
Romneya coulteri Matilija poppy	--/--/4.2/--	Chaparral, coastal scrub; 60 to 3,600 feet (20 – 1,200 meters); often found in burned areas (fire-follower).	March - July	Perennial (rhizomatous) herb; observed in shrub-dominated communities at many locations throughout the project area. Suitable habitat in LZ buffers and species reported or observed near several LZ sites.	No	Yes

Notes:

Federal Status (determined by United States Fish and Wildlife Service [USFS]):

FE Federally Listed Endangered
FT Federally Listed Threatened

California Rare Plant Rank (California Native Plant Society [CNPS] / California Department of Fish and Game [CDFG]) Threat Ranks:

List 1B: Plants rare, threatened or endangered in California and elsewhere.
List 2: Plants rare, threatened or endangered in California but more common elsewhere.
List 4: Plants of limited distribution (A watch list).

0.1-Seriously threatened in California
0.2-Fairly threatened in California
0.3-Not very threatened in California

FS–S = USFS Region 5 Sensitive

Source: CDFG 2011a and CNPS 2012

Table 3.7-3. Special Status Wildlife Species Potentially Present in Project Areas, Cleveland National Forest

Sensitive Species	*Status Fed/State/ USFS*	*Habitat and Distribution*	*Breeding period*	*Notes*	*Potential to Occur within the Project Vicinity*
Mammals					
Dipodomys stephensi Stephen's kangaroo rat	FE/ST/ FS-S	Known from 16 localities in and around San Jacinto Valley from Riverside south to vicinity of Vista, San Diego County. Habitat occurs below 2,000 feet (610 meters) in flat or gently rolling, often degraded grasslands but may also occur in coastal scrub or sagebrush with sparse canopy cover.	Winter, coinciding with beginning of rains. Usually 1 March - 31 July.	No suitable habitat and known range not present in or near project LZs.	None to low
Perognathus longimembris brevinasus Los Angeles pocket mouse	--/CASC/ FS-S	Occurs sparingly in grassland, alluvial sage scrub, and coastal sage scrub of the coastal basins of southern California, historically from Burbank and San Fernando on the northwest to San Bernardino on the northeast to Cabazon, Hemet, and Aguanga on the east and southeast. The recorded elevational range is from 548 feet (167 meters) at Burbank to 2,651 feet (808 meters) at Oak Grove.	Young are born in burrow nests, usually in late spring through early fall.	Hibernates in the winter, generally from October to February. Range is almost entirely outside National Forest System lands.	None to low
Birds					
Coccyzus americanus occidentalis Western yellow-billed cuckoo	FC/SE/FS-S	Less than 40 pairs known in the state in open woodland with clearings and thick, scrubby undergrowth along watercourses. In California, large tracts (in excess of 49 acres [20 hectares]) of deciduous riparian woodland are preferred and bird is generally absent from heavily-forested and urban areas.	Peak is mid-July to early August. Well-concealed nest in tangled willow habitat placed in dense foliage from 5 to 40 feet (2-12 meters) off the ground and close to water.	Areas of tall cottonwood stands are utilized for foraging.	Low
Empidonax traillii extimus Southwestern willow flycatcher	FE-CH/SE/ FS-S	Nests only in dense riparian vegetation associated with streams, rivers, lakes, springs, and other watercourses and wetlands. In California, this bird breeds from near sea level on the Santa Margarita River to 2,640 feet (805 meters) at the South Fork Kern River and 3,000 feet (914 meters) at upper San Luis Rey River.	Arrives in the breeding grounds between early May and early June. Successful breeders depart from breeding territories as early as mid-August, and fledglings probably leave the breeding area a week or two after adults, but few details are known.	Right on edge of species range; the non-listed *E.t. brewsteri* may also be present.	Low

Table 3.7-3. Special Status Wildlife Species Potentially Present in Project Areas, Cleveland National Forest

Sensitive Species	*Status Fed/State/ USFS*	*Habitat and Distribution*	*Breeding period*	*Notes*	*Potential to Occur within the Project Vicinity*
Birds (continued)					
Polioptila californica californica Coastal California gnatcatcher	FT-CH/ CASC/FS-S	A variety of arid scrub, primarily coastal sage, habitats that are more open. Mostly absent from coastal areas dominated by black sage, white sage, or lemonadeberry. Occurs in northwest Baja California, Mexico to Ventura County. Limited to lower elevations (<2,000 feet [<600 meters]) south and west of Transverse and Peninsular Ranges with highest densities occurring in coastal areas of Orange and San Diego counties.	15 February – 31 August. Nest placement typically in areas with less than 40 percent slope gradient, often using gullies and drainages.	CDFG (2011a) notes: local, uncommon, obligate resident of arid coastal scrub below about 1,500 feet (500 meters). In general this species is more numerous near the sage scrub–grassland interface than where sage scrub grades into chaparral. LZ Site 3 would be at or above the upper limit for the species. No coastal California gnatcatchers were observed during the 2012 protocol surveys (SAIC 2012d). Because suitable habitat occurs in the vicinity, there is potential for coastal California gnatcatcher to occupy adjacent areas or travel through LZ Site 3.	Moderate to low
Vireo bellii pusillus Least Bell's vireo	FE-CH/SE/ FS-S	Riparian woodlands, scrub, and thickets, including in coastal southern California.	15 March – 31 August, prefers to nest in a dense shrub layer between 2 to 10 feet (0.6 and 3 meters) from the ground.	No suitable habitat present in or near project LZs.	Low
Amphibians					
Anaxyrus californicus Arroyo toad	FE-CH/CASC/ FS-S	Ranges west of the desert in coastal area washes, arroyos, sandy riverbanks, riparian areas with willows, sycamores, oaks, cottonwoods. Extremely specialized habitat needs, including exposed sandy streamsides with stable terraces for overwinter and forage sites. Streams not necessarily perennial but occur from sea level to 4,400 feet (1,341 meters).	Mating and egg-laying takes place from March to July at the quiet margins of shallow streams or pools free of predatory fishes with sandy or gravel bottoms without silt.	LZs are on ridgelines or peaks. Arroyo toad uses low gradient riverine and adjacent floodplain habitats primarily.	Low

Table 3.7-3. Special Status Wildlife Species Potentially Present in Project Areas, Cleveland National Forest

Sensitive Species	*Status Fed/State/ USFS*	*Habitat and Distribution*	*Breeding period*	*Notes*	*Potential to Occur within the Project Vicinity*
Amphibians (continued)					
Rana draytoni California red-legged frog	FT-CH/CASC/ FS-S	Inhabits quiet pools of streams, marshes, and occasionally ponds along the Coast Ranges from Mendocino County south and in portions of the Sierra Nevada and Cascades ranges, usually below 3,936 feet (1,200 meters).	Breeds January to July (peak in February) in the south. Eggs are deposited in permanent pools attached to emergent vegetation and in contact with the water's surface.	—	None to low
Ranu muscosa Sierra Madre (mountain) yellow-legged frog	FE-CH/--/--	In southern California, isolated populations exist in the San Gabriel, San Bernardino, and San Jacinto Mountains from 1,200 feet to 7,500 feet (370 - 2,290 meters). Populations are restricted to streams in ponderosa pine, montane hardwood-conifer, and montane riparian habitats.	Breeding takes place from March to May. Eggs are usually laid in shallow water attached to gravel or rocks.	—	None to low
Invertebrates					
Euphydryas editha quino Quino checkerspot butterfly	FE-CH/--/--	Topographically diverse landscapes that contain low to moderate levels of nonnative vegetation, including coastal sage scrub, open chaparral, juniper woodlands, forbs, and native grasslands.	Adults emerge early to late spring, mate, lay eggs. Eggs hatch in about 10 days and larva then feed on annuals *Plantago erecta* or *Castilleja exserta*.	Host plants do not occur in survey area. No Quino checkerspot butterflies were documented during the 2012 focused surveys (SAIC 2012e). However, suitable habitat and alternative host plants Rigid bird's beak (*Cordylanthus rigidus*) are present.	Low

Table 3.7-3. Special Status Wildlife Species Potentially Present in Project Areas, Cleveland National Forest

Sensitive Species	*Status Fed/State/ USFS*	*Habitat and Distribution*	*Breeding period*	*Notes*	*Potential to Occur within the Project Vicinity*
Invertebrates (continued)					
Pyrgus ruralis lagunae Laguna Mountains skipper	FE/--/--	Occupies montane meadow habitats in a very restricted range within San Diego County, in the Laguna and Palomar mountains.	Two adult flight seasons each year during which the butterflies mate, one in mid-spring and a second in late summer.	Decreasing abundance of their larval host and nectar plant, Cleveland's horkelia (*Horkelia clevelandii*), which is restricted to montane meadows, has affected abundance. Host plant does not occur in Santa Ana Mountains.	None

Notes:

Federal
FE = Listed under ESA as endangered
FT = Listed under ESA as threatened
FC = Candidate for federal listing
CH = USFWS-designated critical habitat occurs in the county

State
ST = Listed as threatened in California
SE = Listed as endangered in California
CFP = California fully protected
CASC = California species of special concern

USFS
FS–S = USFS Region 5 Sensitive

Source: CDFG 2011b, CalFish 2011, NatureServe Explorer 2011, and CalHerps 2011

Wildlife

A list of target sensitive wildlife species of concern that may occur within the project area is presented in Table 3.7-3. Wildlife habitat surveys conducted for the proposed action focused on the potential for suitable habitat to exist within or in the vicinity of the LZs (SAIC 2012b). Additional USFWS protocol level surveys for coastal California gnatcatcher (*Polioptila californica californica*) and Quino checkerspot butterfly (*Euphydryas editha quino*) were conducted in spring 2012, as described below.

The LZs provide only marginally suitable habitat for most wildlife species because they are usually exposed to, disturbed from and/or developed for prior training use. Native plant communities that typically surround the LZs would provide much higher quality habitats than the LZs themselves, and species that could occur within the LZs would likely be migrating between adjacent higher quality habitats for short periods of time. As a result, very few special status or sensitive animal species have the potential to occur in the LZs due to lack of suitable habitat and/or, for many species, LZs being outside of known ranges.

Two federally listed species have potentially suitable habitat in the project area: coastal California gnatcatcher (listed as federally threatened) and Quino checkerspot butterfly (listed as federally endangered). The buffer area adjacent to LZ Site 3 supports coastal sage scrub habitat and is at the upper limits of the known elevation range for coastal California gnatcatcher. As a result, USFWS protocol level surveys were conducted between April and May 2012, and followed *Coastal California Gnatcatcher* (*Polioptila californica californica*) *Presence/ Absence Survey Guidelines February 28, 1997*. No coastal California gnatcatchers were observed during the protocol survey (SAIC 2012d). Therefore, considering habitat type, known occurrences, lack of presence during breeding season, and the slopes and elevations present in the project area, coastal California gnatcatchers are not expected to occur in or near the proposed LZs; however, because they occupy adjacent areas, they may travel through LZ Site 3.

In addition, buffers associated with LZ Site 3, LZ Site 5, LZ Site 6, LZ Site 6 Alt, LZ Site 7 and LZ Site 8 contain potential suitable habitat for Quino checkerspot butterfly, and the LZs occur within the USFWS Quino Checkerspot Buttefly Survey Area (USFWS 2005). This species is historically known to occur in Orange County and portions of western Riverside County near the Santa Ana Mountains. Quino checkerspot butterflies generally occur in open vegetated habitats that contain the larval host plant, California plantain (*Plantago erecta*). In recent years, these butterflies have been documented in chaparral, where larvae use previously unknown host plant species, including Coulter's snapdragon (*Antirrhinum coulterianum*), Chinese houses (*Collinsia concolor*), and stiffbranch bird's beak (*Cordylanthus rigidus*). Also, "hill-topping", where male butterflies await the arrival of unmated females to secure mates, is common in many species of butterfly. Quino checkerspot butterfly protocol surveys were conducted at LZ Site 3, LZ Site 5, LZ Site 6, LZ Site 6 Alt, LZ Site 7 and LZ Site 8 between March and April 2012, and followed the *USFWS Quino Checkerspot Butterfly (Euphydryas editha quino) Survey Protocol Information, February 2002*. No Quino checkerspot butterflies were documented during the 2012 focused surveys (SAIC 2012e). Therefore, considering known occurrences, the history of Quino checkerspot butterflies being absent from the area, and lack of presence during protocol surveys, Quino checkerspot butterflies are not expected to occur in or near the proposed LZs; however, the LZs represent potential hilltopping venues and the presence of alternative host plants provide potential suitable habitat.

The California Species of Special Concern Coast Range newt (*Taricha torosa torosa*) also has potential to spend non-breeding time in chaparral or grasslands within the project area. This newt migrates up to 2 miles (3 km) to water to breed, and no newts were observed during surveys. In addition, the western red bat (*Lasiurus blossevillii*), also a California Species of Special Concern, has the potential to forage in the project area, but no bats or suitable roosting sites were observed during surveys.

The California Watch List species Cooper's hawk (*Accipiter cooperii*) is expected in the project vicinity and was observed flying near LZ Site 9 during 2011 surveys. Other raptors including the golden eagle (*Aquila chrysaetos*), peregrine falcon (*Falco peregrines* ssp. *anatum*), and prairie falcon (*Falco mexicanus*) are identified as "species of concern" in the Cleveland National Forest Land Management Plan (USFS 2005a) and require protection of known active and inactive raptor nesting areas. Data provided by the Cleveland National Forest (personal communication, Winters 2012) shows that no known raptor nests are located within a 0.5 mile (0.8 km) radius buffer for any of the LZs. The nearest known raptor nest is located approximately 1.5 miles (2.4 km) from LZ Site 3. The remaining known raptor nest locations are greater than 2 miles (3.2 km) from any LZ. Golden eagles, peregrine falcons and prairie falcons may forage in the project area but none of these raptor species were observed during 2011 or 2012 surveys.

USFS-sensitive species such as the California legless lizard (*Anniella pulchra*), coastal rosy boa (*Lichanura trivirgata roseofusca*), and San Diego mountain kingsnake (*Lampropeltis zonata pulchra*) have some potential to occur in the project vicinity, but most have a need for access to water, which was not present at or near any of the LZs. Sensitive bat species may also use the project area for foraging but suitable roost sites were not observed at or near the LZs. Another USFS-sensitive species, the coast horned lizard (*Phrynosoma blainvillii*), occurs in a wide variety of open and chaparral habitats that most of the LZs provide. This species was observed near LZ Site 6 Alt and LZ Site 7 during 2012 surveys.

Management Indicator Species identified for the Cleveland National Forest that occur in the project area include mule deer (*Odocoileus hemionus*), mountain lion (*Puma concolor*), arroyo toad (*Anaxyrus [Bufo] californicus*) and song sparrow (*Melospiza melodia*) (USFS 2012c; SAIC 2012g). Indicators (primarily scat and tracks) of mule deer were seen on several LZs, consistent with likely browsing by this species throughout the project area. The native areas around the LZs also likely support several prey species for mountain lions, and some good habitat for song sparrows. Suitable arroyo toad habitat may occur below the LZs, but not within the LZ or buffer areas.

U.S. Army Corps of Engineers Jurisdictional Lands or Otherwise Sensitive Environments

There are no wetlands or other waters of the U.S. on or in the immediate vicinity of the LZs at the Cleveland National Forest; most of the LZs occur on ridgelines or peaks surrounded by moderate to steep grades.

3.7.1.2 BLM El Centro Managed Lands

The project area encompasses regions in the Colorado and Yuha Deserts that occur at low elevations and are surrounded by higher mountain peaks, thus blocking the moist coastal air and rains, and resulting in very hot, arid climatic conditions (CDFG 2007). The LZs are located primarily northwest of Yuma, Arizona and east of El Centro, California just west of the Colorado River. The topography is characterized by steep, rocky ridges separating broad flat desert valleys. Ravines gradually broaden into sandy washes. Slopes and plains are mostly devoid of vegetation and are instead covered with a desert pavement of angular cobbles.

The climate is arid with hot, dry summers and cool, slightly moist winters. The mean annual precipitation is 3 to 6 inches (76 to 152 mm), with most of the moisture occurring as rain in the winter along with occasional summer thunderstorms (Natural Resource Conservation Science [NRCS] 2010). Runoff is mainly generated from rain falling on rock outcrops in the mountains, which then flows into ravines that drain into the sandy washes. On the slopes and plains where soil material has accumulated, runoff from rainfall events is low to negligible with most rainfall infiltrating into the highly permeable soils (NRCS 2010).

Vegetation

This portion of the Sonoran Desert is fairly low in elevation, compared with other subdivisions of the region, extending from about 4,000 feet (1,219 meters) in elevation to below sea level in some valleys. The geography is mostly broad flat valleys with scattered mountains of barren rock. The valleys are dominated by low shrubs, primarily creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*), two of the most drought-tolerant plants in North America. In the driest areas of this subdivision even these species become restricted to drainage courses, with trees, such as ironwood (*Olneya tesota*) and blue palo verde (*Cercidium floridum*), found only in the larger washes. The mountains support a variety of shrubs and cacti, but the density is typically very sparse. Annual species comprise more than half the flora, especially on the driest sites. These annual species are mostly winter-growing and appear in numbers only when conditions are favorable (Arizona-Sonora Desert Museum 2011; Pavlik 2008).

The vegetation within the LZ survey areas is consistent with that described above for the Sonoran Desert. Vegetation categories identified at the LZs follow *A Manual of California Vegetation* (Sawyer et al. 2009). Primary vegetation categories include the following (SAIC 2012b):

- *Creosote Bush Shrubland Alliance* – creosote bush is the dominant shrub with bursage and brittlebush absent or present in very low cover.
- *Creosote Bush–White Bursage Shrubland Alliance* – creosote bush and bursage are co-dominant with other shrubs not exceeding the cover of these two species. White bursage may be present in greater cover than creosote bush.
- *Blue Palo Verde–Ironwood Woodland Alliance* – blue palo verde and ironwood are co-dominant, or either species is dominant, in the large shrub or tree canopy. The tree canopy may be open to continuous, the shrub layer may be intermittent or open, and the herbaceous layer sparse or with seasonal annuals.

The LZs are typically covered only by desert pavement supporting little to no vegetation. In some LZs, scattered annual species such as desert sunflower (*Geraea canescens*), plantain (*Plantago ovata*), and species of pincushion (*Chaenactis* spp.) were found in small openings or cracks in the desert pavement where moisture likely collects. Shrubs, such as creosote bush and bursage, were mostly found in association with the shallow washes that cross the pavement and drained into larger washes. Creosote bush was most often the dominant shrub with bursage a common co-dominant. Brittlebush (*Encelia farinosa*) and ocotillo (*Fouquieria splendens*) were also frequently common in the shrub layer. Other shrubs, including purple heather (*Krameria erecta*) and fagonia (*Fagonia laevis*), were present at all of the surveyed areas, although sometimes in small numbers. Cacti were also infrequent to common at the LZs. The most common species were beavertail (*Opuntia basilaris*) and slender cholla (*Opuntia echinocarpa*). Teddy bear cholla (*Cylindropuntia bigelovii*), nipple cactus (*Mammillaria tetrancistra*), California barrel cactus (*Ferocactus cylindraceus* var. *cylindraceus*), and others were less commonly observed, although occurrence could be frequent to abundant at some of the surveyed areas, especially in the rockier areas.

Large trees including ironwood and blue palo verde were only found in the larger, broad washes that were usually outside the LZ boundaries and at the outer limits of the survey area. Wolf berry (*Lycium andersonii*), narrowleaf silverbush (*Ditaxis lanceolata*) and desert lavender (*Hyptis emoryi*) were common associates in the broader, more defined desert washes in the survey area. No aquatic or wetland habitats were observed at any of the LZs. Dense riparian habitat dominated by non-native tamarisk (*Tamarix* sp.) was observed in one survey area, near LZ ME3 Option.

Wildlife and Wildlife Habitats

Mammals that occur in desert regions tend to be nocturnal (night active) or crepuscular (active during dawn and dusk hours) to avoid the heat of the day. Common mammals that occupy the more undisturbed portions of the project region include two jackrabbit species. The black-tailed jackrabbit (*Lepus californicus*) lives in valleys and flat, open country of the four U.S. southwestern deserts, and the antelope jackrabbit (*L. alleni*) occurs in the Sonoran and Chihuahuan deserts. A common rodent is the kangaroo rat, with two species found in this region, Merriam's (*Dipodomys merriami*) and desert kangaroo rat (*D. deserti*). Mule deer occupy a wide range across the western U.S. and utilize riparian areas and arroyos where woody browse can be found and cover is present. Coyotes are wide-ranging and feed on mice, rabbits, ground squirrels, other small rodents, insects, reptiles, and fruits and berries in the desert in addition to foraging around human habitations. Signs of wild burro (*Equus asinus*) were prevalent in the project area. The desert is home to a wide variety of reptiles, with common species including rattlesnakes (*Crotalus* spp.) and lizards such as western whiptails (*Cnemidophorus tigris*) and the side-blotched lizard (*Uta stansburiana*), both observed in the LZs.

A variety of birds have adapted to Sonoran Desert life including raptors (birds of prey) and songbirds. Common birds in the project vicinity included turkey vultures (*Cathartes aura*), hummingbirds, black-throated sparrow (*Amphispiza bilineata*), rock wren (*Salpinctes obsoletus*), woodpeckers (Family: Picidae), including flickers and sapsuckers, and upland species such as Gambel's quail (*Callipepla gambelii*).

Sensitive Species

Sensitive species include those that are listed, proposed, or candidates for listing as threatened or endangered under the federal ESA, species that have similar status under the California ESA, species conserved or under management by the BLM, and other species that are of regional concern due to rarity and potential vulnerability to extinction. Sensitive habitats include those that support endangered, threatened or sensitive species and, therefore, are important to the conservation of these species, as well as wetlands and other waters regulated under Sections 401 and 404 of the CWA.

Plants

Several sensitive plants species were the subject of focused surveys based on the potential for occurrence on or in the vicinity of the LZs (Table 3.7-4). The areas surrounding the LZs generally supported sparse desert vegetation types that are suitable habitats for a number of sensitive species. Other species were considered low likelihood based on the lack of suitable habitat. Complete rare plant surveys were conducted within the LZ boundaries and portions of the surrounding native plant communities up to 350 feet (107 meters) away over three visits in 2010 and 2011 (SAIC 2012b). No federal or state-listed plant species and no federal or state-listed special status or BLM Sensitive plant species were found at any of the LZs. Pink fairy duster (*Calliandra eriophylla*), CRPR List 2 (rare in California but more common elsewhere), was common to dominant in the washes near LZs Cupcake, IP1 Option, and Mallard. This species was not found within the LZs, which are located on desert pavement and bordered by the desert washes.

Also, two individuals of suspected Yuma silverbush (*Ditaxis serrata* var. *californica*), CRPR 3 (a review list; plants for which more information is needed) were found just inside the boundary of LZ PC3. Both individuals were a prostrate form of *Ditaxis* and further investigation determined specimens had more features consistent with this sensitive species, although they did not fit all characteristics. Many individuals of narrowleaf silverbush (*Ditaxis lanceolata;* specimens collected and identification confirmed), a woody, upright form of *Ditaxis*, were at the edges of the large wash. It is possible the prostrate form may be a hybrid.

Table 3.7-4. Special Status Plant Species Potentially Present in the Proposed Project Areas, BLM El Centro

Species	*Status Fed/State/CRPR/ Other*	*Habitat*	*Blooming period*	*Notes*
Federally and California State-listed and BLM (El Centro Region) Sensitive Plant Species				
Astragalus magdalenae var. *peirsonii* Peirson's milk vetch	FE/ST/1B.2/ BLM-S	Perennial herb; desert dunes; -180 to 660 feet (-55 – 200 meters).	December - April	Only known occurrence of this species is the Algodones Dunes, east of LZ Sparrow (USGS Quad Clyde). No suitable habitat in the vicinity of LZs.
Croton wigginsii Wiggins' croton	--/SR/2.2/ BLM-S	Perennial shrub; dunes, Sonoran desert scrub; 165 to 330 feet (50 – 100 meters).	March - May	Species is reported from the Algodones Dunes, east of LZ Sparrow (USGS Quad Clyde). Species not expected in LZs, but suitable scrub habitat may be present.
Fremontodendron mexicanum Mexican flannel bush	FE/--/1B.3/ BLM-S	Evergreen shrub; dry canyons, chaparral and southern oak woodlands; 1,500 feet (450 meters).	March - June	Species not reported near any of the LZs, but suitable habitat may be present.
Helianthus niveus ssp. *tephrodes* Algodones Dunes sunflower	FSC/SE/1B.2/ BLM-S	Perennial herb; desert dunes; 165 to 330 feet (50 – 100 meters).	September - May	Species is reported from the Algodones Dunes, east of LZ Sparrow (USGS Quad Clyde). No suitable habitat in the vicinity of LZs.
Lupinus excubitus var. *medius* Mountain Springs lupine	--/--/1B.3/ BLM-S	Perennial, sub-shrub; desert washes, creosote bush scrub; 1,390 to 4,200 feet (425 – 1,370 meters).	March - May	Species not reported near any of the LZs, but suitable habitat may be present.
Dieteria asteroides var *lagunensis* Laguna Mountains aster	--/--/1B.3/ BLM-S	Perennial herb; dry slopes, yellow pine forest, cismontane woodland and lower montane coniferous forest; 2,600 to 7,000 feet (780 – 2,200 meters).	July - August	Species not reported near any of the LZs. Suitable habitat unlikely, based on elevation range of species.
Cylindropuntia munzii Munz cholla	--/--/1B/ BLM-S	Perennial stem succulent, shrub to tree-like; sandy or gravely areas in Sonoran Desert Scrub; 500 to 2,000 feet (30 - 885 meters).	May - Reproduction is vegetative; identifiable all year.	Species not reported near any of the LZs. Only known occurrences from two locations in Chocolate Mountains.
Palafoxia arida var. *gigantea* Giant Spanish needle	--/--/1B.3/ BLM-S	Annual to perennial herb; desert dunes; 50 to 330 feet (15 – 100 meters).	February - May	Species is reported from the Algodones Dunes, east of LZ Sparrow (USGS Quad Clyde). Suitable habitat not likely present in LZs.
Pholisma sonorae Sandfood	--/--/1B.3/ BLM-S	Perennial herb, parasitic; desert dunes; 0 to 660 feet (0 – 200 meters).	April - June	Species is reported from the Algodones Dunes, east of LZ Sparrow (USGS Quad Clyde). Suitable habitat not likely present in LZs.

Table 3.7-4. Special Status Plant Species Potentially Present in the Proposed Project Areas, BLM El Centro

Species	*Status Fed/State/CRPR/ Other*	*Habitat*	*Blooming period*	*Notes*
Other California Rare Plant Rank				
Abronia villosa var. *aurita* Chaparral sand verbena	--/--/1B.1/--	Annual herb; chaparral, coastal scrub, and desert dunes; 260 to 5,300 feet (75 – 1,610 meters).	January - September	Species not reported near any of the LZs, although is reported from larger area (USGS Quad Plaster City) and suitable habitat may be present; not found during surveys.
Calliandra eriophylla Pink fairy-duster	--/--/2.3/--	Perennial deciduous shrub; Sonoran desert scrub, sandy or rocky soils; 400 to 5,000 feet (120 – 1,500 meters).	January - March	Species found near LZs Cupcake, IP1 Option, and Mallard, also observed while travelling in between LZs in dry desert washes. Species was also reported to occur near LZ Pelican but was not found during surveys.
Chylismia arenaria Sand evening-primrose	--/--/2.2/--	Annual/perennial herb; Sonoran desert scrub, rocky soils; -230 to 3,020 feet (-70 – 915 meters).	November - May	Species reported near the following LZs: IP1 Option and Pelican (USGS Quads: Palo Verde Peak, and Quartz Peak); not found during surveys.
Carnegiea gigantea Saguaro	--/--/2.2/--	Perennial stem succulent; Sonoran desert scrub; 165 to 500 feet (50 – 150 meters).	May - June	Species reported near the following LZs: Eider, ME3 Option, MW1, and MW1 Option (USGS Quads: Bard and Picacho NW); not found during surveys.
Colubrina californica Las Animas colubrina	--/--/2.3/--	Perennial deciduous shrub; Mojavean desert scrub, Sonoran desert scrub; 30 to 3,300 feet (10 – 1,000 meters).	September - November (April-May)	Species reported near the following LZs: IP1 Option and Pelican (USGS Quads: Picacho Peak, Quartz Peak); not found during surveys.
Ditaxis claryana Glandular ditaxsis	--/--/2.2/--	Perennial herb; Mojavean desert scrub, Sonoran desert scrub; 0 to 1,540 feet (0 - 465 meters).	October - March	Species reported near the following LZs: IP1 Option and Pelican (USGS Quad: Quartz Peak); not found during surveys.
Ditaxis serrata var. *californica* Yuma silverbush or California ditaxsis	--/--/3.2/--	Perennial herb; Sonoran desert scrub; 0 to 1,540 feet (0 - 465 meters).	March - December	Species (or hybrid) found at LZ PC3; not reported near any other LZs.
Koeberlinia spinosa spp. *tenuispina* Slender-spined allthorn	--/--/2.2/--	Perennial deciduous shrub, riparian woodland, Sonoran desert scrub; 492 to 1,673 feet (150 – 510 meters).	May - July	Species reported near LZ PC3 (USGS Quad: Picacho Peak); not found during surveys.
Malperia tenuis Brown turbans	--/--/2.2/--	Annual herb; Sonoran desert scrub, sandy soils; 495 to 1,690 feet (15 – 335 meters).	March - April	Species reported near LZ C1 (USGS Quad: Plaster City NW); not found during surveys.

Table 3.7-4. Special Status Plant Species Potentially Present in the Proposed Project Areas, BLM El Centro

Species	*Status Fed/State/CRPR/ Other*	*Habitat*	*Blooming period*	*Notes*
Other California Rare Plant Rank (continued)				
Nemacaulis denudata var. *gracilis* Slender cottonheads	--/--/2.2/--	Annual herb; coastal dunes, desert dunes, Sonoran desert scrub; -165 to 1,320 feet (-50 – 400 meters).	(March) April - May	Species is reported from the Algodones Dunes, east of LZ Sparrow (USGS Quad Clyde). Species not expected in LZs, but suitable scrub habitat may be present; not found during surveys.

Notes:

Federal Status (determined by U. S. Fish and Wildlife Service):

FE Federally Listed Endangered
FT Federally Listed Threatened
FP Federally Proposed for Listing
FC Federal Candidate for listing as threatened or endangered.

California State Status (determined by California Department of Fish and Game):

SE California State Listed Endangered
ST California State Listed Threatened
SR California State Listed Rare

California Rare Plant Rank (California Native Plant Society [CNPS] / California Department of Fish and Game [CDFG]) Threat Ranks:

List 1B: Plants rare, threatened or endangered in California and elsewhere.
List 2: Plants rare, threatened or endangered in California but more common elsewhere.
List 4: Plants of limited distribution (A watch list).

0.1-Seriously threatened in California
0.2-Fairly threatened in California
0.3-Not very threatened in California

BLM-S: Bureau of Land Management (BLM) Sensitive

Source: CDFG 2010a; CNPS 2010; BLM 2008

Table 3.7-5. Special Status Wildlife Species Potentially Present in Project Areas, BLM El Centro Field Office

Sensitive Species	*Status Fed/ State (CA or AZ)/ BLM*	*Habitat*	*Breeding period*	*Notes*
Mammals				
Ovis canadensis nelsoni (*O.c. cremnobates*) Nelson's (or desert) bighorn sheep, the Distinct Population Segment (DPS) known as penninsular bighorn sheep	FE-CH/ST/BLM-S, EC	Mountains, canyons, and upper alluvial fans on east facing slopes (typically below 4,593 feet [1,400 meters]) of the Peninsular Ranges, extending southward into Baja California, Mexico.	The rut occurs in late-summer to fall. Lambs are born after a six month gestation.	Critical habitat designated in 2009 north of Ocotillo, California.
Eumops perotis californicus Western mastiff bat	-/-/CASC/BLM-S, EC	Small colonies seek diurnal refuge in rocks crevices that form vertical cliffs with roost entrances typically horizontally oriented, that have moderately large openings, and face downward so they can be entered from below.	Mating occurs in early spring, parturition from June to early July; males and females remain together throughout the year.	The species does not undergo either migration or prolonged hibernation, but is periodically active all winter.
Plecotus townsendii (Pale) Townsend's western big-eared bat	-/-/CASC/BLM-S, EC	A variety of grassland/shrub and forested environments from sea level to 10,000 feet (3,048 meters); rock shelters, caves, and/or abandoned mines for roosts.	Mating occurs in winter; births occur from May through June, with young able to fly 3 weeks after birth.	Juniper-pine forests, shrub-steppe grasslands, desert scrub, deciduous forest, mixed coniferous forests, riparian areas.
Antrozous pallidus Pallid bat	-/-/CASC/BLM-S, EC	Deserts, grasslands, shrublands, woodlands & forests. Most common in open, dry habitats with rocky areas for roosting. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	Mating occurs in fall, gestation begins in spring, and females give birth early each summer within a maternal colony deep in a canyon crevice. Maternal colonies can include up to 200 females and young. The young fledge at about six weeks of age.	—
Myotis ciliolabrum Western small-footed myotis	-/-/BLM-S, EC, Y	Grassland, rivers; roost in caves, mines, rock crevices, abandoned birds' nests, under tree bark, and in buildings. In the winter months, hibernates in rock crevices inside caves and abandoned mines.	Mating occurs in fall, young are born May through July.	—

Table 3.7-5. Special Status Wildlife Species Potentially Present in Project Areas, BLM El Centro Field Office

Sensitive Species	*Status Fed/ State (CA or AZ)/ BLM*	*Habitat*	*Breeding period*	*Notes*
Mammals (continued)				
Myotis evotis Long-eared myotis	-/-/BLM-S, EC	This bat roosts in buildings, crevices, spaces under bark, and snags. Caves are used primarily as night roosts. It roosts singly, or is found in fairly small groups. Feeds along habitat edges, in open habitats, and over water.	Mating probably occurs in the fall. The young are born from May through July, with a peak in June.	From CDFG (2010a) website: The species avoids the arid Central Valley and hot deserts, occurring along the entire coast.
Myotis velifer Cave myotis	-/-/CASC/ BLM-S, EC, Y	A colonial cave-dweller, this bat occurs in colonies of several thousand individuals in most of its range. Mines and buildings also may be used. Hibernation caves have high humidity, often with standing or running water and little air movement. Feeds along riparian vegetation, over water, between patches of riparian vegetation, and to a lesser extent over open areas.	Breeds in fall and winter; young are born in June and July.	—
Myotis yumanensis Yuma myotis	-/-/BLM-S, EC	Optimal habitats are open forests and woodlands with sources of water over which to feed. Distribution is closely tied to bodies of water. Maternity colonies in caves, mines, buildings or crevices that maintain high temperatures.	Births occur from May to early July, and usually only one young is born to each female.	—
Macrotus californicus California leaf-nosed bat	-/-/CASC/AZSC/ BLM-S, EC	Desert scrub, mines; spend days roosting in caves and abandoned mines or buildings (stay through the winter).	Mating occurs in autumn months; young are born in May or June.	Non-migratory

Table 3.7-5. Special Status Wildlife Species Potentially Present in Project Areas, BLM El Centro Field Office

Sensitive Species	*Status Fed/ State (CA or AZ)/ BLM*	*Habitat*	*Breeding period*	*Notes*
Birds				
Coccyzus americanus occidentalis Western yellow-billed cuckoo	FC/SE	Open woodland with clearings and thick, scrubby under-growth along watercourses. In California, large tracts (in excess of 49 acres [20 hectares]) of deciduous riparian woodland - generally absent from heavily forested and urban areas.	Peak is mid-July to early August.	Both members of the pair build a well-concealed nest in dense foliage within 5 to 40 feet (2 –12 meters) off the ground close to water. Tangled willow habitat generally is utilized for nesting, while areas of tall cottonwood stands are utilized for foraging.
Empidonax trailii extimus Southwestern willow flycatcher	FE-CH/SE	Nests only in dense riparian vegetation associated with streams, rivers, lakes, springs, and other watercourses and wetlands.	May-June – July-August.	—
Rallus longirostris ssp. *yumanensis* Yuma clapper rail	FE/ST/CFP	Shallow, freshwater marshes containing stands of cattails and bulrushes.	March 15 – April 30 on California-Arizona border.	—
Vireo bellii pusillus Least Bell's vireo	FE-CH/SE	Dense willow-dominated riparian habitats with lush understory vegetation, nesting in the understory and using taller trees for foraging and singing perches.	First eggs are laid in April.	—
Micrathene whitneyi Elf owl	--/SE	Mature dense vegetation with large trees and an understory of mesquite, willow, or tamarisk; will also occur in dry oak woodlands, wooded canyons, and sycamores at elevations up to 7,000 feet (2,134 meters).	Arrives in breeding range by March. Fledging occurs by late June or early July.	—
Buteo swainsoni Swainson's hawk	--/ST	Typical habitat is open desert, grassland, or cropland containing scattered, large trees or small groves. Forages in adjacent grasslands, suitable grain or alfalfa fields, or livestock pastures. In southern California, now mostly limited to spring and fall transient.	Breeding occurs late March to late August, with peak activity late May through July.	Project area not included on CDFG range map.

Table 3.7-5. Special Status Wildlife Species Potentially Present in Project Areas, BLM El Centro Field Office

Sensitive Species	*Status Fed/ State (CA or AZ)/ BLM*	*Habitat*	*Breeding period*	*Notes*
Birds (continued)				
Colaptes chrysoides Gilded flicker	--/SE	Typically found at an altitude of 0 to 6,854 feet (0 – 2,089 meters) in giant cactus forests of southwestern deserts. Excavates nests in saguaro, cottonwoods, and willows. Non-migratory.	Nesting begins in early April, fledging by June.	—
Melanerpes uropygialis Gila woodpecker	--/SE	Mature cottonwood-tree willow riparian forest, mesquite riparian woodland, and saguaro forest.	April through July, with peak in April-May.	In the desert, this species performs the important ecological function of removing unhealthy flesh, insects, and disease from the saguaro cactus by excavating holes; cavities also provide shelter and nest sites for other sensitive species.
Laterallus jamaicensis ssp. *coturniculus* California black rail	--/ST/CFP/ AZSC/BLM-S, EC	Coastal and freshwater wetland habitat and generally avoid habitat that is affected by daily tidal action, preferring areas that do not flood regularly.	March-June.	Vegetation below 4 inches (10 cm) in height and with the proportion of pickle-weed, rushes, gumplant, peppergrass, alkali bulrush, and cattails within 164 feet (50 meters).
Vireo bellii arizonae Arizona Bell's vireo	--/SE	Low, dense, scrubby vegetation in areas of early succession and is particularly dependent on corridors of habitat along rivers and streams.	March-August.	—
Vireo vicinior Gray vireo	--/CASC	Mountains, chaparral, oak woodland. Occupied habitats occur on arid slopes dominated by short, densely branched, stiff-twigged shrubs.	March through August. Open cup nests are placed in shrubs at heights of 3 to 4 feet (0.9 – 1.2 meters).	During the spring and summer months it feeds by gleaning twigs and leaves for insects.
Toxostoma lecontei Le Conte's thrasher	--/CASC/BLM-S, EC	Occurs primarily in open desert wash, desert scrub, alkali desert scrub, and desert succulent shrub habitats; also occurs in Joshua tree habitat with scattered shrubs.	Territory defended most actively from early December to early February, with breeding occurring from late January into early June. Peak from mid-March to mid-April.	—

Table 3.7-5. Special Status Wildlife Species Potentially Present in Project Areas, BLM El Centro Field Office

Sensitive Species	*Status Fed/ State (CA or AZ)/ BLM*	*Habitat*	*Breeding period*	*Notes*
Birds (continued)				
Athene cunicularia Burrowing owl	--/CASC#2/BLM-S, EC, Y	Grassland and agricultural areas. Yearlong resident of open, dry grassland and desert habitats, and in grass, forb and open shrub stages of pinyon-juniper and ponderosa pine habitats. Uses rodent or other burrow for roosting and nesting cover.	Breeding occurs from March through August, with peak in April and May. Exhibit strong breeding site fidelity.	—
Charadrius montanus Mountain plover	--/CASC#3/ BLM-S	Winter resident from September through March, found on short grasslands and plowed fields in foothill valleys west of San Joaquin Valley, Imperial Valley, and along the central Colorado River valley. Avoids high and dense cover.	Does not nest in California.	—
Falco peregrinus ssp. *anatum* Peregrine falcon	--/CFP/AZSC	Open habitats, such as grasslands, agricultural fields, ponds, and coastal areas. Requires protected cliffs and ledges for cover.	Very uncommon breeding resident. Active nesting sites are known along the coast north of Santa Barbara, in the Sierra Nevada, and in other mountains of northern California, usually near water, March-August.	—
Herptiles				
Gopherus agassizii Desert tortoise, the DPS known as the Mojave population occurring north and west of the Colorado River	FT-CH/ST/BLM-S, EC, Y	Rocky slopes in desert scrub to semi-desert grassland, as well as along washes, and extending into creosote bush flats.	March-May.	Considered present at several LZs (Table 3.7-6 and presumed suitable habitat at all LZs east of the Salton Sea).
Coleonyx switaki Barefoot banded gecko	--/ST/BLM-S, EC	Lives on boulder-strewn hillsides of granitic or volcanic outcroppings in the deserts of San Diego and Imperial counties at elevations of 984 to 2,050 feet (300 – 625 meters).	Breed from Mid-May to late July.	Surrounding scrubby vegetation composed of agave, yucca, cholla, brittlebush, and ocotillo.

Table 3.7-5. Special Status Wildlife Species Potentially Present in Project Areas, BLM El Centro Field Office

Sensitive Species	*Status Fed/ State (CA or AZ)/ BLM*	*Habitat*	*Breeding period*	*Notes*
Herptiles (continued)				
Scaphiopus couchi Couch's spadefoot	--/CASC/BLM-S, EC	In California, elevational distribution is from about 690 feet (210 meters) to about 1,120 feet (340 meters). Frequents arid and semi-arid habitats occurring along desert washes, in desert riparian, palm oases, desert succulent shrub, and desert scrub habitats. It is also found in cultivated cropland areas.	Temporary pools and potholes with water lasting longer than 10-12 days are required as breeding sites. Runoff basins at the base of sand dunes are also used. Individuals are opportunistic breeders, reproducing only during and immediately after the onset of warm rains, usually in the spring and summer.	—
Rana yavapaiensis San Sebastian (or lowland) leopard frog	-/-/BLM-S, EC	Frequents desert, grassland, oak and oak-pine woodlands, entering the permanent springs and pools of streams, overflow ponds, side channels of major rivers, and, in drier areas, permanent stock tanks. Stays close to water.	In California, breeding and egg-laying occur from December to June depending on local conditions. Eggs normally hatch within three weeks; tadpoles typically metamorphose in two to four months.	—
Phyrnosoma mcalli Flat-tailed horned lizard	-/CASC, AZSC/ BLM-S, EC	Fine sand for cover is a critical habitat element, also use shrubs and clumps of grass, in desert washes and desert flats.	Courtship and breeding probably take place in the early spring following winter emergence but this has not been confirmed. Observations of young from a first clutch appeared in early July and those from the second clutch appeared in late August and early September.	These lizards are ant specialists, as are all horned lizards. Harvester ants are the most common food item though other arthropods are occasionally eaten.

Table 3.7-5. Special Status Wildlife Species Potentially Present in Project Areas, BLM El Centro Field Office

Sensitive Species	*Status Fed/ State (CA or AZ)/ BLM*	*Habitat*	*Breeding period*	*Notes*
Invertebrates				
Euphydryas editha quino (=*E.e.wrighti*) Quino checkerspot butterfly	FE	Topographically diverse landscapes that contain low to moderate levels of nonnative vegetation, including coastal sage scrub, open chaparral, juniper woodlands, forbs, and native grasslands.	Adults emerge early to late spring, mate, lay eggs. Eggs hatch in about a week and a half, larva then feed on annuals *Plantago erecta* or *Castilleja exserta*.	—

Notes:

Federal
FE = Listed under ESA as endangered
FT = Listed under ESA as threatened
FC = Candidate for federal listing
CH = USFWS-designated critical habitat occurs in the county

State
ST = Listed as threatened in California
SE = Listed as endangered in California
CFP = California fully protected
WL = California Watch List
AZSC = Arizona Species of Concern
CASC = California Species of Concern

BLM (newest update available 2006)
BLM-S, EC = listed on BLM El Centro Field Office sensitive list
BLM-S, Y = BLM sensitive in Yuma Field Office

Source: CDFG 2010b, CalFish 2010, CalHerps 2010, NatureServe Explorer 2010, and BLM 2008

Wildlife

Project areas also were evaluated for the potential to support habitat for sensitive wildlife species that may occur in the region (Table 3.7-5). Following the data review and assessment, surveys were completed on all LZs to determine potential presence of suitable habitat for special status or BLM sensitive animals (SAIC 2012b). The federally listed desert tortoise (also listed as threatened in California and as a BLM special status species) was identified on or near LZ Sparrow and LZ Mallard, and flat-tailed horned lizard (BLM sensitive species) was observed near LZ C1 and on LZ Wolf in the Yuha Desert west of the Salton Sea. Both species are described in detail in the following sections.

No other federal or state-listed special status or BLM sensitive species were observed within the LZs. Additionally, no LZs occur within USFWS currently mapped critical habitat for the federally listed peninsular bighorn sheep. The LZs surveyed supported limited to no large woody vegetation suitable for special status woodpecker and owl species nesting habitat. No preferred bat habitats such as large caves, deep rock crevices, mines, or abandoned buildings were observed within the LZs. Further, none of the LZs contained perennial water to support special status fish, amphibians, and wading birds listed in Table 3.7-5.

Desert Tortoise (Gopherus agassizii)

The desert tortoise was emergency-listed by USFWS on 4 August 1989, and the Mojave population was federally listed as threatened in April 1990 (USFWS 1990). The Mojave population includes all desert tortoises occurring north and west of the Colorado River, which encompasses the majority of the LZs. The Final Rule for USFWS-designated critical habitat for the Mojave Desert population of the Desert Tortoise was published in 1994 (59 Federal Register 5820-5866). The USFWS determined that the Mojave Desert tortoise population warranted listing in response to documented population declines over large portions of its range. The decline is thought to be due to a number of causes, including loss of habitat, upper respiratory tract disease, predation by ravens on young tortoises, disturbance from off-highway vehicle use, livestock grazing degrading habitat, and direct disturbance and collection by humans. Portions of the LZ project area occur near but not within the Colorado Desert Recovery Unit for desert tortoise described in the USFWS *Draft Revised Recovery Plan* (USFWS 2008).

The desert tortoise is an herbivorous reptile found throughout much of the Mojave and Sonoran Deserts. Its range roughly approximates the distribution of creosote bush scrub plant community. The desert tortoise spends much of the year underground in burrows it excavates to avoid extreme temperatures during summer and winter. Tortoises construct and maintain burrows, of which there may be several within an individual's home range. The desert tortoise is active above ground during the spring, summer, and autumn when daytime temperatures are below 90 °F (32 °C). Most activity occurs during spring and early summer.

Desert tortoises in the Colorado Desert Recovery Unit are found in the valleys, on bajadas, desert pavements, and rocky slopes, and in the broad, well-developed washes. Vegetation within critical habitat is characterized by relatively species-rich succulent scrub, creosote bush scrub, and blue palo verde, ironwood, and smoke tree communities. The emergence of tortoises generally coincides with healthy growth of winter and late summer annuals because this region has two distinct wet seasons that support corresponding floras (USFWS 2008). Desert tortoises require friable soil for burrow and nest construction.

The soil must be a fine gravelly and/or sandy loam, with some clay for burrow stability. Burrows are dug to use during winter dormancy and for summer use; burrows may be more than 9 feet (3 meters) long. Tortoise burrows are located in the open, under shrubs and rocks, or in the banks of gullies and washes. This species remains in burrows during the hottest parts of summer to conserve water, emerging in the morning or late afternoon to forage from March through October (U.S. Geological Survey [USGS] 2004). Desert tortoises sometimes rely on shrubs for cover during the day. Tortoises remain in burrows during most of the period between November and March (i.e., winter dormancy).

No critical habitat is present at or in the vicinity of any of the LZs. LZ Sparrow occurs closest to mapped USFWS-designated critical habitat and is within approximately 3 miles (4.8 km) of known desert tortoise occurrences (CDFG 2010a).

With the exception of LZ C1 and LZ Wolf that are located in the Yuha Desert and west of the Salton Sea, the rest of the LZs are within the mapped desert tortoise range (CDFG 2010b) and are considered suitable habitat for the species. Desert tortoise protocol-level surveys were conducted from 3 to 7 October 2011 and followed *2010 Field Season Pre-project Field Survey Protocol for Potential Desert Tortoise Habitats* (USFWS 2010). LZ C1 and LZ Wolf were not surveyed because they are outside the known range of the species. Two additional sites (LZ Mallard and LZ Sparrow) are within the known range of the species, and tortoises or sign were identified at these LZs during prior reconnaissance surveys and are assumed occupied; therefore no additional surveys were completed for LZ Mallard and LZ Sparrow. Based on the reconnaissance survey and the protocol-level surveys, presence of live tortoise was observed at LZ Sparrow and tortoise sign (burrows, scat, carcasses and/or shell remains) was observed within the protocol survey area for LZ Cupcake, LZ IP1 Option, LZ Eider, LZ Mallard, and LZ ME3 Option (Tables 3.7-6 and 3.7-7). The occurrence of either live tortoises or tortoise sign indicates the presence of desert tortoise (USFWS 2010). Although sign and/or tortoises were not located at the remainder of the sites, they are within the known range and recovery area of desert tortoise and for the purposes of this evaluation, suitable habitat is presumed.

Table 3.7-6. Summary of Results for Tortoise Survey Efforts on BLM Managed Lands

Landing Zone Name	*Tortoise Sign within the Protocol Survey Area*
Bull	no sign
C1	- [3]
Cupcake	burrow (class 3) and scat (class 3)
Eider	carcass (class 5)
IP1 Option	burrow (class 3)
Mallard [1]	burrow (class1), scat (class 3)
ME3 Option	burrow (class 5)
MW1	no sign
MW1 Option	no sign
PC3	no sign
Pelican	no sign
Sparrow [2]	live tortoise, burrows (class 2, 3, 4, and 5)
Wolf	- [3]

Notes:
See Table 3.7-7 for class descriptions.
1 Observed during biological surveys October 2010; LZ not surveyed in October 2011.
2 Observed during biological surveys April 2010, LZ not surveyed in October 2011.
3 Protocol surveys not required. LZ is west of the Salton Sea and outside the known range and recovery area for Desert tortoise.

Table 3.7-7. Desert Tortoise Sign Key

Sign Type	*Class 1*	*Class 2*	*Class 3*	*Class 4*	*Class 5*
Burrow and Den	Currently active with tortoise or recent tortoise sign	Good condition, definitely tortoise but no evidence of recent use	Deteriorated condition but is definitely tortoise	Deteriorated condition, possibly tortoise (no other corroborating sign)	Good condition, possibly tortoise (no other corroborating sign)
Scat	Wet or moist but not from rain or dew or dried but with obvious odor	Dry, dark brown, has a glaze, and some odor	Dry, has no glaze or odor, is slightly bleached, is light brown, and plant fibers are tightly packed	Dry, has no glaze or odor, is somewhat bleached, is light brown to pale yellow, plant fibers are not tightly packed, and has a scaly appearance.	Dry, has no glaze or odor, is bleached, is white, and consists only of plant fibers
Carcasses, Shell Remains and bone fragments	Fresh or putrid	Fresh or putrid, is of normal color and the scutes adhere to the bone	Scutes are peeling from the bone	Shell bone is falling apart and the growth rings on the scutes are peeling	Disarticulated and scattered

Flat-tailed Horned Lizard (Phrynosoma mcallii)

The distribution of the flat-tailed horned lizard once included the area from Palm Springs, California south to Sonora and Baja California, Mexico. Its current range is the most limited of all horned lizards and is restricted to scattered locations on sandy soils in the lower Colorado River subdivision of the Sonoran Desert. In the U.S., this species currently occurs primarily between the Salton Sea and the southern border with Mexico, concentrated in the Imperial Valley and the deserts west and south of Yuma, Arizona. Concerns about the declining numbers of flat-tailed horned lizard prompted its addition to the species proposal for listing as threatened, but the proposal was withdrawn by the USFWS on 15 March 2011 (76 Federal Register 14210). The flat-tailed horned lizard remains of concern and is protected through conservation agreements and a Rangewide Management Strategy (Flat-tailed Horned Lizard Interagency Coordinating Committee [FTHLICC] 2003). State and federal agencies that manage land or natural resources within the range of this species are participants in the Conservation Agreement and the Rangewide Management Strategy, including MCAS Yuma, Naval Air Facility (NAF) El Centro, and NAVFAC SW (FTHLICC 2003).

Two of the project LZs, C1 and Wolf, occur within the known range of this species, but no LZs are located within flat-tailed horned lizard designated Management and Research Areas (FTHLICC 2003). A flat-tailed horned lizard was observed within LZ Wolf during the April 2011 survey. One was also observed during an archaeological survey in May 2010 near LZ C1 (SAIC 2011).

U.S. Army Corps of Engineers Jurisdictional Lands or Otherwise Sensitive Environments

Aquatic and wetland habitats are limited in the Colorado and Yuha Deserts. Two of the region's most significant aquatic systems are the Salton Sea and the Colorado River. In some areas runoff from seasonal rains and groundwater springs can form alluvial fans, desert arroyos, desert fan palm oases, freshwater marshes, brine lakes, desert washes, ephemeral and perennial streams, and riparian vegetation communities dominated by cottonwood, willow, and non-native tamarisk (CDFG 2007). Areas surrounding several of the LZs support small dry desert washes with a slightly higher cover of vegetation. No wetlands or other waters of the U.S. are present within any of the LZs.

3.7.2 Environmental Consequences and Mitigation Measures

The training associated with the proposed action includes the use of several types of rotary wing and tilt-rotor aircraft practicing approach, touch-down, and takeoff exercises at the LZs. No deployment or recovery of personnel or equipment, and no use of training artillery is proposed. A detailed presentation of operational frequency is presented in section 2.2 (*Proposed Action*) and Tables 2.2-1 and 2.2-2.

This biological resource impact assessment was conducted for the proposed action and evaluated several factors including magnitude of impact, permanence of impact (permanent loss versus temporary short term/temporary long term), sensitivity of the resource, and legal protection of the resource. This assessment is based on project-specific biological resource surveys (SAIC 2012a, 2012d, 2012e), a review of existing data for the region, data contained within the CNDDB, and coordination among Cleveland National Forest, BLM, USFWS, and USMC staff. A Biological Assessment (USMC 2012a) has been prepared separately for this project as part of the ESA Section 7 consultation process, and the USFWS concurrence letter is included in Appendix A-3.

3.7.2.1 Alternative 1

Cleveland National Forest

Vegetation

No construction is proposed at any of the LZs; therefore, there would be no direct removal of vegetation at any of the proposed project areas. In addition, all LZs in the Cleveland National Forest are developed to various levels ranging from fire roads to entirely paved helicopter pads, and the LZs are already in use and are routinely exposed to existing training activities involving helicopters. Under Alternative 1, the training frequency would be similar to existing conditions, with the total annual sorties decreasing about 7 percent and overall landings increasing about 3 percent. As a result, the frequency of events would decrease from existing conditions; however, the number of landing per event would slightly increase. Continued training would result in the temporary disturbance of loose surface debris and soil caused by downdraft and outwash from moving rotors (collectively known as rotor wash) in the vicinity of takeoffs, landings, and near-surface hovering. Additionally, the MV-22B would replace the antiquated CH-46E over time, and rotor wash from the MV-22B is 3 to 4 times greater than that associated with the CH-46 (Bell Boeing 2008).

Rotor wash from aircraft during landing, takeoffs, and hovering immediately above the ground would temporarily affect vegetation and wildlife habitat in the immediate vicinity of the hovering aircraft. Rotor wash would result in dust and debris being scattered and becoming airborne in the immediate vicinity of the aircraft, although the extent of this dust disturbance would depend on a variety of factors including local soil characteristics, topography, presence of vegetation, and weather conditions. Dust deposits may affect essential plant processes including photosynthesis, respiration, and transpiration; dust also may allow the penetration of phytotoxic gaseous pollutants to nearby vegetation and may cause increased incidence of plant pests and diseases (Farmer 1993). Indirect impacts would be localized to the existing

disturbed and/or developed open areas of the LZs and, to a lesser extent, adjacent vegetation[1]; any limited herbaceous vegetation (e.g., grasses and forbs) would be quick to recover. Because these LZs are generally devoid of native vegetation or paved, the continued training activity would not likely result in uprooting of plants or permanently affecting the distribution of plant communities or associated habitats. Additionally, the proposed dust abatement measures described in section 2.2.1.3 (*Flight Activity within the Cleveland National Forest*) would minimize dust generation and limit indirect effects on adjacent vegetation.

No plant species found on the LZs and/or buffer areas are included in the Federal Noxious Weed List (USDA 2012j) or on lists of target species for management prepared for southern California national forests (USFS 2005c). In general, the non-native species that do occur on the LZs and buffer areas are ubiquitous in southern California and are long established in the project area, and thus do not pose a new threat to native vegetation (SAIC 2012i). There is minimal risk of transporting seed of invasive species from site to site because all travel would be by aircraft.

Because of the unique tilt-rotor design of the MV-22B, introduction of the MV-22B into a national forest is a fire concern. Fire ignitions would be most frequent under conditions of low moisture, low relative humidity, and high ambient temperatures, and are especially prevalent under Santa Ana conditions, during which dry air masses move from the interior to the coast, typically accompanied by high winds and hot temperatures. Fire potential would be highest in undeveloped areas with an abundance of natural fire fuels (e.g., dry grasses or finely branched shrubs that extend above the ground surface), dry soil, and low moisture content. Under the proposed action, however, aircraft would only land within the designated LZ areas, which are typically heavily disturbed and/or developed and generally devoid of vegetation. No landings would occur in undisturbed, undeveloped sites outside of the proposed LZs. Additionally, many of the LZs are on or adjacent to fire breaks, which are routinely maintained by the USFS through controlled burns or other methods. Therefore, the potential for fire is considered low.

In addition, operation of the MV-22B, itself, has not been identified as a cause of frequent fires. A DoN review concluded that under normal operations with engine exhaust deflectors operating, the exhaust of the MV-22B should not heat the ground to a temperature high enough to support combustion of plant based materials such as dry grasses (DoN 2008 [see Appendix E]). The aircraft operates with the exhaust deflectors on at all times when on the ground, and the pilot is not allowed to land in an unprepared LZ if the deflectors are inoperative.

Based on the above analysis, impacts on vegetation associated with takeoff, landing and low-level hovering would be less than significant.

Wildlife and Wildlife Habitats

The use of any rotary wing and tilt-rotor aircraft in the vicinity of undeveloped areas has the potential to add noise to the natural environment, similar to existing conditions. While transitioning to the LZs from an airfield, rotary wing aircraft would usually fly between 1,000 and 2,000 feet (305 and 610 meters) above ground level; tilt-rotor aircraft would usually fly similar to a turboprop airplane, between 8,000 and 12,000 feet (2,438 and 3,658 meters) above ground level. While lining up and conducting an approach, rotary wing aircraft operate at altitudes between 200 and 1,000 feet (61 and 305 meters) above ground level, and usually approach from an easterly or westerly heading. The MV-22B would follow a similar approach but would remain at altitudes between 200 and 3,000 feet (61 and 914 meters) above ground level, and transition to descend in a steeper trajectory to the LZ. While flying at higher altitudes, the MV-22 would

[1] The majority of dust exposure would be confined to the LZ and is expected to disperse quickly over an area up to about 350 feet (107 meters) distance from the aircraft, although this distance would depend on a variety of factors, including local soil characteristics, topography, presence of vegetation, and weather conditions. The 350-foot radius was based on the Navy Program Office's review of existing rotor wash information for the MV-22 (Bell Boeing 2008).

produce less approaching noise than lower flying rotary wing aircraft. Noise modeling of the proposed approach pattern demonstrated that noise exposure under Alternative 1 would be most prevalent within about 1,200 feet (366 meters) of an LZ (see section 3.2, *Noise*). Noise modeling for Alternative 1 also resulted in lower or identical noise envelopes at all LZs compared to current conditions, and only one LZ (LZ Site 6/LZ Site 6 Alt) would experience annual-averaged sound levels greater than 65 dB $CNEL_{mr}$ (see Section 3.1, *Noise*). Any nearby canyon bottoms and riparian corridors within the approach pattern would experience annual-averaged sound levels less than 65 dB $CNEL_{mr}$.

Noise can cause a response by wildlife, potentially inducing a startle response and causing possible injury from trampling or uncontrolled running or flight, increasing expenditure of energy during critical periods, decreasing the amount of time spent on life functions such as seeking food or mates, temporarily masking auditory signals from other animals, and/or otherwise reducing the protection and stability of young animals. The type of noise that can stimulate the startle reflex is highly variable among animal species and situations (Manci et al. 1988). In general, studies have indicated that close, loud, and sudden noises that are combined with a visual stimulus produce the most intense reactions. Rotary wing aircraft are believed to generally induce the startle response more frequently than fixed wing aircraft (Gladwin et al. 1988). This response is attributed to the low-frequency percussive sounds ("wop-wop-wop") characteristic of some helicopters, such as the UH-1 Huey (UH-1N), which are audible at a distance, and, at closer range, have visible moving rotors. As for a typical startle response to a rotary wing aircraft, current training activities were witnessed during field surveys, with a CH-46E touching down at and taking off from LZ Site 11. Several songbirds were observed to fly away from the immediate vicinity of the LZ as the helicopter approached. Following takeoff, the birds returned within five minutes.

Additionally, the frequency of noise (how constant or infrequent the noise source is) will affect species differently. For example, constant noise sources such as chronic industrial noise can reduce nesting bird species richness and lead to a change in the species composition of avian communities towards more tolerant species (Francis et al. 2009). Like industrial noise, chronic traffic noise appears to have the potential to alter avian communities and reduce population densities for several bird species (Reijnen and Foppen 2006). Some species seem to be unaffected by noise while others may not come near roads when traffic volume is high (Bautista et al. 2004). For example, song sparrows (*Melospiza melodia*) living in urban environments in Oregon have been shown to adapt and maintain their populations in urban areas despite the noise (Woods and Yezerinac 2006), whereas horned lark (*Eremophila alpestris*) numbers decreased at distances of up to 1,640 feet (500 meters) from the edge of the road (United States Department of Transportation 2004).

Helicopter overflights and landings are a source of more infrequent noise, in contrast to chronic urban noise discussed above. Overall, there are few studies available that have examined the effect of aircraft noise on bird species; however, those studies that do exist generally focus on a particular group or species of bird. For example, to investigate the potential effects of rotary wing noise on coastal California gnatcatcher populations, Hubbs-SeaWorld Research Institute conducted a study at MCAS Miramar from 1998 through 2001 that involved monitoring active coastal California gnatcatcher nests to determine factors affecting nesting success (Hubbs-SeaWorld Research Institute 2006). At MCAS Miramar, the noise environment, including helicopters, is not correlated with reproductive success of coastal California gnatcatcher; however, habitat structure, composition and other physical components are correlated with nesting success. The study concluded that coastal California gnatcatchers find and inhabit suitable nesting habitat independent of the noise environment at MCAS Miramar.

Several other studies on nesting raptors have also indicated that birds become habituated to aircraft overflights and that long-term reproductive success is not affected by exposure to overflight (Grubb and King 1991; Ellis et al. 1991). Bald eagles (*Haliaeetus leucocephalus*) were more disturbed by human pedestrian activity than overflights by aircraft (Grubb and King 1991). In another study, Andersen et al.

(1989) found that red-tailed hawks (*Buteo jamaicensis*), a common raptor in the Cleveland National Forest, appeared to readily habituate to regular aircraft overflights. Nesting peregrine falcons (*Falco peregrinus*) in Alaska showed small differences in nest attendance and time-activity budgets between undisturbed nests and those that were overflown by military aircraft within 500 feet (152 meters); however, the differences were not correlated with specific overflights nor did they affect reproductive success (Palmer et al. 2003). Furthermore, Palmer et al. (2003) did not observe a difference in nest-provisioning rates between disturbed and undisturbed nests. Similarly, golden eagles have shown little effects due to aircraft flights. In their guidelines for aerial surveys, the USFWS (Pagel et al. 2010) summarized past studies by stating that most golden eagles respond to survey aircraft (fixed wing and helicopters) by remaining on their nests and continuing to incubate or roost. Surveys took place generally as close as 33 to 66 feet (10 to 20 meters) from cliffs (including hovering less than 30 seconds if necessary to count eggs) and no farther than 656 feet (200 meters) from cliffs depending on safety (Pagel et al. 2010).

Although there are no specific studies evaluating the impacts of tilt-rotor aircraft (MV-22B) on wildlife species, this aircraft is somewhat similar to rotary wing aircraft, such as the CH-46E, except as follows. The MV-22B would appear more like a fixed wing aircraft with onset of sound from an MV-22B building up relatively gradually and the rotating blades forming a blur rather than being seen as rotating parts, and thereby reducing the potential for a startle effect. The MV-22B sounds more like a conventional turboprop aircraft, such as a short-hop commuter airliner or a C-130 cargo plane, than a helicopter in that it makes a steady buzzing tone and lacks the low pitched percussive ("wop-wop-wop") sound associated with many helicopters. .

Wildlife in the vicinity of the point source for noise would likely exhibit increased awareness or response, which would vary depending on animal group and other factors. The species groups most likely to be present in the immediate vicinity of the LZs, and thus most likely to be affected by noise associated with continued LZ use, include small mammals, reptiles, and resident birds. Ungulates and large mammals may traverse LZs but because most LZs are located on ridgelines, only limited protective habitat and resources exists. Animals present would likely avoid the area, take cover, or temporarily suspend activity when the noise source is present.

Regarding raptors and other Migratory Bird Treaty Act (MBTA)-protected birds (SAIC 2012h), the nearest known raptor nests are located between about 1.5 to 2 miles (2.4 to 3.2 km) from an LZ. However, it is possible that an aircraft on approach to an LZ or flying between LZs could fly near one of the raptor nests, although the frequency of such an event, if occurring at all, is expected to be low because there are only approximately 3 to 7 sorties proposed at individual LZs per month[2]. As noted above, several studies on nesting raptors have indicated that birds become habituated to aircraft overflights and that long-term reproductive success is not affected by exposure to overflight; nonetheless, overflight activity has the potential to at least temporarily result in a behavioral change in nesting birds, and as a result, the USFS may require breeding season limitations or seasonal restrictions at some LZs to minimize impacts to known raptor nests or other migratory bird species, and this would be coordinated during the Special Use Permit process.

In addition to noise, effects related to dust generation and wind velocities from rotor wash would diminish with distance from the aircraft. Wind velocities associated with rotor wash would diminish substantially beyond about 100 feet (30 meters) from the aircraft (Bell Boeing 2008). Additionally, the proposed dust

[2] Most of the LZs would have approximately 36 sorties over the year (estimated at three sorties per month or about one every 10 days). LZ Site 9 and 9 Alt would have 36 annual sorties split between them (estimated at less than two sorties per month or one every 20 days at each LZ). The maximum expected frequency would be at LZ Sites 6 and 6 Alt, with 170 annual sorties split between them (estimated at 7 sorties per month or one every 4 to 5 days at each LZ).

abatement measures described in section 2.2.1.3 (*Flight Activity within the Cleveland National Forest*) would minimize dust generation and limit effects on vegetation and wildlife habitat.

Although some disruption to wildlife functions may temporarily occur in the immediate vicinity of the disturbed and/or degraded LZs, the continued training use of these LZs, even with the incorporation of the MV-22B, is not likely to permanently preclude the use of the adjacent areas by common and non-listed wildlife species or permanently remove habitats or use by MBTA-protected birds. If there were a response to the training activity in the immediate vicinity of the LZ, the most likely response would be a temporary movement of birds to another area or take cover during the activity. Because of the infrequency of touchdown and takeoff operations and the type of activity proposed, the scope of effect would be primarily within the immediate area surrounding LZs and would only occur occasionally (not chronic like traffic or industrial noise). This type of wildlife response would be within the range of responses to a wide variety of human and non-human stimuli. Therefore, although temporary effects would occur in the immediate vicinity of LZs during specific training events, or from overflights that occur within proximity to nesting birds such as raptors, impacts resulting from this alternative on common and non-listed sensitive wildlife populations and habitats could occur but would not be expected to be significant.

Special Status Plant Species

Only one federally listed plant, thread-leaved brodiaea (listed as federally threatened and state endangered), may occur within the project vicinity (near LZ Site 3) based on the known distribution and elevational range of the species and the presence of suitable habitat. Thread-leaved brodiaea was not identified during 2011 and 2012 surveys, but this species may not present above ground parts every year. Although it is not likely, it is possible for it to be present within the buffer area of LZ Site 3. Even if it is present, it would be unlikely that the critical underground parts (corms) would be injured by proposed aircraft on the ground with engines running. MV-22B landing and takeoff operations would result in greater heat conditions and rotorwash disturbance than rotary wing aircraft due to the orientation of its nacelles. Although surface soil temperatures can reach 422 °F (216 °C) under the MV-22 nacelles, thread-leaved brodiaea corms are normally buried about 6 inches (15 cm) or more below the soil surface. Soil transfers heat very poorly, with heat transfer depending not only on the surface temperature and duration of exposure but also on the soil water content, soil texture, and soil pore distribution (Sugihara et al. 2006). Heat transfer through dry soils is very poor and temperatures rapidly decrease with small increments of depth. For example, a grass fire with surface soil temperatures of 482 °F (250 °C) generated temperatures of less than 212 °F (100 °C) at a depth of only 0.5 inches (1.3 cm) (Wells et al. 1979). At a depth of only 2 inches (5 cm), there is very little increase in soil temperature even after exposures to surface temperatures ranging from about 572 °F (300 °C) to over 1,112°F (600 °C) on the order of 20 minutes or more (Figure 5.2 in Sugihara et al. 2006). Because thread-leaved brodiaea corms would be buried at about 3 times that depth, it is doubtful that injurious or lethal increases in temperature would be experienced by the corms. Based on the insulating properties of soil, temperatures would be expected to diminish rapidly with depth and very small changes in temperature would be expected at the depth that thread-leaved brodiaea corms would be buried. Similarly, transfer of heat laterally from the point of heating would be very slow. Any effect from the exhaust gases would therefore be localized underneath the engine nacelles.

As a result, even if the thread-leaved brodiaea is present, the potential for injury to underground parts would be very low and would be most likely to occur directly on the LZ itself, where suitable habitat for this species does not occur. Therefore, impacts to thread-leaved brodiaea, if the plant is present, would be less than significant.

No other federally listed plant species are expected to be present at or within the LZ buffers. Regarding indirect effects to other sensitive plant species, the continued training activity would not likely result in uprooting of plants or permanently affecting the distribution of plant communities or associated habitats, as described above under *Vegetation*. Additionally, the proposed dust abatement measures described in section 2.2.1.3 (*Flight Activity within the Cleveland National Forest*) would minimize dust generation and limit indirect effects on adjacent vegetation, including special status plant species. Similarly, the Biological Evaluation (USMC 2012b) of USFS sensitive plant species concluded that the project may affect some individuals, but would not cause a trend toward federal listing or a loss of viability.

Special Status Wildlife Species

No federally listed endangered or threatened wildlife species are expected to occur on or in the vicinity of the proposed LZs due to a lack of suitable habitat and results of negative surveys of adjacent native wildlife habitats (SAIC 2012d, 2012e). The two exceptions include possible visits by coastal California gnatcatcher near LZ Site 3 and possible hilltopping on or near LZs by Quino checkerspot butterflies.

Although no coastal California gnatcatchers were observed in the project vicinity, it is possible, although unlikely, that a coastal California gnatcatcher would visit on or near LZ Site 3 when an aircraft operation was occurring. During such an event, it may fly away or take cover in response to the aircraft. Similarly, the LZs represent potential hilltopping venues for Quino checkerspot butterflies due to the presence of alternative host plants (e.g., rigid bird's beak [*Cordylanthus rigidus*] and Chinese houses [*Collinsia concolor*]). However, project implementation would not remove vegetation or other habitat components that support these host plants. If coastal California gnatcatchers or Quino checkerspot butterflies are occasional visitors to the area, and they are present when a proposed aircraft operation is occurring, the expected temporary noise and dust that occur in the LZs and buffers during intermittent operations would likely cause individuals to avoid the area. However, based on the negative survey results, lack of evidence that the species occur at any of the LZs, and the infrequency of proposed training, the potential for any effect on these species is low.

If other federally protected species migrate through the area, the primary direct impacts of aircraft activity on endangered, threatened, and sensitive species would include noise and aircraft rotor wash (winds generated during low level hovering), similar to discussions above under *Wildlife and Wildlife Habitats*. Noise and rotor wash decrease with distance and would be of concern only when the aircraft is close to occupied habitat, such as during takeoff and landing, or low-level hovering, if the species is present. Bird species (including migratory and/or nesting birds) located adjacent to project sites would be most vulnerable as they may exhibit a flushing response to the noise and downdraft of aircraft. Raptors are less likely to show a negative response to overflights and noise. Similar to common wildlife, the most likely response by an endangered, threatened, or sensitive bird species (including migratory species) to the training activity would be temporary avoidance of the area during the activity. Therefore, potential impacts on federally listed, state-listed, and other sensitive wildlife species, if they were to be present, are expected to be less than significant. Similarly, the Biological Evaluation (USMC 2012b) of USFS sensitive wildlife species concluded that the project may affect some individuals, but would not cause a trend toward federal listing or a loss of viability.

Sensitive Habitats

No wetlands or other sensitive habitat types are present on or in the immediate vicinity of the Cleveland National Forest LZs; therefore, no impacts would occur.

BLM El Centro Managed Lands

Vegetation

No new construction or infrastructure improvements are proposed as part of this alternative; therefore, there would be no direct loss of vegetation or wildlife habitat associated with aircraft operations at the BLM El Centro LZs. As described above for the Cleveland National Forest LZs, continued training may result in temporary disturbance of loose surface debris and soil caused by rotor wash in the vicinity of takeoffs, landings, and near-surface hovering, potentially resulting in an indirect impact to vegetation and soils. Downdraft from aircraft could temporarily disturb vegetation and wildlife habitat in the immediate vicinity of the aircraft. This potential impact would be very localized and would be unlikely to permanently affect the distribution of sparse plant communities or associated habitats. Additionally, most LZs are already almost entirely dominated by desert pavement with little to no vegetation present. Moreover, any localized effect on the soil at the LZs may be obscured by blowing dust and sand associated with naturally-occurring high winds (dust storms or sandstorms) that may occur numerous times per year. Additionally, the training areas that would be used have a history of similar training activities, and incorporation of increased operations due to the new MV-22B aircraft would represent a negligible change in the overall training environment at these locations. As a result, impacts associated with hovering and landing would be limited to areas that are routinely affected by training and have limited vegetation, and would be minor and very localized.

Under the proposed action, aircraft would only land within the designated LZ areas, which are almost entirely devoid of vegetation and dominated by desert pavement, and no landings would occur in undisturbed, undeveloped sites outside of the proposed LZs. Therefore, the potential for fire is considered very low, given the available information on the aircraft and general lack of fire fuel at the BLM El Centro LZs.

Based on the above analysis, impacts on vegetation associated with takeoff, landing and low-level hovering would be less than significant.

Wildlife and Wildlife Habitats

Most of the vertebrate species that occur in the vicinity of the BLM El Centro LZs are resident or migratory birds, reptiles, and nocturnal mammals. As discussed above under Cleveland National Forest, the use of any rotary wing or tilt-rotor aircraft within undeveloped areas has the potential to add noise to the natural environment and cause a response by wildlife, potentially inducing a startle response; cause possible injury from trampling or uncontrolled running or flight; increased expenditure of energy during critical periods; decreased the amount of time spent on life functions such as seeking food or mates; temporary mask auditory signals from other animals; and/or otherwise reduce the protection and stability of young animals (Manci et al. 1988). As described above for the Cleveland National Forest, there are no specific studies evaluating the impacts of tilt-rotor aircraft on wildlife species. However, impacts would be somewhat similar to those of other rotary wing aircraft, although the MV-22B may sound more like a conventional turboprop aircraft than a helicopter.

Effects related to dust generation and wind velocities from rotor wash and effects from noise would diminish with distance from the aircraft. Wind velocities associated with rotor wash would diminish substantially beyond 100 feet (30 meters) from the aircraft (Bell Boeing 2008). Noise modeling of the proposed approach pattern demonstrated that noise exposure under Alternative 1 would be most prevalent within about 1,300 feet (396 meters) of an LZ (see section 3.2, *Noise*). However, the density of wildlife at LZs at any given time would be very low due to the lack of vegetation and vast exposed desert pavement areas. As a result, impacts on wildlife from downdraft/outwash and noise are expected to be less than significant.

Special Status Plant Species

There are no existing federally listed plant species known to occur on or in the immediate vicinity of the LZs considered under this alternative (SAIC 2012b). Implementation of the proposed action is unlikely to affect sensitive plant species. As a result, no impacts on endangered, threatened, and sensitive plant species would occur.

Special Status Wildlife Species

Desert Tortoise. Desert tortoise is known to occur at or near several LZs (Table 3.7-6) and, based on the known range of the species and habitat preferences, the species has the potential to occur at all LZs except LZ C1 and LZ Wolf. All LZs proposed for continued training are established and currently used. None of the LZs are located within designated critical habitat for the desert tortoise.

Desert tortoises are above ground and active during a very limited time of year, generally during spring, and could be affected directly by aircraft landings. Desert tortoises are typically underground during the hottest parts of summer to conserve water, and they brumate (hibernation-like state that cold-blooded animals utilize during very cold weather) underground during most of the period between November and March. From March to October, desert tortoises emerge to forage in the morning and late afternoon, with most activity occurring in March and April (USGS 2004). Because of the limited period of activity above ground, operations during evening and nighttime hours and during the winter months would not affect desert tortoises. Even during the period of greatest tortoise activity, training operations have a very low probability of affecting tortoises given the sparse distribution of individual tortoises, the existing uses and level of disturbance of the LZs, and the small "footprint" of an operation. Because no ground activities (only touch-down and takeoff operations) are proposed under this alternative, the potential for aircraft to individually crush burrows or otherwise physically degrade habitat is very low.

Because of the high winds, blowing dust, and outdoor recreation that are all common in the area, any effects on desert tortoise from aircraft would be low and not likely to result in a permanent change to the habitat for the species. Individual tortoises in the vicinity of a landing or hovering aircraft may assume a protective posture by temporarily withdrawing their head and limbs into their shell and remaining still, much as they do when a human or predator approaches. This posture provides protection from physical injury, and minimizes exposure to blowing dust and high frequency sound. Water balance and energy balance would be unaffected. The tortoise would resume normal activities following departure of the aircraft from the immediate area of the tortoise. Furthermore, noise effects on desert tortoise are not well understood, but similar to other effects, the potential for tortoise to be present at the exact time when an aircraft is approaching and during the time of year when tortoises are active would result in a very low potential for effects.

Because activities proposed under this alternative would not result in the permanent removal, conversion, or degradation of habitat for the species, and because the potential for direct effects on individual tortoises such as crushing or temporary destruction of burrows is considered very low, impacts resulting from proposed activities are considered less than significant.

Flat-tailed Horned Lizard. Only two LZs, C1 and Wolf, are within the known range of the species. Activities proposed at these locations would include touching down and taking off by rotary wing and tilt-rotor aircraft. The sites are currently used for training and no construction, removal, modification, or conversion of habitat is proposed. Although training activities would temporarily increase noise and dust at an LZ while training occurs, effects would not result in the loss of any habitat for flat-tailed horned lizard. The desert environment routinely includes high winds and blowing dust and species are accustomed to such forces. Because no on-ground training is proposed, the potential for the direct loss of any habitat is very low, and impacts resulting from proposed activities are considered less than significant.

Other Federally Listed or Otherwise Sensitive Species. No other federally listed endangered or threatened wildlife species are expected to occur on or in the vicinity of the proposed LZs due to a lack of suitable habitat and results of surveys of adjacent native wildlife habitats. If a federally protected species migrates through the area, such as a transient from the Colorado River or other more suitable habitat, the primary direct impacts of aircraft activity on endangered, threatened, and sensitive species would include noise and aircraft rotor wash (winds generated during low level hovering), similar to discussions above under *Wildlife and Wildlife Habitats*. Noise and rotor wash effects decrease with distance and would be of concern only when the aircraft is close to occupied habitat, such as during takeoff and landing operations, or low-level hovering, if the species is present. Bird species (including migratory and/or nesting birds) located adjacent to project sites would be most vulnerable as they may exhibit a flushing response to the noise and downdraft of an aircraft. Similar to common wildlife, the most likely response by an endangered, threatened, or sensitive bird species (including migratory species) to the training activity would be temporary avoidance of the area during the activity. Therefore, potential impacts on federally listed, state-listed, and other sensitive wildlife species, if they were to be present, are expected to be less than significant.

Sensitive Habitats

No wetlands or other sensitive habitat types are present on or in the immediate vicinity of the BLM El Centro LZs; therefore, no impacts would occur.

Avoidance, Minimization and/or Mitigation Measures

Proposed dust abatement measures at LZs within the Cleveland National Forest are described in section 2.2.1.3 (*Flight Activity within the Cleveland National Forest*). These measures would reduce the potential for dust accumulation on nearby vegetation and reduce the level of impacts on biological resources. Because there would be no significant impact on biological resources, no additional avoidance, minimization, and/or mitigation measures are required.

3.7.2.2 No Action Alternative

Under the No Action Alternative, no USMC rotary wing or tilt-rotor operations would occur on public lands managed by the Cleveland National Forest and the BLM El Centro Field Office. However, other agencies, such as the Sheriff's Department, Fire Department, and the U.S. Navy, may still use the LZs. Therefore, noise and rotor wash effects from aircraft operations would likely continue within the vicinity of the LZs, although at a lower rate than under existing conditions. The degraded quality of surface and vegetation at the LZs would likely remain the same even at a reduced rate of use. Specific to desert sites, desert tortoise individuals and habitats would continue to be subject to disturbance, but at a reduced rate. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.

3.8 Cultural Resources

3.8.1 Affected Environment

Cultural resources are historic and traditional cultural properties that reflect our heritage and are considered important to a culture, a subculture, or a community for scientific, traditional, religious, or other reason. Federal regulations define historic properties to include prehistoric and historic sites, buildings, structures, districts, or objects in or eligible for inclusion on the National Register of Historic Places (National Register), as well as artifacts, records, and remains related to such properties (NHPA, as amended [16 USC 470-470x-6]). Additionally, cultural resources are protected under the Archaeological Resources Protection Act of 1979 (ARPA) (16 USC 470aa-470mm), Native American Graves Protection and Repatriation Act (NAGPRA) (25 USC 3001-3013), and the American Indian Religious Freedom Act (42 USC 1996 and 1996a). Compliance with Section 106 of the NHPA, which directs federal agencies to take into account the effect of a federal undertaking on a historic property, is outlined in the Advisory Council on Historic Preservation's regulations, "Protection of Historic Properties" (36 CFR Part 800). The NHPA and associated Section 106 compliance also provides guidance for Native American consultation.

3.8.1.1 Definition of the Area of Potential Effects

Under Section 106 of the NHPA, federal agencies must review the effects of an undertaking within the area of potential effects (APE), defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR 800.16(d)).

The APE for the proposed action consists of all areas of potential ground disturbance associated with aircraft operations at LZs in the Cleveland National Forest and on BLM lands. Although no new construction or improvements are proposed at any LZ, ground disturbance from hovering and landing of aircraft could occur due to dust and debris being scattered and/or becoming airborne from aircraft rotor wash. Downdraft (and outwash) forces, collectively known as rotor wash, are relative to the engine power settings and the aircraft's proximity to the ground. Rotor wash from an aircraft during landing, takeoff, and hovering operations immediately above the ground may disturb archaeological artifacts lying on the surface in the immediate vicinity of the aircraft, although the extent of this disturbance would depend on local soil characteristics, presence of vegetation, and size/weight of artifacts. Therefore, to account for the possible extent of ground disturbance from aircraft rotor wash during landing, takeoff, and hovering operations, the APE was defined as the LZ and a 350-foot (107-meter) radius buffer surrounding each LZ, based on a downdraft study commissioned by the Navy (Bell Boeing 2008).

For historic architectural resources and Native American resources, the APE for direct impacts is the same as described above (i.e., areas of potential ground disturbance from aircraft rotorwash), but indirect impacts were also considered for the viewshed of any historic buildings or traditional cultural resources that may be affected by proposed aircraft operations.

The California SHPO reviewed this undertaking (File No. USMC 120802A) and concurred that the project APE had been properly determined and documented pursuant to 36 CFR 800.4(a)(1) and 800.16(d) (see Appendix A-5).

3.8.1.2 Cultural Setting

The prehistoric chronology for southern California can be divided into three general periods – Early Prehistoric, Archaic Period, and Late Prehistoric Period. The Early Prehistoric period, also known as the San Dieguito complex, dates from about 12,000 to 7,000 years before present (B.P.). The San Dieguito

people were hunter-gatherers that appear to have been organized into small mobile groups. The economy of San Dieguito groups was probably a generalized one that included both plants and animals, although there was an emphasis on deer, elk, and small game. The environment was generally cooler and wetter than at present, which provided a greater density of animal and plant resources. By the end of this period, climactic and ecological conditions approximated the present arid situation, resulting in reduced resources and human populations and a possible abandonment of desert regions by about 7,000 B.P. San Dieguito sites commonly contain a wide variety of scrapers, heavy choppers, crescentics, and large leaf-shaped projectile points and knives (Moratto 1984). In desert regions, such as the Colorado and Yuha deserts[1], San Dieguito sites include lithic scatters, cleared circles, rock features, and trails on the surface of heavily deflated desert pavements (SAIC 2011). Few sites from this time period, consisting of only an occasional San Dieguito projectile point, have been recorded further north in the Cleveland National Forest (SAIC 2012c).

The Archaic Period, dating from about 7,000 to 1,000 B.P., was a time of more regional specialization of hunting and gathering traditions. The desert complexes have been termed Pinto (7,000-4,000 B.P.) and Amargosa (4,000-1,000 B.P.) based on distinctive projectile point types. Although present in the Great Basin and Mojave Desert, Pinto and Amargosan sites have rarely been identified in the Colorado and Yuha deserts (SAIC 2011). For other regions of southern California, this time period is defined by the La Jolla/Pauma complex (circa 8,600-1,300 B.P.). During this period the subsistence focus changed from generalized hunting and gathering and a more mobile lifestyle to an emphasis on plant foods and marine resources. Most sites are located along the coast and major drainage systems extending inland and are characterized by the appearance of milling stone technology (basin metates and manos), shell middens, terrestrial and marine mammal remains, burials, rock features, cobble-based tools at coastal sites and increased hunting equipment and quarry-based tools at inland sites. No well-documented La Jolla/Pauma complex sites have been recorded in the Trabuco Ranger District[2] of the Cleveland National Forest (SAIC 2012c).

The Late Prehistoric period (about 1,000-100 B.P.) was a time characterized by an increased number of sites, technological innovations, and new patterns in material culture and belief systems throughout southern California. In the desert regions, the term Patayan ("the Old Ones" in the Yuman language) is used to define a pattern of subsistence, settlement and technology during this time period. Groups occupied seasonal villages or temporary camps where rock-outlined *jacales* (thatched roof huts), simple *ramadas* (structures with roofs but no walls), low-walled rock structures, or brush huts were constructed. Horticulture was first practiced by groups on the Colorado River and it later spread to the Imperial Valley. Traits associated with the mobile and diversified subsistence strategy include a sparse material culture, extensive trail systems, the use of temporary camps and limited activity areas, a dispersed settlement pattern, use of rockshelters, agave roasting pit sites, and the use of bedrock and portable ground stone milling equipment (SAIC 2011).

For other regions of southern California, the Late Prehistoric period is defined by the San Luis Rey complex, which has been identified for the southern Orange, western Riverside, and northern San Diego Counties area. It is characterized by the introduction of ceramics and changes in burial traditions and lithic technology. Along the coast, there is a shift from littoral resource exploitation to an emphasis on inland plant (especially acorns) food collection, processing, and storage. These changes are believed to be associated with a migration of Yuman-speaking people from the eastern Colorado River region around 2,000 B.P. (Rogers 1945) and Shoshonean speakers after about 1,500 B.P. (Moratto 1984). During this period, inland semi-sedentary villages were established along major watercourses, and mountain areas were seasonally occupied to exploit acorns and piñon nuts. Late Prehistoric sites are well documented in the Cleveland National Forest (SAIC 2012c).

[1] As described in Chapter 2, the BLM El Centro LZs are located in the Colorado and Yuha deserts.
[2] As described in Chapter 2, the Cleveland National Forest LZs are located in the Trabuco Ranger District.

Ethnographically, two Hokan-speaking groups, the Desert Tipai (Kamia or Kumeyaay) and Quechan, are primarily affiliated with the project area in the desert region. In addition, other lowland Yuman tribes, such as the Mojave, Cocopah, Halchidhoma, and Maricopa, traveled widely across the desert for purposes of social visitation, religious pilgrimages, trade, alliance building, and warfare (Cleland 2004). This is represented by the numerous trail systems throughout the Colorado Desert (Schaefer and Schultze 1996). Further northwest, three Shoshonean groups (Gabrielino, Luiseño/Juaneño, and Cupeño) are primarily affiliated with the Trabuco Ranger District of the Cleveland National Forest. All but the Cupeño are associated with one of the coastal missions at San Gabriel, San Luis Rey, and San Juan Capistrano. Additional information on the prehistory, ethnohistory, and history of the project area is presented in the archaeological survey reports noted below (SAIC 2011, 2012c).

3.8.1.3 Cultural Resources within the APE for Cleveland National Forest

An archaeological investigation for the ten Cleveland National Forest LZs was conducted for the proposed action, and consisted of archival and document review of previous archaeological studies and a Class III intensive field survey[3] of the entire APE (SAIC 2012c). A records and literature search of the California Historical Resources Information System (CHRIS) was conducted at the Eastern Information Center (EIC), University of California, Riverside, and at the South Central Coastal Information Center (SCCIC), California State University Fullerton, California on 3 May 2010 to identify previously recorded cultural resources and previous studies within a 1-mile (1.6-km) radius of the APE. A records search was also conducted at the Cleveland National Forest supervisor's office, San Diego, California, on 27 May 2011. Previous archaeological investigations recorded four archaeological sites located within a one-mile radius of the APE, but none within the APE for the Cleveland National Forest.

Although some of the APE had been previously surveyed, these surveys were at least 20 years old and many did not provide complete pedestrian survey coverage of their respective project areas; therefore, the entire APE was re-surveyed in August 2011. During the survey, one newly identified prehistoric site and one newly recorded isolated find were recorded outside of the LZ but within the 350-foot (107-meter) buffer area. The prehistoric site (CA-ORA-1717) consists of a petroglyph (human-shaped stick figure) carved on a sandstone boulder. The petroglyph is recommended eligible for inclusion in the National Register under Criterion D, because the site may provide information on prehistoric ceremonialism and symbolism, and it may mark the location of a sacred area to Native Americans. The isolated find (Primary Number 30-100340) is a rock pool feature recommended not eligible for listing in the National Register. Isolated finds, by definition, are usually not eligible for listing in the National Register, and this holds true for the rock pool isolate. No historic buildings were identified at any LZ.

3.8.1.4 Cultural Resources within the APE for BLM El Centro Managed Lands

An archaeological investigation for the BLM El Centro LZs was conducted for the proposed action, and consisted of archival and document review of previous archaeological studies and a Class III intensive field survey[4] of the entire APE (SAIC 2011). Records and literature searches of the CHRIS were conducted at the South Coastal Information Center (SCIC) on 11 February 2010, 4 October 2010, and 8 April 2011 to identify previously recorded cultural resources and previous studies within a 1-mile (1.6-km) radius of the APE. Although the archaeological survey covered 23 potential LZs, 10 of the 23 LZs were subsequently dropped from further consideration due to potential impacts on archaeological resources and are no longer part of the proposed action. Based on input from interested Indian tribes (see below), two other LZs were redesigned to minimize impacts on nearby archaeological sites. The following summary provides information in regards to the 13 LZs that are carried forward under the proposed action.

[3] SAIC received a permit under the ARPA (Permit # TRD-000103) from the Cleveland National Forest District Office in July 2011.

[4] The Class III field survey was conducted under BLM Statewide Cultural Use Permit (CA-10-15) and three separate Fieldwork Authorizations (CR-CA-670-10-120FA01; CR-CA-670-10-120FA02; and CR-CA-670-10-120FA03).

Previous archaeological investigations recorded 134 archaeological sites within one mile (1.6 km) of the APE for the 13 BLM El Centro LZs (see Table 3 of SAIC 2011). Three sites were recorded within the APE, but were not relocated during the field survey. It is possible the sites were either recorded in the wrong location or may have been destroyed since their recordation (e.g., artifacts may have been collected or washed away from their original location) (see SAIC 2011).

Although some of the APE had been previously surveyed (see SAIC 2011), most of these surveys were at least 20 years old; therefore, the entire APE was re-surveyed between May 2010 and April 2011. The Class III intensive field survey confirmed that no archaeological sites or isolates are located within any of the 13 LZs, but the survey recorded 23 archaeological sites within the buffer zones of the LZs (Table 3.8-1). Of these 23 sites, three prehistoric trails (CA-IMP-11649, CA-IMP-11665, and CA-IMP-11667) are recommended eligible for listing in the National Register under Criterion D[5], because they may provide information on prehistoric and ethnohistoric Native American culture history, trail usage, transport, and symbolic behavior. An additional 15 sites consisting of rock cairns and rock alignments may represent trail markers, shrines, hunting blinds, or mark the locations of prehistoric burials or places of traditional cultural importance, but this cannot be verified without further study. These 15 sites are considered eligible for inclusion in the National Register under Criterion D for the purposes of this undertaking. Therefore, 18 sites within the APE for the 13 BLM El Centro LZs are considered historic properties for the purposes of this undertaking.

Table 3.8-1. Newly Recorded Sites Within the Project APE for BLM El Centro

Site Identifier	*Site Type*	*National Register Eligibility Recommendation*
CA-IMP-11640	Rock cairn	Eligible*
CA-IMP-11641	Rock cairn & possible shrine	Eligible*
CA-IMP-11642	Historic rock cairn	Not eligible
CA-IMP-11648	Rock alignment	Not eligible
CA-IMP-11649	Prehistoric trail	Eligible
CA-IMP-11653	Rock cairn	Eligible*
CA-IMP-11654	Rock cairn	Eligible*
CA-IMP-11655	Rock cairn	Eligible*
CA-IMP-11660	Rock cairn	Eligible*
CA-IMP-11661	Rock cairn	Eligible*
CA-IMP-11662	Rock cairn	Eligible*
CA-IMP-11664	Rock cairn	Eligible*
CA-IMP-11665	Prehistoric trail complex	Eligible
CA-IMP-11667	Prehistoric trails	Eligible
CA-IMP-11668	Rock cairn	Eligible*
CA-IMP-11669	Rock cairn	Eligible*
CA-IMP-11670	Rock cairn	Eligible*
CA-IMP-11671	Rock cairn	Eligible*
CA-IMP-11672	Rock cairn	Eligible*
CA-IMP-11673	Rock alignment	Eligible*
CA-IMP-11675	Prehistoric lithic scatter	Not eligible
CA-IMP-11676	Prehistoric lithic scatter	Not eligible
CA-IMP-11677	Prehistoric lithic scatter	Not eligible

Notes:
*For the purposes of this undertaking, the site is considered eligible for inclusion in the National Register.
Source: SAIC 2011

[5] The California SHPO (File No. USMC 120802A) declined to either concur or not concur with the determinations of eligibility.

3.8.1.5 Native American Consultation and Coordination

As described in section 2.6 (*Agency Consultation and Approvals*), the USMC, in cooperation with BLM and USFS, initiated consultation with federally recognized and non-federally recognized Indian tribes affiliated with lands involved in this action. Seventy-two letters were sent in April 2012 to initiate the consultation process (Appendix A). To date, responses have been received from the Agua Caliente Band of Cahuilla Indians, Augustine Band of Cahuilla Indians, Cabazon Band of Mission Indians, Cocopah Indian Tribe, Quechan Indian Tribe, Rincon Band of Luiseño Indians, and Soboba Band of Luiseño Indians. The USMC coordinated with interested groups to determine if any other sensitive cultural sites, besides the archaeological sites discussed above, are located within the APE. No other resources were identified during this effort. The USMC also took into consideration concerns made by groups on potential effects on archaeological resources, and dropped some LZs from further consideration and redesigned two others to minimize impacts on nearby archaeological sites. For example, LZ Canary and LZ PC3 Option, which were addressed in the Public Draft EA, were subsequently dropped from further consideration at the request of the Quechan Indian Tribe.

3.8.2 Environmental Consequences and Mitigation Measures

3.8.2.1 Alternative 1

Cleveland National Forest

As described in section 3.8.1.4 (*Cultural Resources within the APE for Cleveland National Forest*), only one site (CA-ORA-1717, petroglyph) located within the APE for the Cleveland National Forest LZs is considered a historic property for the purpose of this undertaking. The archaeological site is in the buffer area of an LZ and is protected from possible aircraft rotor wash disturbance because it is located down slope from the LZ and sheltered behind a rock outcrop. Therefore, there would be no effect on a historic property or tribal cultural resource, and no significant impacts would occur under NEPA.

BLM El Centro Managed Lands

As described in section 3.8.1.5 (*Cultural Resources within the APE for BLM El Centro Managed Lands*), no archaeological sites or isolates are located within any of the 13 LZs, although 18 archaeological sites considered historic properties for the purpose of this undertaking are located within the buffer area surrounding the LZs. The 18 archaeological sites either are located at least 200 feet (61 meters) from aircraft landing and takeoff operations or otherwise protected from rotor wash by local geographic features. Therefore, it is unlikely that rotor wash from aircraft operations would adversely affect these sites. There would be no adverse effect on a historic property or tribal cultural resource, and no significant impacts would occur under NEPA. The California SHPO reviewed the proposed undertaking (File No. USMC 120802A) and concurred that the proposed undertaking would have no adverse effect on the identified historic properties.

Avoidance, Minimization and/or Mitigation Measures

Because there would be no significant impact on cultural resources, no avoidance, minimization, and/or mitigation measures are required beyond the project redesign components that were incorporated into the proposed action (e.g., dropping/redesigning LZs to minimize impacts).

3.8.2.2 No Action Alternative

Under the No Action Alternative, no USMC rotary wing or tilt-rotor operations would occur on public lands managed by the Cleveland National Forest and the BLM El Centro Field Office. No adverse impact on historic properties would occur under the No Action Alternative.

3.9 Public Health and Safety

The USMC practices Operational Risk Management as outlined in OPNAVINST 3500.39A and MCO 3500.27A. Requirements outlined in these documents provide for a process to maintain readiness in peacetime and achieve success in combat while safeguarding people and resources. The following safety and environmental health analysis addresses issues related to the health and wellbeing of both military personnel and civilians. Specifically, this section provides information on hazards associated with aircraft mishaps and wildfire management. Proposed flight activities at the Cleveland National Forest and on BLM El Centro managed lands do not include the use of flares or ordnance and, therefore, explosive safety is not addressed.

3.9.1 Affected Environment

The FAA is responsible for ensuring safe and efficient use of U.S. airspace by military and civilian aircraft and for supporting national defense requirements. To fulfill these requirements, the FAA has established safety regulations, airspace management guidelines, a civil-military common system, and cooperative activities with the DoD. The primary concern with regard to military training flights is the potential for aircraft mishaps (i.e., crashes) to occur, which could be caused by mid-air collisions with other aircraft or objects, weather difficulties, mechanical failures, pilot error, or bird-aircraft strikes.

Aircraft mishaps are classified as A, B, or C (Table 3.9-1). Class A mishaps are the most severe with total property damage of $2 million or more and a fatality and/or permanent total disability. Based on historical data on mishaps at all installations, and under all weather conditions and altitudes of flight, the military services calculate Class A mishap rates per 100,000 flying hours for each type of aircraft in the inventory. These mishap rates do not consider combat losses due to enemy action. Calculating Class A mishaps can be used for comparing mishap rates for various aircraft types, as shown below.

Table 3.9-1. Projected Class A Mishap Rates for Aircraft

Mishap Class	*Total Property Damage*	*Fatality/Injury*
A	$2,000,000 or more and/or aircraft destroyed	Fatality or permanent total disability
B	$500,000 or more but less than $2,000,000	Permanent partial disability or three or more persons hospitalized as inpatients
C	$50,000 or more but less than $500,000	Nonfatal injury resulting in loss of time from work beyond day/shift when injury occurred

Historically, when new military aircraft first enter the inventory, the accident rate for flight safety is higher. During the development and testing phase, the MV-22 recorded two Class A mishaps. All MV-22 aircraft were grounded for 17 months after the second mishap in December 2000. As a result of these incidents, a major re-engineering of the aircraft's electrical and hydraulic systems allowed the aircraft to return to flight in November 2001 (Fiscal Year [FY] 2002). Since that time, additional safety, reliability and maintainability improvements along with additional capabilities have been implemented. To present a realistic picture of the actual mishap rate for the MV-22, the number of Class A mishaps during the testing phase of the aircraft (before reaching operational status) versus the number of mishaps after reaching operational status is broken out in Table 3.9-2. The accident rate for the MV-22 after reaching operational status is 1.43 for 69,823 hours (FY 2004 through FY 2010).

Table 3.9-2. Class A Flight Mishaps for MV-22

FY	*Flight Hours*	*Class A Mishaps*	*Mishap Rate*[3]
Before Reaching Operational Status			
1999	416	0	0
2000	221	1	452.5
2001	470	1	212.8
2002[1]	Unavailable	0	0
2003[1]	Unavailable	0	0
Operational Status			
2004[2]	1,986	0	0
2005	5,045	0	0
2006	6,989	0	0
2007	10,547	1	9.48
2008	15,123	0	0
2009	13,204	0	0
2010	16,929	0	0
Total (2004-2010)	69,823	1	1.43

Notes:
1. Aircraft Grounded.
2. Aircraft Returns to Flight Status.
3. Class A mishap rates per 100,000 flying hours.

Source: Holden 2011

The rotary wing aircraft included under this proposed action have similar total mishap rates (Tables 3.9-2, 3.9-3, 3.9-4). The H-46, the longest running aircraft, has a mishap rate of 5.73 for 4,078,948 flight hours (FY 1964 through FY 2010); the CH-53E has a rate of 2.4 for 790,775 flight hours (FY 1984 through FY 2010); the UH-1N has a rate of 3.16 for 253,517 flight hours (FY 1999 through FY 2010); the UH-1Y has a rate of zero for 14,822 flight hours (FY 2007 through FY 2010); the AH-1W has a rate of 2.18 for 504,477 flight hours (FY 1999 through FY 2010); and the AH-1Z has a rate of zero for 3,091 flight hours (FY 2007 through FY 2010). A notable pattern in these tables is the fluctuation of mishap rates from year to year for all aircraft types, especially during the early years of introduction.

The MV-22B and other relatively new aircraft (AH-1Z and UH-1Y) are expected to have (in the future) an accident rate similar to or less than other rotary aircraft (approximately one per 100,000 flight hours). This is part of an established trend regarding military aircraft. Combat aircraft are becoming more reliable, even as they become more complex.

Table 3.9-3. Class A Flight Mishaps for Light Attack Helicopters

Year	*UH-1N*			*UH-1Y*			*AH-1W*			*AH-1Z*		
	Flight Hours	**Class A Mishaps**	**Mishap Rate**	**Flight Hours**	**Class A Mishaps**	**Mishap Rate**	**Flight Hours**	**Class A Mishaps**	**Mishap Rate**	**Flight Hours**	**Class A Mishaps**	**Mishap Rate**
FY 99	24,644	0	0.00	-	-	-	42,546	2	25.85	-	-	-
FY 00	22,818	0	0.00	-	-	-	42,069	1	26.15	-	-	-
FY 01	22,552	0	0.00	-	-	-	41,246	0	0.00	-	-	-
FY 02	22,857	3	13.13	-	-	-	44,454	1	24.74	-	-	-
FY 03	19,192	2	10.42	-	-	-	36,609	1	30.05	-	-	-
FY 04	18,722	2	10.68	-	-	-	37,952	2	28.98	-	-	-
FY 05	25,461	0	0.00	-	-	-	50,004	0	0.00	-	-	-
FY 06	22,713	0	0.00	-	-	-	45,345	1	24.26	-	-	-
FY 07	24,923	1	4.01	235	0	0	48,951	0	0.00	88	0	0
FY 08	18,455	0	0.00	1,886	0	0	38,045	1	28.91	738	0	0
FY 09	14,992	0	0.00	3,228	0	0	34,922	1	31.50	726	0	0
FY 10	16,188	0	0.00	9,473	0	0	42,334	2	25.98	1,539	0	0
Total	253,517	8	3.16	14,822	0	0	504,477	12	2.18	3,091	0	0

Note: Class A mishap rates per 100,000 flying hours.
Source: Holden 2011

Table 3.9-4. Class A Flight Mishaps for Medium and Heavy Lift Helicopters

Year	*H-46 (all types)*[1]			*CH-53E*		
	Flight Hours	**Class A Mishaps**	**Mishap Rate**[2]	**Flight Hours**	**Class A Mishaps**	**Mishap Rate**[2]
FY 64	147	0	0	-	-	-
FY 65	9,034	1	11.07	-	-	-
FY 66	33,442	2	5.98	-	-	-
FY 67	75,236	17	22.60	-	-	-
FY 68	92,108	24	26.06	-	-	-
FY 69	161,595	29	17.95	-	-	-
FY70	140,406	21	14.96	-	-	-
FY 71	132,350	9	6.80	-	-	-
FY 72	96,042	9	9.37	-	-	-
FY 73	93,971	6	6.38	-	-	-
FY 74	68,509	6	8.76	-	-	-
Jul-Dec 74	41,170	4	9.72	-	-	-
CY 75	86,428	5	5.79	105	0	0
CY 76	87,319	5	5.73	27	0	0
CY 77	93,500	3	3.21	249	0	0
CY 78	97,307	5	5.14	0	1	0
CY 79	92,390	3	3.25	88	0	0
Jan-Sep 80	66,689	4	6.00	0	0	0
FY 81	88,951	8	8.99	160	0	0
FY 82	92,300	5	5.42	4,629	0	0
FY 83	99,406	3	3.02	10,629	0	0
FY 84	106,039	3	2.83	16,259	1	6.15
FY 85	106,883	2	1.87	19,152	4	20.89
FY 86	110,743	7	6.32	22,748	1	4.40
FY 87	118,331	5	4.23	16,081	1	6.22
FY 88	112,606	4	3.55	21,075	0	0
FY 89	112,365	4	3.56	25,431	0	0
FY 90	98,775	4	4.05	27,385	1	3.65
FY 91	110,122	3	2.72	30,269	1	3.30
FY 92	96,834	4	4.13	28,598	1	3.50
FY 93	106,743	5	4.68	31,903	1	3.13
FY 94	98,796	2	2.02	33,779	0	0
FY 95	96,115	1	1.04	34,345	0	0
FY 96	90,401	5	5.53	24,867	0	0
FY 97	81,816	3	3.67	26,439	0	0
FY 98	87,321	1	1.15	30,327	0	0
FY 99	84,346	1	1.19	29,408	1	3.40
FY 00	92,849	1	1.08	32,739	0	0
FY 01	91,708	2	2.18	28,660	0	0
FY 02	90,287	2	2.22	36,144	1	2.77
FY 03	79,390	2	2.52	37,340	0	0
FY 04	63,436	1	1.58	35,010	2	5.71
FY 05	71,758	1	1.39	34,595	1	2.89
FY 06	59,676	0	0	33,321	1	3.00
FY 07	56,330	1	1.78	33,828	1	2.96
FY 08	41,032	1	2.44	29,842	0	0
FY 09	36,558	0	0	24,768	0	0
FY 10	29,388	0	0	30,575	0	0
Total	4,078,948	234	5.73	790,775	19	2.4

Notes:
1. Data are from all models of the H-46, not just the CH-46,
2. Class A mishap rates per 100,000 flying hours.

Source: McKeel 2011

3.9.2 Environmental Consequences and Mitigation Measures

3.9.2.1 Alternative 1

Emergency and Mishap Response

It is not possible to predict the precise location of an aircraft accident, should one occur. Improved system awareness and sensing capabilities installed on combat aircraft have the benefit of improved tracking and avoidance of light aircraft, thereby reducing mishap potentials. If an accident occurs, however, the first consideration is loss of life followed by damage to property. The aircrew's ability to exit from a malfunctioning aircraft is dependent on the type of malfunction encountered. The probability of an aircraft crashing into a populated area is extremely low, but it cannot be totally discounted. During training flights within the airspace, pilots are instructed to avoid direct flyovers of population centers when operating at very low altitudes. The limited amount of time an aircraft spends over any specific geographic area lessens the probability of a disabled aircraft impacting a populated area.

Secondary effects of an aircraft crash include the potential for fire or environmental contamination. Since the extent of secondary effects is situational, it is difficult to quantify them. A crash of any aircraft can cause damage and/or loss of life. Should a mishap occur in highly vegetated areas during a hot, dry summer, such a mishap would pose a higher risk of fire than would a mishap in more barren and rocky areas during the winter (see below for additional wildfire information). When an aircraft crashes, it may release hydrocarbons and the petroleum, oils, and lubricants not consumed in a fire could contaminate soil and water. The potential for contamination depends on several factors such as the porosity of the surface soils as that would determine how rapidly contaminants are absorbed, the specific geologic structures in the region would determine the extent and direction of the contamination plume, and the locations and characteristics of surface and groundwater in the area would affect the extent of contamination to those resources.

Cleveland National Forest

The overall number of proposed sorties at the Cleveland National Forest is expected to decrease slightly compared to existing conditions (from 452 to 422 annual sorties), while the number of overall landings is expected to increase slightly (from 2,132 to 2,205 annual landings). This change would result in a negligible impact on mishap potential compared to existing conditions. Additionally, as noted above, the MV-22B and other relatively new aircraft (AH-1Z and UH-1Y) are expected to have (in the future) an accident rate similar to or less than other rotary aircraft (approximately one per 100,000 flight hours), which may lower the overall mishap potential compared to the existing mix of aircraft. All safety actions that are in place for existing training flights would continue to be in place for the proposed operations. The 3D MAW maintains detailed emergency and mishap response plans to react to an aircraft accident, should one occur. These plans assign agency responsibilities and prescribe functional activities necessary to react to major mishaps, whether on or off the base. Therefore, there would be no significant impact to flight safety as a result of the implementation of Alternative 1.

BLM El Centro Managed Lands

Because the number of proposed sorties and landings on BLM El Centro managed lands is expected to increase by over 300 percent under Alternative 1, there may be an increase in mishap potential compared to existing conditions. However, the MV-22B and other relatively new aircraft (AH-1Z and UH-1Y) are expected to have (in the future) an accident rate similar to or less than other rotary aircraft (approximately one per 100,000 flight hours), which may lower the overall mishap potential compared to the existing mix of aircraft. As described above for operations at the Cleveland National Forest, all safety actions that are in place for existing training flights would continue to be in place for the proposed operations. Therefore, there would be no significant impact to flight safety as a result of the implementation of Alternative 1.

Wildfire Management

Rotary wing aircraft have been training in the Cleveland National Forest and on BLM El Centro lands for over 40 years and have not been identified as an ignition source for wildfires during normal operations. Because of its unique tilt-rotor design, introduction of the MV-22B into a national forest has been a concern for officials at the Trabuco Ranger District of the Cleveland National Forest. The Program Executive Officer for Air Assault and Special Mission Programs initiated a study to determine the risk of grass fire due to the exhaust temperature of the MV-22 (DoN 2008 [see Appendix E]). This study indicates that under normal operations, with exhaust deflectors operating, the exhaust of the MV-22 would not heat the ground to a temperature high enough to support combustion of plant based materials. This is consistent with operational experience that found only one fire caused by an inoperative exhaust deflector in over 44,000 flight hours of operations with various types and locations of unprepared landing areas (DoN 2008).

Cleveland National Forest

As discussed in section 3.7 (*Biological Resources*), fire ignitions would be most frequent under conditions of low fuel moisture, low relative humidity, and high ambient temperatures, and are especially prevalent under Santa Ana conditions, during which dry air masses move from the interior to the coast, typically accompanied by high winds and hot temperatures. Fire potential would be highest in undeveloped areas with an abundance of natural fire fuels (e.g., dry grasses or finely branched shrubs that extend above the ground surface), dry soil, and low moisture content. Under Alternative 1, however, aircraft would only land within the designated LZs, which are typically heavily disturbed and/or developed and generally void of natural vegetation (see Appendix D), and no landings would occur in undisturbed, undeveloped sites outside of the proposed LZs. Additionally, many of the LZs are on or adjacent to fire breaks, which are routinely maintained by the USFS through controlled burns or other methods. Therefore, the potential for fire is considered low for operations at the Cleveland National Forest LZs. The USMC would work closely with the USFS, as needed, to establish appropriate protocols in the unlikely event of an aircraft mishap or ignition of fire. Therefore, there would be no significant impact to public health and safety as a result of the implementation of Alternative 1.

BLM El Centro Managed Lands

As described above for operations at the Cleveland National Forest, fire potential would be highest in undeveloped areas with an abundance of natural fire fuels (e.g., dry grasses or finely branched shrubs that extend above the ground surface), dry soil, and low moisture content. Under Alternative 1, however, aircraft would only land within the designated LZs, which are almost entirely void of vegetation and dominated by desert pavement, and no landings would occur in undisturbed, undeveloped sites outside of the proposed LZs. Therefore, the potential for fire on BLM El Centro lands is considered very low. The USMC would work closely with the BLM, as needed, to establish appropriate protocols in the unlikely event of an aircraft mishap or ignition of fire. Therefore, there would be no significant impact to public health and safety as a result of the implementation of Alternative 1.

Avoidance, Minimization and/or Mitigation Measures

Because there would be no significant impact to public health and safety, no avoidance, minimization, and/or mitigation measures are required.

3.9.2.2 No Action Alternative

Under the No Action Alternative, no USMC rotary wing or tilt-rotor operations would occur on public lands managed by the Cleveland National Forest and the BLM El Centro Field Office. However, other agencies, such as the Sheriff Department, Fire Department, and the U.S. Navy, may still use the LZs. Therefore, public health and safety issues may continue within the vicinity of the LZs, although likely at a lower level than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.

3.10 Aesthetics

3.10.1 Affected Environment

Visual resources are defined as the natural and manufactured features that constitute an area's aesthetic qualities. These features form the overall impression that an observer receives of an area, including its landscape character. Landforms, water surfaces, vegetation, and manufactured features are considered distinctive elements of an area's visual character.

Generally, any activity that has the potential to alter the quality or distinguishable characteristic of the perceived environment may be considered as having an impact on the visual resources of that area. The significance of a change in visual character is influenced by social considerations including public value placed on the resource, public awareness and use of the area, and general community concern for visual resources in the area. These social considerations are the basis of visual sensitivity and derive from the degree of public interest in a visual resource and concern over potential adverse changes in the quality of that resource.

Of particular importance with respect to military operations is an assessment of the perceived impacts that landing operations may have on the aesthetic and visual quality of representative aesthetic features. In particular, aesthetic and visual resources associated with the LZs in the Cleveland National Forest and on BLM managed lands primarily involve the natural landscape associated with mountain ridges and diverse desert environments in which landing operations would occur.

3.10.1.1 Cleveland National Forest

As discussed in section 3.3 (*Land Use and Recreation*), all of the LZs, with the exception of LZ Site 7, are located within areas of the Cleveland National Forest designated by the USFS as Back Country land use zone (Figure 3.3-1). LZ Site 7 is located within the Back Country, Non-Motorized land use zone. In addition, the LZs in the Cleveland National Forest are in the Silverado and Elsinore Places designated in the Forest Plan (USFS 2005a). According to the Forest Plan, both Places should remain undeveloped as natural appearing backdrops to the nearby urban areas of Orange and Riverside counties. Maintenance of scenic qualities is a program emphasis for both areas.

Elsinore Place is one of the most visible landscapes in the national forest. The USFS manages this area to preserve the undeveloped quality and character of the urban backdrop, including the natural appearing skyline silhouette of the Santa Ana Mountains, and the scenic integrity of areas visible from Interstate-15 and Ortega Highway corridors.

Silverado Place is maintained as a natural appearing landscape that functions as a backdrop for southern Orange County and canyon communities. The USFS manages this area to preserve the undeveloped quality and character of the urban backdrop. Areas viewed from canyon communities include woodland plant habitats that have high scenic value and enhance the recreation experience (e.g., wildflowers and deciduous trees) and rare vegetative communities on upland slopes that add diversity to the landscape (i.e., knobcone pine and coastal sage scrub).

The USFS designates scenic integrity objectives to areas within the national forest. Scenic integrity is the state of naturalness (or disturbance) created by human activities or alteration. The project area is located within an area with a high scenic integrity objective, which means the area appears unaltered.

No scenic highways or wild and scenic rivers are located within the project area or immediate vicinity.

3.10.1.2 BLM El Centro Managed Lands

The LZs are located on land managed according to the CDCA Plan, as amended (BLM 1980), which designates land uses according to multiple-use classes, as described in section 3.3 (*Land Use and Recreation*). The proposed LZs are located in areas designated as unclassified lands. Unclassified lands are scattered and isolated parcels of public land in the CDCA, which are managed on a case-by-case basis, as described in the Land Tenure Adjustment Element section of the CDCA Plan (BLM 1980). There are no provisions to protect visual resources within unclassified lands in the Land Tenure Adjustment Element of the CDCA Plan (BLM 1980).

3.10.2 Environmental Consequences and Mitigation Measures

Visual resource impacts associated with aircraft operations primarily involve the presence of aircraft in otherwise natural rural settings. Visual effects include the aircraft themselves, both in the air and on the ground, as well as ancillary visible evidence of aircraft operations such as dust generation during landing and takeoff operations. During night time operations, navigation lights would be visible. An associated effect is the noise of engines and blades that would attract attention in the direction of the aircraft and away from visual resources, thereby making it more likely that a bystander would notice the aircraft.

3.10.2.1 Alternative 1

Cleveland National Forest

The overall number of proposed operations in the Cleveland National Forest would decline slightly from current operations (from 452 to 422 sorties per year), while the number of landings is expected to increase slightly (from 2,132 to 2,205 annual landings). There would be no construction or alteration of the landscape that would be visible to the casual observer; therefore, there would be no permanent change to the visual environment. Overflights to and from the LZs would continue, but at a relatively low frequency of about 36 sorties per year (or 3 a month) for most LZs. While the mix of aircraft would differ from the current situation, it is very unlikely that casual observers would notice the difference.

Rotor wash from aircraft landing, takeoff, and hovering operations would result in dust and debris being scattered and becoming airborne in the immediate vicinity of the aircraft, although the extent of this dust disturbance would depend on local soil characteristics, presence of vegetation, and weather conditions. Dust would be visible to recreational users in the general area within sight of the LZ, but the airborne dust would disperse quickly. For example, time-lapsed photographs taken during a one-time MV-22 landing demonstration at LZ Site 5 show that airborne dust from the landing dispersed in less than two minutes (Figure 3.10-1).[1]

Aircraft activities at the proposed LZs would also occur in low numbers and would be generally dispersed over broad geographic areas. Regular, repeated, or continuous adverse visual impacts would be unlikely because routine training operations would vary on a daily basis. Casual observers would primarily be recreational users within the Cleveland National Forest. As discussed in section 3.3 (*Land Use and Recreation*), disturbance to nearby recreational users (e.g., hiking, biking, etc.) could occur, but this would be short-term, consisting of isolated and infrequent landing and takeoff operations, and of low intensity (i.e., low numbers of aircraft). Although recreation within the project area occurs throughout the week, scheduling would result in automatic separation of flight operations from weekend public recreation. Therefore, the potential for visual or aesthetic impacts on recreational users would be somewhat reduced. Given these characteristics, routine training activities would not result in permanent alteration of the area's visual environment or high scenic integrity, and there would be no significant impact on visual resources.

[1] Note that LZ Site 5 is composed of barren and gravelly soils and the remnants of an old landing pad and, therefore, may not represent the maximum amount of dust generation at other previously undeveloped sites.

Figure 3.10-1. Time-Lapsed Photographs during a One-Time MV-22 Landing Demonstration at LZ Site 5

BLM El Centro Managed Lands

Aircraft operations on BLM El Centro lands would increase substantially from current operations (from 483 to 2,080 sorties per year). As with the Cleveland National Forest LZs, there would be no construction or alteration of the landscape that would be visible to the casual observer. Even with an increase in overflights to and from the LZs, the overall frequency would remain relatively low at about 114 to 346 sorties per year (or 10 to 29 a month) for each LZ. While the mix of aircraft would differ from the current situation, it is unlikely that casual observers would notice the difference. Overall, the visual effects of Alternative 1 within BLM El Centro lands would be somewhat greater than the current level of impacts due to the larger numbers of sorties. However, the number of sorties per day would still be small and of short duration and would be dispersed over a wide geographic area such that no one location is likely to experience substantial adverse visual impacts. Given these characteristics, routine training activities would not result in permanent alteration of the area's visual environment, and there would be no significant impact on visual resources.

Avoidance, Minimization and/or Mitigation Measures

Because there would be no significant impact on visual resources, no avoidance, minimization, and/or mitigation measures are required. However, as discussed in section 2.2.1.3 (*Flight Activity within the Cleveland National Forest*), the USMC would work with the USFS to identify and implement appropriate dust abatement measures to minimize fugitive dust emissions. These measures would reduce the potential for dust generation and associated visual or aesthetic impacts on recreational users in the Cleveland National Forest.

3.10.2.2 No Action Alternative

Under the No Action Alternative, no USMC rotary wing or tilt-rotor operations would occur on public lands managed by the Cleveland National Forest and the BLM El Centro Field Office. However, other agencies, such as the Sheriff Department, Fire Department, and the U.S. Navy, may still use the LZs. Therefore, minor impacts on visual resources may continue within the vicinity of the LZs, although likely at a lower level than under existing conditions. Depending on how often the LZs are used by other agencies, this could be a beneficial impact.

4 Cumulative Impacts

4.1 Introduction

CEQ regulations implementing NEPA require that the cumulative impacts of a proposed action be assessed (40 CFR Parts 1500-1508). A cumulative impact is defined as the following:

> *The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (40 CFR § 1508.7)*

CEQ's guidance for considering cumulative effects states that NEPA documents "should compare the cumulative effects of multiple actions with appropriate national, regional, state, or community goals to determine whether the total effect is significant" (CEQ 1999). The first step in assessing cumulative effects, therefore, involves identifying and defining the scope of other actions and their interrelationship with the proposed action or alternatives. The scope must consider other projects that coincide with the location and timetable of the proposed action and other actions. Section 4.2 identifies relevant past, present, and reasonably foreseeable future actions, including both military actions in the region as well as other federal and non-federal actions. Projects were selected because they are either similar to the proposed action, large enough to have far reaching effects, or in proximity to the proposed action. Section 4.3 provides an analysis of cumulative impacts for relevant environmental resources, and further defines the region of influence and relevant projects for each resource area.

4.2 Past, Present, and Reasonably Foreseeable Future Projects Considered in the Cumulative Analysis

This section describes past, present, and reasonably foreseeable future actions in either the project area or the greater regional area of influence. Projects are organized by military actions (section 4.2.1), USFS actions (section 4.2.2), BLM actions (section 4.2.3), Orange County actions (section 4.2.4), Riverside County and California Department of Transportation (Caltrans) actions (section 4.2.5), and City of Corona actions (section 4.2.6). Most of the land within and surrounding the project area is federally owned and/or federally managed and, therefore, the projects described below center on federal actions. Note that some utility developments that are proposed on nearby federal lands (e.g., San Diego Gas & Electric Company [SDG&E] projects) are included below under the applicable federal land owner. To the extent that details regarding such actions exist and the actions have a potential to interact with the proposed action described in this EA, these actions are included in the cumulative impact analysis.

4.2.1 Military Actions

Chocolate Mountain Aerial Gunnery Range Land Withdrawal Renewal. The DoN is initiating the process set forth in the Withdrawal Act of 1994 to request Congress to renew the land withdrawal at the Chocolate Mountain Aerial Gunnery Range, which is part of the USMC's Bob Stump Training Range Complex, as there is a continuing military need for the range. The current military withdrawal for the range expires in October 2014. The range consists of approximately 459,000 acres (185,750 hectares) located within desert mountain terrain in Riverside and Imperial counties in southern California, east of the Salton Sea (see Figure 1.1-1). Its primary mission is military aircrew training in the delivery of air-to-ground ordnance. The DoN published a Notice of Intent in the Federal Register in September 2010

announcing its intent to prepare a Legislative Environmental Impact Statement (EIS) to support the land withdrawal application (DoN 2011a). The Draft Legislative EIS was distributed to the public in August 2012 (DoN 2012a), and the public comment period ended 30 November 2012. No change in the potential for direct impacts to biological resources (including desert tortoise) or cultural resources would be expected to occur as a result of the renewal of the CMAGR land withdrawal.

West Coast Homebasing of the Joint Strike Fighter. The DoN published a Notice of Intent in the Federal Register in January 2011 announcing its intent to prepare an EIS that will evaluate the potential environmental effects associated with basing the Navy's F-35C Joint Strike Fighter aircraft on the west coast of the U.S. Under this proposal, a total of seven active-duty F/A-18C Hornet squadrons and one fleet replacement squadron, a total of 100 aircraft, would transition to the more advanced F-35C Joint Strike Fighter beginning in 2015. The preliminary screening process identified two potentially suitable west coast home basing locations: Naval Air Station Lemoore, located in Kings County, California, and Naval Air Facility El Centro, located in Imperial County, California (DoN 2011b). Additionally, the DoN signed the Record of Decision (ROD) in December 2010 to homebase 96 USMC Joint Strike Fighters at MCAS Miramar and 88 USMC Joint Strike Fighters at MCAS Yuma (DoN 2010b). Potential impacts may include noise and air quality associated with aircraft overflights.

MCAGCC Twentynine Palms Land Acquisition and Airspace Establishment Project. This proposed action consists of expanding the land base and special use airspace of MCAGCC in Twentynine Palms, California, to provide a training range facility capable of supporting large force exercises. The proposed action would accommodate a proposed new program of sustained, combined-arms, live-fire, and maneuver training for all elements of a Marine Expeditionary Brigade-sized Marine Air Ground Task Force. The Draft EIS (DoN 2011c) was distributed to the public in February 2011, with the comment period running through May 2011. The Final EIS (DoN 2012c) was released in July 2012, with the ROD expected in January 2013 (DoN 2012b). The EIS indicates the project may impact biological resources (including desert tortoise), cultural resources, paleontological resources, soils, air quality, and mineral resources.

Proposed Utility and Infrastructure Improvements to Camp Billy Machen. This proposed action consists of providing utility and infrastructure improvements to a Navy Sea, Air and Land (SEAL) Team desert warfare training facility that is located on the northwestern edge of the Chocolate Mountain Aerial Gunnery Range, near Niland, Imperial County, California. The project also proposes constructing a materials storage facility outside the existing cantonment area. A Finding of No Significant Impact (FONSI) was signed in April 2012 (USMC 2012c).

4.2.2 United States Forest Service Actions

Ongoing Uses within the Cleveland National Forest. The Cleveland National Forest provides for management of multiple-uses, as described in the Land Use Management Plan (USFS 2005a). Ongoing activities and uses that occur within the forest include restoration of vegetation, recreation (hunting, fishing, lodges, resorts, clubs, mountain biking, camping, and off-highway vehicle use), motorized use, communication sites, livestock grazing, roads, utility corridors, mineral resource exploration and development, renewable energy development, and fuel break construction/maintenance. In particular, the Land Use Management Plan has identified the need to maintain 1,000 acres of fuel break annually, and fuel breaks need to be treated on a rotational basis to assure that a low fuel loading is maintained (USFS 2005a; see also specific fuel break projects noted below). Fuel break maintenance generally includes grading and controlled burns, which may result in smoke and dust emissions.

Consolidation and Reissuance of San Diego Gas & Electric Company Permits. The Cleveland National Forest proposes to issue a Master Special Use Permit to SDG&E for the operation and maintenance of

existing electric distribution and transmission lines, appropriate access roads, and other appurtenant facilities (USFS 2012e). The permit will also include conditions necessary for resource protection. The project area is located in multiple locations within the Trabuco, Palomar and Descanso Ranger Districts, Cleveland National Forest. This action is needed because the existing authorizations are expired, and the existing powerlines are needed to supply power to local communities, residents, and government-owned facilities located within and adjacent to the Cleveland National Forest. An EA was completed in May 2009 (USFS 2009). The EA indicates the project may have wildland fire risks and impacts on biological resources.

Sunrise Powerlink Transmission Line Project. The Cleveland National Forest proposes to allow SDG&E to construct powerlines across portions of the Cleveland National Forest between Imperial Valley and San Diego. The 119-mile (192-km) Sunrise Powerlink transmission line would affect the Cleveland National Forest Descanso Ranger District near MCAS Miramar and would cross BLM land to tie in near El Centro, California. The purpose of the line is to link San Diego to the Imperial Valley. Communities potentially affected include Alpine, Lakeside, McCain Valley, and other incorporated areas in San Diego County, California. This project was approved by the California Public Utilities Commission (CPUC) and BLM in 2010 (see section 4.2.3 for more information on BLM's action). The Cleveland National Forest superintendent approved the project in July 2010 (USFS 2012d), and is currently under construction. The ROD (USFS 2010) indicates the project would have wildland fire risks, visual impacts, and impacts on biological resources.

North Main Divide Fuel Break System. The proposed action would remove vegetation on the North Main Divide Fuel break System, which is located along the North Main Divide Road within the Trabuco Ranger District, Cleveland National Forest (USFS 2012f). The proposal calls for both hand clearing techniques and prescribed fire in performing this vegetation removal. A Final EA was released in May 2012 (USFS 2012j), and a FONSI was signed in May 2012 (USFS 2012k). Fuel break maintenance generally includes some grading and controlled burns, which may result in smoke and dust emissions.

El Cariso, Indian, and Munhall Plantation Vegetation Management. The Trabuco Ranger District of the Cleveland National Forest proposes to manage vegetation in three locations on the district utilizing a variety of methods, including possible use of broadcast burning within the understory. Proposed activities would improve the health and vigor of trees and other vegetation in the plantations and would protect the trees from wildfires. A scoping letter was released in June 2011 (USFS 2011a), and the project is currently under analysis (USFS 2012g). Broadcast burning within the understory may result in temporary smoke and dust emissions.

Elsinore Peak Fuels Treatment. The Trabuco Ranger District proposes to create a fuels treatment area adjacent to the community of Rancho Capistrano and along the South Main Divide Road by using mechanical treatments and burning. A scoping letter was released in June 2011 (USFS 2011a), and the project is currently under analysis (USFS 2012h). Fuels treatment generally may include grading and controlled burns, which may result in smoke and dust emissions.

Silverado Fuel Break. The Trabuco Ranger District proposes to construct a fuel break on the ridge between Silverado and Harding canyons to provide protection for the communities in Silverado and Modjeska canyons. The fuel break system would be maintained by hand clearing vegetation, pile burning, mechanical equipment (masticator) and broadcast burning. A scoping letter was released in July 2011 (USFS 2011b), and the project is currently under analysis (USFS 2012i). Fuel break maintenance generally includes grading and controlled burns, which may result in smoke and dust emissions.

4.2.3 Bureau of Land Management Actions

Ongoing Uses within the BLM El Centro Field Office Jurisdiction. The mission of the BLM is to sustain the health, diversity, and productivity of public lands for the use and enjoyment of present and future generations. Land within the jurisdiction of the BLM El Centro Field Office provides for management of multiple-uses, in accordance with FLPMA. Ongoing activities and uses that occur within these BLM lands include renewable energy development, fire/fuels management, grazing of rangeland, landscape conservation, recreation (bird watching, camping, hiking, horseback riding, mountain biking, off-road vehicles, rockhounding, and target shooting), management of wild horses and burros, management of abandoned mine lands, and management of wildlife and fisheries.

West Chocolate Mountains Renewable Energy Evaluation Area. BLM is currently evaluating a proposed action to develop renewable energy projects within a 59,000 acre (23,877 hectare) West Chocolate Mountains Renewable Energy Evaluation Area (REEA) located east of the Salton Sea and west of the Chocolate Mountains. The purpose of the proposed action is to facilitate appropriate and environmentally responsible development of geothermal, solar, and wind energy in the West Chocolate Mountains REEA. BLM is preparing an EIS and a CDCA Plan Amendment to evaluate the potential environmental impacts associated with identifying sites on specific BLM managed surface lands as suitable for authorization of rights-of-way for testing and developing solar and wind energy facilities. This EIS and CDCA Plan Amendment also will consider approval of a noncompetitive geothermal lease application filed with the BLM before 2005. This planning effort will not sanction any specific energy development at this time, including the lease application, which might result in environmental impacts. Additional project-specific environmental analyses would need to be conducted before on-the-ground development activities could occur; however, further amendments of the CDCA plan would not be required (BLM 2012a). The Draft EIS (BLM 2011e) was distributed to the public in June 2011, and the Final EIS (BLM 2012k) was released in November 2012. The EIS identified adverse impacts to air quality, noise, geologic resources, soils, water resources, vegetation, fish and wildlife, cultural resources, paleontological resources, visual resources, lands and realty, human health and safety, energy and minerals, recreation, and traffic and transportation.

Sunrise Powerlink Transmission Line Project. Similar to what was described above in section 4.2.2, this project consists of a 119-mile (192-km) Sunrise Powerlink transmission line proposed by SDG&E. BLM and the CPUC released a Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS) in October 2008. The EIS/EIR was supported by the following Cooperating and Responsible agencies: the USFS (Cleveland National Forest), the Bureau of Indian Affairs, MCAS Miramar, and the California Department of Parks and Recreation (Anza-Borrego Desert State Park). On 24 February 2009, the BLM approved a temporary right-of-way grant for construction and a long-term right-of-way grant for the operation and maintenance of the transmission lines where they cross approximately 49 miles of public lands in Imperial and San Diego counties. On 2 February 2011, the BLM issued a notice to proceed for construction within the fence line of the existing Imperial Valley Substation, and on 4 April 2011, issued a second notice to proceed authorizing construction of overhead transmission on the public lands crossed by the project (BLM 2012b). The EIS/EIR (CPUC 2008) identified potential impacts that include air emissions associated with construction; loss of native vegetation, removal of habitat, and potential collisions of birds with transmission lines; loss of agricultural lands; noise from construction, maintenance, and corona noise from transmission lines; threats to biological resources in certain locations; visual resources; recreational resources; and cultural resources.

Ocotillo Sol Solar Energy Project. SDG&E is requesting a right-of-way authorization from the BLM to construct and operate a photovoltaic solar energy facility on public land located in southwest Imperial County, California. The Ocotillo Sol Solar Energy Project would be built on an approximately 100-acre (40 hectare) site located approximately 9 miles (15 km) southwest of El Centro, and 4 miles (6 km) south

of Interstate 8. The project would be a 15- to 18-megawatt (MW) photovoltaic project (with peak capacity of 20 MW). The Draft EIS (BLM 2012k) was distributed to the public in April 2012, and the Final EIS is currently being prepared (BLM 2012c). Impacts identified in the Draft EIS (BLM 2012k) include construction and operational emissions of air pollutants, greenhouse gas emissions, potential soil erosion, water resources, biological resources, cultural resources, paleontological resources, threat of wildland fire, recreation, visual resources, transportation, noise, and public health and safety.

Ocotillo Express Wind Energy Project. Ocotillo Express, LLC, has applied to the BLM for a right-of-way on public lands to construct a wind generation power plant facility. This power plant facility would be located approximately 5 miles (8 km) west of Ocotillo, California. The project would generate 550 MW of wind energy, and would include a substation; administration, maintenance and operations facilities; transmission; and temporary construction lay down areas. The recently approved Sunrise Powerlink transmission line crosses the proposed site, which represents 15,000 acres (6,070 hectares) of public land administered by the BLM, with a small portion of public land under the jurisdiction of Imperial County. The Sunrise Powerlink would deliver the power generated by the Ocotillo Express project to energy consumers throughout southern California. The Final EIS/EIR was released in March 2012 (BLM 2012d) and the ROD for this project was published in the Federal Register on 11 May 2012 (BLM 2012j). In addition, the Notice to Proceed was authorized on 14 May 2012 (BLM 2012e), and the right-of-way grant was signed on 11 May 2012 (US DOI 2012). The Final EIS/EIR (BLM 2012d) identified potential impacts to air quality, cultural resources, noise, paleontological resources, vegetation resources, visual resources, and wildlife resources.

Imperial Solar Energy Center-West. CSOLAR Development, LLC, has submitted a right-of-way application to construct, operate, and maintain a 230 kilovolt transmission line on land managed by the BLM El Centro Field Office (BLM 2012f). The proposed action consists of two primary components: 1) the construction and operation of a solar energy facility; and, 2) the construction and operation of the electrical transmission lines that would connect from the solar facility to the existing Imperial Valley substation. The solar energy center would be on 1,103 acres (446 hectares) of vacant land previously utilized for agricultural purposes in the Imperial Valley, California. The Final EIR/EA was released in July 2011 (BLM 2011a), and the FONSI was signed in August 2011 (BLM 2011b). Furthermore, the Secretary of the Interior approved the transmission line on public lands on 25 August 2011 (US DOI 2011a), and the right-of-way grant was signed on 27 September 2011 (US DOI 2011b). The Final EIR/EA (BLM 2011a) considered potential impacts to visual resources, land use, transportation/circulation, air quality, greenhouse gas emissions, geology/soils and mineral resources, cultural resources, noise, agricultural resources, health and safety, hydrology and water quality, biological resources, public services and utilities, paleontological resources, and recreation.

Tule Wind Energy and East County Substation Projects. Pacific Wind Development has submitted a right-of-way application to BLM to construct, operate, and maintain an energy generation facility approximately 60 miles (97 km) east of San Diego, California, north of Interstate 8 (BLM 2012g). The project would generate 200 MW of wind energy. The proposed project would include the construction of new roads, turbines, a transmission line, and other facilities. It would be constructed on approximately 15,500 acres (6,273 hectares) consisting of lands administered by the BLM as well as private lands under county jurisdiction, state lands, and lands within the Ewiiaapaayp Indian Reservation. SDG&E has applied to BLM for a 1.5-mile (2.4-km) long right-of-way to accommodate a 138-kilovolt transmission line in support of the wind project. The right-of-way is part of the application SDG&E has filed with the CPUC for the much larger East County Substation Project. The Final EIR/EIS was released in October 2011 (BLM 2011c), and the ROD was signed in December 2011 (BLM 2011b). Various components of the proposed project were determined in the EIR/EIS to potentially impact biological resources (Quino checkerspot butterfly), air quality, visual resources, cultural resources, and noise.

Imperial Valley Solar Project (formerly named and referred to as the Solar Two Project). Stirling Energy Systems has submitted an application to BLM for development of a concentrated solar electrical generating facility capable of generating 750 MW of renewable power (BLM 2012h). The proposed project is located on approximately 6,140 acres (2,485 hectares) of federal land managed by the BLM and approximately 300 acres (121 hectares) of privately owned land. The project site is in Imperial County, California, approximately 4 miles (6 km) east of Ocotillo, and 14 miles (23 km) west of El Centro. The Final EIS was released in July 2010 (BLM 2010), and a ROD was signed on 5 October 2010 (BLM 2012h). However, on 17 August 2011, the California Energy Commission formally terminated the project license at the applicant's request (California Energy Commission 2011).

Imperial Sand Dunes Recreation Area Management Plan. The USFWS designated critical habitat for Peirson's Milk Vetch in 2008, which triggered BLM to begin a new Recreation Area Management Plan planning process. The planning area consists of approximately 200,000 acres (80,937 hectares), with approximately 150,000 acres (60,703 hectares) of BLM managed land and 25,829 acres (10,453 hectares) designated as North Algodones Dunes Wilderness Area. The planning area is bordered on the east by the Chocolate Mountain Range and the Cargo Muchacho Mountains, bordered on the west by the East Mesa Flat-tailed Horned Lizard Management Area, and bordered on the south by the U.S./Mexico border. The Recreation Area Management Plan includes closing 100 percent of Peirson's Milk Vetch critical habitat, providing more acreage available for off-highway vehicle recreation than under current conditions, providing protection of Peirson's Milk Vetch, and making lands available for renewable energy (BLM 2012i). The Final EIS (BLM 2012 m) was released in September 2012.

4.2.4 Orange County Actions

Saddle Crest Homes. An application has been submitted to the Orange County Community Development Department for a General Plan Amendment, Specific Plan Amendment, and Area Plan to allow for development of Saddle Crest Homes, a gated community comprised of 65 detached single-family residential units concentrated off Santiago Canyon Road, with proposed open space dedication along the northeastern portion of the property. Saddle Crest Homes is located in unincorporated Orange County north of the junction of Live Oak Canyon Road with El Toro Road and east of Santiago Canyon Road. The Cleveland National Forest and other open space areas are adjacent to Saddle Crest Homes to the north. The project site lies within the Upper Aliso Residential District in the northwestern portion of the Foothill Trabuco Specific Plan area. A Draft EIR (County of Orange 2012a) was published on 20 April 2012, and the Final EIR (County of Orange 2012b) was released in July 2012. The EIR identified potential impacts to aesthetics, air quality, biological resources, cultural resources, geology and soils, greenhouse gas emissions, hazards and hazardous materials, hydrology and water quality, land use and planning, recreation, and utilities and service systems.

Oak Flat Tower. Kierktron Inc. has submitted an application to the Orange County Community Development Department for a grading permit and building permit to allow for development of four radio transmitting towers and equipment building and removal of existing site structures. The project is located at 9193 Black Star Canyon Road, within an unincorporated area of Orange County adjacent to the Riverside County border. The site is a private in-holding within the Cleveland National Forest Trabuco Ranger District known as "Oak Flat." An Initial Study and Mitigated Negative Declaration was prepared in August 2011. The Mitigated Negative Declaration (County of Orange 2011) noted less than significant impacts, with mitigation, for biological resources, cultural resources, geology and soils, greenhouse gas emissions, hazards and hazardous materials, and noise.

4.2.5 Riverside County and California Department of Transportation Actions

State Route-91 Corridor Improvement Project. The Riverside County Transportation Commission and Caltrans are proposing capacity, operational, and safety improvements on part of State Route 91 and part of Interstate 15. The project would widen the existing State Route 91 from the State Route 91/State Route 241 interchange in the cities of Anaheim and Yorba Linda in Orange County to Pierce Street in the City of Riverside in Riverside County. The project also includes improvements to Interstate 15 in Riverside County between the Interstate 15 and Cajalco Road interchange in the City of Corona and the Interstate 15 and Hidden Valley Parkway interchange in the City of Corona. The Draft EIR/EIS was published on 20 May 2011, which started the public comment period that ended on 11 July 2011. The Final EIR/EIS was released in August 2012, and a ROD was signed on 23 October 2012 (Caltrans 2012).

4.2.6 City of Corona Actions

Rancho de Paseo Valencia. An application has been submitted to the City of Corona Planning Department to allow for development of 34 single-family estate lots on 64 acres. Approval of the project is pending.

Arantine Hills Specific Plan. An application was submitted to the City of Corona Planning Department for approval of a General Plan Amendment, Specific Plan, development agreement, a tentative map, and subsequent parcel maps and tentative tract maps to allow for development of a 276-acre master-planned community that includes residential, commercial, and mixed-use development as well as open space/recreational uses. A Draft EIR (City of Corona 2012a) was published on 9 May 2012, and the Final EIR was released in July 2012 (City of Corona 2012b). The EIR identified potential impacts for air quality, biological resources, archaeological and paleontological resources, geology and soils, greenhouse gas emissions, hazards and hazardous materials, hydrology and water quality, noise, transportation, and utilities and service systems.

Foothill Parkway Westerly Extension. The City of Corona Public Works Capital Improvement Division submitted an application to construct two new miles of Foothill parkway from Skyline Drive to Paseo Grande at Green River. Connections to the new section of Foothill Parkway from both Mangular Avenue via Chase drive and Border Avenue are also being considered as part of the overall project. The project would improve east/west traffic flow through the southern portion of the city and provide a parallel route to Ontario Avenue. The Final EIR was approved in February 2009. The final engineering and design is expected to be completed in 2012 after which construction would begin. The Final EIR (City of Corona 2009) identified potential impacts for aesthetics, light and glare, air quality, noise, cultural resources, and geologic and seismic hazards.

Green River Road Widening. The City of Corona Public Works Capital Improvements Division submitted an application to widen Green River Road between State Route 91 and Palisades Drive from 4 to 6 lanes including installation of curb and gutter, sidewalk, utility relocation, installation of storm drain laterals and culverts, the installation of a new traffic signal at Green River Road/ Palisades Drive, the modification of the existing traffic signal at Green River Road/Dominguez Ranch Road, and the modification of the exiting intersections of Green River Road/Fresno Road and Green River Road/Nicholas Place. An Initial Study and Mitigated Negative Declaration (City of Corona 2010) was prepared in January 2010. Potential impacts were noted in the Mitigated Negative Declaration for hydrology and water quality, air quality, biological resources, hazards and hazardous materials, and cultural resources.

4.3 Potential Cumulative Impacts by Environmental Resource Area

This section addresses the potential cumulative impacts of the proposed action in conjunction with the aforementioned projects. These projects represent past, present, and reasonably foreseeable actions with the potential for cumulative impacts when considered in conjunction with the potential impacts from the proposed action. However, if a project would not result in direct or indirect impacts on a resource area, it would not contribute to a cumulative impact on that resource area. CEQ guidance states, "A cumulative effects analysis should 'count what counts,' not produce superficial analyses or a long laundry list of issues that have little relevance to the effect of the proposed action or the eventual decisions" (CEQ 1997). Therefore, the cumulative impact analysis focuses on 1) those resource areas with the potential to be significantly impacted by the project; and/or 2) those resource areas currently in poor or declining health or at risk even if project impacts would be relatively small (less than significant).

4.3.1 Airspace

The geographic scope of the airspace cumulative analysis includes the airspace over much of southern California. The regional airspace on the west coast (and elsewhere) is becoming more and more crowded due to increasing commercial, private, and military aviation demands. The FAA has to consider multiple and sometimes competing demands, while managing airspace conditions to satisfy all aviation users. Regarding the proposed action, the change in proposed operations would not alter the airspace configuration or use over public lands (i.e., the current alignment, minimum or maximum altitudes, allowable times of use, and route widths), and it would not impact current or future military and general aviation uses of the airspace. Other military projects within the region that could affect airspace use include the MCAGCC Land Acquisition and Airspace Establishment Project and the Basing of the Joint Strike Fighter (if Naval Air Facility El Centro is selected for basing), both of which could increase military aviation operations within the general region. The Chocolate Mountain Aerial Gunnery Range Land Withdrawal Renewal is not expected to significantly affect airspace use, because it would allow continued use of that training range, similar to existing conditions. Additionally, various alternative energy projects, such as those associated with the proposed West Chocolate Mountains Renewable Energy Evaluation Area, would not directly affect airspace use. However, they could have indirect impacts on adjacent military activities by introducing new light sources that could affect military night flight training or other obstacles (e.g., wind towers) that could encroach on military and general aviation airspace use. The LZs identified under the proposed action, however, were chosen based on adequate airspace conditions (e.g., lack of air traffic congestion or airspace restrictions) to reduce potential conflicts within the regional airspace. Therefore, the cumulative impacts identified for airspace from the proposed action, in conjunction with other projects on and in the regional vicinity, would not be cumulatively significant.

4.3.2 Land Use and Recreation

Urbanization and population growth in southern California in the past 50 years has led to an increased demand for and use of the Cleveland National Forest and BLM land for recreational land uses (USFS 2005a, BLM 1980). Outdoor recreation is a growing use within the national forest and BLM land and demand is expected to increase in the future with continued population growth. Conflicts among land uses and users may increase as available space becomes more crowded, where incompatible uses are not separated, or where desired opportunities are not available (USFS 2005a, BLM 1980). Human caused sights and sounds are an impact on the recreational experiences, typically disrupting the primitive solitude that visitors seek. These often include the sight and sound of nearby development, highways, management activities, and commercial or military overflights.

The geographic scope of the land use cumulative analysis includes the Cleveland National Forest, Trabuco Ranger District, and lands managed by the BLM El Centro Field Office, as well as adjacent areas/communities. Cumulative impacts are assessed in terms of their compatibility with existing land uses and recreational opportunity. Projects within this region that would displace a current use, change suitability of a location for its current or planned uses, or impede the management of land use resources according to authorized plans would impact land use. Also, projects that would decrease recreational opportunities, diminish the user experience, and/or restrict spatial and temporal availability of recreational opportunities would impact recreation.

The proposed action would not result in significant impacts to land use or recreation within jurisdictions of the USFS or BLM because existing land use designations would not change as a result of the proposed action, and the existing land uses and recreational opportunities within the project area would essentially continue to be used for the same purposes.

Numerous proposed new construction projects listed in section 4.2 (*Past, Present, and Reasonably Foreseeable Future Projects Considered in the Cumulative Analysis*), especially the various alternative energy projects, the Imperial Sand Dunes Recreation Area Management Plan, and residential development adjacent to the Cleveland National Forest, have the potential to impact land use and recreation. Additionally, examples of proposed military projects that may impact land use and recreation include Basing of the Joint Strike Fighter (increased aircraft overflights if Naval Air Facility El Centro is selected for basing) and the MCAGCC Land Acquisition and Airspace Establishment Project (withdrawal of public lands for military use). Most of these projects would require a change in existing land use designation. The proposed alternative energy projects would likely result in decreased recreational opportunities because the land would no longer be available for recreational uses, while the Sand Dunes Recreation Area Management Plan would increase recreational opportunities. Additionally, the new residential developments near the Cleveland National Forest may result in increased recreational use of the forest. However, the cumulative projects located on and in the vicinity of the proposed LZs would be required to comply with existing land use and forest management plans, as described for the proposed action, including appropriate management for multiple uses, such as recreation. Therefore, the cumulative impacts identified for land use and recreation from the proposed action, in conjunction with other projects on and in the regional vicinity, would not be cumulatively significant.

4.3.3 Air Quality

4.3.3.1 Criteria Pollutants

The proposed training operations under the proposed action would generate air emissions that would occur over large areas within the Cleveland National Forest, BLM El Centro Field Office managed lands, and San Diego County project regions. As discussed in section 3.4 (*Air Quality*), due to their proximity to large population centers and climactic conditions, the air sheds around the Cleveland National Forest and BLM El Centro managed lands can experience high air pollutant concentrations. These regions do not currently attain the national and/or state ambient air quality standards for O_3, PM_{10}, and/or $PM_{2.5}$. However, due to the general rural locations of the project landing zones and aircraft flight routes, ambient pollutant levels are lower in these areas compared to the urbanized areas within the project air basins.

Because most of the emissions associated with the proposed action would occur from in-flight aircraft, they would substantially dilute in the atmosphere prior to impact at ground level. Any concurrent emissions-generating action that occurs in the vicinity of proposed training operations, such as prescribed burns, unpaved road use, new construction related to renewable energy projects or residential development, and increased military aircraft training activities identified above in section 4.2 (*Past, Present, and Reasonably Foreseeable Future Projects Considered in the Cumulative Analysis*), would

potentially contribute to the ambient cumulative impact of proposed emissions. Future sources of air emissions would occur far enough away from proposed operations such that they also would substantially dilute and produce low ambient pollutant impacts in proximity to proposed operations. Therefore, air quality impacts from the combination of proposed and future emission sources would not be substantial enough to contribute to an exceedance of an ambient air quality standard. As a result, the proposed training operations associated with the proposed action would produce less than significant cumulative impacts to criteria pollutant levels.

4.3.3.2 Greenhouse Gases

The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough alone 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 adopted or science-based NEPA significance threshold for GHGs, this EA compares GHG emissions from the proposed action to baseline conditions and to the U.S. net GHG emissions inventory of 2009 to determine the relative increase in proposed GHG emissions. Appendix B presents estimates of GHG emissions generated by the proposed action.

Table 4-1 summarizes the net change in annual GHG emissions that would occur from the proposed training operations under Alternative 1. These data show that CO_2e emissions from Alternative 1would increase by 455 percent over the project baseline CO_2e emissions. These data also show that the ratio of CO_2e emissions from Alternative 1 to the CO_2e emissions associated with the net U.S. sources in 2009 is approximately 0.0015/5,618 million metric tons, or about 0.0003 percent of the U.S. CO_2e emissions inventory. Since GHG emissions from Alternative 1 would equate to minimal amounts of the U.S inventory, this would not substantially contribute to global climate change. Therefore, GHG emissions from the proposed action would produce less than significant cumulative impacts to global climate change.

Table 4-1. Annual GHG Emissions from the Proposed Action

Scenario/Activity	*Metric Tons per Year*[1]			
	CO_2	**CH_4**	**N_2O**	**CO_2e**
Emission Increases – Alternative 1	-	-	-	15,298
Project Baseline Emissions	-	-	-	3,418
Alternative 1 Emissions as a % of Baseline Emissions	-	-	-	448
U.S. 2009 Net Emissions (10^6 metric tons) [2]	-	-	-	5,618.2
Alternative 1 Emissions as a % of U.S. Emissions	-	-	-	0.0003

Notes:
1. CO_2e = (CO_2 * 1) + (CH4* 21) + (N2O * 296).
2. Source: USEPA 2011b

Although the proposed action would produce minimal cumulative impacts to global climate change, the USMC and DoN implement broad-based programs to reduce energy consumption and shift to renewable and alternative fuels, thereby reducing overall emissions of GHGs. Some of these programs include the following:

- EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, adopted in October 2009, directs federal agencies to increase renewable energy use to achieve general GHG emission reductions. EO 13514 requires federal agencies to develop a 2008 GHG emissions baseline and to develop a percentage reduction target for agency-wide GHG reductions by 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 analyses. The DoD is currently developing its Strategic Sustainability Performance Plan that will guide USMC initiatives to reduce GHG emissions.

- The Commandant of the Marine Corps' *"Bases-to-Battlefield" Expeditionary Energy Strategy and Implementation Plan* (2011) declares the intent to implement measures to conserve energy and to reduce a dependence on foreign oil. The campaign plan identifies long-term goals to reduce energy intensity and increase the amount of renewable electrical energy usage. This plan requires base commanders to evaluate the effectiveness of incorporating emerging technologies that would reduce GHGs.
- MCI West has undertaken a study to evaluate and address GHG emissions, as documented in the draft *Greenhouse Gas Assessment for Marine Corps Installations West* (MCI West 2009). The study provides the basis for recommended GHG management policies at MCI West.
- On 16 October 2009, the Secretary of the Navy announced five energy targets for the Navy and Marine Corps, as summarized below:
  - When awarding contracts, appropriately consider energy efficiency and energy footprints as additional factors in acquisition decisions.
  - By 2012, demonstrate a Green Strike Group composed of nuclear vessels and ships powered by biofuels. 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 biofuels, and aircraft running on biofuels.
  - 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 the shore-based installations energy requirements from alternative sources. Also, convert 50 percent of all shore installations to net zero energy consumers.
  - By 2020, half of the 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 22 January 2010 the DoN and the Department of Agriculture signed an MOU to encourage the development of advanced biofuels and other renewable energy systems.

Renewable energy projects currently implemented and planned within the jurisdiction of MCI West would reduce emissions of GHGs by about 250,000 metric tons (CO_2e) from current operations over a 25-year life cycle (DoN 2010a). These projects include thermal and photovoltaic solar systems, geothermal power plants, and wind generators. These renewable energy initiatives are not proposed as emission reductions to directly offset GHG emissions produced by the proposed action, but rather demonstrate initial responses for DoN compliance with EO 13514 and to factor GHG management into DoN proposals and impact analyses.

Climate Change Adaptation

In addition to assessing whether the proposed action potentially would impact climate change, the following considers how climate change could impact these actions and what adaptation strategies, if any, would be required to respond to these future conditions. For project operations within southern California, the main effect of climate change to consider is increased temperatures, droughts, and wildfires, as documented in *Global Climate Change Impacts in the United States* (United States Global

Change Research Program 2009). Current rotary wing training operations in the Cleveland National Forest and BLM El Centro project regions have adapted to the high temperatures that frequently occur in both areas, as well as wildfires that occur in the Cleveland National Forest. Exacerbation of these conditions in the future could impede proposed training operations during extreme events or could cause smoke obscurations from wildfire events. No other substantial effects from future climate change would impact the proposed training operations.

4.3.4 Water Resources

Most of the LZs are located in relatively undisturbed watersheds with natural channels. However, many stream channels downstream of the Cleveland National Forest, Trabuco Ranger District, and lands under the jurisdiction of the BLM El Centro Office boundaries have been altered through flow management or channelization. Urbanization and agricultural development downstream of the USFS and BLM lands has had a marked effect on water resources. Watershed conditions, or watershed health, on the national forests and BLM land vary depending on amount of disturbance that has occurred within each watershed and the effect of the disturbance on the natural integrity of the watershed as a whole. Most water produced within the Cleveland National Forest, Trabuco Ranger District, and lands under the jurisdiction of the BLM El Centro Office meets or exceeds federal and state water quality standards. Waters that do not meet State Regional Water Quality Control Board standards (CWA Section 303 [d]) can be designated by the state as "impaired." Impairments are alterations in water quality factors typically associated with temperature, sediment, and chemicals. These water bodies are usually found in low elevational areas, have associated floodplains, and have easy vehicle access and high use rates. Disturbances within the watershed including recreation, grazing, and special uses can also adversely affect a watershed's condition.

Because the proposed action would have no impact on groundwater resources or floodplains, this cumulative analysis focuses on surface waters. The cumulative geographic scope with respect to soil erosion and associated sediment transfer and delivery to nearby waterways is the encompassing watershed of each proposed action site, as these areas represent receiving waters for the cumulative projects. Under the proposed action, the soils at most LZs are susceptible to wind erosion, including aircraft rotor wash during landings, takeoffs, and hovering. However, the proposed action would utilize already existing landing sites on level ground, in areas generally far removed from perennial surface waters. Therefore, there would be no significant impact to water resources.

Water quality impacts associated with erosion-induced sedimentation could result from proposed new construction projects listed in section 4.2 (*Past, Present, and Reasonably Foreseeable Future Projects Considered in the Cumulative Analysis*), especially the various alternative energy and residential development projects. Compliance with applicable DoD, Federal, State, BLM, USFS, and local regulations, land use and resource management plans, and/or requirements would minimize the majority of long-term impacts from both the proposed action and other projects on and in the regional vicinity. In addition, the relative distance from the LZs to significant perennial waterways makes substantial transport of sediment unlikely and would not greatly contribute to the combined actions of other activities resulting in sediment transport to waterways. Therefore, the cumulative impacts identified for water resources from the proposed action, in conjunction with other projects on and in the regional vicinity, would not be cumulatively significant.

4.3.5 Biological Resources

Rapid development in southern California and beyond to western Arizona has resulted in a steady decline of regionally important plant communities and habitats for native plant and wildlife species. As a result, the availability and connectivity of high function native open space areas have become limited, and require management and regulatory oversight. Lands such as those associated with National Forest System and

BLM can be protected from major development, but nonetheless are subject to mixed land uses such as recreation, alternative energy development, timber, mining, or other activities, all of which have the potential to further reduce the quantity or quality of important native habitats.

The geographic region of analysis for cumulative impacts on biological resources consists of areas on or in the vicinity of the Cleveland National Forest, BLM El Centro managed lands, and adjacent communities. Projects with direct and indirect impacts on biological resources include those that would result in the direct loss of native plant communities, loss of individuals, permanent loss of sensitive plant populations, noise production, dust disturbance, and permanent lighting. For native plant and wildlife communities, other significant impacts could include habitat fragmentation or degradation of quality, and direct permanent loss of contiguous native connecting habitats such as migration or movement corridors.

Regarding the proposed action, the primary direct impacts of aviation activity on endangered, threatened, and sensitive species, such as desert tortoise and/or federally listed transient birds, would include noise and aircraft rotor wash (winds generated during low level hovering). Noise and rotor wash effects decrease with distance and would be of concern only when aircraft are close to occupied habitat, such as during takeoff and landing, or low-level hovering, if the species are present. The most likely response by a sensitive wildlife species to the training activity would be temporary avoidance of the area during the activity. Dust and debris produced by training operations at the LZs could potentially result in an indirect impact to vegetation and soil; however due to weather patterns, lack of vegetation and the locations of the LZs, dust would only temporarily affect the surrounding vegetation and wildlife habitat in the immediate vicinity of the hovering aircraft.

Numerous proposed new construction projects listed in section 4.2 (*Past, Present, and Reasonably Foreseeable Future Projects Considered in the Cumulative Analysis*), especially the various alternative energy projects and residential development projects, have the potential to impact biological resources. Additionally, examples of proposed military projects that may impact biological resources include Basing of the Joint Strike Fighter (noise from increased aircraft overflights if Naval Air Facility El Centro is selected for basing) and the MCAGCC Land Acquisition and Airspace Establishment Project (potential desert tortoise impacts from military training). Potential impacts from reasonably foreseeable actions in the project areas would range from temporary noise and dust exposure and increased human activity during other project construction, to the permanent loss of various-sized areas of habitats, especially in desert regions for alternative energy projects. Some of these impacts are mitigable, especially if the project sites do not support federally listed or otherwise sensitive species, and provide only marginal habitat to more common wildlife. With the low activity level of operational use for the proposed and foreseeable actions, it is expected that migratory and resident wildlife within the project areas would continue to use occupied habitats. The limited adverse impacts associated with the proposed action would contribute minimally to adverse effects on biological resources associated with the combined development projects proposed and underway in Cleveland National Forest and on BLM lands that would cumulatively result in the build-out of undeveloped areas. As a result, the cumulative impacts identified for biological resources from the proposed action, in conjunction with other projects on and in the regional vicinity, would not be cumulatively significant.

4.3.6 Cultural Resources

Regional development and urbanization in southern California has resulted in extensive impacts on cultural resources, especially the destruction of archaeological sites. Archaeological sites are non-renewable resources, and there are strict federal and state regulations for their management and protection. As noted for *Biological Resources* above, public lands managed by the USFS and BLM can be protected from major development; however, various types of mixed land uses such as recreation, residential construction,

alternative energy development, timber, mining, or other activities, all have the potential to impact archaeological sites, historic buildings or structures, or traditional cultural properties.

The geographic region of analysis for cumulative impacts on cultural resources consists of areas on or in the vicinity of the Cleveland National Forest, BLM El Centro managed lands, and adjacent communities. For the proposed action, LZs within Cleveland National Forest and BLM El Centro managed lands were selected and designed to minimize impacts on archaeological sites, and the proposed action would have no adverse effect on a historic property or tribal cultural resource.

Numerous proposed construction projects listed in section 4.2 (*Past, Present, and Reasonably Foreseeable Future Projects Considered in the Cumulative Analysis*), especially the various alternative energy projects and residential development projects proposed in previously undisturbed areas, have the potential to impact cultural resources. Additionally, examples of proposed projects that may impact cultural resources from ground disturbance associated with military training activities include Basing of the Joint Strike Fighter and the MCAGCC Land Acquisition and Airspace Establishment Project. Federal projects with the potential for significant impacts on cultural resources would undergo Section 106 review under NHPA and any potentially significant impacts would be mitigated, usually through avoidance when possible. However, archaeological sites are a limited resource and, therefore, any impact on an archaeological site that is eligible or potentially eligible for listing in the National Register and/or is of concern to the Native American community may contribute to a cumulative impact. The limited impacts associated with the proposed action would contribute minimally to adverse impacts on cultural resources associated with the combined development projects proposed and underway in the Cleveland National Forest and on BLM lands that would cumulatively result in the build-out of undeveloped areas. Therefore, the cumulative impacts identified for cultural resources from the proposed action, in conjunction with other projects on and in the regional vicinity, would not be cumulatively significant.

4.3.7 Aesthetics

The rugged wildland landscapes of southern California are increasingly valued for the visual contrast they provide in a rapidly urbanizing region. Visitors and residents value the forested and open space backdrops that frame the urban complex. The contrast between the urban and natural settings is the unique characteristic that distinguishes this area from other regions of the country. As the area surrounding the Cleveland National Forest, Trabuco Ranger District, and lands under the jurisdiction of the BLM El Centro Office have become more urbanized, a higher value has been placed on natural-appearing landscapes and their preservation for future generations.

The geographic scope of analysis for the cumulative loss of visual quality includes the Cleveland National Forest, Trabuco Ranger District, and lands managed by the BLM El Centro Field Office, as well as adjacent areas/communities. Generally, projects that have the potential to alter the quality or distinguishable characteristic of the perceived environment may be considered as having an impact on the visual resources of that area. The significance of a change in visual character is influenced by social considerations including public value placed on the resource, public awareness of the area, and general community concern for visual resources in the area.

The proposed action would not result in significant aesthetic impacts within jurisdictions of the USFS or BLM because the number of annual sorties at each LZ would be small, sorties would be of short duration, and sorties would be dispersed over a wide geographic area such that no one location is likely to experience a substantial adverse visual impacts. Overall, proposed action activities would contribute minimally to cumulative loss of visual quality.

Numerous proposed construction projects listed in section 4.2 (*Past, Present, and Reasonably Foreseeable Future Projects Considered in the Cumulative Analysis*), especially the various alternative energy projects and residential development projects proposed in previously undisturbed areas, have the potential to impact aesthetic resources. However, federal projects with the potential for significant impacts on aesthetic resources would be required to comply with existing USFS and BLM management plans, as described for the proposed action, including provisions for protecting scenic integrity and sensitive visual resources. The limited adverse impacts associated with the proposed action would contribute minimally to adverse impacts on visual or aesthetic resources associated with the combined development projects proposed and underway in Cleveland National Forest and on BLM lands that would cumulatively result in the build-out of undeveloped areas. Therefore, the cumulative impacts to visual quality from the proposed action, in conjunction with other projects on and in the regional vicinity, would not be cumulatively significant.

5 Other NEPA Considerations

5.1 Energy Requirements and Conservation Potential of Alternatives Including the Proposed Action and All Mitigation Measures Being Considered

The proposed aircraft operations would not include construction or improvements within the Cleveland National Forest or on BLM lands, and there would be no change in energy (electricity and natural gas) or water consumption for these agencies. Additionally, the proposed aircraft operations would not add any new energy or water consumption demands at any military installation[1]. Therefore, energy and water consumption, as well as demand for services, would not increase due to implementation of the proposed action.

5.2 Irreversible or Irretrievable Commitment of Natural or Depletable Resources

NEPA requires an analysis of significant, irreversible effects resulting from implementation of a proposed action. Resources that are irreversibly or irretrievably committed to a project are those that are typically used on a long-term or permanent basis; however, those used on a short-term basis that cannot be recovered (e.g., non-renewable resources such as metal, fuel, and other natural or cultural resources) also are irretrievable. Human labor also is considered an irretrievable resource. All such resources are irretrievable in that they are used for one project and thus become unavailable for other purposes. An impact that falls under the category of the irreversible or irretrievable commitment of resources is the destruction of natural resources that could limit the range of potential uses of that resource.

The proposed aircraft operations would not include construction or improvements within the Cleveland National Forest or on BLM lands, so there would be no short- or long-term commitment of resources on public lands (e.g., construction materials and construction labor). Proposed aircraft operations would result in an irreversible commitment of fuel for aircraft training activities and human labor associated with military training. However, such commitments are similar to existing conditions, and are neither unusual nor unexpected, given the nature of the action.

The proposed action would not result in the destruction of environmental resources, such that the range of potential uses of the environment would be limited, or affect the biodiversity of the region.

5.3 Relationship Between Local Short-Term Use of the Human Environment and Maintenance and Enhancement of Long-Term Productivity

NEPA requires consideration of the relationship between short-term use of the environment and the impacts that such use could have on the maintenance and enhancement of long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. Such impacts include the possibility that choosing one alternative could reduce future flexibility to pursue other alternatives, or that choosing a certain use could eliminate the possibility of other uses at the site.

[1] Increased operations at the air stations from the introduction of the MV-22B were previously addressed in the EIS for the West Coast Basing of the MV-22 (DoN 2009a).

The proposed action would allow continued use of existing LZs within the Cleveland National Forest and on BLM lands. The selected LZs are typically heavily disturbed and/or developed and generally void of vegetation. Therefore, implementation of the proposed action would not result in short-term or long-term risks to the health, safety, or general welfare of communities surrounding the project area. In addition, long-term biological productivity would not be affected because implementation of the proposed action would not result in significant direct, indirect, or cumulative impacts to biological resources.

5.4 Any Probable Adverse Environmental Effects that Cannot be Avoided and are not Amenable to Mitigation

This EA has determined that the proposed action would not result in any significant unmitigable impacts; therefore, there are no probable adverse environmental effects that cannot be avoided or are not amenable to mitigation.

6 Persons and Agencies Contacted or Consulted

The following federal agencies were either involved in the NEPA process or were contacted during preparation of this EA. Appendix A also has a listing of federally recognized and non-federally recognized Indian tribes, other agencies, organizations, and individuals that were contacted through the NEPA public participation process. See also section 1.5 (*Public Participation Process*) and section 2.6 (*Agency Consultation and Approvals*) for more information.

Department of Defense

- Coffer, Lyn. Aircraft Environmental Support Office, U.S. Navy – Fleet Readiness Center Southwest, Naval Station North Island
- Finn, Kelly. NEPA Project Manager, NAVFAC SW
- Goodfellow, Sue. Head, Planning and Conservation Section, USMC Headquarters, Marine Corps Installation Command (MCI-Com)
- Hamilton, Mike. Assistant Director, Office of Government External Affairs, MCI West
- Herbst, George. Archaeologist, NAVFAC SW
- Karika, LtCol Ken "Smooch." 3D MAW, MCAS Miramar
- Lamb, Ron. NEPA Specialist, USMC Headquarters, MCI-Com
- Likins, Zachery. Environmental Coordination and Compliance, Environmental Security, MCI West
- Shiro, Major Todd "Buff." 3D MAW, MCAS Miramar

United States Forest Service

- Brand, Becky. Special Use Administrator, Trabuco Ranger District, Cleveland National Forest
- Eastwood, Steve. Engineering, Lands, Recreation and Heritage Staff Officer, Cleveland National Forest
- Fletcher, Keith. District Ranger, Trabuco Ranger District, Cleveland National Forest
- Harvey, Steve. Heritage and Tribal Relations Program Manager, Cleveland National Forest
- Joseph, Carlton. Fire Management Officer (Chief), Cleveland National Forest
- Martin, Gordon. District Fire Management Officer, Trabuco Ranger District, Cleveland National Forest
- Mink, Virgil. Former Special Use Administrator, Trabuco Ranger District, Cleveland National Forest
- Rodriguez, Jake. Recreations, Lands, and Special Uses Staff Officer, Trabuco Ranger District, Cleveland National Forest
- Thomas, Mary. Former District Wildlife Biologist and Resource Staff Officer, Trabuco Ranger District, Cleveland National Forest
- Winter, Kirsten. Forest Biologist, Cleveland National Forest

Bureau of Land Management

- Blanchard, Jenny. Archaeologist, BLM, El Centro Field Office
- McCollum, Christine. Archaeologist, BLM, El Centro Field Office
- Sahagun, Jeff. Archaeologist, BLM, El Centro Field Office
- Simmons, Carrie. Archaeologist, BLM, El Centro Field Office
- Steward, Daniel. Resources Branch Chief, BLM, El Centro Field Office
- Trouette, Andrew. Biologist, BLM, El Centro Field Office
- Tyson, Sharon. Biologist, BLM, El Centro Field Office
- Wood, Vicky. Manager, BLM, El Centro Field Office

United States Fish and Wildlife Service

- Bennett, Jesse. Carlsbad Field Office, USFWS
- Sorensen, Pete. Palm Springs Field Office, USFWS

State Historic Preservation Office

- Saunders, Jenan. Acting State Historic Preservation Officer

7 List of Preparers

Lead Agency

USMC
MCI West Box 555200
MCB Camp Pendleton, California 92055

Cooperating Agency

USFS Cleveland National Forest
10845 Rancho Bernardo Road, Suite 200
San Diego, California 92127

This EA was prepared for, and under the direction of, the USMC and NAVFAC SW by SAIC. Members of SAIC's team of professional staff who contributed to the preparation of this document are listed below.

Name	***Title***	***Degree***	***Years of Experience***	***Project Participation***
Karen Foster	NEPA Project Manager/Cultural Resources Manager	Ph.D., Anthropology	22	EA Project Manager; Cultural Resources
A. Trevor Pattison	NEPA Project Manager/ Environmental Scientist	B.S., Earth Systems Science	13	EA Deputy Project Manager; Biological Resources
Chris Crabtree	Air Quality Specialist/ Meteorologist	B.A., Environmental Studies	26	Air Quality; RONA
Adam Hasen	Air Quality Specialist	B.S., Chemical Engineering and MBA	29	Air Quality
Brad Rock	Senior Analyst	B.A., Biology	36	Airspace; Public Health and Safety
Debra Barringer	Ecologist	M.S., Ecology	16	Biological Resources
Lauren Brown	Botanist	B.S., Ecology and Systematic Biology	19	Biological Resources
Stephen Bryne	Senior Archaeologist	M.S., Anthropology	15	Cultural Resources
Trisha Drennan	Senior Archaeologist	M.Sc., Maritime Archaeology	12	Cultural Resources
Greg Wadsworth	Production Manager	B.A., Music Composition	6	Document Production
Lisbeth Springer, AICP	Senior Planner	MCRP	26	Environmental Justice
Christopher Woods	GIS Analyst	B.A., Geography	13	GIS, Field Data Collection
Cay FitzGerald	Technical Illustration, Graphics	A.A., Fine Arts	32	Graphics
Catrina Gomez	Environmental Planner	MESM, Environmental Science & Management	6	Land Use and Recreation; Aesthetics
Joseph Czech (Wyle Laboratories, Inc.)	Principal Engineer, Noise	B.S., Aerospace Engineering	22	Noise
Patrick H. Kester (Wyle Laboratories, Inc.)	Acoustical Engineer	B.S., Mechanical Engineering	4	Noise
Andrew Lissner	NEPA Project Manager	Ph.D., Biology	26	Quality Assurance/ Quality Control
Daniel Dehn	Environmental Analyst	M.A., English	6	Topography, Geology, and Soils; Water Resources

8 References

Andersen, D.E., O.J. Rongstad, and W.R. Mytton. 1989. Response of Red-Tailed Hawks to Helicopter Overflights. *The Condor*, Volume 91: 296-299.

Arizona-Sonora Desert Museum. 2011. Center for Sonoran Desert Studies. Available on internet at: http://www.desertmuseum.org/desert/sonora.php. Accessed 29 April 2011.

Bautista M. Luis, Jesus T. Garcia, Ricardo G. Calmaestra, Carlos Palacin, Carlos A. Martin, Manuel B. Morales, Raul Bonal, and Javier Vinuela. 2004. Effects of Weekend Road Traffic on the Use of Space by Raptors. Conservation Biology 18: 726-732.

Bean, Lowell J., and Charles R. Smith. 1978. Cupeño. In *California*, edited by R. F. Heizer, pp. 550-563. Handbook of North American Indians, vol. 8, W. C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Bell Boeing. 2008. Hover Outwash Profile Comparison of V-22, CH-46A, CH-53E.

Berglund, B., and T. Lindvall, editors. 1995. Community Noise. Institute of Environmental Medicine.

Bowles, A. E., S. Eckert, L. Starke, E. Berg, L. Wolski, and J. Matesic, Jr. 1999. Effects of Flight Noise from Jet Aircraft and Sonic Booms on Hearing, Behavior, Heart Rate, and Oxygen Consumption of Desert Tortoises (*Gopherus agassizii*). Air Force Research Laboratory AFRL-HE-WP-TR-1999-0170.

Bureau of Land Management (BLM). 2012a. West Chocolate Mountains Renewable Energy Evaluation Area. Web site at: http://www.blm.gov/ca/st/en/fo/elcentro/nepa/wcm.html. Accessed May 2012.

_____. 2012b. Sunrise Powerlink Transmission Line Project. Web site at: http://www.blm.gov/ca/st/en/fo/elcentro/nepa/sunrise.html. Accessed May 2012.

_____. 2012c. Ocotillo Sol Project. Web site at: http://www.blm.gov/ca/st/en/fo/elcentro/nepa/ocotillosol.html. Accessed May 2012.

_____. 2012d. Proposed Plan Amendment & Final Environmental Impact Statement/Final Environmental Impact Report for the Ocotillo Wind Energy Facility. February 2012. Web site at: http://www.blm.gov/ca/st/en/fo/elcentro/nepa/ocotillo_express_wind.html. Accessed May 2012.

_____. 2012e. Ocotillo Express Wind Energy Project. Web site at: http://www.blm.gov/ca/st/en/fo/elcentro/nepa/ocotillo_express_wind.html. Accessed May 2012.

_____. 2012f. Imperial Solar Energy Center (CSolar) West. Web site at: http://www.blm.gov/ca/st/en/fo/elcentro/nepa/isec_west.html. Accessed May 2012.

_____. 2012g. Tule Wind Energy and East County Substation Projects. Web site at: http://www.blm.gov/ca/st/en/fo/elcentro/nepa/tule.html. Accessed May 2012.

_____. 2012h. Imperial Valley Solar Project. Web site at: http://www.blm.gov/ca/st/en/fo/elcentro/nepa/stirling.html. Accessed May 2012.

_____. 2012i. Imperial Sand Dunes Recreation Area Management Plan. Web site at: http://www.blm.gov/ca/st/en/fo/elcentro/recreation/ohvs/isdra/dunesinfo/docs/isdramp.html. Accessed May 2012.

_____. 2012j. Record of Decision for the Ocotillo Wind Energy Facility and Amendment to the California Desert Conservation Area Plan. May.

_____. 2012k. Draft Environmental Impact Statement/Draft CDCA Plan Amendment, Ocotillo Sol Project, Bureau of Land Management. April.

_____. 2012l. Final Environmental Impact Statement and California Desert Conservation Area Plan Amendment for the West Chocolate Mountains Renewable Energy Area. BLM/CA/ES-2013-001+1793. November.

_____. 2012m. Imperial Sand Dunes Proposed Recreation Area Management Plan/California Desert Conservation Area Plan Amendment and Final Environmental Impact Statement. El Centro Field Office. Septemeber.

_____. 2011a. Final Environmental Impact Report and Environmental Assessment for the Imperial Solar Energy Center (CSolar) West Project. July. Web site at: http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/elcentro/nepa/isec_west.Par.73533.File.dat/F0ISECw_ES.pdf. Accessed May 2012.

_____. 2011b. Finding of No Significant Impact for the Imperial Solar Energy Center (CSolar) West Project. August.

_____. 2011c. Final Environmental Impact Report and Environmental Impact Statement for the East County Substation, Tule Wind, and Energia Sierra Juarez Gen-Tie Projects. October. Web site at: http://www.cpuc.ca.gov/environment/info/dudek/ECOSUB/ECO_Final_EIR-EIS.htm#VOLUMES 1 and 2: Revised Draft EIR/EIS. Accessed May 2012.

_____. 2011d. Record of Decision for the Tule Wind Project. December.

_____. 2011e. Draft Environmental Impact Statement and California Desert Conservation Area Plan Amendment for the West Chocolate Mountains Renewable Energy Area, DOI no. DES 11-21, June.

_____. 2010. Final Environmental Impact Statement for the Imperial Valley Solar Project. July. Web site at: http://www.blm.gov/ca/st/en/fo/elcentro/nepa/stirling.html. Accessed May 2012.

_____. 2008. Proposed Resource Management Plan and Final Environmental Impact Statement. Colorado River District, Yuma Field Office, Yuma, AZ. April.

_____. 2003. *Imperial Sand Dunes Recreation Area Management Plan (RAMP).* El Centro Filed Office. May.

_____. 1980 (as amended). *The California Desert Conservation Area Plan 1980 as amended*. Desert District. Riverside, California.

CalFish. 2011. Online information about fish species of California. Web site at: http://calfish.ucdavis.edu/calfish/. Accessed January 2011.

_____. 2010. Online information about fish species of California. Web site at: http://calfish.ucdavis.edu/calfish/. Accessed March 2010.

CalHerps. 2011. Online information about reptile and amphibian species of California. Web site at: http://www.californiaherps.com/. Accessed January 2011.

_____. 2010. Online information about reptile and amphibian species of California. Web site at: http://www.californiaherps.com/. Accessed March 2010.

California Air Resources Board (ARB). 2011. *Area Designations Maps/State and National*. Web site at: http://www.arb.ca.gov/desig/adm/adm.htm. Accessed August 2011.

_____. 2010. *Ambient Air Quality Standards (AAQS)*. Web site at: http://www.arb.ca.gov/research/aaqs/aaqs.htm. Accessed August 2010.

California Department of Fish and Game (CDFG). 2011a. California Natural Diversity Database. Species occurrences database search using RareFind 4. Report generated 6 July 2011.

_____. 2011b. Department of Fish and Game Biogeographic Data Branch of California Natural Diversity Database, Special Animals list and California Wildlife Habitat Relationships System. Prepared by California Interagency Wildlife Task group. Web site at: http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.aspx. Accessed March 2011.

_____. 2010a. California Natural Diversity Database. Species occurrences database search using RareFind 3 (version 3.1.1). Report generated 12 October 2010.

_____. 2010b. Department of Fish and Game Biogeographic Data Branch of California Natural Diversity Database, Special Animals list and California Wildlife Habitat Relationships System. Prepared by California Interagency Wildlife Task group. Web site at: http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.aspx. Accessed April 2010.

_____. 2007. California Wildlife: Conservation Challenges; California Wildlife Action Plan. Web site at: http://www.dfg.ca.gov/wildlife/WAP/ region-colorado.html. Accessed May 2011.

California Department of Transportation (CALTRANS). 2012. Record of Decision. California State Route 91 Corridor Improvement Project. October.

California Department of Water Resources (CDWR). 2007. Basins and Subbasins of the South Coast Hydrologic Region and the Colorado River Basin.

_____. 2003. California's Groundwater. Bulletin 118. October. Updated February 2004.

California Energy Commission. 2011. Order Terminating Commission Decision and License for Imperial Valley Solar Project. Docket 08-AFC-5C. August.

_____. 2009. *The Future Is Now: An Update on Climate Change Science Impacts and Response Options for California*. Web site at: http://www.energy.ca.gov/2008publications/CEC-500-2008-071/CEC-500-2008-071.PDF. Accessed September 2011.

California Native Plant Society (CNPS). 2012. On-line Inventory of Rare and Endangered Plants. Web site at: http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi. Accessed July 2012.

_____. 2010. On-line Inventory of Rare and Endangered Plants. Web site at: http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi. Accessed October 2010.

California Public Utilities Commission (CPUC). 2008. Final Environmental Impact Report/Environmental Impact Statement and Proposed Land Use Amendment, San Diego Gas & Electric Company Application for the Sunrise Powerlink Project. SCH #2006091071. DOI Control No. FES-08-54. October.

California Water Resources Control Board (CWRCB). 2007. Fact Sheet – Colorado River Basin.

City of Corona. 2012a. Draft Environmental Impact Report, State Clearing House No. 2006091093, Arantine Hills Specific Plan. May.

_____. 2012b. Final Environmental Impact Report, State Clearing House No. 2006091093, Arantine Hills Specific Plan. July.

_____. 2010. Initial Study / Mitigated Negative Declaration, Green River Road Widening. January.

_____. 2009. Final Environmental Impact Report, Foothill Parkway Westerly Extension, SCH NO. 2007061044. January.

Cleland, James H. 2004. Ethnographic Trail Systems as Large-Scale Cultural Landscapes: Preservation and Management Issues. In *Exploring the Boundaries of Historic Landscape Preservation*, pp. 41-55. The Alliance for Landscape Preservation. Web site at: http://www.clemson.edu/caah/cedp/cudp/pubs/alliance/04_cleland.pdf. Accessed September 2011.

Commandant of the Marine Corps. 2011. *USMC Expeditionary Energy Strategy and Implementation Plan - Bases-to-Battlefield.*

Council on Environmental Quality. 2010. White House Council on Environmental Quality Announces Steps to Modernize and Reinvigorate the National Environmental Policy Act. Web site at: http://www.whitehouse.gov/administration/eop/ceq/Press_Releases/18 February_2010.

Countess Environmental. 2006. *WRAP Fugitive Dust Handbook*. Available at http://www.wrapair.org/forums/dejf/fdh/.

County of Orange. 2012a. Saddle Crest Homes Draft Environmental Impact Report. April.

_____. 2012b. Saddle Crest Homes Final Environmental Impact Report. July.

_____. 2011. Initial Study and Mitigated Negative Declaration, KBRT – Oak Flat Towers Planning Application No. PA 100028. August.

Delaney, D. K., T.G. Grubb, and L.L. Pater. 1997. Effects of Helicopter Noise on Nesting Mexican Spotted Owls. Project Order No. DE P.O. 95-4, U.S. Air Force, Holloman Air Force Base, New Mexico.

Department of Navy (DoN). 2012a. Draft Legislative Environmental Impact Statement for the Renewal of the Chocolate Mountain Aerial Gunnery Range Land Withdrawal. August.

_____. 2012b. Land Acquisition/Airspace Establishment Study. Web site at: http://www.marines.mil/unit/29palms/las/Pages/default.aspx. Accessed May 2012. Web site changed to: http://www.29palms.marines.mil/Staff/G4InstallationsandLogistics/Land Acquisition.aspx. Accessed December 2012.

_____. 2012c. Final Environmental Impact Statement, Land Acquisition and Airspace Establishment to Support Large-Scale Marine Air Ground Task Force Live Fire and Maneuver Training. July.

_____. 2011a. Chocolate Mountain Aerial Gunnery Range Land Withdrawal Renewal. Web site at: http://www.chocolatemountainrenewal.com/index.html. Accessed August 2011.

_____. 2011b. Navy Publishes Notice of Intent to Prepare West Coast Joint Strike Fighter Homebasing EIS. Web site at: http://www.navy.mil/search/display.asp?story_id=58234. Accessed August 2011.

_____. 2011c. Draft Environmental Impact Statement, Land Acquisition and Airspace Establishment to Support Large-Scale Marine Air Ground Task Force Live Fire and Maneuver Training. February.

_____. 2010a. Final Environmental Impact Statement for the West Coast Basing of the F-35B. Table 7-10 in Section 7.3.4.

_____. 2010b. Record of Decision for the U.S. Marine Corps West Coast Basing of the F-35B Aircraft. December.

_____. 2009a. Final Environmental Impact Statement for the West Coast Basing of the MV-22. Prepared by the Department of Navy.

_____. 2009b. MV-22 Facilities Requirements Document for Typical Shore-based and Shipboard Sites. Volume 1. The Boeing Company.

_____. 2008. Risk of Fire from V-22 Exhaust. Technical Memorandum Ser PMA-275/V22/357 to Headquarters, Marine Corps, Department of Aviation, Aviation Logistics Support Branch, Washington DC from Program Executive Officer, Air ASW Assault and Special Mission Programs, Patuxent River MD. 21 July 2008.

Ellis, D.H., C.H. Ellis, and D.P. Mindell. 1991. Raptor Responses to Low-Level Jet Aircraft and Sonic Booms. *Environmental Pollution*, Volume 74: 53-83.

Farmer, A. 1993. The Effects of Dust on Vegetation - a Review. Environmental Pollution 79: 63-75.

Federal Aviation Administration (FAA). 2010. Pilot/Controller Glossary. Addendum to the Aeronautical Information Manual. Web site at: http://www.faa.gov/air_traffic/publications/atpubs/PCG/INDEX.HTM. Accessed August 2011.

_____. 2008. Pilot's Handbook of Aeronautical Knowledge. U.S. Department of Transportation, FAA, Flight Standards Service. FAA-H-8083-25A.

Federal Emergency Management Agency (FEMA). 1984. Flood Insurance Rate Maps, Imperial County California. March.

Federal Interagency Committee on Aviation Noise (FICAN). 1997. Effects of Aviation Noise on Awakenings from Sleep. June.

Federal Interagency Committee on Noise (FICON). 1992. Federal Agency Review of Selected Airport Noise Analysis Issues. August.

Fire Department News Network. 2011. United States Marine Corps and Navy Helicopter Crews Assist CAL Fire With Wildfire Suppression. Web site at: http://www.fdnntv.com/news.asp_Q_articleID_E_8519_A_title_E_United_States_Marine_Corps_and_Navy_Helicopter_Crews_Assist_CAL_Fire_With_Wildfire_Suppression. Accessed June 2011.

Flat-tailed Horned Lizard Interagency Coordinating Committee (FTHLICC). 2003. Flat-tailed horned lizard rangewide management strategy, 2003 revision. 78 pp. plus appendices.

Francis, C.D., C. P. Ortega and A. Cruz. 2009. Noise Pollution Changes Avian Communitites and Species Interactions. Current Biology 19: 1415-1419.

Gladwin, D.N., D.A. Asherin, and K.M. Manci. 1988. Effects of Aircraft Noise and Sonic Booms on Fish and Wildlife. Results of a Survey of U.S. Fish and Wildlife Service Endangered Species and Ecological Services Field Offices, Refuges, Hatcheries, and Research Centers. U.S. Fish and Wildlife Service, National Ecology Research Center, Fort Collins, Colorado.

Grubb, T.G. and R.M. King. 1991. Assessing Human Disturbance of Breeding Bald Eagles with Classification Tree Models. *Journal of Wildlife Management*, Volume 55, Number 3: 500-511.

Harris, C.M. 1979. Handbook of Noise Control. McGraw-Hill Book Co.

Holden, Lt Col. 2011. Electronic mail between Lt Col Holden and Brad Chittenden regarding aircraft mishap data for the MV-22, UN-1N, UN-1Y, AH-1W, and AH-1Z. August.

Hubbs-SeaWorld Research Institute. 2006. Final Report: The Effects of Helicopter Noise on the Coastal California Gnatcatcher at Marine Corps Air Station Miramar. Prepared for Marine Corps Air Bases Western Area Naval Facilities Engineering Command, Southwest. San Diego, California.

Imperial County Air Pollution Control District (ICAPCD). 2011. *ICAPCD Rules and Regulations*. Web site at: http://www.imperialcounty.net/AirPollution/Forms%20&%20Documents/RULEBOOK/06%20RULEBOOK%20JUNE%2028%20%202011.pdf. Accessed September 2011.

Intergovernmental Panel on Climate Change (IPCC). 2007. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the IPCC*. Geneva, Switzerland. Web site at: http://www.ipcc.ch/ipccreports/ar4-wg1.htm. Accessed September 2011.

Jennings, C.W. 1967. Geologic Map of California: Salton Sea sheet: California Division of Mines and Geology. Scale 1:250000. Web site at: http://ngmdb.usgs.gov/ngm-bin/ILView.pl?sid=333_1.sid&vtype=b. Accessed August 2011.

Karika, personal communication. 2011. Electronic mail between LtCol Kenneth Karika, USMC, Joseph Czech, Wyle Laboratories, Inc., and SAIC regarding regarding training radius for rotary wing and tilt-rotor aircraft. June.

Kociolek A.V., A. P. Clevenger, C.C. St. Clair, and D. S. Proppe. 2010. Effect of Road Networks on Bird Populations. Conservation Biology 25: 241-249.

Manci, K.M., D.N. Gladwin, R. Villella, and M. Cavendish. 1988. Effects of Aircraft Noise and Sonic Booms on Domestic Animals and Wildlife: a Literature Synthesis. U.S. Fish and Wildlife Service National Ecology Research Center, Ft. Collins, CO. NERC-88/29.

Marine Corps Installations West (MCI West). 2009. *Greenhouse Gas Assessment for Marine Corps Installations West*.

McKeel, Major Geoff. 2011. Electronic mail between Major Geoff McKeel, Aviation Safety Officer, and Lt. Col. Holden regarding aircraft mishap data for the CH-46 and the CH-53, February and August.

Miles, Scott R. and Charles B. Goudey (compilers). 1997. Ecological Subregions of California: Section and Subsection Descriptions. USDA Forest Service, Pacific Southwest Region, San Francisco, California.

Moratto, M. 1984. *California Archaeology*. Orlando: Academic Press, Inc.

Morton, D.M. 2004. Preliminary Digital Geologic Map of the Santa Ana 30' x 60' Quadrangle, Southern California. USGS Open File Report 99-172.

Munz, Philip A., and David D. Keck. 1968. A California Flora. University of California Berkeley.

Natural Resources Conservation Service (NRCS). 2010. U.S. Department of Agriculture. Soil Survey Geographic (SSGURGO) Database for Orange County, California. Web site at: http://soildatamart.nrcs.usda.gov. Accessed July 2010.

NatureServe Explorer. 2011. An online encyclopedia of life. Web site at: http://www. natureserve.org/explorer/. Accessed January 2011.

_____. 2010. An online encyclopedia of life. Web site at: http://www. natureserve.org/explorer/. Accessed March 2010.

Naval Facilities Engineering Command (NAVFAC). 2006. *Department of the Navy Southwest – Renewable Energy and Distributed Generation Projects*.

Navy Aircraft Environmental Support Office (AESO). 2011. *AESO Memorandum Report No. 9953, Revision B, Aircraft Emissions Estimates: H-60 Mission Operations Using JP-5*.

_____. 2009a. *AESO Memorandum Report No. 9824, Revision B, Aircraft Emissions Estimates: AH-1W Takeoff and Landing Cycle and In-Frame, Maintenance Testing Using JP-5*.

_____. 2009b. *AESO Memorandum Report No. 9961, Revision A, Aircraft Emissions Estimates: AH-1 Mission Operations Using JP-5*.

_____. 2009c. *AESO Memorandum Report No. 9929, Revision A, Aircraft Emissions Estimates: H-60 Takeoff and Landing Cycle and In-Frame, Maintenance Testing Using JP-5*.

_____. 2001a. *AESO Memorandum Report No. 9816, Revision F, Aircraft Emissions Estimates: H-46 Takeoff and Landing Cycle and In-Frame, Maintenance Testing Using JP-5*.

_____. 2001b. *AESO Memorandum Report No. 9959, Revision B, Aircraft Emissions Estimates: H-46 Mission Operations Using JP-5*.

_____. 2001c. *AESO Memorandum Report No. 9946, Revision E, Aircraft Emissions Estimates: V-22 Landing and Takeoff Cycle and In-Frame, Engine Maintenance Testing Using JP-5*.

_____. 2001d. *AESO Memorandum Report No. 9965, Revision B, Aircraft Emissions Estimates: V-22 Mission Operations Using JP-5*.

_____. 2000a. *AESO Memorandum Report No. 9822, Revision C, Aircraft Emissions Estimates: H-53 Takeoff and Landing Cycle and In-Frame, Maintenance Testing Using JP-5*.

_____. 2000b. *AESO Memorandum Report No. 9960, Revision B, Aircraft Emissions Estimates: H-53 Mission Operations Using JP-5*.

Pagel, J.E., D.M. Whittington, and G.T. Allen. 2010. Interim Golden Eagle Inventory and Monitoring Protocols; and Other Recommendations. Division of Migratory Bird Management, U.S. Fish and Wildlife Service. February.

Palmer, A.G., D.L. Nordmeyer, and D.D. Roby. 2003. Effects of Jet Aircraft Overflights on Parental Care of Peregrine Falcons. Wildlife Society Bulletin 31(2):499-509.

Pavlik, B. M. 2008. The California Deserts An Ecological Rediscovery. University of California Press, Berkeley and Los Angeles, CA.

Reijnen, R., and R. Foppen. 2006. Impact of Road Traffic on Breeding Bird Populations. Pp 255-274 in ed. J. Davenport and J. Davenports. *The Ecology of Transportation: Managing Mobility for the Environment*. Springer, Netherlands.

Rogers, Malcolm J. 1945. An Outline of Yuman Prehistory. *Southwestern Journal of Prehistory* 1(2):167-198.

Rogers, T.H. 1965. Geologic Map of California: Santa Ana Sheet. California Division of Mines and Geology. Scale 1:250,000. Web site at: http://ngmdb.usgs.gov/ngm-bin/ILView.pl?sid=452_1.sid&vtype=b. Accessed August 2011.

San Diego County Air Pollution Control District (SDCAPCD). 2011. *SDCAPCD Rules and Regulations*. Web site at: http://www.sdapcd.org/rules/rules.html. Accessed September 2011.

Sawyer J. O., T. Keeler-Wolf, and J. M. Evens. 2009. A Manual of California Vegetation (2nd edition). California Native Plant Society Press, Sacramento, California.

Schaefer, J. and Carol Schultze. 1996. Cultural Resources of Indian Pass: An Inventory and Evaluation for the Imperial Project, Imperial County, California. Report prepared by ASM Affiliates. Report submitted to Chemgold. Unpublished report on file at South Coastal Information Center, San Diego State University, San Diego.

Science Applications International Corporation (SAIC). 2012a. Biological Resources Survey Report of Ten Proposed Military Aircraft Landing Zones, U.S. Forest Service Lands, Cleveland National Forest Orange and Riverside Counties, California.

_____. 2012b. Biological Resources Survey Report of Twenty-Three Proposed Military Aircraft Landing Zones on Bureau of Land Management Lands, Imperial County, California.

_____. 2012c. Cultural Resources Survey Report of Ten Proposed Military Aircraft Landing Zones, U.S. Forest Service Lands, Cleveland National Forest Orange and Riverside Counties, California.

_____. 2012d. Protocol Survey Report for the Coastal California Gnatcatchers, U.S. Forest Service Lands, Cleveland National Forest, Orange County, California.

_____. 2012e. Protocol Survey Report for the Qunio Checkerspot Butterfly, U.S. Forest Service Lands, Cleveland National Forest Orange and Riverside Counties, California.

_____. 2012f. Results of Focused Thread-leaved brodiaea (*Brodiaea filifoia*) Surveys for the Proposed Military Aircraft Landing Zone Project Located on the United States Forest Service, Cleveland National Forest, Orange County, California.

_____. 2012g. Management Indicator Species Report for the United States Marine Corps Rotary Wing and Tilt-Rotor Training Operaions on Cleveland National Forest, Orange and Riverside Counties, Califonria. November.

_____. 2012h. Migratory Bird Assessment for the United States Marine Corps Rotary Wing and Tilt-Rotor Training Operaions on Cleveland National Forest, Orange and Riverside Counties, Califonria. November.

_____. 2012i. Noxious Weed Risk Assessment for the United States Marine Corps Rotary Wing and Tilt-Rotor Training Operaions on Cleveland National Forest, Orange and Riverside Counties, Califonria. November.

_____. 2012j. U.S. Department of Agriculture Federal noxious weed list. Available on-line at http://plants.usda.gov/java/noxious?rptType=Federal. Accessed October.

_____. 2011. Cultural Resources Survey Report of Twenty-three Proposed Military Aircraft Landing Zones on Bureau of Land Management Lands, Imperial County, California. September.

South Coast Air Quality Management District (SCAQMD). 2012. *Historic Ozone Air Quality Trends*. Available at http://www.aqmd.gov/smog/o3trend.html. Accessed 2012.

_____. 2011. *SCAQMD Rules and Regulations*. Website http://www.aqmd.gov/rules/rulesreg.html.

Strand, R.G. 1962. Geologic Map of California: Sand Diego-El Centro Sheet. California Division of Mines and Geology. Scale 1:250,000. Web site at: http://ngmdb.usgs.gov/ngm-bin/ILView.pl?sid=489_1.sid&vtype=b. Accessed September 2011.

Sugihara, Neil, Jan w. van Wagtendonk, Joann Fites-Kaufman, Kevin E. Shaffer, and Andrea E. Thode. 2006. Fire in California's Ecosystems. University of California Press, Berkeley and Los Angeles, California.

United States Department of Agriculture (USDA). 2012. Biological Resource Condition, Cleveland National Forest. Web site at: http://www.fs.usda.gov/detail/cleveland/landmanagement/planning/?cid=fsbdev7_016573. Accessed May 2012.

_____. 2011. Web Soil Survey website data – multiple soils. Web site at: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Accessed August 2011.

_____. 2007. Official Soil Series Descriptions – multiple soils. Web site at: http://soils.usda.gov/technical/classification/osd/index.html. Accessed August 2011.

_____. 2006. Land Resource Regions and Major Land Resource Areas of the United States, Caribbean, and the Pacific Basin. USDA Handbook 296. Natural Resources Conservation Service.

_____. 1980. Soil Survey of Yuma-Wellton Area, Parts of Yuma County Arizona, and Imperial County, California. Soil Conservation Service, in cooperation with the Arizona Agricultural Experiment Station and the California Agricultural Experiment Station. December.

_____. 1978. Soil Survey of Orange County and Western Part of Riverside County, California. Soil Conservation Service and Forest Service, in cooperation with University of California Agricultural Experiment Station. September.

_____. 1977. Soil Survey of Maricopa County Arizona, Central Part. Soil Conservation Service in cooperation with the University of Arizona Agricultural Experiment Station. September.

United States Department of Interior (US DOI). 2012. Right-of-Way Grant for the Ocotillo Express Wind Facility. El Centro Field Office. Serial No. CACA-051552. May.

_____. 2011a. Imperial Solar Energy Center (CSolar) West Secretary of Interior, Salazar, Press Release. *Salazar Approves Transmission for Major Solar Project in California*. 25 August.

_____. 2011b. Right-of-Way Grant for Imperial Solar Energy Center (CSolar) West. El Centro Field Office. Serial No. CACA-51644. September.

_____. 2010. Right-of-Way Lease/Grant for Imperial Valley Solar. El Centro Field Office. Serial No. CACA-47740. October.

United States Department of Transportation. 2004. Synthesis of Noise Effects on Wildlife Populations. Publication No. FHWA-HEP-06-016. September.

United States Environmental Protection Agency (USEPA). 2011a. *The Green Book Nonattainment Areas for Criteria Pollutants*. Web site at: http://www.epa.gov/oar/oaqps/greenbk. Accessed September 2011.

_____. 2011b. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2009*. EPA 430-R-11-005. April 2011. Web site at: http://www.epa.gov/climatechange/emissions/usinventoryreport.html. Accessed September 2011.

_____. 2006. *Compilation of Air Pollutant Emission Factors, AP-42, Volume I.* Section 13.2.5, Industrial Wind Erosion. Web site at: http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s0205.pdf. Accessed September 2011.

United States Fish and Wildlife Service (USFWS). 2011. Letter received in response to: Request for Species List for the Proposed MV-22 and Rotary Wing Operations and Training on Non-Department of Defense Lands in Orange, Riverside, and Imperial Counties, California and List of Federally Endangered, Threatened, Proposed, and Candidate Species that may Occur in the Vicinity of Orange County, California. 17 February.

_____. 2010. Preparing for any Action that May Occur Within the Range of the Mojave Desert Tortoise (*Gopherinus agassizii*), which contains Pre-project Field Survey Protocol for Potential Desert Tortoise Habitats . USFWS, 2010 Field Season, 18 pp., Desert Tortoise Recovery Office, Reno, Nevada.

_____. 2008. Draft revised recovery plan for the Mojave population of the desert tortoise (*Gopherus agassizii*). U.S. Fish and Wildlife Service, California and Nevada Region, Sacramento, California.

_____. 2005. USFWS Quino Checkerspot Butterfly Survey Area. Web site at: http://www.fws.gov/carlsbad/TEspecies/Documents/QuinoDocs/web-map20052.pdf. Accessed May 2012.

_____. 1990. Endangered and threatened wildlife and plants; Determination of threatened status for the Mojave population of the desert tortoise. Federal Register 55(63):12178–12191.

United States Forest Service (USFS). 2012a. Notice of Intent to Amend Land Management Plans for the Angeles, Cleveland, Los Padres, and San Bernardino National Forests, California. Federal Register Vol. 77, No. 82. 27 April.

_____. 2012b. Southern California National Forests Land Management Plan Amendments. Web site at: http://a123.g.akamai.net/7/123/11558/abc123/forestservic.download.akamai.com/11558/www/nepa/76364_FSPLT2_123449.pdf. Accessed May 2012.

_____. 2012c. Cleveland National Forest Management Indicator Species information obtained from Cleveland National Forest files. April.

_____. 2012d. Sunrise Powerlink Transmission Line Project. Web site at: http://www.fs.fed.us/nepa/fs-usda-pop.php/?project=27924. Accessed May 2012.

_____. 2012e. Consolidation and Reissuance of San Diego Gas & Electric (SDGE) Company Permits. Web site at: http://data.ecosystem-management.org/nepaweb/current-sopa.php?forest=110502 and http://www.fs.fed.us/nepa/nepa_project_exp.php?project=310. Accessed May 2012.

_____. 2012f. North Main Divide Fuel Break System. Web site at: http://data.ecosystem-management.org/nepaweb/current-sopa.php?forest=110502 and http://www.fs.fed.us/nepa/nepa_project_exp.php?project=34142. Accessed May 2012.

_____. 2012g. El Cariso, Indian, and Munhall Plantation Vegetation Management. Web site at: http://data.ecosystem-management.org/nepaweb/current-sopa.php?forest=110502 and http://www.fs.fed.us/nepa/nepa_project_exp.php?project=34018&exp=detail. Accessed May and December 2012.

_____. 2012h. Elsinore Peak Fuels Treatment. Web site at: http://data.ecosystem-management.org/nepaweb/current-sopa.php?forest=110502 and http://www.fs.fed.us/nepa/nepa_project_exp.php?project=23080&exp=detail. Accessed May and December 2012.

_____. 2012i. Silverado Fuel Break. Web site at: http://data.ecosystem-management.org/nepaweb/current-sopa.php?forest=110502 and http://www.fs.fed.us/nepa/nepa_project_exp.php?project=12953&exp=detail. Accessed May and December 2012.

_____. 2012j. North Main Divide Fuels Reduction Project Environmental Assessment. Cleveland National Forest. May.

_____. 2012k. North Main Divide Fuels Reduction Project Finding of No Significant Impact. Cleveland National Forest. May.

_____. 2011a. Scoping Letter for the El Cariso, Indian, and Munhall Plantation Vegetation Management Project, Trabuco Ranger District, Cleveland National Forest. June.

_____. 2011b. Scoping Letter for the Silverado Fuel Break Project, Trabuco Ranger District, Cleveland National Forest. July.

_____. 2010. Record of Decision, San Diego Gas & Electric Special Use Authorization for the Sunrise Powerlink Transmission Line Project. July.

_____. 2009. Environmental Assessment for the San Diego Gas & Electric Master Special Use Permit, Cleveland National Forest. May.

_____. 2005a. *Land Management Plan. Parts 1, 2, 3:* R5-MB-074-B, R5-MB-075, R5-MB-077, and R5-MB-080.

_____. 2005b. Final Environmental Impact Statement on four Forest Land Management Plans. Vols. 1 and 2. R5-MB-074-A. September.

_____. 2005c. U.S. Department of Agriculture Land Management Plan. Part 3 Design Criteria for the Southern California National Forests. September.

United States Geological Survey (USGS). 2010. USGS Protected Areas Database v1.1 04/30/2010. Web site at: http://gapanalysis.usgs.gov/data/padus-data/.

_____. 2004. Desert Tortoise Ecology, Mojave Desert Tortoise GATF Project. Web site at: http://geochange.er.usgs.gov/sw/impacts/biology/tortoise1. Accessed July 2009.

United States Global Change Research Program. 2009. Global Climate Change Impacts in the United States. Web site at: www.globalchange.gov/usimpacts. Accessed March 2010.

United States Marine Corps (USMC). 2012a. Biological Assessment for the for the United States Marine Corps Rotary Wing and Tilt-Rotor Training Operaions on Cleveland National Forest, Orange and Riverside Counties, Califonria. July.

_____. 2012b. Biological Evaulation for the United States Marine Corps Rotary Wing and Tilt-Rotor Training Operaions on Cleveland National Forest, Orange and Riverside Counties, Califonria. November.

_____. 2012c. Department of Defense United States Marine Corps Finding of No Significant Impact For Proposed P -771 Infrastructure Improvements at Camp Billy Machen, Imperial County, California. 11 April 2012.

_____. 2011. Electronic mail from LtCol Kenneth Karika, USMC, to Joseph Czech, Wyle Laboratories, Inc., re "data collection workbook for SoCal RW&TR Ops Training EA (noise & aq)". 16 March.

_____. 2010a. FY2011 Marine Aviation Plan. September.

_____. 2010b. MV-22 Training and Readiness Manual. NAVMC 3500.11B. March.

Wells, C, R. Campbell, L. DeBano, C. Lewis, R. Fredriksen, E.C. Franklin, R. Froelich, and P. Dunn. 1979. Effects of Fire on Soil: A State-of-Knowledge Review. U.S. Department of Agriculture, Forest Service, General Technical Report, WO-7. Prepared for the Forest Service National Fire Effects Workshop, April 10-14, 1978. Denver, Colorado.

Woods, E. William and Stephen M. Yezerinca. 2006. Song Sparrow (*Melospiza melodia*) Song Varies with Urban Noise (Le Chant de Melospiza melodia Varie avec le Bruit Urbain). The Auk 123: 650-659.

Winters, personal communication. 2012. Electronic mail between Kirsten Winters, biologist at the Cleveland National Forest, and SAIC regarding raptor nest locations in the Trabuco Ranger District.

Wyle. 2010. Wyle Report WR 08-04, Rotorcraft Noise Model Technical Reference and User Manual (Version 7.2), Wyle Laboratories, Inc. April 2010.

_____. 1997. Wyle Research Report WR 94-12-R, Military Operating Area and Range Noise Model MR_NMAP User's Manual, Wyle Laboratories, Inc. March 1997.

9 Acronyms

°C	Celsius
°F	Fahrenheit
µg/m^3	micrograms per cubic meter
2D MAW	Second Marine Aircraft Wing
3D MAW	Third Marine Aircraft Wing
4^{th} MAW	Fourth Marine Aircraft Wing
ACEC	Area of Critical Environmental Concern
AESO	Navy Aircraft Environmental Support Office
AH-1W	Super Cobra (helicopter)
AH-1Z	Viper (helicopter)
ALM	Maximum Sound Level
APE	area of potential effects
ARB	Air Resources Board
ARPA	Archaeological Resources Protection Act
B.P.	Before Present
BLM	Bureau of Land Management
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAL	Confined Area Landing
CAL Fire	California Department of Forestry and Fire Protection
Caltrans	California Department of Transportation
CCAA	California Clean Air Act
CDCA	California Desert Conservation Area
CDFG	California Department of Fish and Game
CNDDB	California Natural Diversity Database
CDWR	California Department of Water Resources
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
CH-46E	Sea Knight (helicopter)
CH-53E	Super Stallion (helicopter)
CHRIS	California Historical Resources Information System
cm	centimeter
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_{2e}	CO_2 equivalent
CPUC	California Public Utilities Commission
CRPR	California Rare Plant Rank
CWA	Clean Water Act
CWRCB	California Water Resources Control Board
CY	calendar year
dB	decibel
dBA	decibel on an “A-weighted” scale
DoD	Department of Defense
DoN	Department of the Navy
EA	Environmental Assessment

EIC	Eastern Information Center
EIR/EIS	Environmental Impact Report/Environmental Impact Statement
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FICON	Federal Interagency Committee on Noise
FLPMA	Federal Land Policy and Management Act
FONSI	Finding of No Significant Impact
FTHLICC	Flat-tailed Horned Lizard Interagency Coordinating Committee
FY	fiscal year
GHG	greenhouse gases
GWP	global warming potential
Hz	hertz
I MEF	First Marine Expeditionary Force
ICAPCD	Imperial County Air Pollution Control District
IFR	Instrument Flight Rules
IVPA	Imperial Valley Planning Area
JP	Joint Publication
km	kilometers
LZ	landing zone
MAG	Marine Air Group
MAGTF	Marine Air Ground Task Forces
MBTA	Migratory Bird Treaty Act
MCAGCC	Marine Corps Air Ground Combat Center
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MCI	Marine Corps Installations
MCI-Com	Marine Corps Installations Command
MCO	Marine Corps Order
MLRA	Major Land Resource Area
mm	millimeter
MOU	Memorandum of Understanding
mph	miles per hour
MR_NMAP	Military Operating Area and Range Noise Model
MSL	mean sea level
MV-22	Osprey (tilt-rotor aircraft)
MW	megawatt
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NATOPS	Naval Air Training and Operating Procedures Standardization
NAVFAC SW	Naval Facilities Engineering Command Southwest
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
nm	nautical mile
NO_2	nitrogen dioxide
NOA	Notice of Availability
NO_x	nitrogen oxides
NRCS	Natural Resource Conservation Science

O_3	ozone
OHV	off-highway vehicle
OPNAVINST	Chief of Naval Operations Instruction
PL	Public Law
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	and particulate matter less than 2.5 microns in diameter
ppm	parts per million
PSD	Prevention of Significant Deterioration
REEA	Renewable Energy Evaluation Area
RNM	Rotorcraft Noise Model
ROD	Record of Decision
RONA	record of non-applicability
ROS	Recreation Opportunity spectrum
RPRS	Rare Plant Ranking System
SAIC	Science Applications International Corporation
SCAB	South Coast Air Basin
SCAQMD	South Coast Air Quality Management District
SCCIC	South Central Coastal Information Center
SCIC	South Coastal Information Center
SDAB	San Diego Air Basin
SDCAPCD	San Diego County Air Pollution Control District
SDG&E	San Diego Gas & Electric Company
SEAL	Sea, Air and Land
SEL	Sound Exposure Level
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SSAB	Salton Sea Air Basin
TDS	total dissolved solids
UH-1N	Huey (helicopter)
UH-1Y	Venom (helicopter)
U.S.	United States
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USMC	United States Marine Corps
VFR	Visual Flight Rules
VOC	volatile organic compounds
WTI	Weapons Tactics Instructors

APPENDIX A

Scoping and Agency Correspondence

APPENDIX A-1

Scoping

United States Department of Agriculture | Forest Service | Cleveland National Forest

Trabuco Ranger District
1147 East 6th Street
Corona, CA 92879-1616
(951) 736-1811
(951) 736-3002 FAX
CRS 1-800-735-2922

File Code: 1950/2720
Date: March 2, 2012

Dear Interested Party:

The Trabuco Ranger District of the Cleveland National Forest proposes to issue a special use authorization to the U.S. Marine Corps (USMC), to facilitate the training requirements of Third Marine Air Wing (3D MAW) squadron. This authorization would allow the USMC to implement continued aviation operations for up to ten currently established Landing Zones (LZs). The aviation operations would involve landing and launching aircraft multiple times at an LZ, and may include landing at multiple LZs during each visit to the Cleveland National Forest. Multiple aircraft may use a single LZ (depending on LZ size and configuration) during a practice landing. A typical landing and takeoff operation would consist of a low level approach to the LZ to allow a pilot to visually inspect the area and select a specific site that is free of obstacles (e.g. uneven terrain) and civilians (e.g. recreational users). Operations may simulate pickup or drop off of passengers, evacuation of wounded personnel, or delivery of supplies. No actual movement of personnel or supplies would occur at the LZs. Refueling would not occur on National Forest System lands.

Legal description of area
Landing Zones are listed in numerical order; however, LZs 1, 2 and 4 were eliminated due to location conflicts during pre-application screening.
The LZs are located as follows, and are all within the San Bernardino Meridian:

- Landing Zone #3 - NW ¼ sec. 28, T.4S, R.7W.,
- Landing Zone #5 - NE ¼ sec. 30 T.4S, R.7W.,
- Landing Zone #6 and #6 alternative - SW ¼ sec. 26, T.4S, R.7W.,
- Landing Zone #7 - SW ¼ sec. 2, T.5S, R.7W.,
- Landing Zone #8 - SW ¼ sec. 1, T.5S, R.7W.,
- Landing Zone #9 and #9 alternative - NW ¼ sec. 8, T.5S, R.6W.,
- Landing Zone #10 - SW ¼ sec. 18, T.5S, R.6W.,
- Landing Zone #11 - NW ¼ sec. 25, T.5S, R.7W.

Purpose and Need

The purpose of the proposed action is to allow continued military aviation training operations on National Forest System (NFS) lands in southern California that have been used for approximately 40 years by Marine Corps helicopters. The use of these public lands by USMC rotary wing and tilt-rotor squadrons is needed to develop and sustain critical pilot skills by achieving and maintaining required operational training that meet USMC standards for certifications, safety, combat effectiveness, and combat survivability.

There are two key needs for the proposed action:

• *Varied Terrain with Adequate Airspace Conditions*. To meet and maintain high standards of training, 3D MAW and other visiting squadrons must operate in a variety of terrain, climatic conditions, and altitudes that simulate various real world conditions (e.g., access to a variety of low level flight approaches, landing areas, outlying landing fields and other types of air and ground space). Aircrews must learn to quickly recognize, understand, and solve the tactical challenges presented by each of these conditions and be able to conduct all types of required missions under variable terrain. By training under a variety of environmental conditions and locations with adequate airspace conditions (e.g., lack of air traffic congestion or airspace restrictions), aircrews can maximize training opportunities and ensure that each training flight is challenging, instructional, and not repetitious.

• *Proximity to Air Station.* A basic requirement of aviation training is for training areas to be in reasonable proximity to military air stations if training is to result in combat-ready aircrews. Training within proximity to air stations allows aircrews and aircraft to spend a larger proportion of the limited and expensive flight time available for training on productive activities rather than en route to and from the training area. It also ensures that an aircraft can fly from the air station to a training area, complete a 40-minute training mission, and return to the air station while retaining an acceptable fuel reserve (e.g., enough fuel to accommodate an emergency or weather delay). The mountainous environment of the Cleveland National Forest offers high altitude, confined area landing opportunities that are not replicated on USMC installations or training ranges within proximity to the air stations in question. The next closest high altitude military aviation training area with established LZs is associated with the Marine Corps Mountain Warfare Training Center in the Sierra Nevada Mountains near Bridgeport, California; the LZs are located over 300 nm (555 km) from MCAS Camp Pendleton and even farther from MCAS Miramar or MCAS Yuma. Overall, current DoD installations and ranges are able to fulfill most mission requirements, but they do not offer the full variability needed to simulate real world conditions and often experience crowded airspace conditions. Therefore, continued use of LZs on public lands managed by the Cleveland National Forest is critical to the quality, variety, and quantity of training; and the ability of USMC aviation to maintain readiness.

Proposed Action

The USMC aviation training operations would continue the existing rotary wing flight activity on Cleveland National Forest lands, except that CH-46E sorties (flight missions) would decline over time and would be replaced by MV-22B tilt-rotor aircraft sorties. Proposed sorties by aircraft type are provided in the table below. Overall, the number of proposed sorties at the Cleveland National Forest is expected to decrease about seven percent compared to existing conditions.

Aircraft	Estimated Existing Annual Sorties	Estimated Proposed Annual Sorties	Proposed Change in Annual Sorties	Percent Change
AH-1W (Super Cobra) Light attack helicopter AH-1Z (Viper) Light attack helicopter	228	154	-74	-33%
UH-1N (Huey) Light attack helicopter UH-1Y (Venom) Light attack helicopter	132	138	+6	+5%
CH-53 (Super Stallion) Heavy lift helicopter	24	24	-	0%
CH-46E (Sea Knight) Medium lift helicopter	68	-	-68	-100%
MV-22B1 (Osprey) Tilt-rotor aircraft	-	106	+106	+100%
Total	452	422	-30	-7%

The largest change in aircraft flight activity is related to the proposed MV-22B sorties. The MV-22B tilt rotor aircraft is a new type of aircraft for the USMC, with new and different capabilities as compared to the CH-46E helicopter it replaces. The USMC has made reasonable assumptions about the number and types of proposed MV-22B sorties, based on what is currently being performed by medium lift helicopter squadrons, while accounting for noted differences in the aircraft. For example, with its greater speed and range, the MV-22B would permit tactical training in ways not currently possible using conventional helicopters, including training farther from their home base without the need for refueling.

Based on the latest Marine Aviation Plan (USMC 2010a), the number of proposed AH-1W/Z and UH-1N/Y sorties is estimated to fluctuate slightly from existing conditions due to slight fluctuations in aircraft numbers over time, while no change is expected for CH-53E operations. Aircraft would fly along normal departure routes from an airfield and then along established routes to reach a general LZ area. While transitioning to the LZs from an airfield, the rotary wing usually would fly between 1,000 to 2,000 feet (305 to 610 meters) above ground level, while the tilt-rotor aircraft usually would fly similar to a turboprop airplane between 8,000 to 12,000 feet (2,438 to 3,658 meters) above ground level. All flight operations would be conducted in conformance with Federal Aviation Administration-mandated restrictions and Naval Air Training and Operating Procedures Standardization (NATOPS) flight instructions (e.g., Chief of Naval Operations Instruction [OPNAVINST] 3710.7U), which includes regulations for avoiding public areas and designated Wilderness areas. Pilots are restricted from landing within congressionally-designated or proposed Wilderness areas or United States Fish and Wildlife Service-designated critical habitat. Additionally, all operations would follow standard operating procedures for 3D MAW described in Wing Order 3710.39E and/or similar wing orders for visiting squadrons (e.g., Wing Order 3710.39 for 2D MAW).

The USMC is requesting a special use authorization in order to utilize up to ten of the existing LZs on the Trabuco Ranger District. Each LZ is from 0.1 to 0.3 acres (approximately 100' x 50' to 115' x 115') in size, primarily in open areas with minimal vegetation. The LZs have been exposed to rotor wash from rotary wing aircraft use for many years. Aviation operations would include day and night flight training for pilots. Night-time landings would be accomplished using Night Vision Devices (NVDs), and will not involve illumination of the LZs. No night operations would occur after 2200 (10:00 p.m.). Normal flight operations would not include weekends or federal holidays. Flights would not occur from 1200 (12:00 p.m.) on Fridays through 2359 (11:59 p.m.) on Sundays. Between 10 and 30 total individual landing exercises would occur each month. Operations for this project would not include ground troop movements.

How You Can Provide Comments

If you would like to provide comments on the proposed action, please ensure that your comments are submitted or postmarked on or before April 15, 2012. Mailed comments must be submitted to:

Mike Hamilton
Deputy Director
Western Regional Environmental Coord
Government and External Affairs Office
P.O. Box 555246
Camp Pendleton, CA 92055

Written comments may also be submitted between the hours of 8:00 a.m. and 4:30 p.m. on business days at the address above, or may be submitted through facsimile at (805) 566-6427. If you would like to submit your comments via email, please send them in a Word (.doc), rich text format (.rtf), or text (.txt) format to Mike Hamilton at charles.hamilton@usmc.com.

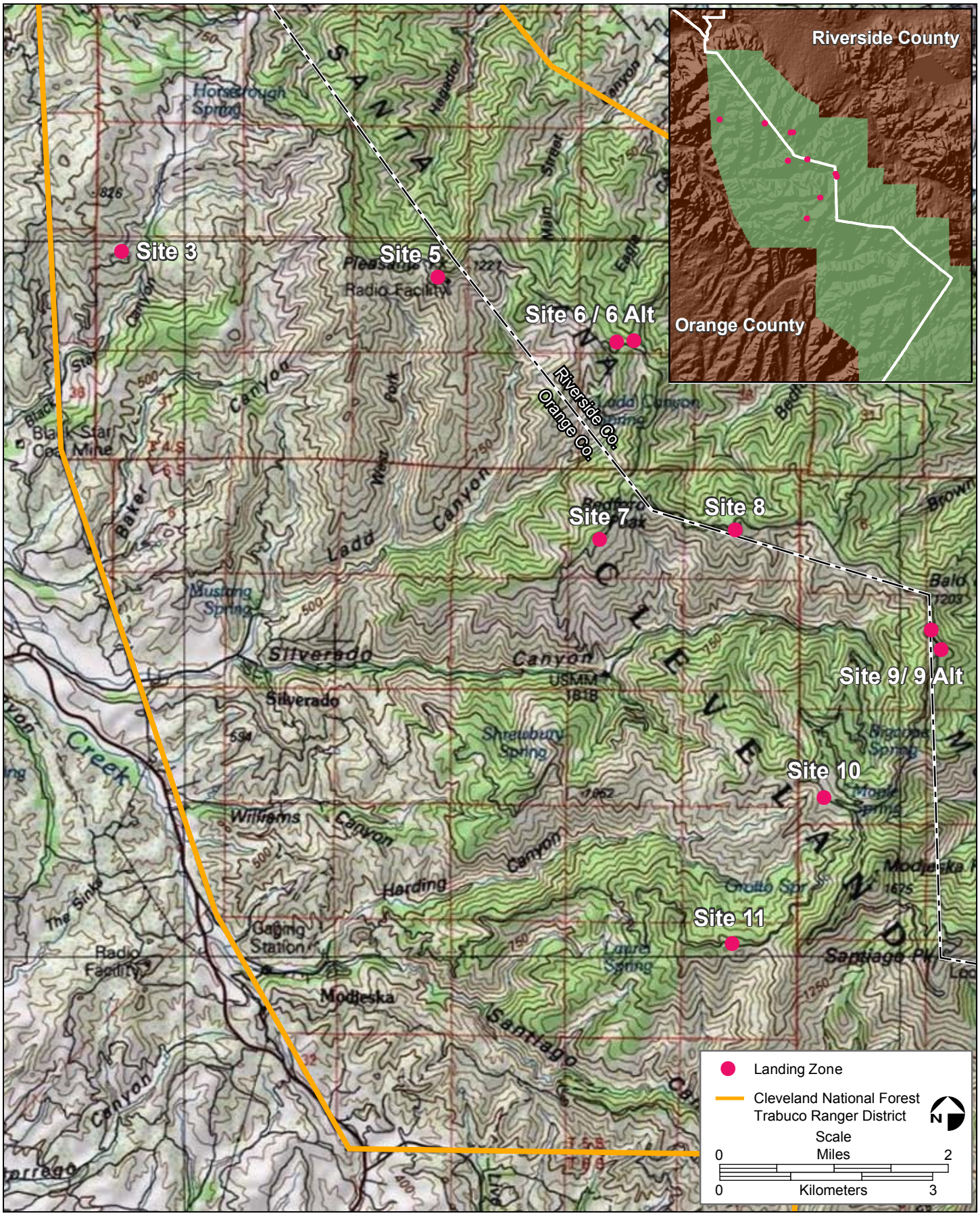
To be eligible for appeal rights, persons who submit comments must either sign the comments or verify identity upon request. Names and addresses of persons making comments will become part of the public record. Only persons who provide comments or otherwise express interest in the proposed action during the scoping or comment periods will be eligible as appellants. Comments must meet the requirements of 36 CFR 215.

If you would like more information about this project, please contact Becky Brand at (951) 736-1811 ext. 3222.

Thank you for your interest in the Cleveland National Forest.

Sincerely,

KEITH W. FLETCHER
District Ranger


Riverside County
Orange County
Site 3
Site 5
Site 6 / 6 Alt
Site 7
Site 8
Site 9/ 9 Alt
Site 10
Site 11
Riverside Co.
Orange Co.
Landing Zone
Cleveland National Forest
Trabuco Ranger District
N
Scale
Miles
0
2
Kilometers
0
3

Public Scoping Letter Mailing List

4-Wheel Drive & Sport Utility Magazine	Harbors, Beaches & Parks Commission
AC/SES, Planning Branch	Historical Commission
Acjachemen Nation	Iipay Nation of Santa Ysabel
American Towers	IMBA
Azteca News	Inaja/Cosmit Reservation
Backcountry Horsemen	Inter-Canyon League
Barona Band of Mission Indians	Irvine Valley College
Bowers Museum	Jamul Indian Village
Bureau of Indian Affairs, So. California	Juaneno Band of Mission Indians
Bureau of Land Management	Juaneno Indian Council/San Juan Capistrano
Burlington Northern Santa Fe R/R	Jurupa Chamber of Commerce
California Coalition Alternative to Pesticide	La Jolla Band of Luiseño Indians
California Indian Basket Weavers Assoc	La Posta Band of Mission Indians
California Dept of Fish & Game	Lake Elsinore Valley Chamber of Commerce
California State Assembly	Los Angeles Mycological Society
California State Assembly, District 64	Los Angeles SMSA Limited Partnership
California State Assembly, District 66	Los Coyotes Band of Cahuilla and Cupeño Indians
Camp Pendleton Marine Corps	Manzanita Band of Mission Indians
Campo Band of Mission Indians	Martin Luther King Senior Citizens
Canyon Land Conservation Fund	Mesa Grande Band of Mission Indians
Cato Geoscience	Mexican Ind. Sociedad de Obreros
CDC/CRC Norco Fire Dept.	Mobile Relay Associates, Inc.
Center for Biological Diversity	Murrieta Chamber of Commerce
Chambers Group	Norco Chamber of Commerce
City of Corona	Norco Fire Department
City of Elsinore	OCSD/Communications Division
City of Lancaster	OES, Fire & Rescue Branch
City of Los Angeles	Orange Chamber of Commerce
City of Murrieta	Orange Co. Chapter, CNPS
Corona Chamber of Commerce	Orange County Board of Supervisors
Corona Fire Dept.	Orange County Fish & Game
Corona Public Library, Heritage Room	Orange County Historical Commission
CORVA	Orange County Transportation Authority
County of Orange	Pacific Mining Association
County of Riverside	Pala Band of Mission Indians
County Regional Parks	Pauma Band of Luiseño Indians
Day Wireless Systems	PCAS
Department of Forestry	Pechanga Band of Mission Indians
Department of Parks-Recreation, Elsinore/Chino	Pechanga Environmental Program
Department of Forestry & Fire Protection	Pechanga Fire Department
El Cariso Volunteer Fire Department	Pechanga Indian Reservation
Elsinore Hang Gliding Association, Mission Viejo	Pechanga Tribal Council
Elsinore Hang Gliding Association, Temecula	Pinnacle Towers Inc.
Ewiiaapaayp Band of Kumeyaay Indians	Press Enterprise
Fish & Game Commission	Public Facilities & Resources Department
Fresno County Parks Division	Ramona Band of Cahuilla Indians
Fullerton College	Raytheon Systems Co.

Public Scoping Letter Mailing List

Glen Ivy Hot Springs	Viejas Band of Kumeyaay Indians
Greater Riverside Chamber of Commerce	Warrior's Society
Resource Conservation District	Water Quality Control Board
Resources Development & Management Dept.	Wildomar Chamber of Commerce
Rincon Band of Mission Indians	Mark Abrams
Riverside County Board of Supervisors	Leighsa Anderson
Riverside County Fish & Game Commission	Neal Anderson
Riverside Library	Paul Apodaca
Riverside Visitor Center	Al Bahm
Rural Canyons Conservation Fund	Carol Barreto
San Juan Capistrano Juaneno Indians	Carole Bell
San Pasqual Band of Diegueño Indians	Don Benefiel
Santiago County Water District	Deborah Bieber
Sea & Sage Audubon Society	Richard Bohlander
Sheriff/ Real Estate Service	Larry Boothe
Sherman Indian Museum	Randy Botta
Sierra Club	Gary Bounce
Sierra Club, Audubon Society	Barbara Bowers
Sierra Sites	Michael Brajdic
Southern California Edison Co.	David Bramlet
Southern California Edison Fire Control	Allen Brown
Southern California Gas Co.	Peter Brucker
Southern California Magazine	Dave Buchanan
State of California Transportation Dept.	David Buckingham
Sycuan Band of The Kumeyaay Nation	Bob Buster
Temecula Band of Luiseno Indians	Ilse Byrnes
The Center For Natural Resources	Bryan Calderwood
The Mature Traveler	Kenneth Calvert
The Nature Conservancy	Glen Campbell
The Wilderness Society	Kerry Cato, PhD
Touch Tel Corp	Ray Chandros
Trabuco District Electronic Users Association	Arthur Coe
Trabuco Holy Jim Cabin Association	Fred Daniel
Trails4All	Ian Davidson
Transportation & Land Management Agency	Barbara Deboom
Transportation Corridor Agencies	Dee Dee Dunbar
U. S. Dept of Agriculture/Forest Fire Lab	Joseph Dworzan
U. S. Marine Corps Environmental Security	Teri Edelbrock
U.S. Army Corps of Engineers	Leroy J. Elliot
Union Pacific R/R Co.	Dennis Ellison
United States House of Representatives, Brea	Larry Engwall
United States House of Representatives, Fullerton	Anne Fege
United States House of Representatives, Garden Grove	Virginia Field
United States House of Representatives, Riverside	Davis Fillis
URS Corporation	Robert Fisher
USGS	Gordon Martin
Jim Force	Bo Mazzetti

Public Scoping Letter Mailing List

Gloria Freel	Ed Mc Ormond
Richard Friesen	Carol Mccolly
John Furlong	George Mcgehee
Len Gardner	Debbie Megna
Shasta Gaughen	Manuel Mello, Jr.
Shirley Grindle	Kenneth Meza
Gary Glotfelty	Sally Miller
Josephine Gomas Bardot	Noel Moore
John Gomez, Jr	Terry Morairty
Mike Grace	Al Moreno
Sally Haase	Phil Moser
Manuel Hamilton	Albert Murtz
Philip Hamm	Boyd Newby
Andrew Harris	Glen Newman
Raymond Haynes	Lt. Col. and Mrs. David Niederhaus
Shireen Heidari	Deborah North
Liza and Garry Heinrich	Cathy Nowak
Mike Hilberath	Rex Oliver
Daviod Hogan	Rebecca Osuna
Anna Hoover	Rod Pacheco
Kristy Hori	Gary Palakouic
Elden Hughes	Ann and Ken Palmer
Patricia Huntington-Biagini	Gwendolyn Parada
Vincent Ibanez	Vivian Parker
Albert Ilata	Ramiro Parra
Alissa Ing	La Vonne Peck
Deborah Johnson	Stephen Pencall
Melissa Johnson	Chalynn Peterson
Sonia Johnston	Robert Peterson
Rich Kimberlin	Anthony R. Pico
Jerry King	Kenneth and Vikki Piety
Dave Kling	Zachary Principe
Francine Kupsch	Bill Purcell
Monique La Chappa	Gregory Quellette
Allen E. Lawson	Ken Quigley
Pauline Leonard	Gabriele Rau
Joe Linder	John Reddick
Mayoral Lopez	Alec Reynolds
Ruth Love	Linda and Gene Ridenour
Ulrike Luderer	Joseph Robben
Mark Macarro	Honorable Frank C. Roberts
Thomas Machulda	Lilian Robles
John Magee	Teeter Maria Romero
Randall Majel	Thorpe Romero
Barbara Mangan	Mark Romere
Beverly Martin	Eva-Maria Swedlow
Mary Lou Rosczyk	W. Tadlock

Public Scoping Letter Mailing List

Cindy Roth	Tom Tammone
Edward Royce	Lisa Telles
Tom Ruzika	Stacie Tennant
Kami Sabetzadeh	Bruce Thompson
Loretta Sanchez	Wolf Tinsley
Wayne Scharf	Wayne Todd
Roger Scherer	James Trujillo
Hay Scott	Daniel J. Tucker
Markus Seitz	Chris and AntonioVargas
Stuart Sheldon	Norma Velez
Jill Sherman	Laura Verdugo
Marie Siebee	Teresa Viveros
Lorene Sisquoc	Marian Walkingstick
Chuck Skaggs	Mike Wallman
James Sleeper	Mike Warren
Dr. William Smith	Keith Warren
Robert Smith	Ray Weems
Bill and Marilyn Soderquist	Robert Wheeler
Laura Solorio	Troy Whitman
Betty Somes	John Williams
Darlene Sotelo	Nancy Williams
Bobby Spiegel	Chris Wills, MD
Todd Spitzer	Stefanie Wilson
Judy Spivey	Pete Wohlgemuth
Ted St. John	L Wolfley
Fred Steiner	Mike Wylie
John Stickler	Jeremy Zagarella
Henry Stringer	
Edwin Studor	

APPENDIX A-2

Tribal Consultation

United States Department of Agriculture
Forest Service
Cleveland National Forest
SO
10845 Rancho Bernardo Rd.
Suite 200
San Diego, CA 92127-2107
(858) 673-6180
(858) 673-6192 FAX
(800) 735-2922 CRS

File Code: 2360
Date: April 4, 2012

Mr. Thorpe Romero, Chairman
Barona Band of Mission Indians
1095 Barona Road
Lakeside, CA 92040

SUBJECT: INITIATION OF CONSULTATION – AIRCRAFT TRAINING ON NON-DEPARTMENT OF DEFENSE LANDS BY THE UNITED STATES MARINE CORPS

Dear Chairman Romero:

This letter is to inform you that Marine Corps Installations/WEST (MCIWEST) is initiating Government-to-Government Native American consultation for a project that would allow the United States Marine Corps (USMC) to continue rotary wing aircraft (helicopter) training on non-Department of Defense (DoD) lands within southern California, as well as introducing tilt-rotor aircraft training on those lands. USMC rotary wing aircraft training currently occurs on public lands managed by the United States Forest Service (USFS) Cleveland National Forest (Trabuco Ranger District) and the Bureau of Land Management (BLM) El Centro Field Office. The types of aircraft involved with this project include various helicopters (AH-1W/Z, UH-1N/Y, CH-53E, and CH-46E) as well as the recently acquired Osprey tilt-rotor (MV-22) aircraft.

The purpose of the project is to allow continued military aviation training operations on USFS and BLM managed lands that have been used for approximately 40 years by Marine Corps helicopters. The use of these public lands by USMC helicopter and MV-22 squadrons is needed to develop and sustain critical pilot skills that meet USMC standards for certifications, safety, combat effectiveness, and combat survivability. Current DoD installations and ranges are able to fulfill most mission requirements, but they do not offer the full variability needed to simulate real world conditions and often experience crowded airspace conditions. Therefore, continued use of USFS and BLM managed lands is critical to the quality, variety, and quantity of training and the ability of USMC aviation to maintain readiness.

The project involves landing and takeoff operations at specified "landing zones" (LZs) (Figures 1 - 3). Typical practice landing and takeoff operations consist of a low level approach to the LZ to allow a pilot to visually inspect the area and select a specific landing site that is free of all obstacles (e.g., uneven terrain) and civilians (e.g., recreational users). The pilot lands the aircraft only when the area is determined safe. This type of training enables pilots and flight crews to identify an LZ, transition into an appropriate approach, land, and then subsequently take off in a variety of weather conditions (i.e., rain, cross-winds, cloud cover) and in different types of terrain. Training would not include ground maneuver (i.e., no trucks or people on the ground), refueling operations, the use of flares or ordnance, or the need for any type of construction.

Aircraft operations would primarily originate from Marine Corps Air Station (MCAS) Miramar and MCAS Camp Pendleton in San Diego County, California. Operations may also originate out of MCAS Yuma in Arizona, especially during large training exercises. Aircraft would fly along normal departure routes from an airfield and then along established routes to reach a general LZ area. While transitioning to the LZs from an airfield, helicopters usually would fly between 1,000 to 2,000 feet above ground level, while the tilt-rotor aircraft usually would fly similar to a turboprop airplane between 8,000 to 12,000 feet above ground level.

In accordance with Section 106 of the National Historic Preservation Act (NHPA) (16 USC Section 470f), which requires federal agencies to take into account the effects of their undertakings on historic properties, each federal agency must consult with any Indian tribe that attaches religious and cultural significance to historic properties that may be affected by the agency's undertakings (36 CFR Section 800.2(c)(2)(ii)). As the project proponent, MCIWEST is currently in the process of identifying historic properties that may be affected by the continued use of existing rotary wing aircraft and new tilt-rotor aircraft on the Trabuco District of the Cleveland National Forest. MCIWEST requests your assistance in identifying places and/or practices that have traditional, religious, or cultural importance that you think could be affected by the proposed project. We appreciate your input on this important matter.

MCIWEST is currently preparing an Environmental Assessment, pursuant to the National Environmental Policy Act (NEPA), to assess the potential environmental effects of the project, and will be offering the public an opportunity to comment on the proposed action. In addition to contacting your office, the USFS and MCIWEST are contacting all other appropriate federally and non-federally recognized tribal governments, and welcomes tribal representatives to attend any and all public meetings. All comments received, and any specific issues expressed to MCIWEST, will be taken into consideration while planning for this undertaking.

If you have any questions regarding consultation on this proposed project, or would like to schedule a separate Government-to-Government tribal consultation meeting, please contact Mike Hamilton, Deputy Director, Office of Government and External Affairs, MCIWEST (760-725-2635; charles.hamilton@usmc.mil). If you have a question for a specific land agency, please contact Daniel Steward, Resources Branch Chief, BLM El Centro Office (760-337-4424, msteward@blm.gov) or Steve Harvey, Heritage and Tribal Relations Program Manager, Cleveland National Forest (858-674-2973, slharvey@fs.fed.us).

Sincerely,

/s/ William Metz
WILLIAM METZ
Forest Supervisor

Enclosure

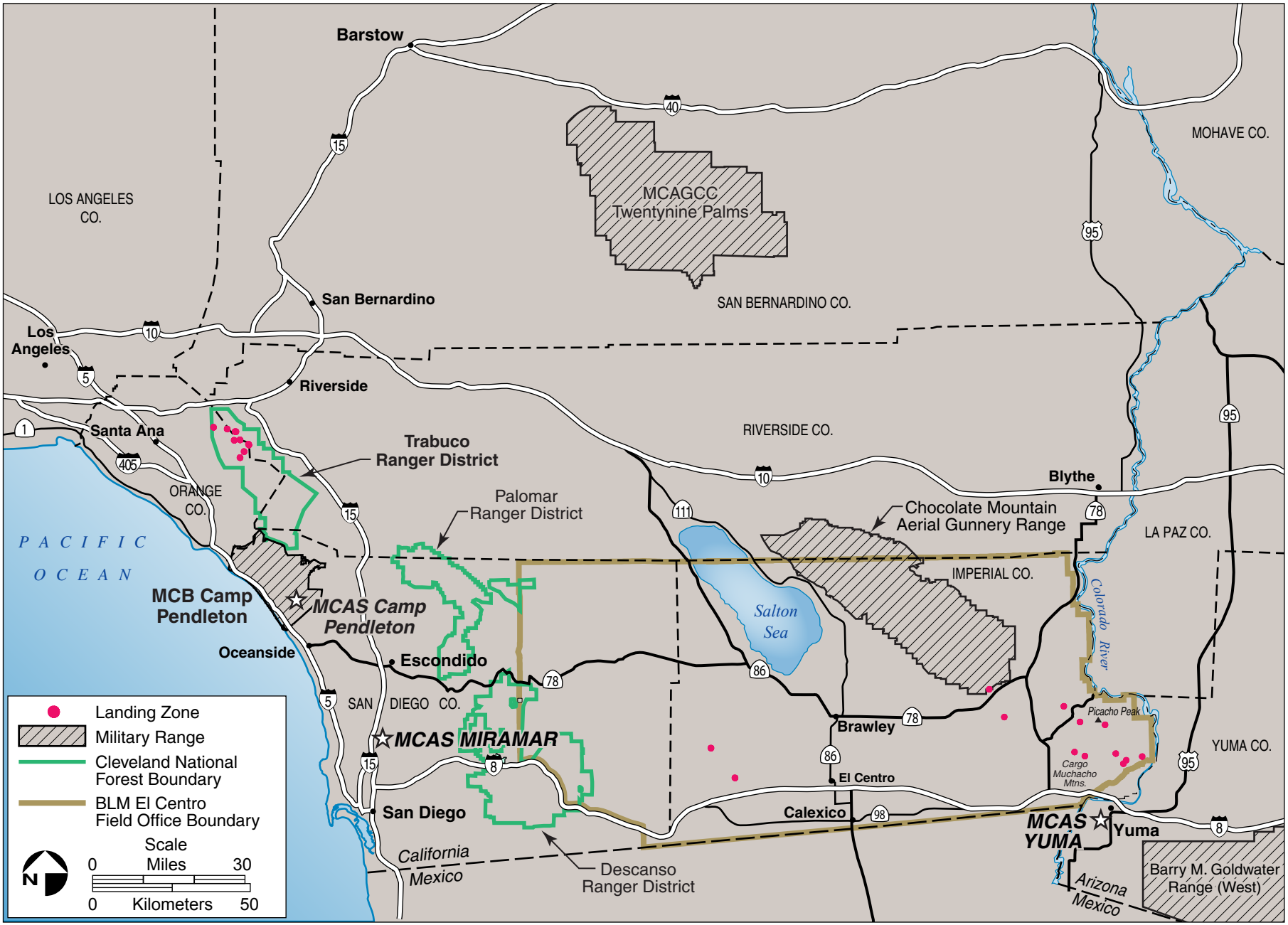


Figure 1. Location of Proposed Landing Zones within the Cleveland National Forest, Trabuco Ranger District, and the BLM El Centro Field Office

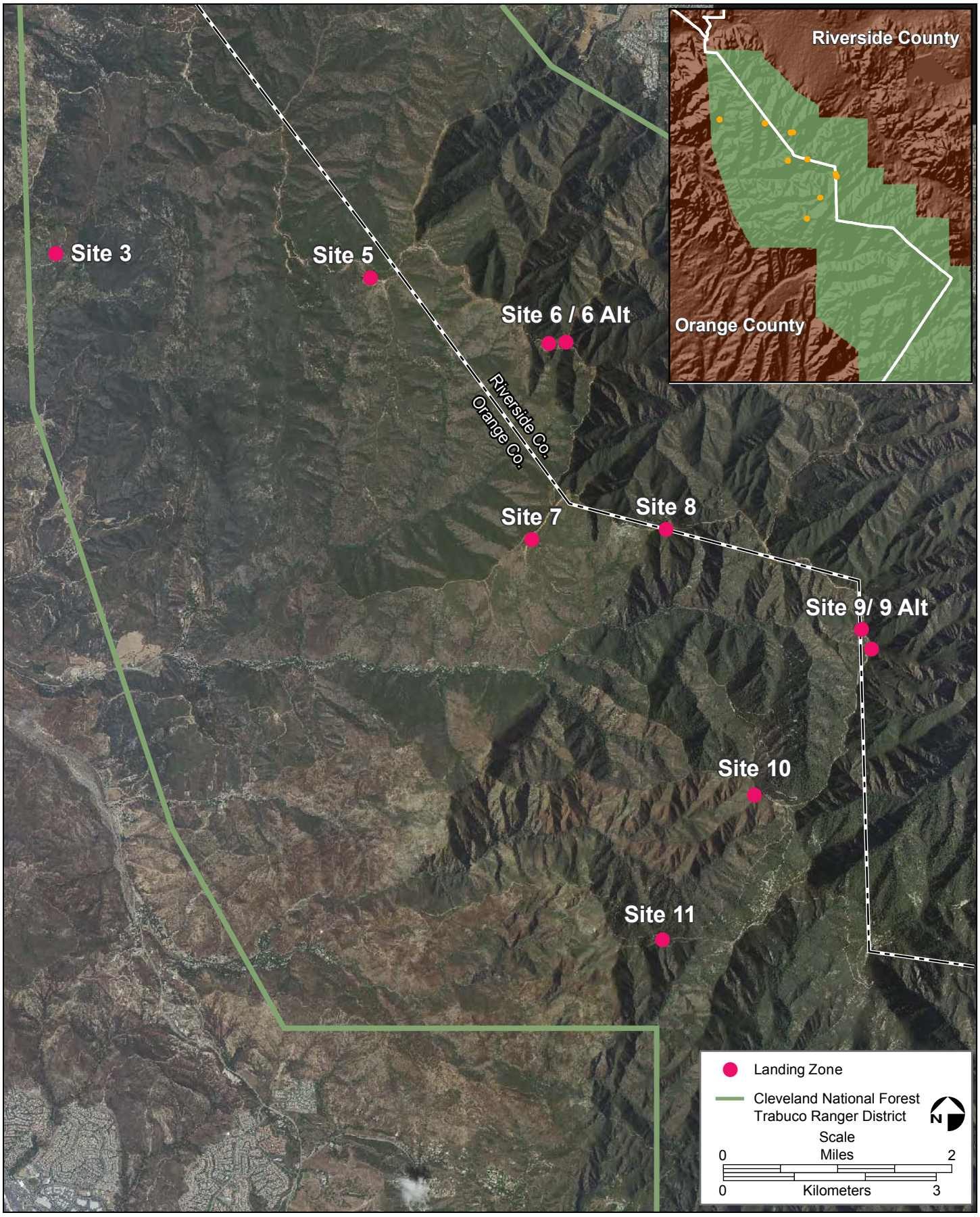


Figure 2. Location of Proposed Landing Zones within the Cleveland National Forest

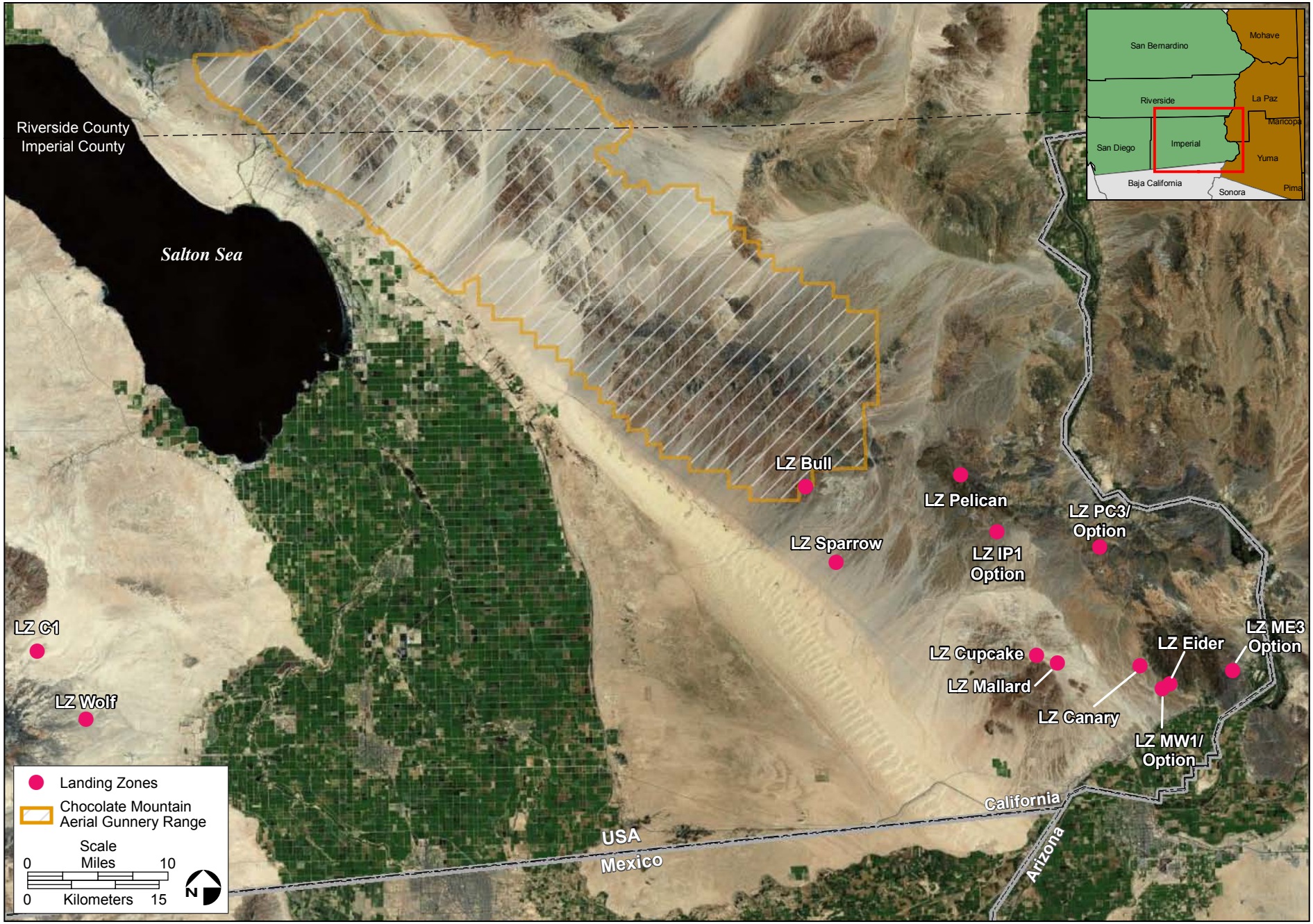


Figure 3. Location of Proposed Landing Zones within BLM El Centro Managed Lands

UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS WEST
BOX 555200
CAMP PENDLETON, CALIFORNIA 92055-5200

IN REPLY REFER TO:
G-7
3000
13 Apr 2012

Dear Interested Party:

SUBJECT: INITIATION OF CONSULTATION – AIRCRAFT TRAINING ON NON-DEPARTMENT OF DEFENSE LANDS BY THE UNITED STATES MARINE CORPS

Marine Corps Installations/WEST (MCIWEST) is initiating consultation for a project that would allow the United States Marine Corps (USMC) to continue rotary wing aircraft (helicopter) training on non-Department of Defense (DoD) lands within southern California, as well as introducing tilt-rotor aircraft training on those lands. USMC rotary wing aircraft training currently occurs on public lands managed by the United States Forest Service (USFS) Cleveland National Forest (Trabuco Ranger District) and the Bureau of Land Management (BLM) El Centro Field Office. The types of aircraft involved with this project include various helicopters (AH-1W/Z, UH-1N/Y, CH-53E, and CH-46E) as well as the recently acquired Osprey tilt-rotor (MV-22) aircraft.

The purpose of the project is to allow continued military aviation training operations on USFS and BLM managed lands that have previously been used for approximately 40 years by Marine Corps helicopters. The use of these public lands by USMC helicopter and MV-22 squadrons is needed to develop and sustain critical pilot skills that meet USMC standards for certifications, safety, combat effectiveness, and combat survivability. Current DoD installations and ranges are able to fulfill most mission requirements, but they do not offer the full variability needed to simulate real world conditions and often experience crowded airspace conditions. Therefore, continued use of USFS and BLM managed lands is critical to the quality, variety, and quantity of training and the ability of USMC aviation to maintain readiness.

The project involves landing and takeoff operations at specified "landing zones" (LZs) (Figures 1 - 3). Typical practice landing and takeoff operations consist of a low level approach to the LZ to allow a pilot to visually inspect the area and select a specific landing site that is free of all obstacles (e.g., uneven terrain) and civilians (e.g., recreational users). The pilot lands the aircraft only when the area is determined safe. This type of training enables pilots and flight crews to identify an LZ, transition into an appropriate approach, land, and then subsequently take off in a variety of weather conditions (i.e., rain, cross-winds, cloud cover, etc.) and in different types of terrain. Training would not include ground maneuver (i.e., no trucks or people on the ground), refueling operations, the use of flares or ordnance, or the need for any type of construction.

Aircraft operations would primarily originate from Marine Corps Air Station (MCAS) Miramar and MCAS Camp Pendleton in California. Operations may also originate out of MCAS Yuma in Arizona, especially during large training exercises. Aircraft would fly along normal departure routes from an airfield and then along established routes to reach a general LZ area. While transitioning to the LZs from an airfield, helicopters usually would fly between 1,000 to 2,000

feet above ground level, while the tilt-rotor aircraft usually would fly similar to a turboprop airplane between 8,000 to 12,000 feet above ground level.

In accordance with Section 106 of the National Historic Preservation Act (NHPA) (16 USC Section 470f), which requires federal agencies to take into account the effects of their undertakings on historic properties, each federal agency must consult with any Indian tribe that attaches religious and cultural significance to historic properties that may be affected by the agency's undertakings (36 CFR Section 800.2(c)(2)(ii)]). We are currently in the process of identifying historic properties that may be affected by the continued use of existing rotary wing aircraft and the new tilt-rotor aircraft. We request your assistance in identifying places and/or practices that have traditional, religious, or cultural importance that you think could be affected by the proposed project. We appreciate your input on this important matter.

We are currently preparing an Environmental Assessment, pursuant to the National Environmental Policy Act (NEPA), to assess the potential environmental effects of the project, and will be offering the public an opportunity to comment on the proposed action. In addition to contacting your office, MCIWEST is contacting all other appropriate federally and non-federally recognized tribal governments, and we welcome tribal representatives to attend any and all public meetings. All comments received, and any specific issues expressed to MCIWEST, will be taken into consideration while planning for this undertaking.

If you have any questions regarding consultation on this proposed project, or would like to schedule a separate government-to-government tribal consultation meeting, please contact my project lead for this issue, Deputy Director Mike Hamilton at (760) 725-2635, email charles.hamilton@usmc.mil. If you have a question for a specific land agency, please contact Daniel Steward, Resources Branch Chief, BLM El Centro Office (760-337-4424, msteward@blm.gov) or Steve Harvey, Heritage and Tribal Relations Program Manager, Cleveland National Forest (858-674-2973, slharvey@fs.fed.us).

Sincerely,

Patrick L. Christman
Assistant Chief of Staff G-7
Director, Regional Environmental Coordination /
Governmental and External Affairs
Marine Corps Installations West

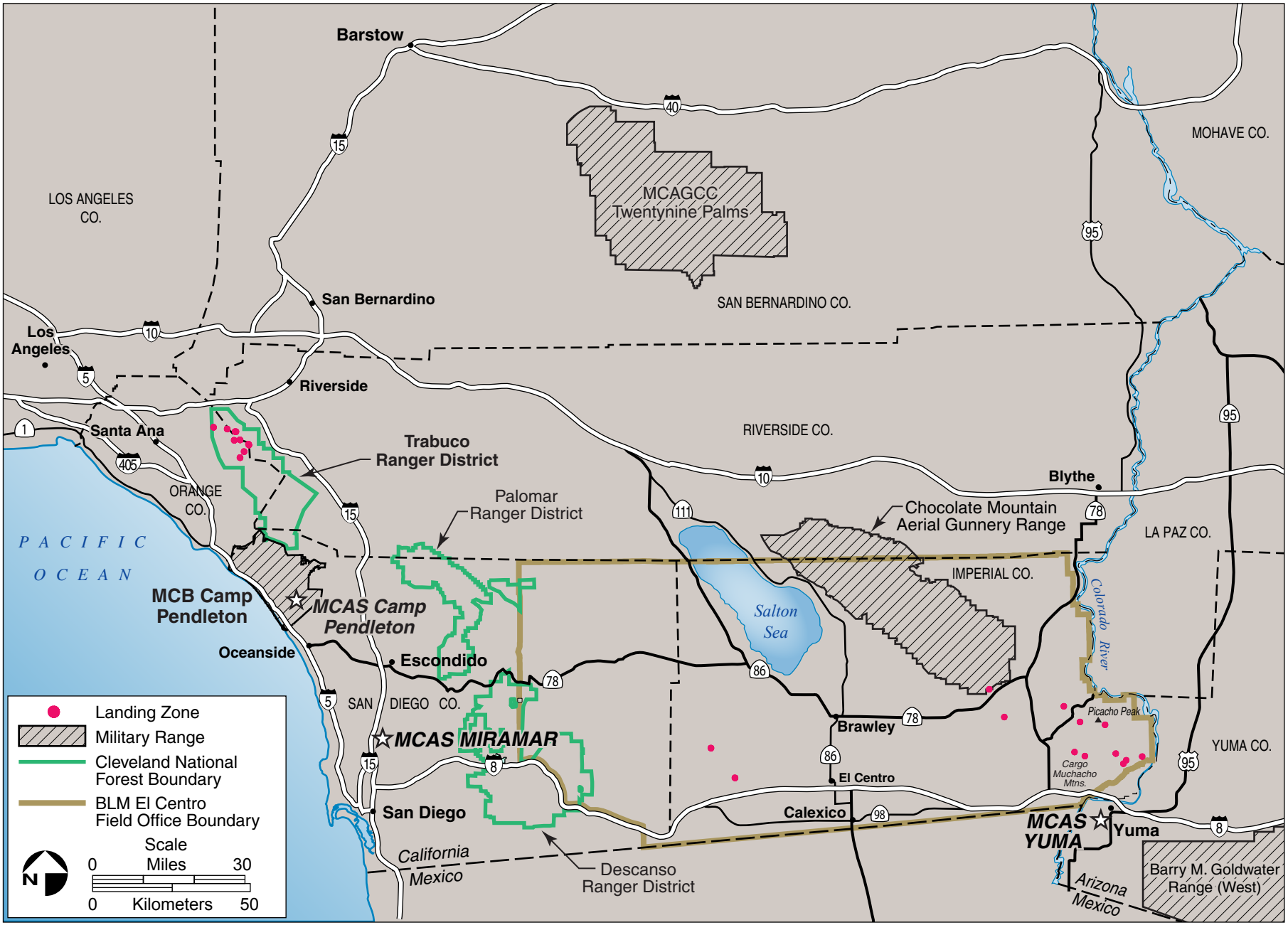


Figure 1. Location of Proposed Landing Zones within the Cleveland National Forest, Trabuco Ranger District, and the BLM El Centro Field Office

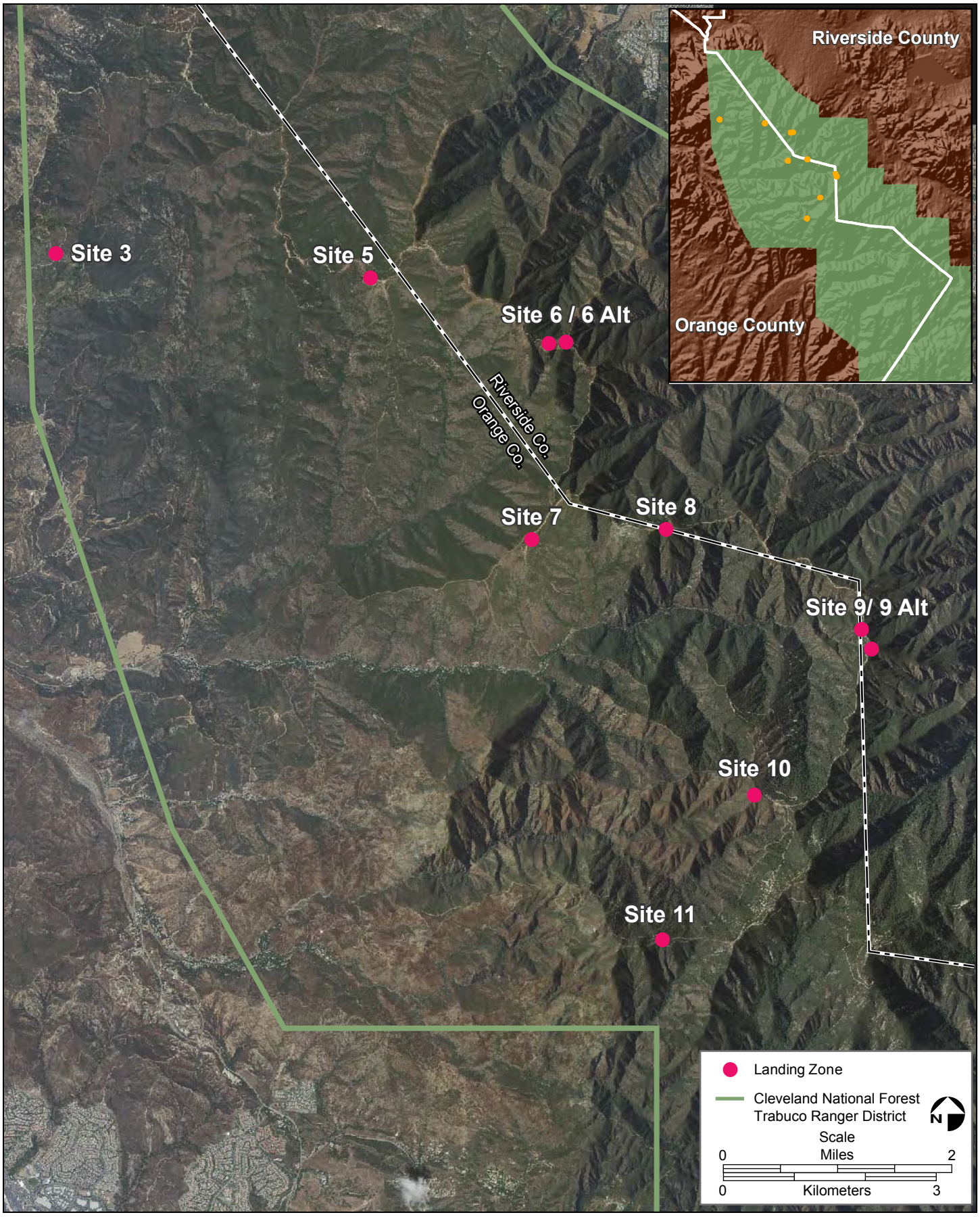


Figure 2. Location of Proposed Landing Zones within the Cleveland National Forest

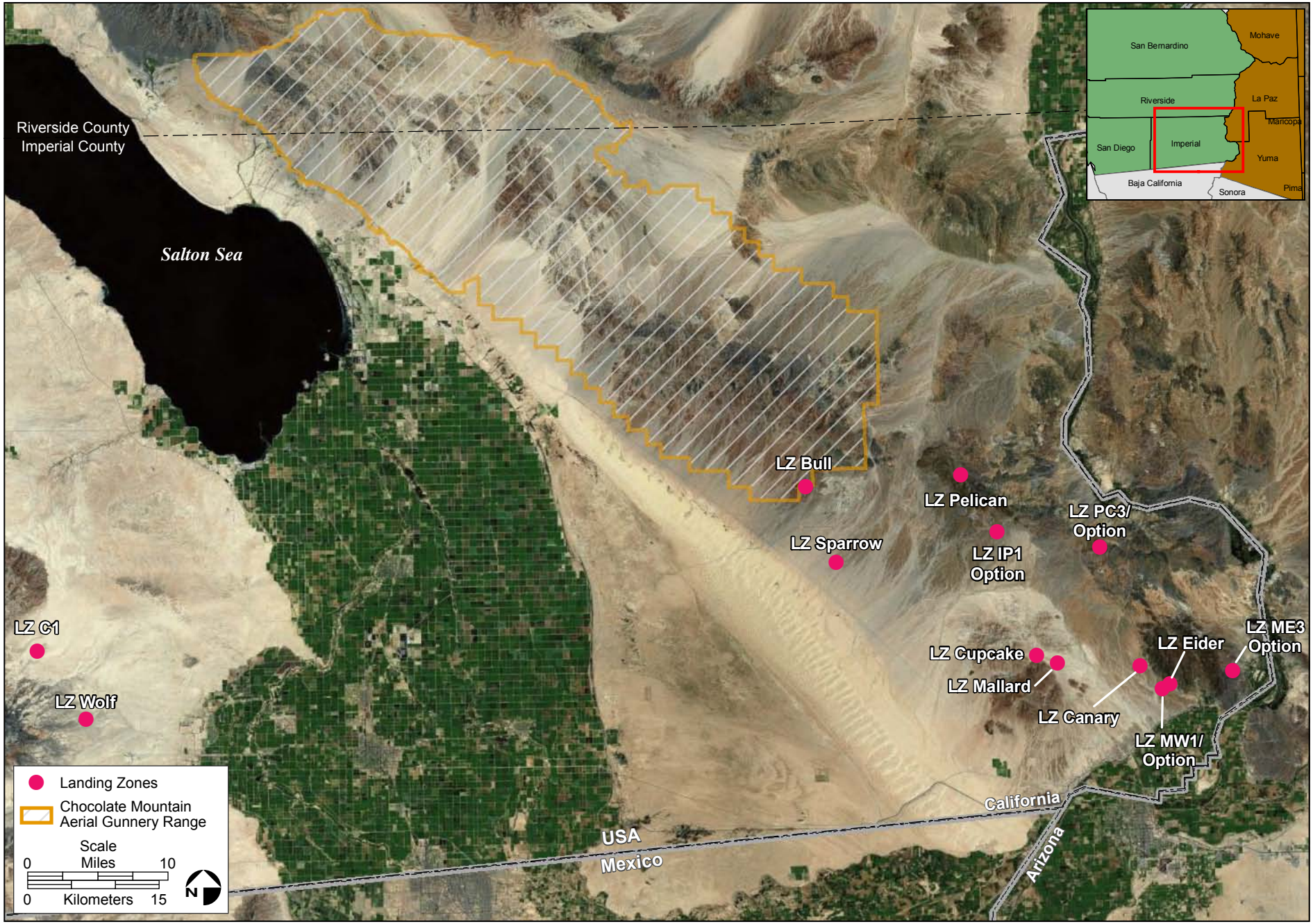


Figure 3. Location of Proposed Landing Zones within BLM El Centro Managed Lands

Federally and Non-Federally Recognized Indian Tribes
Included in the Consultation Process

Agua Caliente Band of Cahuilla Indians
Ak-Chin Indian Community
Augustine Band of Cahuilla Mission Indians
Barona Band of Mission Indians
Cabazon Band of Mission Indians
Cahuilla Band of Mission Indians
Campo Band of Mission Indians
Campo Kumeyaay Nation
Chemehuevi Indian Tribe
Cocopah Indian Tribe
Colorado River Indian Tribes
Colorado River Reservation
Ewiiaapaayp Band of Kumeyaay Indians
Fort McDowell Yavapai Nation
Fort Mojave Indian Tribe
Fort Yuma Indian Reservation – Quechan Tribe
Gila River Indian Community
Iipay Nation of Santa Ysabel
Inaja/Cosmit Reservation
Jamul Indian Village
Juaneño Band of Mission Indians
Kumeyaay Cultural Historic Committee
Kumeyaay Cultural Repatriation Committee
Kwaaymii Laguna Band of Mission Indians
La Jolla Band of Luiseño Indians
La Posta Band of Mission Indians
Los Coyotes Band of Cahuilla and Cupeño Indians
Manzanita Band of Mission Indians
Mesa Grande Band of Mission Indians
Morongo Band of Mission Indians
Pala Band of Mission Indians
Pauma Band of Luiseño Indians
Pechanga Band of Luiseño Indians
Quechan Cultural Committee
Ramona Band of Cahuilla Indians
Rincon Band of Mission Indians
Salt River Pima-Maricopa Indian Community
San Luis Rey Band of Luiseño Indians
San Luis Rey Band of Mission Indians
San Manuel Band of Mission Indians
San Pasqual Band of Diegueño Indians
Santa Rosa Band of Cahuilla Mission Indians
Santa Ysabel Band of Diegueno Indians
Soboba Band of Luiseño Indians
Sycuan Band of the Kumeyaay Nation
Tohono O'odham Nation
Torres-Martinez Desert Cahuilla Indians
Twentynine Palms Band of Mission Indians
Viejas Band of Kumeyaay Indians

THE COCOPAH INDIAN TRIBE
Cultural Resource Department
14515 S. Veterans Drive
Somerton, Arizona 85350
Telephone (928)627-4849
Cell (928) 503-2291
Fax (928) 627-3173

CCR-089-11-001

March 5, 2012

Mr. Charles Hamilton
Deputy Director
Marine Corps Installations West
P.O. Box 555200
Camp Pendleton, California 92055-5200

RE: Comments on the Archaeological Survey Report for the Twenty-Three Proposed Military Aircraft Landing Zones on BLM Lands, Imperial County, California

Dear Mr. Hamilton:

The Cultural Resources Department of the Cocopah Indian Tribe appreciates your notification of this project. We are pleased that you contacted our department on this issue for the purpose of solicitation of our input and to address concerns on this matter. We have the following comments to make on the project.

The project boundaries lie within the footprint of the Colorado River corridor. These lands have been used for centuries by the ancestors of the Colorado River Tribes. This fact is known through tribal oral histories and has been clearly acknowledged in the Final Archaeological Survey Report of Twenty-Three Proposed Military Aircraft Landing Zones on Bureau of Land Management Lands, Imperial County, California (Dated September 2011) that you provided to this office. The numerous previously recorded (Table 3, page 3-9), cultural resources within 1 mile radius of the project APE and newly recorded cultural resources document the vast number of trails, geoglyphs, rock alignments, cleared circles and other artifacts located throughout this area and are evidence of the presence of Native American people's habitation of this area from prehistory to the present. Also, within this region are the Indian Pass ACEC and the Proposed Picacho Basin Archaeological District. These locations have been given special designation as areas to be protected for their cultural resources and importance to tribal cultural values. As documented in the Archaeological Survey Report (Table 13) this project will have an impact on many of these irreplaceable cultural resources.

We are also concerned with the course of this project and the lack of consultation with the affected Native American Tribes. Your office has not contacted the Cocopah Indian Tribe to distinguish our concerns or consult with us on this project. The Archaeological Survey Report was sent to us only after we made the request to BLM to receive a copy of the report as stated in your cover letter for the report. It is our understanding that the USMC would be the lead agency for NEPA and Section 106 consultation. Given that, this document and the EA should be provided to all interested parties including tribes. At this time, we would like to request a copy of the EA and sufficient time to review the document and also ask that the same documents be provided to other interested tribes.

Given our concerns with this project mentioned about we recommend that this project not move forward until a complete assessment of the cultural and environmental resources is conducted. Further, the project should be relocated to an area away from the Colorado River corridor and into an area devoid of cultural and environmental concerns.

If you have any questions or need additional information please feel free to contact the Cultural Resource Department. We will be happy to assist you with any future concerns or questions.

Sincerely,

H. Jill McCormick, M.A.

Cultural Resources Manager

Cc: Carrie Simmons BLM El Centro Field Office Archaeologist

April 30, 2012

Attn: Mike Hamilton, Deputy Director
Regional Environmental Coordination
and Office of Government and External Affairs
MCIWEST G-7

Re: Aircraft Training on Non-Department of Defense Lands by the USMC

The Soboba Band of Luiseño Indians appreciates your observance of Tribal Cultural Resources and their preservation in your project. The information provided to us on said project(s) has been assessed through our Cultural Resource Department, where it was concluded that although it is outside the existing reservation, the project area does fall within the bounds of our Tribal Traditional Use Areas. At this time the Soboba Band does not have any specific concerns regarding this project, but requests notification of any inadvertent discoveries that may be discovered during the course of the project.

[SPECIAL NOTE (for projects other than cell towers): *If* this project is associated with a city or county specific plan or general plan action it is subject to the provisions of SB18-Tradtional Tribal Cultural Places (law became effective January 1, 2005) and will require the city or county to participate in **formal, government-to-government** consultation with the Tribe. If the city or county are your client, you may wish to make them aware of this requirement. By law, they are required to contact the Tribe.

Sincerely,

Joseph Ontiveros
Soboba Cultural Resource Department
P.O. Box 487
San Jacinto, CA 92581
Phone (951) 654-5544 ext. 4137
Cell (951) 663-5279
jontiveros@soboba-nsn.gov

RINCON BAND OF LUISEÑO INDIANS

Culture Committee

Post Office Box 68 · Valley Center, California 92082 ·
(760) 297-2621 or·(760) 297-2622 & Fax:(760) 749-8901

May 18, 2012

William Metz
Forest Supervisor
United States Department of Agriculture – Forest Service
Cleveland National Forest SO
10845 Rancho Bernardo Road, Suite 200
San Diego, CA 92127-2107

Re: Initiation of Consultation – Aircraft Training on non-Department of Defense Lands by the United States Marine Corps

Dear William Metz,

This letter is written on behalf of the Rincon Band of Luiseño Indians. Thank you for inviting us to submit comments on the Initiation of Consultation – Aircraft Training on non-Department of Defense Lands by the United States Marine Corps project.

The Rincon Band has concerns for impacts, disturbances, and destruction to historic properties, cultural resources, and findings of significant value that are considered culturally important to the Luiseño people. This is to inform you that some of your identified landing zone locations are situated within the Aboriginal Territory of the Luiseño people.

We are concerned for the protection of any inadvertent archaeological discoveries that could be made or uncovered at the various aircraft landing sites. We do recommend a Native American Monitor be present for all ground disturbances involving any construction activities, and also that you contact the Native American Heritage Commission regarding information on other Tribes in your project area. Additionally, we request that you would provide us with updates regarding the project.

If you have any questions, please contact (760) 297-2635. Thank you for this opportunity to protect and preserve our cultural assets.

Sincerely,

Rose Duro
Rincon Culture Committee Chair

Bo Mazzetti, Tribal Chairman | Stephanie Spencer, Vice Chairwoman | Charlie Kolb, Council Member | Steve Stallings, Council Member | Laurie E. Gonzalez, Council Member

UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS WEST – MARINE CORPS BASE
BOX 555200
CAMP PENDLETON, CALIFORNIA 92055-5200

IN REPLY REFER TO:
G-7
3000
13 June 2012

Ms. Rose Duro
Rincon Band of Luiseno Indians, Cultural Committee
PO BOX 68
Valley Center, California 92082

Ms. Duro
Thank you for your inquiry.

The U.S. Marine Corps (USMC) is preparing an Environmental Assessment (EA) for the continued use of U.S. Forest Service (USFS) and Bureau of Land Management (BLM) lands by rotary-wing aircraft (helicopters) and the new tilt-rotor aircraft, known as the MV-22 (which is replacing the current-inventory CH-46E).

The Native American Heritage Commission was contacted regarding this project in 2011. The USMC, in cooperation with BLM and USFS, has also mailed out seventy-two letters to initiate consultation with federally recognized and non-federally recognized Indian tribes affiliated with lands involved in this action.

The USMC in support of this EA has conducted detailed archaeological surveys for 33 proposed landing zones (LZ), ten of which are located in the Trabuco Ranger District of the Cleveland National Forest, and 23 sites located in the El Centro Field Office area of the BLM. These field surveys were conducted in coordination with the USFS and BLM to determine the presence or absence of archaeological sites within or adjacent to each proposed LZ to include a 350ft buffer area beyond the perimeter of each LZ.

For these LZs no construction or improvements are proposed. As you mention, soil disturbance does have the potential to occur from rotor-induced downwash (also known as prop wash) from hovering and landing aircraft. To acknowledge this, surveys also included a 350-foot buffer area around each LZ perimeter to evaluate any potential surface disturbance that could occur from the landing and take-off activities.

For the ten proposed LZ sites in the Cleveland National Forest, no archaeological sites were found within the LZ areas and only one archaeological site was located within the Area of Potential Effect (APE). This newly-recorded site is in the survey buffer area, and is protected from possible disturbance from rotor wash because it is located down slope from the LZ and sheltered behind a rock outcrop. On the BLM managed lands, eight of the 23 LZs surveyed were dropped from consideration for future use by the USMC because of the presence of archaeological resources. The USMC is analyzing the effects of using the remaining 15 existing LZs on BLM lands.

We plan to have the Draft EA available for public review in July 2012. You will be notified when the EA is available, and we invite you to attend one of our public review meetings after the release of the Draft EA. If you have additional questions, concerns, or would like more information, or if you so desire I can arrange for a Government-to-Government meeting to discuss any specific concerns with the Tribe. My contact information is (760)725-2635; email Charles.hamilton@usmc.mil.

Again thank you for your inquiry.

Sincerely,

C. M. Hamilton
Deputy Director G-7
Marine Corps Installations West

Copy to: USFS Cleveland National Forest
(Attn: Steve Harvey)
10845 Rancho Bernardo Road, Suite 200
San Diego, CA
92127-2107

AUGUSTINE BAND OF CAHUILLA INDIANS
P.O. Box 846 • Coachella, CA 92236 • (760) 398-4722 • Fax (760) 398-4252
Tribal Chairperson: MaryAnn Green

May 24, 2012

Patrick L. Christman
United States Marine Corps
Marine Corps Installation West
Box 555200
Camp Pendleton, CA 92055-5200

RE: Marine Corps Continuation of Aircraft Training Project

Dear Mr. Christman:

Thank you for the opportunity to offer input concerning the development of the above-identified project. We appreciate your sensitivity to the cultural resources that may be impacted by your project, and the importance of these cultural resources to the Native American peoples that have occupied the land surrounding the area of your project for thousands of years. Unfortunately, increased development and lack of sensitivity to cultural resources has resulted in many significant cultural resources being destroyed or substantially altered and impacted. Your invitation to consult on this project is greatly appreciated.

At this time we are unaware of specific cultural resources that may be affected by the proposed project. We encourage you to contact other Native American Tribes and individuals within the immediate vicinity of the project site that may have specific information concerning cultural resources that may be located in the area. We also encourage you to contract with a monitor who is qualified in Native American cultural resources identification and who is able to be present on-site full-time during the pre-construction and construction phase of the project. Please notify us immediately should you discover any cultural resources during the development of this project.

Very truly yours,

Augustine Band of Cahuilla Indians

MaryAnn Green

Mary Ann Green
Tribal Chairperson

AGUA CALIENTE BAND OF CAHUILLA INDIANS
TRIBAL HISTORIC PRESERVATION

May 25, 2012

Patrick L. Christman
Assistant Chief of Staff G-7
Director, Regional Environmental Coordination/
Governmental and External Affairs
Marine Corps Installation West
Box 555200
Camp Pendleton, CA 92055-5200

RE: Initiation of Consultation- Aircraft Training on Non-Department of Defense Lands by the United States Marine Corps

Dear Mr. Christman:

The Agua Caliente Band of Cahuilla Indians appreciates your efforts to include the Agua Caliente Tribal Historic Preservation Office in your project. The project area is beyond the Agua Caliente Indian Reservation lands and our Traditional Use Area. We currently have no concerns regarding this project. We defer to Soboba Band of Luiseño Indians. This letter shall conclude our consultation efforts.

Again, we appreciate your interest in our tribal resources and heritage. If you have questions or require additional information, please do not hesitate to call me at (760) 699-6907. You may also email me at ptuck@aguacaliente-nsn.gov .

Cordially,

Patricia A. Garcia-Tuck
Tribal Historic Preservation Office
AGUA CALIENTE BAND
OF CAHUILLA INDIANS

C: Agua Caliente Cultural Register

X:\CONSULTATIONS Letters\FY2012\Off\USMC_MCIWEST_ 05_25_12.doc

5401 DINAH SHORE DRIVE, PALM SPRINGS, CA 92264
T 760/699/6800 F 760/699/6924 WWW.AGUACALIENTE-NSN.GOV

APPENDIX A-3

United States Fish and Wildlife Service

UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS WEST
BOX 555200
CAMP PENDLETON, CALIFORNIA 92055-5200

3000
G-7
7 Jan 2011

Mr. Jim Bartel, Field Supervisor
U.S. Fish and Wildlife Service
6010 Hidden Valley Road
Carlsbad, CA 92011

Dear Mr. Bartel:

SUBJECT: MV-22 AND ROTORY WING OPERATIONS AND TRAINING ON NON-DEPARTMENT OF DEFENSE LANDS

Pursuant to Section 7 of the Endangered Species Act, Marine Corps Installations West (MCIWEST) is requesting a list of potential threatened and endangered species that are present or have the potential to occur within the vicinities of proposed Marine Corps actions in Orange, Riverside and Imperial Counties. MCIWEST proposes to conduct rotary wing and tilt rotor aircraft training and readiness operations that consist of landings and takeoffs on lands located outside of Department of Defense (DoD) controlled airspace and off of Department of the Navy/U.S. Marine Corps (USMC) controlled installations and training ranges on the west coast.

These operations will involve the utilization of small areas of land for Landing Zones (LZs) for both rotary wing and tilt rotor aircraft, as well as portions of the airspace above these land areas. The USMC currently conducts rotary wing operations on public lands managed by the U.S. Forest Service (USFS) Cleveland National Forest, Trabuco Ranger District, and the Bureau of Land Management (BLM). An Environmental Assessment, pursuant to the National Environmental Policy Act, is being prepared to evaluate the effects of these continued operations by existing rotary wing inventory as well as the potential effects from the newly acquired MV-22B Osprey tilt-rotor aircraft in these landing and takeoff operations.

The purpose of the proposed project is to achieve and then maintain a high level of operational training for the various flight crews which are required to meet standards for certifications, safety, and combat survivability in support of mission requirements and combat readiness. In order to meet and maintain these readiness standards, Marine Corps aviation squadrons

3000
G-7
7 Jan 2011

Need to train in a variety of terrain, climatic conditions, and altitudes that simulate various real world conditions. These requirements necessitate the use of land and airspace both on and off of DoD installations and ranges. Current DoD installations and ranges are able to fulfill some of the requirements; however, other areas outside of DoD control are needed to provide realistic training on varying terrain (e.g., access to a variety of low level flight approaches, landing areas, outlying landing fields and other types of air and ground space) to simulate realistic combat situations. Training under a variety of environmental conditions results in improved combat survivability for the flight crew, passengers, and the aircraft.

We request an updated list of species that have the potential to occur within the proposed project areas and we stand by for further correspondence and meetings. If you have any questions or require additional information, please contact Mr. Mike Hamilton at (760) 725-2635. Thank you for your cooperation in this matter.

Sincerely,

Patrick L. Christman

Patrick L. Christman
Assistant Chief of Staff G-7
Regional Environmental and
Governmental Affairs

Enclosure: Proposed Landing Zones

Copy to: MCIWEST AC/S G4 ES
USFWS Carlsbad Pete Sorensen
USFWS Carlsbad David Zoutendyk

Proposed Landing Zones

The Marine Corps is coordinating 'Usage Permits or agreements' with BLM and the USFS for 27 Landing Zones 11 of which are located in the Trabuco Ranger District of the Cleveland National Forest and the other 16 are located in BLM El Centro Field District.

Flight Operations at these sites will provide 'landing and take-off' training for flight crew familiarization in order to provide the crews with more diverse and different terrain to operate in and will afford them the opportunity to train in more challenging environments in order to enhance their flight skills.

The landing sites we are requesting for consideration and usage permit in the Cleveland National Forest are:

CAL (MAL) Site 03BA: Lat: 33°47'54.69"N Long: 117°39'30.97"W
CAL (MAL) Site 04BA: Lat: 33°47'47.77"N Long: 117°37'23.35"W
CAL (MAL) Site 05BA: Lat: 33°47'43.95"N Long: 117°36'38.83"W
CAL (MAL) Site 06BA: Lat: 33°47'14.99"N Long: 117°35'0.69"
CAL Site ALT 06BA: Lat: 33°47'15.82"N Long: 117°34'51.49"W
CAL (MAL) Site 07BA: Lat: 33°45'45.43"N Long: 117°35'9.88"W
CAL (MAL) Site 08BA: Lat: 33°45'50.30"N Long: 117°33'56.11"W
CAL (MAL) Site 09BA: Lat: 33°45'4.81"N Long: 117°32'8.91"W
CAL Site ALT 09BA: Lat: 33°44'55.66"N Long: 117°32'3.85"W
CAL (MAL) Site 10BA: Lat: 33°43'48.81"N Long: 117°33'6.81"W
CAL (MAL) Site 11BA: Lat: 33°42'42.50"N Long: 117°33'56.61"W

The landing sites we are requesting for consideration and usage permit in the BLM El Centro Field Office are:

C1 Option	Lat: 32°53'53.6274"N	Long: 115°58'8.3994"W
Canary	Lat: 32°51'54.324"N	Long: 114°37'22.8"W
Canary Option	Lat: 32°52'7.9674"N	Long: 114°37'19.1994"W
Cupcake	Lat: 32°52'40.908"N	Long: 114°44'56.3994"W
Eider	Lat: 32°50'47.112"N	Long: 114°35'13.2"W
IP 1	Lat: 33°00'21.636"N	Long: 114°47'38.3994"W
IP 1 Option	Lat: 33°00'24.768"N	Long: 114°47'27.5994"W
ME1	Lat: 32°50'19.4994"N	Long: 114°32'31.2"W
ME3	Lat: 32°51'27.3594"N	Long: 114°30'36"W
MW4	Lat: 32°50'19.392"N	Long: 114°33'39.6"W
PC3	Lat: 32°59'11.004"N	Long: 114°50'5.9994"W
PC3 Option	Lat: 33°03'47.8794"N	Long: 114°50'5.9994"W
Pelican	Lat: 33°04'06.6714"N	Long: 114°49'51.6"W
PM3	Lat: 33°08'34.2234"N	Long: 114°47'2.4"W
Sparrow	Lat: 32°58'044.364"N	Long: 114°59'27.5994"W
MW1	Lat: 32°50'27.672"N	Long: 114°35'45.6"W

Enclosure (1)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road, Suite 101
Carlsbad, California 92011

In Reply Refer To:
FWS-MCBCP-11B0154-11SL0267

FEB 17 2011

Mr. Patrick L. Christman
Assistant Chief of Staff G-7
Regional Environmental and Governmental Affairs
Marine Corps Installations West
P.O. Box 555200
Camp Pendleton, California 92011

Subject: Request for Species List for the Proposed MV-22 and Rotary Wing Operations and Training on Non-Department of Defense Lands in Orange, Riverside, and Imperial Counties, California

Dear Mr. Christman:

This letter is in response to your request, received January 24, 2011, for a list of federally endangered, threatened, and proposed species potentially present in the vicinity of the above referenced project. To assist you in evaluating the potential occurrence of federally listed endangered, threatened, proposed, and candidate species and their critical habitat that may occur in the vicinity of the area identified, we are providing the enclosed list.

The primary mission of the U.S. Fish and Wildlife Service (Service) is to "work with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people." Specifically, the Service administers the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*), and provides support to other Federal agencies in accordance with the provisions of the Fish and Wildlife Coordination Act. Section 9 of the Act prohibits the "take" (e.g., harm, harassment, pursuit, injury, kill) of federally listed wildlife. Take incidental to otherwise lawful activities can be permitted under the provisions of section 7 (Federal consultations) and section 10 (private permits) of the Act.

We do not have on-the-ground site-specific information for this area. Therefore, we recommend that an assessment of the actual potential for direct, indirect, and cumulative impacts likely to result from the proposed study be conducted by a biologist directly familiar with the habitat conditions and associated species in and around the study area.

Please contact the California Department of Fish and Game for State-listed and other sensitive species that may occur in the area of the project. State-listed species are protected under the provisions of the California Endangered Species Act. Rare plant species that may occur in the

TAKE PRIDE® IN AMERICA

project area are included in the California Native Plant Society's (CNPS) inventory of rare and endangered vascular plants in California. State-listed and CNPS species require full consideration under the California Environmental Quality Act.

Should you have any questions regarding the species list provided, or your responsibilities under the Act, please contact Fish and Wildlife Biologist Peter Beck of my staff at (760) 431-9440, extension 213.

Sincerely,

for Karen A. Goebel
Assistant Field Supervisor

Enclosure

Federally Endangered, Threatened, Proposed, and Candidate Species that May Occur in the Vicinity of Orange County, California

January 27, 2011

Common Name	Scientific Name	Federal Status[1]
Plants		
Braunton's milk-vetch	*Astragalus brauntonii*	endangered, CH
Ventura marsh milk-vetch	*Astragalus pycnostachyus* var. *lanosissimus*	endangered, CH
thread-leaved brodiaea	*Brodiaea filifolia*	threatened, CH
salt marsh bird's beak	*Chloropyron maritimum* var. *maritimum*	endangered
San Fernando Valley spineflower	*Chorizanthe parryi* var. *fernandina*	candidate
Santa Monica Mountains dudleya	*Dudleya cymosa* subsp. *ovatifolia*	threatened
Laguna Beach live-forever	*Dudleya stolonifera*	threatened
Santa Ana River woolly-star	*Eriastrum densifolium* subsp. *sanctorum*	endangered
Gambel's watercress	*Rorippa gambellii*	endangered
big-leaved crown beard	*Verbesina dissita*	threatened
Invertebrates		
San Diego fairy shrimp	*Branchinecta sandiegonensis*	endangered, CH
Quino checkerspot butterfly	*Euphydryas editha quino*	endangered, CH
Riverside fairy shrimp	*Streptocephalus woottoni*	endangered, CH
Fish		
Santa Ana sucker	*Catostomus santaanae*	threatened, CH
tidewater goby	*Eucyclogobius newberryi*	endangered, CH
southern steelhead	*Oncorhynchus mykiss*	endangered

Federally Endangered, Threatened, Proposed, and Candidate Species that May Occur in the Vicinity of Orange County, California

January 27, 2011

Common Name	Scientific Name	Federal Status[1]
Amphibians		
arroyo toad	*Anaxyrus californicus*	endangered, CH
California red-legged frog	*Rana draytoni*	threatened, CH
Birds		
western snowy plover	*Charadrius alexandrinus nivosus*	threatened, CH
yellow-billed cuckoo	*Coccyzus americanus*	candidate
southwestern willow flycatcher	*Empidonax traillii extimus*	endangered, CH
short-tailed albatross	*Phoebastria albatrus*	endangered
coastal California gnatcatcher	*Polioptila californica californica*	threatened, CH
light-footed clapper rail	*Rallus longirostris levipes*	endangered
California least tern	*Sternula antillarum browni*	endangered
least Bell's vireo	*Vireo bellii pusillus*	endangered, CH
Mammals		
southern sea otter	*Enhydra lutris nereis*	threatened
Pacific pocket mouse	*Perognathus longimembris pacificus*	endangered

[1] CH – Designated Critical Habitat
PCH – Proposed Critical Habitat

Federally Endangered, Threatened, Proposed, and Candidate Species that May Occur in the Vicinity of Riverside County, California

January 27, 2011

Common Name	Scientific Name	Federal Status[2]
Plants		
Munz's onion	*Allium munzii*	endangered, CH
San Diego ambrosia	*Ambrosia pumila*	endangered, CH
Braunton's milk-vetch	*Astragalus brauntonii*	endangered, CH
Coachella Valley milk-vetch	*Astragalus lentiginosus* var. *coachellae*	endangered, CH
triple-ribbed milk-vetch	*Astragalus tricarinatus*	endangered
San Jacinto Valley crownscale	*Atriplex coronata* var. *notatior*	endangered, CH
Nevin's barberry	*Berberis nevinii*	endangered, CH
thread-leaved brodiaea	*Brodiaea filifolia*	threatened, CH
Vail Lake ceanothus	*Ceanothus ophiochilus*	threatened, CH
slender-horned spineflower	*Dodecahema leptoceras*	endangered
Santa Ana River woolly-star	*Eriastrum densifolium* subsp. *sanctorum*	endangered
Parish's daisy	*Erigeron parishii*	threatened, CH
San Diego button celery	*Eryngium aristulatum* var. *parishii*	endangered
spreading navarretia	*Navarretia fossalis*	threatened, CH
California Orcutt grass	*Orcuttia californica*	endangered
Brand's phacelia	*Phacelia stellaris*	candidate
Hidden Lake bluecurls	*Trichostema austromontanum* subsp. *compactum*	threatened
Invertebrates		
vernal pool fairy shrimp	*Branchinecta lynchi*	Threatened, CH
Casey's June beetle	*Dinacoma caseyi*	endangered, PCH

Federally Endangered, Threatened, Proposed, and Candidate Species that May Occur in the Vicinity of Riverside County, California

January 27, 2011

Common Name	Scientific Name	Federal Status[2]
Quino checkerspot butterfly	*Euphydryas editha quino*	endangered, CH
Delhi Sands flower-loving fly	*Rhaphiomidas terminatus abdominalis*	endangered
Riverside fairy shrimp	*Streptocephalus woottoni*	endangered, CH
Fish		
Santa Ana sucker	*Catostomus santaanae*	threatened, CH
desert pupfish	*Cyprinodon macularius*	endangered, CH
bonytail chub	*Gila elegans*	endangered, CH
Colorado squawfish	*Ptychocheilus lucius*	endangered, CH
razorback sucker	*Xyrauchen texanus*	endangered, CH
Amphibians		
arroyo toad	*Anaxyrus californicus*	endangered, CH
desert slender salamander	*Batrachoseps aridus*	endangered
California red-legged frog	*Rana draytoni*	threatened, CH
mountain yellow-legged frog	*Rana muscosa*	endangered, CH
Reptiles		
desert tortoise	*Gopherus agassizii*	threatened, CH
flat-tailed horned lizard	*Phrynosoma mcallii*	prop. threatened
Coachella Valley fringe-toed lizard	*Uma inornata*	threatened, CH
Birds		
mountain plover	*Charadrius montanus*	threatened
yellow-billed cuckoo	*Coccyzus americanus*	candidate
southwestern willow flycatcher	*Empidonax traillii extimus*	endangered, CH
coastal California gnatcatcher	*Polioptila californica californica*	threatened, CH

Federally Endangered, Threatened, Proposed, and Candidate Species that May Occur in the Vicinity of Riverside County, California

January 27, 2011

Common Name	Scientific Name	Federal Status[2]
Yuma clapper rail	*Rallus longirostris yumanensis*	endangered
California least tern	*Sternula antillarum browni*	endangered
least Bell's vireo	*Vireo bellii pusillus*	endangered, CH
Mammals		
San Bernardino kangaroo rat	*Dipodomys merriami parvus*	endangered, CH
Stephens' kangaroo rat	*Dipodomys stephensi*	endangered
Peninsular bighorn sheep	*Ovis canadensis nelsoni*	endangered, CH
Palm Springs ground squirrel	*Spermophilus tereticaudus chlorus*	candidate

[2] CH – Designated Critical Habitat
PCH – Proposed Critical Habitat

Federally Endangered, Threatened, Proposed, and Candidate Species that May Occur in the Vicinity of Imperial County, California

January 27, 2011

Common Name	Scientific Name	Federal Status[3]
Plants		
Peirson's milk-vetch	*Astragalus magdalenae var. peirsonii*	threatened, CH
Fish		
desert pupfish	*Cyprinodon macularius*	endangered, CH
bonytail chub	*Gila elegans*	endangered, CH
Colorado squawfish	*Ptychocheilus lucius*	endangered, CH
razorback sucker	*Xyrauchen texanus*	endangered, CH
Reptiles		
desert tortoise	*Gopherus agassizii*	threatened, CH
flat-tailed horned lizard	*Phrynosoma mcallii*	prop. threatened
Birds		
mountain plover	*Charadrius montanus*	threatened
yellow-billed cuckoo	*Coccyzus americanus*	candidate
southwestern willow flycatcher	*Empidonax traillii extimus*	endangered, CH
Yuma clapper rail	*Rallus longirostris yumanensis*	endangered
California least tern	*Sternula antillarum browni*	endangered
least Bell's vireo	*Vireo bellii pusillus*	endangered, CH
Mammals		
Peninsular bighorn sheep	*Ovis canadensis nelsoni*	endangered, CH

[3] CH – Designated Critical Habitat
PCH – Proposed Critical Habitat

September 27, 2011

U.S. Fish and Wildlife Service.
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road,
Carlsbad, CA 92011

ATTN: Ms. Pete Sorensen

RE: Notification to conducted focused presence/absence surveys for the desert tortoise on the Bureau of Land Management Lands Imperial County, CA for the MV22 and Rotary Wing Training Environmental Assessment.

Dear Mr. Sorensen,

This letter serves as AMEC Earth & Environmental, Inc. (AMEC)/Science Applications International Corporation (SAIC) formal notification of our intention to conduct focused presence/absence surveys for the desert tortoise (*Gopherus agassizii*) on 17 proposed helicopter landing zones (LZ) collectively referred to as the "El Centro Landing Sites" (See attached map). The surveys will be conducted starting October 3, 2011 in accordance with the *2010 Field Season Pre-project Field Survey Protocol for Potential Desert Tortoise Habitats* (USFWS 2010). Surveyors will be led by myself and Nathan Moorhatch of AMEC, and supported byTara Schoenwetter and Debra Barringer of SAIC.

Respectfully,

Michael D. Wilcox
Wildlife Biologist / Ecologist
AMEC
Earth & Environmental, Inc.
3120 Chicago Avenue, Suite 110, Riverside, CA 92507, USA
Tel 1+ (951) 369-8060, Fax 1+ (951) 369-8035
Direct 1+ (951) 369-8060 x 105, Mobile 1+ (951) 634-9765
michael.wilcox@amec.com
amec.com

SAIC

Ms. Susie Tharratt
Recovery Permit Coordinator
U.S. Fish and Wildlife Service
Ecological Services, Carlsbad Field Office
6010 Hidden Valley Road Suite 101
Carlsbad, California 92011

12 March 2012

Re: Notification of Initiation of Surveys for Federally-listed Coastal California Gnatcatcher Surveys on Cleveland National Forest at Trabuco Ranger District, Orange County, California for the Rotary Wing and Tilt-Rotor Training Operations on Public Lands Environmental Assessment.

Dear Ms. Tharratt,

This letter serves as Science Applications International Corporation (SAIC) formal notification of our intention to conduct U.S. Fish and Wildlife Service (USFWS) protocol surveys for federally-listed coastal California gnatcatcher (*Polioptila californica californica*) at Cleveland National Forest, in the Trabuco Ranger District.

Marine Corps Installations/WEST (MCIWEST) is initiating consultation for a project that would allow the United States Marine Corps (USMC) to continue rotary wing aircraft (helicopter) training on non-Department of Defense (DoD) lands within southern California, as well as introducing tilt-rotor aircraft training on those lands. USMC rotary wing aircraft training currently occurs on public lands managed by the United States Forest Service (USFS) Cleveland National Forest (CNF) (Trabuco Ranger District). Protocol surveys for federally-listed coastal California gnatcatcher (*Polioptila californica californica*) would be conducted at CNF Landing Zone Site 3 in eastern Orange County, California and is located in Black Star Canyon along the western slopes of the Santa Ana mountains (U.S. Geological Survey 7.5-minute series, Black Star Canyon topographic quadrangle) (Figure 1). More specifically, Site 3 occurs at an elevation of 2,044 feet and is approximately 0.5 acres in size, with a total area of about 13.0 acres, including surrounding 350 ft. radius buffer area (potential impact area).

Surveys will be conducted by biologist Brian Karpman (Permit number- 810768); SAIC biologist Tara Schoenwetter will assist with surveys under the direct supervision of the above listed permitted individual. The surveys will be conducted starting March 21, 2012 in accordance with the *Coastal California Gnatcatcher (Polioptila californica californica) Presence/Absence Survey Guidelines* (Guidelines) (USFWS 1997). Survey results will be sent to the USFWS within 45 days of completion.

Please contact me via phone (714) 454-7784 or email icarus816@msn.com, if you have any questions or concerns regarding this notification.

Respectfully submitted,

Brian Karpman
101 Eucalyptus Lane
Costa Mesa, California 92627
Tel: (714) 454-7784

Ken H. Osborne (permit #TE837760-7)
6675 Avenue Juan Diaz,
Riverside, CA 92509
(951) 360-6461

March 26, 2012

Attn: Ms. Susie Tharratt,
USFWS Carlsbad Field Office
6010 Hidden Valley Road, Suite 101
Carlsbad, CA 92011

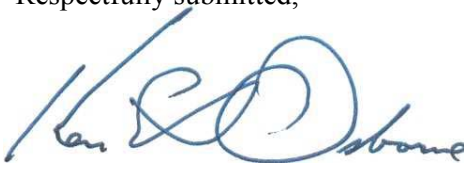
RE: Quino Checkerspot Butterfly Survey being undertaken for six sites of proposed Military Aircraft Landing Zones, Santa Ana Mountains, Cleveland National Forrest.

Dear Ms. Tharratt,

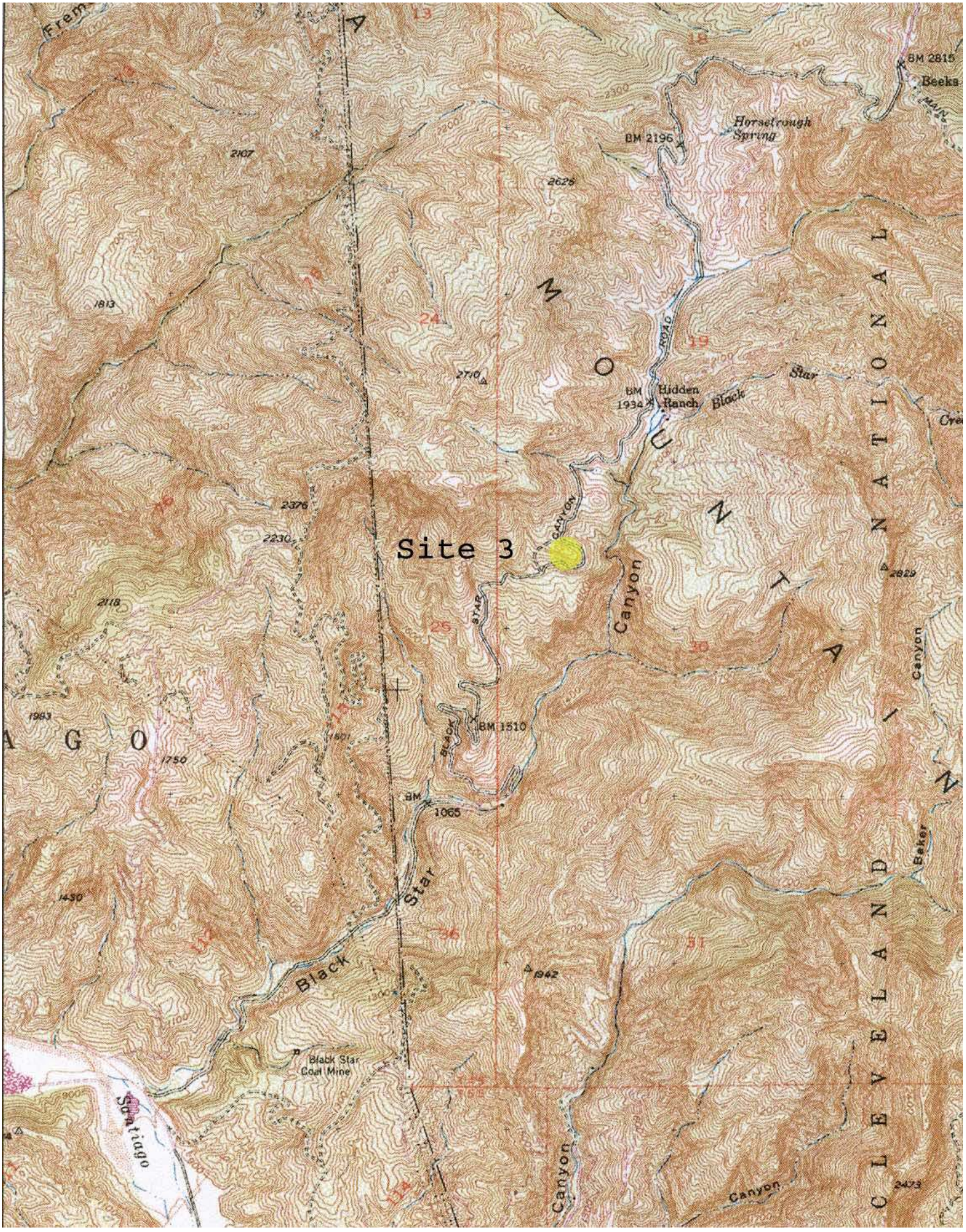
I write and inform you of protocol, focused adult Quino Checkerspot Butterfly (QCB) surveys I am undertaking for this year in the Santa Ana Mts., Cleveland National Forest for the Marine Corps Installations/WEST (MCIWEST) rotary wing and tilt-rotor training operations on public lands Environmental Assessment (EA). Six proposed Military Landing Zone Sites (for Helicopters) are distributed along ridgelines in northern portions of the Santa Ana Mts., in Riverside and Orange Counties, ranging in elevation from 2,044 feet to nearly 4,000 feet. Each of the sites (including surrounding buffer areas) encompasses approximately 10 to 13 acres.

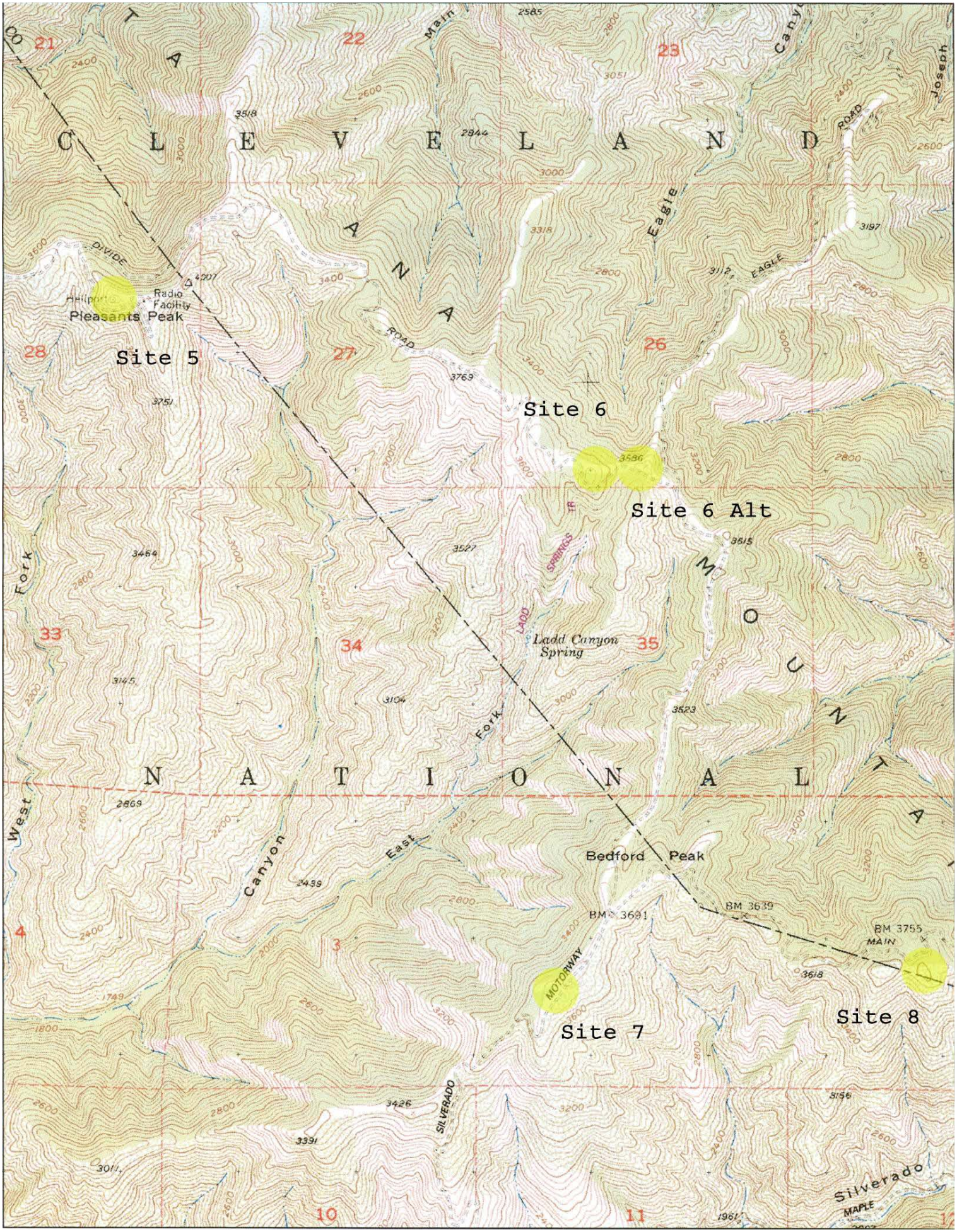
I am undertaking these surveys on behalf of Endemic Environmental Services /Science Applications International Corporation (SAIC). On March 18, 2012, I visited six proposed Landing Zone Sites, identified as “Site 3”, “Site 5”, “Site 6”, “Site 6 Alt.”, “Site 7”, and “Site 8” on the attached maps (Black Star Canyon, CA, and Corona South, CA, USGS Topographic maps at 100%) to be surveyed for QCB specifically in order to 1) evaluate site potential(s) for occurrence of QCB; and 2) in order to undertake preliminary site evaluations consistent with and pursuant to the USFWS prescribed QCB survey protocol. I found *Plantago erecta* south of Site 3, (lowest elevation of the sites). Of the remaining sites(5, 6, 6 Alt., 7, and 8), all are of elevations between 3,500 and 4,000 feet, contextually situated within chaparral communities where the QCB host plant *Cordylanthus rigidus* is present on at least two sites. Habitats on, or in the vicinity of all these sites, have the potential to support QCB in the context of the “high” elevation ecology of the butterfly, where QCB phenology is typically a month behind the low elevation populations. All sites represent potential hilltopping areas for QCB.

Respectfully submitted,



Ken H. Osborne


Site 3
Horsetrough Spring
Hidden Ranch
Black Star Canyon
Black Star Canyon Road
Black Star Coal Mine
Beeks
Baker
Canyon
Santiago
MOUNTAINS
CLEVELAND NATIONAL
BM 2196
BM 1934
BM 1510
BM 1065
BM 2815
2625
2710
2376
2230
2118
1983
1801
1750
1430
1942
2829
2473


Site 5
Site 6
Site 6 Alt
Site 7
Site 8
CLEVELAND
NATIONAL
FOREST
Pleasants Peak
Radio Facility
Heliport
Bedford Peak
Ladd Canyon Spring
Eagle
Main
Joseph
Divide
Road
Fork
West
East
Canyon
Motorway
Silverado
Maple
BM 3691
BM 3639
BM 3755
3586
3527
3523
3464
3145
3104
3426
3391
3769
3751
3518
2844
2585
3051
3197
3112
2869
2439
1749
3156
3618
3615

Begin forwarded message:

From: Crysta Dickson <crysta100@cox.net>
Date: April 4, 2012 8:24:03 PM PDT
To: "susie_tharratt@fws.gov" <susie_tharratt@fws.gov>
Cc: "bnerhus@gmail.com" <bnerhus@gmail.com>
Subject: Modification to notice to begin CAGN surveys, Blackstar Cyn, Cleveland Nat'l Forest, OC, CA

Hello Susie,
Attached is a 15 day notice previously sent to you to begin CAGN surveys for a site in Blackstar Cyn, Cleveland National Forest, Orange County, CA. Due to unexpected circumstances, Brian Karpman will not be able to conduct the surveys. We would like to modify the the notice to include myself as the permitted biologist (TE-067347-4) conducting the surveys. Biologists Tara Schoenwetter and Barry Nerhus will assist and be under my direct supervision during all surveys. I would also like to modify the schedule to begin surveys starting Friday, April 13, 2012. All other conditions under the notification will remain the same. Please feel free to contact me if there are any questions.

Thank you,
Crysta Dickson
949.292.7135
Crysta100@cox.net

UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS WEST-MARINE CORPS BASE
BOX 555010
CAMP PENDLETON, CALIFORNIA 92055-5010

)90
NV/DIR
G 6 2012

Mr. Jim Bartel
Field Supervisor
USFWS Carlsbad Field Office
6010 Hidden Valley Road
Carlsbad, CA 92009

Attention: Jonathan Snyder

Dear Mr. Bartel:

SUBJECT: REQUEST FOR INFORMAL CONSULTATION IN SUI RT OF ROTARY WING/TILT-ROTOR HELICOPTER TRAINING OPERATIONS ON NON-DEPARTMENT OF DEFENSE LANDS

On behalf of the United States Marine Corps (USMC), Marine Corps Installations West-Marine Corps Base (MCIWEST-MCB), Camp Pendleton (CAMPEN), requests an informal consultation with the United States Fish and Wildlife Service (USFWS) in support of Rotary Wing and Tilt-Rotor (MV-22) Helicopter Training Operations on non-Department of Defense (DoD) lands, as described below. A Biological Assessment and associated survey reports for the Proposed Action are provided in enclosure (1).

Project activities will occur at twenty-three landing zones (LZs), located on the Bureau's of Land Management (El Centro Field Office) and the United States Forest Service's (Cleveland National Forest) lands (enclosure (2)). Twenty-three federally listed species and one candidate specie for listing were evaluated based on an initial assessment of species distribution and availability of suitable habitat. MCIWEST-MCB CAMPEN determined that the Proposed Action will *Not Effect* twenty of the twenty-four species, and *May Affect, Not Likely to Adversely Affect,* four of the twenty-four species (enclosure (3)).

Description of the Action

The purpose of the proposed action is to introduce the MV-22 Osprey tilt-rotor aircraft into military aviation training and to continue military aviation training on non-DoD lands within southern California which have previously been used by the USMC

for approximately 40 years. The continued use of public lands by USMC helicopter squadrons is needed to develop and sustain critical pilot skills that meet USMC standards for pilot certification, safety, combat effectiveness, and combat survivability. Current DoD installations and ranges are able to fulfill most training mission requirements, however, they do not offer the full range of variability needed to simulate real world conditions and often experience crowded airspace conditions. Therefore, continued use of non-DoD lands, particularly public lands, by USMC helicopter squadrons, inclusive of MV-22s, is critical and crucial for the quality, variety, and quantity of training to maintain military readiness.

The Proposed Action involves landing and takeoff operations at specified LZs. The USMC does not propose new construction, modifications, or improvements at any of the twenty-three selected LZs (enclosure (1)). Typical practice landing and takeoff operations consist of a low level approach to an LZ to allow the pilot to visually inspect the area and select a specific landing site within the LZ that is free of all obstacles (e.g., uneven terrain, tall vegetation, etc.), as well as civilians (e.g., recreational users). The pilot lands the aircraft only when the area is determined to be safe. This type of training enables pilots and flight crews to identify an LZ, transition into an appropriate approach, land, and then subsequently take off in a variety of weather conditions (i.e., rain, cross-winds, cloud cover, etc.) and in different types of terrain. Rotary wing and tilt-rotor aircraft landing gear typically touch the ground in three or four contact points, with each contact no more than one square foot distance from each other. Other impacts of aircraft landing and takeoff operations include engine noise and rotor-induced downwash of ground sediment, as described in the enclosed Biological Assessment (enclosure (4)). The aircrafts involved with this undertaking include various helicopters (AH-1W/Z, UH-1N/Y, CH-53E) and the MV-22 tilt-rotor Osprey aircraft. The CH-46E aircraft would continue to use these same LZs until such time as they are fully replaced by the MV-22 Osprey (projected for not later than 2018).

Pilots will be restricted to landing at the selected LZs listed in enclosure (1). Training would not include ground maneuvers (i.e., no trucks or people on the ground), refueling operations, the use of flares or ordnance, or the need for any type of construction. Pilots will use pre-flight briefing materials illustrating permissible landing sites and will use precision navigation systems to follow the landing restrictions listed in the briefing materials.

Aircraft operations will primarily originate from Marine Corps Air Station (MCAS) Miramar and MCAS Camp Pendleton in California. Operations may also originate out of MCAS Yuma in Arizona, especially during large training exercises. Aircrafts will fly along normal departure routes from an airfield and then along established routes to reach a general LZ area. While transitioning to the LZs from an airfield, helicopters will usually fly between 1,000 to 2,000 feet above ground level, while the tilt-rotor aircraft usually will fly between 8,000 to 12,000 feet above ground level, similar to a turboprop airplane.

Summary of the Biological Assessment

The USFWS reports 87 federally listed wildlife species (with some overlaps by counties) having the potential to occur within Riverside, Imperial, and Orange counties, which encompass the project areas. A number of species can be removed from consideration because there is no potential for the species to exist in the project area, based on a lack of minimal habitat requirements (such as beach, marine, and perennial river species). Twenty-three federally listed threatened or endangered species and one candidate specie were then carried forward and initially evaluated for having the potential to occur within the two regions of proposed action activities (enclosure (2)). The twenty-four species were further evaluated. Based on the lack of known occurrences and suitable habitat, results of project-specific biological surveys, and project sites being outside known range of many species, only four species – the California gnatcatcher (*Polioptila californica californica*), Quino checkerspot butterfly (*Euphydryas editha quino*), thread-leaved brodiaea (*Brodiaea filifolia*), and desert tortoise (*Gopherus agassizii*) – have the

FOR OFFICIAL USE ONLY

potential to occur within or in the vicinity of the proposed project LZs. No critical habitat for these species occurs within or immediately adjacent to the twenty-four LZs.

Coastal California gnatcatcher has the potential to occur in the vicinity of only one LZ in the Cleveland National Forest (LZ Site 3). Direct effects resulting in injury or mortality to the California gnatcatcher are unlikely because of the limited amount of high quality habitat, potential for the species to occur at an LZ that is higher than this species known elevation range, and negative results from the 2012 protocol surveys. However, indirect effects such as the addition of noise, dust, and other disturbance that may cause a startle or flight response has the potential to occur at LZ Site 3, if gnatcatchers should be present in the area.

The Quino checkerspot butterfly has the potential to occur on six LZs in the Cleveland National Forest (LZ Site 3, LZ Site 5, LZ Site 6, LZ Site 6 Alt, LZ Site 7 and LZ Site 8). Direct effects resulting in injury or mortality to the Quino checkerspot butterfly are unlikely considering known occurrences coupled with the history of Quino checkerspot butterflies being absent from the area, and negative results provided from the 2012 protocol surveys. Quino checkerspot butterflies are not expected to occur in or near the proposed LZs. However, the LZs represent potential hilltopping venues for the Quino checkerspot butterfly and the presence of host plants (e.g., rigid bird's beak [*Cordylanthus rigidus*] and Chinese houses [*Collinsia concolor*]) provide suitable habitat. Project implementation will have no adverse effects on vegetation or other habitat components and, therefore, would have no direct effects to the Quino checkerspot butterfly. If Quino checkerspot butterflies are occasional visitors to the area, indirect effects such as the expected temporary noise and dust disturbance that will occur at the LZs and buffers will not be anticipated to adversely affect the species.

Thread-leaved brodiaea has the potential to occur only in the vicinity of one LZ in Cleveland National Forest (LZ Site 3). Thread-leaved brodiaea survey results from 2011 and 2012 were negative. Project implementation will have no adverse effects

on vegetation or other habitat components and, therefore, will have no direct effects on thread-leaved brodiaea. For thread-leaved brodiaea occurrences that may be in the project vicinity, indirect effects such as temporary exposure to dust that may occur during intermittent operations will not adversely affect the species.

Potential direct effects on desert tortoise that may result from the proposed action include direct mortality of individuals in the rare event of a tortoise's presence during a training operation with inability to escape or crushing of burrows. Indirect impacts such as noise and dust may cause a startle response due to aircraft landing, low-altitude hovering, and takeoff operations. Anticipated effects of the proposed action will be temporary, if at all, affect only individuals of listed species, and are not likely to reach the level of injury or mortality, except in very rare instances. It is not expected that any population exposed to proposed aircraft operations will be measurably affected.

Therefore, "Proposed Action" impacts may affect but are unlikely to adversely affect listed species or their suitable habitat within or near project LZs. Consequently, the USMC has determined that the Proposed Action would not jeopardize the continued existence or recovery of any federally listed species potentially occurring in the project area.

If we can provide any additional information or clarification to facilitate this informal consultation, please contact me at (760) 725-3561 or Mr. Zak Likins at (760) 763-7948, or zachery.likins@usmc.mil.

Sincerely,

S. W. NORQUIST
Director
Environmental Security
By direction of the
Commanding General

FOR OFFICIAL USE ONLY

5090
ENV/DIR
AUG 6 2012

Enclosures:
1. General Biological Resources Survey Report with Appendices (General Biological Resources Survey Report, Cleveland National Forest LZs; General Biological Resources Survey Report, Bureau of Land Management, El Centro LZs)
2. Table 1: Size and Location of Proposed LZs
3. Table 2: Listed Species and Summary of Potential Effects/USMC Determination
4. Biological Assessment with Appendices (Survey Report for Quino Checkerspot Cleveland National Forest; Survey Report for Thread-leaved Brodiaea,Cleaveland National Forest; Survey Report for Coastal California Gnatcatcher, Cleveland National Forest; Survey Report for Desert Tortoise, Bureau of Land Management, El Centro)

FOR OFFICIAL USE ONLY

TABLE 1: SIZE AND LOCATION OF PROPOSED LZs

LZ Site Name	*LZ Size (acres)*	*LZ and Buffer (acres)*	*Long DM*	*Lat DM*	*Long DD*	*Lat DD*	*Long DMS*	*Lat DMS*	*UTM X*	*UTM Y*
Cleveland National Forest LZs[1]										
3	0.3	12.9	117° 39.516'	33° 47.912'	-117.659	33.79853	117°39'30.97	33°47'54.69	439035	3740013
5	0.3	13.2	117° 36.647'	33° 47.732'	-117.611	33.79557	117°36'38.83	33°47'43.95	443461	3739657
6	0.1	10.6	117° 35.011'	33° 47.250'	-117.583	33.78754	117°35'0.69	33°47'14.99	445982.6	3738753
6 ALT	0.2	11.5	117° 34.858'	33° 47.264'	-117.581	33.78771	117°34'51.49	33°47'15.82	446207	3738770
7	0.3	12.5	117° 35.165'	33° 45.757'	-117.586	33.7626	117°35'9.88	33°45'45.43	445728.7	3735988
8	0.2	11.9	117° 33.935'	33° 45.838'	-117.566	33.76398	117°33'56.11	33°45'50.30	447624.8	3736130
9	0.1	10.4	117° 32.148'	33° 45.080'	-117.536	33.75135	117°32'8.91	33°45'4.81	450383.9	3734716
9 ALT	0.1	11.1	117° 32.064'	33° 44.928'	-117.534	33.74879	117°32'3.85	33°44'55.66	450503.5	3734431
10	0.1	11.2	117° 33.114'	33° 43.813'	-117.552	33.73024	117°33'6.81	33°43'48.81	448874.1	3732383
11	0.3	12.8	117° 33.944'	33° 42.708'	-117.566	33.71179	117°33'56.61	33°42'42.50	447581.6	3730344
BLM El Centro LZs[2]										
Bull	3.8	26.0	-115° 01.634'	33° 03.420'	-115.0272267	33.05700808	-115° 01' 38.02"	33° 03' 25.23"	684184.5	3659337
C1	1.8	20.4	-115° 58.167'	32° 53.896'	-115.9694455	32.8982760	-115° 58' 10.00"	32° 53' 53.79"	596382.6	3640480.7
Cupcake	2.0	20.4	-114° 44.896'	32° 52.681'	-114.7482759	32.87801945	-114° 44' 53.79"	32° 52' 40.87"	710658.1	3640012
Eider	5.9	35.8	-114° 35.193'	32° 50.747'	-114.5865456	32.8457840	-114° 35' 11.56"	32° 50' 44.82"	725874.0	3636771.9
IP1 Option	2.3	21.8	-114° 47.456'	33° 0.407'	-114.7909316	33.0067806	-114° 47' 27.35"	33° 0' 24.41"	706367.1	3654206.4
Mallard	1.8	24.0	-114° 43.402'	32° 52.154'	-114.7233669	32.8692252	-114° 43' 24.12"	32° 52' 09.21"	713010.0	3639086.9
ME3 Option	13.0	46.8	-114° 30.596'	32° 51.466'	-114.5099422	32.85776587	-114° 30' 35.79"	32° 51' 27.96"	733013.7	3638267
MW1	3.2	25.2	-114° 35.790'	32° 50.407'	-114.5965029	32.84010884	-114° 35' 47.41"	32° 52' 24.39"	724956.2	3636121
MW1 Option	5.4	33.2	-114° 35.808'	32° 50.490'	-114.5967936	32.84149827	-114° 35' 48.46"	32° 50' 29.39"	724925.4	3636275
PC3	0.8	16.6	-114° 40.117'	32° 59.299'	-114.6686150	32.9883110	-114° 40' 7.01"	32° 59' 17.92"	717841.6	3652405.0
Pelican	0.3	13.2	-114° 50.102'	33° 03.793'	-114.8350294	33.0632204	-114° 50' 06.11"	33° 03' 47.59"	702117.8	3660379
Sparrow	13.6	63.1	-114° 59.469'	32° 58.681'	-114.9911477	32.9780211	-114° 59' 28.13"	32° 58' 40.88"	687720.9	3650642.1
Wolf	31.0	73.0	-115° 54.640'	32° 49.640'	-115.9106736	32.8273336	-115° 54' 38.42"	32° 49' 38.40"	601960.6	3632670.8

Notes:

* Landing Zone (LZ), Decimal Minutes (DM), Decimal Degrees (DD), Degrees Minutes Seconds (DMS), and Universal Transverse Mercator (UTM) Zone 11N

[1]The datum for all coordinates is North American Datum 1983 (NAD 83).

[2]The datum for all coordinates is WGS84.

ENCLOSURE (2)

TABLE 2: LISTED SPECIES AND SUMMARY OF POTENTIAL EFFECTS / USMC DETERMINATION

Listed Species	*Federal Status*	*Effects Determination*	*Justification for Determination*
Cleveland National Forest Trabuco Ranger District LZs			
Coastal California gnatcatcher	FT	May Affect, Not Likely to Adversely Affect	Suitable habitat present in buffer area of one LZ (Site 3) in Cleveland National Forest. No occurrences of coastal California gnatcatchers reported during 2011 field surveys and protocol surveys conducted in 2012 . Because suitable habitat occurs in the vicinity, there is potential for coastal California gnatcatchers to occupy adjacent areas or travel through LZ Site 3.
Arroyo toad	FE	No Effect	No suitable habitat observed on or near LZs; suitable topography not present (drainages).
Stephens' kangaroo rat.	FE	No Effect	Not known to occur in the project vicinity; no suitable habitat observed.
Pacific pocket mouse	FE	No Effect	Not known to occur in the project vicinity; no suitable habitat observed.
California red-legged frog	FT	No Effect	Not known to occur in the project vicinity; no suitable habitat observed.
Sierra Madre yellow-legged frog	FE	No Effect	Not known to occur in the project vicinity; no suitable habitat observed.
Desert slender salamander	FE	No Effect	Not known to occur in the project vicinity; no suitable habitat observed.
San Diego fairy shrimp	FE	No Effect	No sign of vernal pool habitat observed or expected on or near LZs.
Riverside fairy shrimp	FE	No Effect	No sign of vernal pool habitat observed or expected on or near LZs.
Vernal pool fairy shrimp	FT	No Effect	No sign of vernal pool habitat observed or expected on or near LZs.
Santa Ana sucker	FT	No Effect	Not known to occur in the project vicinity; no suitable habitat observed.
Laguna Mountains skipper	FE	No Effect	Not known to occur in the project vicinity; no suitable habitat observed.
Quino checkerspot	FE	May Affect, Not Likely to Adversely Affect	Primary host plants were not present in project LZs; however, suitable habitat and alternative host plants are present on select LZs in the Cleveland National Forest. Some LZs represent potential hilltopping venues. No Quino checkerspot butterflies were recorded during protocol surveys conducted in 2012.
Munz's onion	FE	No Effect	Not known to occur in the project vicinity; no suitable habitat observed.
Santa Monica dudleya	FT	No Effect	Nearest known occurrence reported is 3 miles (5 km) west of LZ Site 11; no suitable habitat observed on or near LZs.
Thread-leaved brodiaea	FT	May Affect, Not Likely to Adversely Affect	Not known to occur in the project vicinity; only one LZ (Site 3) is within elevation range of this species and suitable habitat is present. Species not found during surveys conducted in 2011 and 2012.
BLM El Centro LZs			
Peninsular bighorn sheep	FE	No Effect	No suitable habitat within LZs, and no effects to suitable habitat expected.
Yuma clapper rail	FE	No Effect	Not known to occur in the project vicinity; no suitable habitat observed.
Desert tortoise	FT	May Affect, Not Likely to Adversely Affect	Suitable habitat and species present near some of the LZs; however, LZs not within critical habitat. Intermittent training operations are not likely to have an adverse effect on the population.
Desert pupfish	FE	No Effect	Not known to occur in the project vicinity; no suitable habitat observed.
Peirson's milk vetch	FT	No Effect	Not known to occur in the project vicinity; no suitable habitat observed.
Species that May Occur in Both Project Areas			
Southwestern willow flycatcher	FE	No Effect	No riparian habitat present in LZs; species may pass through during migration.
Western yellow-billed cuckoo	FC	No Effect	No riparian habitat present in LZs; species may pass through during migration.
Least Bell's vireo	FE	No Effect	No riparian habitat present in LZs; species may pass through during migration.
Notes: FT – federally listed as threatened; FE – federally listed as endangered; FC – a candidate for listing.			

ENCLOSURE (3)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road, Suite 101
Carlsbad, California 92011

In Reply Refer To:
FWS-OR/WRIV/IMP-11B0154-12I0526

SEP 04 2012

S.W. Norquist
Director, Environmental Security
United States Marine Corps
Marine Corps Installations West-Marine Corps Base
Box 555010
Camp Pendleton, California 92055-5010

Subject: Request for Section 7 Informal Consultation Regarding the Proposed Rotary Wing/Tilt-Rotor Helicopter Training Operations on Non-Department of Defense Lands, Orange, Riverside, and Imperial Counties, California

Dear Mr. Norquist:

This letter responds to your request and biological assessment dated and received August 6, 2012, regarding the potential effects of the proposed rotary wing/tilt-rotor helicopter training operations and potential impacts to the federally endangered Quino checkerspot butterfly (*Euphydryas editha quino*) and the federally threatened coastal California gnatcatcher (*Polioptila californica californica*), desert tortoise (*Gopherus agassizii*), and thread-leaved brodiaea (*Brodiaea filifolia*). In your letter and biological assessment, you concluded that the proposed project may affect, but is not likely to adversely affect these species and requested our concurrence with this determination in accordance with the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*).

The proposed project involves the use of 10 landing zones on the Trabuco Ranger District of the Cleveland National Forest and 13 on Bureau of Land Management (BLM) lands. The landing zones would be used by rotary wing and tilt-rotor aircraft including the Sea Knight (CH-46E), Super Stallion (CH-53E), Super Cobra (AH-1W), Viper (AH-1W), Huey (UH-1N), Venom (UH1Y), and Osprey (MV-22B). The proposed areas have been used as landing zones for these aircraft previously, except for the MV-22B. About 2,618 sorties are planned, which translates to over 16,000 individual landings. While transitioning to the landing zones, the rotary wing aircraft would fly between 1,000 to 2,000 feet above ground level, while the tilt-rotor aircraft would fly between 8,000 to 12,000 feet above ground level.

Quino Checkerspot Butterfly, Coastal California Gnatcatcher, and Thread-leaved Brodiaea

We concur that the Quino checkerspot butterfly, coastal California gnatcatcher, and thread-leaved brodiaea are not likely to be adversely affected by the proposed project. Appropriate habitat

assessments and surveys were completed in 2011 and 2012, and no occurrences of these species were observed in and around the proposed landing zones.

Desert Tortoise

Eleven of the 13 landing zones on BLM lands have desert tortoise suitable habitat. During surveys according to U.S. Fish and Wildlife Service protocol, desert tortoise were observed near two of the landing zones, and burrows or other sign were found at an additional three landing zones. The 11 zones that are suitable desert tortoise habitat are characterized by central areas of pavement, surrounded by washes or open creosote bush scrub (*Larrea tridentata*).

However, we concur that the desert tortoise is not likely to be adversely affected by the proposed project. The proposed landing zones have been used for several decades, and our field inspection of several landing zones found that the extent of surface disturbance from past landings is sufficiently minor that it is often difficult to detect. Since past use of these zones has not resulted in significant impacts to desert tortoise habitat and use of the MV-22B should not result in significant additional impacts, we do not anticipate that the proposed action would appreciably degrade the value of desert tortoise habitat in and around these sites. In addition, the potential for the collision with or crushing of a desert tortoise or its burrow is discountable. Desert tortoise burrows tend to be constructed in washes or under vegetation while the majority of the landing zones are pavement, and the footprint associated with the types of aircraft proposed for use is relatively small.

Should project plans change or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered. Please contact Jesse Bennett of this office at 760-431-9440, extension 305 or Nisa Marks of the Palm Springs Fish and Wildlife Office at 760-322-2070, extension 208 with any questions.

Sincerely,

Jonathan Snyder

for Karen A. Goebel
Assistant Field Supervisor

UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS WEST-MARINE CORPS BASE
BOX 555010
CAMP PENDLETON. CALIFORNIA 92055-5010

5090
ENV/DIR
21 Nov 12

Copy
Mailed 23 Nov 2012

Mr. Jim Bartel
Field Supervisor
U. S. Fish and Wildlife Service
Carlsbad Field Office
6010 Hidden Valley Road
Carlsbad, CA 92009
Attn: Jesse Bennett and/or Jonathan Snyder

Dear Mr. Bartel:

SUBJECT: PROPOSED ROTARY WING/TILT-ROTOR HELICOPTER TRAINING OPERATIONS ON NON-DEPARTMENT OF DEFENSE LANDS IN ORANGE AND RIVERSIDE COUNTIES, CALIFORNIA (FWS-OR/WRIV /IMP-11 BO 154-1210526).

The U.S. Forest Service, Cleveland National Forest (Forest Service), a Cooperating Agency on the above named Proposed Action has requested that the U. S. Marine Corps (Marine Corps) provide you with the following supplemental information. To that end, Marine Corps Installations West (MCIWEST)-MCB Camp Pendleton (MCBCAMPEN), on behalf of the Marine Corps, is transmitting the supplemental information listed below for your review regarding potential impacts for the Proposed Action on three (3) species; the federally endangered Quino checkerspot butterfly *(Euphydryas editha quino)*, the federally threatened coastal California gnatcatcher *(Polioptila californica californica)* and thread-leaved brodiaea *(Brodiaea filifolia)*.

Since your concurrence with our original determination on the subject Proposed Action (USFWS letter dated 04 September 2012), the Proposed Action has been modified to include dust abatement measures. In light of this supplemental information, we request this supplemental information, as highlighted below, be inserted into a revised Biological Assessment for the Proposed Action (FWS-OR/WRIV/IMP-11 BO 154-1210526) and a reconsideration of your analysis and determination of *"not likely to be adversely affected"*... as it relates to the above species:

Executive Summary

- Page ES-3, lines 13-19, the following text has been inserted. This will be a global change to all project documents (i.e., Environmental Assessment, Biological Assessment and Biological Evaluation), prepared for the Proposed Action, where appropriate.

  "The proposed action for National Forest System, Trabuco Ranger District lands includes implementation of dust abatement measures. These measures have yet to be described in detail, but are expected to consist of application of a dust palliative (e.g.,

semi-permanent glue-like materials) that will reduce the amount of dust mobilized and dispersed by aircraft operations. The Marine Corps will work with the Forest Service on selection of an appropriate material and on implementation of a suitable monitoring plan. Monitoring will ensure that the dust abatement measures are successful in reducing dust generation to a level that will not adversely affect the area surrounding the landing pads and ensure that the dust abatement practices themselves do not result in adverse effects on regulated resources."

- Page ES-4, lines 1-4, the language regarding "jeopardy" has been stricken, as jeopardy calls are only made by the U.S. Fish and Wildlife Service (USFWS). This will be a global change to all project documents (i.e., the Environmental Assessment, Biological Assessment and Biological Evaluation) prepared for the Proposed Action.

Proposed Action

- Page IIa-5, under description of proposed activity, after line 19, the following text has been inserted. This will be a global change to all project documents (i.e., Environmental Assessment, Biological Assessment and Biological Evaluation), prepared for the Proposed Action, where appropriate.

  "The proposed action for National Forest System, Trabuco Ranger District lands includes implementation of dust abatement measures. These measures have yet to be described in detail, but are expected to consist of application of a dust palliative (e.g., semi-permanent glue-like materials) that will reduce the amount of dust mobilized and dispersed by aircraft operations. The Marine Corps will work with the Forest Service on selection of an appropriate material and on implementation of a suitable monitoring plan. Monitoring will ensure that the dust abatement measures are successful in reducing dust generation to a level that will not adversely affect the area surrounding the landing pads and ensure that the dust abatement practices themselves do not result in adverse effects on regulated resources."

- Page IIa-5, line 40, the following text has been inserted:

  "The Special Use Permit would replace the 1972 MOU as the instrument authorizing land use and occupancy. At the request of the Forest Service, the USMC has temporarily ceased aviation operations under this document."

Measures Proposed to Avoid, Minimize and Compensate for Effects to Listed Species

- Page IIb, lines 1-3 have been replaced with the following text, as indicated above regarding a global change to the document:

"The proposed action for National Forest System, Trabuco Ranger District lands includes implementation of dust abatement measures. These measures have yet to be described in detail, but are expected to consist of application of a dust palliative (e.g.,

semi-permanent glue-like materials) that will reduce the amount of dust mobilized and dispersed by aircraft operations. The Marine Corps will work with the Forest Service on selection of an appropriate material and on implementation of a suitable monitoring plan. Monitoring will ensure that the dust abatement measures are successful in reducing dust generation to a level that will not adversely affect the area surrounding the landing pads and ensure that the dust abatement practices themselves do not result in adverse effects on regulated resources."

Description of Listed Species or Critical Habitat

- Page IV-5, lines 27-29, the Forest Service maintains that surveys for *Brodiaea filifolia* did not fully meet the survey protocol requirements set forth by USFWS and the Cleveland National Forest, and that plant surveys were conducted too early in the season and did not overlap with peak flowering times for this species on the Cleveland National Forest. Therefore, lines 27-29 have been replaced with the following text:

  "Surveys in 2011 and 2012 did not identify this species as present, but Brodiaea filifolia spends most of its life comprised only of underground parts. Above ground parts are present for only a few months out of the year typically following substantial spring rains and may not be present above ground every year, based on conditions. As a result, there is some chance for Brodiaea filifolia to be present within the 350 feet (107 meters) buffer of LZ Site 3 (the LZ itself does not support suitable habitat)."

Analysis of Effects

- Page V-4 and V-5, lines 21 (V-4) to 20 (V-5) in sections describing anticipated effects on Thread-leaved Brodiaea, California Gnatcatcher, and Quino Checkerspot Butterfly, the following text has been inserted for each species:

  "With inclusion of proposed mitigation measures for dust abatement, and monitoring of dust abatement effectiveness, exposure to dust would not be expected to adversely affect the species."

Persons and Agencies Contacted or Consulted

- Page VIII, Mary Thomas was contacted in May 2011 during the early stages of the project, however, she was not involved in the consultation effort, nor did she review the BA in its final form. At the request of the Forest Service, her name has been removed from this section.

General Consideration

- The BA will strike all statements regarding jeopardy and adverse modification of critical habitat, as these finding are made only by the USFWS for federally-listed species (p. ES-4, lines 1-4; page I-2, line 14; page V-6, Lines 6-8).

- On page IV-5, lines 27-29, the last sentence is revised to include the following text: "Surveys for *Brodiaea filifolia* did not fully meet the survey protocol requirements set forth by the Cleveland National Forest, as plant surveys were conducted too early in the season and did not overlap with the peak flowering times for this species on the Forest. Survey results, therefore, cannot be considered conclusive and it remains possible that *Brodiaea filifolia* may still be present at LZ3."

- On page V- 4 and V- 5, lines 21 (V-4) to 20 (V-5) in sections describing anticipated effects on thread-leaved brodiaea, California Gnatcatcher, and Quino Checkerspot Butterfly, the following text has been inserted for each species:

  " With inclusion of the proposed mitigation measures for dust abatement, and monitoring of dust abatement effectiveness, exposure to dust would not be expected to adversely affect the species."

Upon completion of the revisions identified above to all appropriate sections of the BA and related project documents, copies of the revised BA and related documents will be forwarded to your office for your records.

Please let me know if you have any questions, comments or concerns regarding the changes identified above for the Proposed Action, or if you need additional information beyond what is provided. Point of contacts are Mr. Zak Likins at (760)725-7948 or Mr. Charles Hamilton at (760)725-2635.

C. M. Hamilton
Deputy Director, G-7 GEA/REC
MCIWest-MCBCamPend

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road, Suite 101
Carlsbad, California 92011

In Reply Refer To:
FWS-OR/WRIV/IMP-11B0154-12I0526-R001

DEC 17 2012

C.M. Hamilton
United States Marine Corps
Marine Corps Installations West-Marine Corps Base Camp Pendleton
Box 555010
Camp Pendleton, California 92055-5010

Subject: Section 7 Informal Consultation Regarding the Proposed Rotary Wing/Tilt-Rotor Helicopter Training Operations on Non-Department of Defense Lands, Orange, Riverside, and Imperial Counties, California

Dear Mr. Hamilton:

This letter responds to your letter dated November 21, 2012, and received November 26, 2012, regarding the proposed rotary wing/tilt-rotor helicopter training operations. We had previously concurred in a September 4, 2012, letter that the proposed activities were not likely to adversely affect the federally endangered Quino checkerspot butterfly (*Euphydryas editha quino*) and the federally threatened coastal California gnatcatcher (*Polioptila californica californica*), desert tortoise (*Gopherus agassizii*), and thread-leaved brodiaea (*Brodiaea filifolia*) in accordance with the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*). You propose to add dust abatement measures and monitoring to the proposed action for project activities on the Cleveland National Forest. These changes will further avoid and minimize potential effects to federally listed species. Therefore, we continue to concur that the proposed action is not likely to adversely affect federally listed species as described in our September 4, 2012, letter.

Should project plans change or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered. Please contact Jesse Bennett of this office at 760-431-9440 extension 305 with any questions.

Sincerely,

for Karen A. Goebel
Assistant Field Supervisor

APPENDIX A-4

United States Forest Service

United States Department of Agriculture
Forest Service
Cleveland National Forest

Trabuco Ranger District
1147 East 6th Street
Corona, CA 92879-1616
(951) 736-1811
(951) 736-3002 FAX
CRS 1-800-735-2922

File Code: 2720
Date: January 31, 2012

Mr. Christopher E. Haskett
Real Estate Contracting Officer
Naval Facilities Engineering Command Southwest
1220 Pacific Highway
San Diego, CA 92132-5190

Dear Mr. Haskett:

This letter is a follow up to our meeting with you on January 12, 2012, regarding your Special Use Proposal dated December 20, 2010, which requests a Special Use Authorization for up to ten Landing Zones located on National Forest System lands on the Trabuco Ranger District of the Cleveland National Forest.

Your proposal meets Forest Service screening criteria regulations located at Title 36 CFR 251.54(e) (enclosed) for consideration as an application for the use and occupancy of National Forest System lands. In concept, we are accepting your proposal as an application. Your application will be subject to environmental analysis according to the provisions of the National Environmental Policy Act (NEPA). We will consider authorizing your proposal based on the findings of the NEPA analysis once it has been completed.

We are currently in the process of preparing an Interagency Agreement between the United States Marine Corps and the USDA Forest Service for funding of Forest Service personnel to continue to review your documentation, and process your request.

If you have any questions concerning this matter, please contact Becky Brand, Special Uses Administrator. She can be reached at (951) 736-1811 ext. 3222.

Sincerely,

KEITH W. FLETCHER
District Ranger

UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS WEST
BOX 555200
CAMP PENDLETON, CALIFORNIA 92055-5200

IN REPLY REFER TO:
G-7
3000
27 Feb 2012

Forest Supervisor, Cleveland National Forest
10845 Rancho Bernardo Road
Suite 200
San Diego, CA 92127

Dear Mr. Metz

Subject: INVITATION TO BE A COOPERATING AGENCY ON THE ENVIRONMENTAL ASSESSEMENT FOR THE "ROTARY WING AND TILT-ROTOR TRAINING OPERATIONS ON PUBLIC LANDS WITHIN SOUTHERN CALIFORNIA"

The U.S. Marine Corps (USMC) is in the process of preparing an Environmental Assessment (EA) for a proposed "Rotary Wing and Tilt-Rotor Training Operations on Public Lands within Southern California in Riverside, Orange and Imperial Counties, California."

The purpose of the proposed action is to facilitate the continued Rotary Wing and Tilt Rotor Aircraft Landing and Take Off operations on U.S. Department of Agriculture (USDA) Forest Service and Bureau of Land Management (BLM) managed lands. The proposed areas on the Cleveland National Forest and BLM El Centro management areas have been used for approximately 40 years by USMC helicopters. The use of these public lands managed under your responsibility are needed to continue to develop critical pilot skills by achieving and maintaining specific operational training that is required to meet USMC training standards for certification. This training simultaneously provides enhanced skills that are paramount for safe flying operations and combat survivability. There is one action alternative and a no-action alternative proposed in the EA. The alternatives are as follows:

a. Alternative 1 - Under this alternative, USMC aviation would continue existing rotary wing flight activity in the Cleveland National Forest and on BLM El Centro managed lands, except that CH-46 E sorties would decline over time and would be replaced by MV-22B sorties. This alternative would require the

Cleveland National Forest, Trabuco Ranger District to issue a Special Use Permit to support military activities consistent with the 1988 Master Agreement between the Department of Defense and the USDA.

b. No-Action Alternative - Under the No Action Alternative, no rotary wing or tilt-rotor operations would occur on public lands managed by the Cleveland National Forest and the BLM El Centro Field Office.

In accordance with 40 CFR § 1501.6 of the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provision of the National Environmental Policy Act (NEPA), the USMC requests that your agency become a cooperating agency due to the special expertise, knowledge, and experience that your agency possesses. We believe that your participation as a cooperating agency would serve the mutual interests of both of our agencies, provide closer communication, and be perceived more favorably by the general public.

As a cooperating agency, the Forest Service has the right to expect that the EA will enable you to discharge your jurisdictional responsibilities and communicate much more readily with the Marine Corps if any procedures or obligations are not being adhered to.

The Marine Corps expects that at the end of the process that the EA will satisfy Forest Service NEPA requirements including those related to project alternatives, environmental consequences and mitigation. Further, the Marine Corps intends to use the EA and, if appropriate, the subsequent Finding of No Significant Impact, as decision-making documents and as the basis for a Special Use Permit application to utilize designated, approved Landing Zones per the permit.

The Marine Corps recommends that the roles and responsibilities of the Forest Service in the development of the above EA project should include the following as they relate to your area of expertise:

- Provide meaningful and early input to reflect the views and concerns of your agency on the adequacy of the document, alternatives considered, and the anticipated impacts and mitigation;

- Participate in coordination meetings as appropriate;

- Provide timely review and comment on project documents and supporting information;

- Provide updated mailing lists of stakeholders in Affected National Forest or other Federal land to the USMC for soliciting input and distributing the scoping letter, and the Draft and Final EA and Finding of No Significant Impact as required by law;

- Review and provide input to the Notice of Availability of the EA, before publication in appropriate periodicals;

- Prepare a scoping letter for USMC to mail, on behalf of the Forest Service, to stakeholders in a mailing list provided by the Forest Service. Letters shall be on Forest Service letterhead and shall be signed by an Authorized Forest Service Officer;

- If needed, reserve the right to prepare, at its option, selected sections of the Draft and/or Final EA; as appropriate, the Forest Service will provide such prepared material in a time and manner consistent with the agreed upon schedule;

- To the extent that the Scenic Integrity Objectives or any other aspects of any Cleveland National Forest Land Management Plan may preclude, or are potentially inconsistent with, the proposed action, the Forest Service will identify such potential inconsistencies at the beginning of the NEPA process, and shall collaborate with the USMC to ensure that sufficient information is collected during the course of the environmental review process to propose mitigation designed to meet plan objectives, or allow the Forest Service to amend its current Land Management Plan to remove such inconsistencies and allow the proposed action to be carried forward.

- Should the decision be made to authorize the project, this letter will serve as the continuing cooperative agreement between the USMC and the Forest Service to prepare and process the Special Use Permit.

In consideration of the above, the Marine Corps shall be responsible for the following activities:

- Comply with NEPA and all other applicable laws, executive orders, regulations, and direction, including, but not limited to, the CEQ Regulations (40 CFR Parts 1500-1508), Forest Service Regulations (36 CFR Part 220) Forest Service Manual 1950, and Forest Service Handbook § 1909.15;

- Have sole responsibility for all costs incurred by both parties pursuant to the proposed action;

- Be responsible for conducting joint public hearings, if necessary;

- Be responsible for consulting with the U.S. Fish and Wildlife Service and the California State Historic Preservation Officer regarding the proposed action;

- Cooperate in defense of any appeal and/or suit involving the legality or adequacy of the Forest Service's or USMC's compliance with NEPA with regard to the environmental analysis;

- Provide all graphic handouts and presentations for public meetings, if any are needed. The USMC shall submit any such graphic presentations and/or handouts to the Forest Service for approval before distributing them at public meetings, and shall be responsible for all stenographic, clerical, graphics, layout, printing, and like work;

- Mail out scoping letters and other correspondence on behalf of the Forest Service, and arrange for publication of notices as required by the NEPA process; Assist the Forest Service in responding to comments on public scoping and outreach;

- Provide the draft Environmental Assessment (EA) for Review by the Forest Service, incorporate Forest Service comments, submit for public review and comment, respond to

comments; incorporate substantive comments in the draft EA, and complete a final EA for Forest Service review. The final EA will describe any mitigation measures between Federal plans or laws as they pertain to the proposed action and describe the extent to which the Forest Service would reconcile the proposed action;

- Have primary responsibility for writing and rewriting all sections, parts, and chapters of the EA, and as lead Federal agency, be responsible for ensuring compliance with all applicable federal laws, executive orders, regulations and direction;

- Be responsible for the scope and content of the EA;

- Provide timely and accurate additional information that the Forest Service requests to process the EA and if approved, the permit application.

- Provide documents requested by the Forest Service that can be reasonably obtained.

- Provide to the Forest Service agreed upon completed proposed activity descriptions necessary to complete the EA. This will include, but is not limited to, maps and descriptions of all improvements and landing zones for which authorization is sought.

Additionally, both parties shall attempt to resolve any disputes at the lowest level. If these disagreements cannot be readily resolved at the project manager level, the issues will be referred in writing to the Forest Supervisor for resolution (with a copy provided to both parties). If there is still no resolution at this level, coordination with the Regional Forester and MCIWEST Commanding General will be the next step to resolve the issue if ever required.

The USMC desires to make a decision on the proposed action by the end of July 2012. Both Parties will attempt to meet this timeframe. Attached to this letter is a draft schedule, which is intended to serve as a template for the actual schedule to complete the environmental review and permit process. Each agency shall undertake their best efforts to comply with all deadlines set forth in said schedule.

3000
G-7
27 February 2012

My point of contact in these matters is Charles (Mike) Hamilton, Charles.hamilton@usmc.mil, Deputy Director, G-7 Regional Environmental Coordination and Governmental External Affairs, at (760)725-2635.

We look forward to your response and to working with you and your staff on this important endeavor and formally request that your agency become a cooperating agency for this action.

Patrick L. Christman
Assistant Chief of Staff G-7
By direction of the Commanding General

Enclosure: (1) MV-22 Timeline/Proposed Schedule for Environmental Assessment

Rotary Wing/Tilt-Rotor Training Operations on Public Lands
TIMELINE / PROPOSED SCHEDULE FOR ENVIRONMENTAL ASSESSMENT

-Identification/Concurrence of LZ locations and Basic Project (including MCI West Description Elements Initial Coordination with USFS and BLM)	COMPLETE
-Final LZ List (confirmation on Cleveland LZs & final scrub of BLM LZs)	COMPLETE
-USMC submits Special Use Permit Application	COMPLETE
-Operational Training Data Collection	COMPLETE
-Draft Description of Project Action and Alternatives (DOPAA) & Identify Data Gaps	COMPLETE
-Revised DOPAA	COMPLETE
-USMC Review Preliminary EA v1	COMPLETE
-USMC Review Preliminary Draft EA v2	COMPLETE
-USFS accepts Special Use Permit Application	COMPLETE
-USFS Scoping Period (30 days)	15 MAR to 15 APR
-USFS Analysis and Review of Scoping Comments Period (10 days)	23 APR to 30 APR
-SHPO Concurrence (30 days)	4 APR to 4 MAY
-Tribal Consultation Letters Mailed	15 APR
-Initiate Section 7 Consultation with U.S. Fish and Wildlife Service (Formal or Informal TBD)	16 APR to 18 JUN
-USMC and USFS Review Preliminary Draft EA v3 (Screen check)	16 APR to 4 MAY
-USFS and USMC incorporate scoping issues into the Draft EA (Timeframe approximate dependant on comments received)	1 MAY to 11 MAY
-BA/BE Preparation	IN PROGRESS
-Last Revisions / Print PUBLIC DRAFT EA	7 MAY to 18 MAY
-Publication of NOA for Public Draft EA	18 MAY to 20 MAY
-Public Review and Comment Period of Draft EA (30 days)	21 MAY to 18 JUN

Rotary Wing/Tilt-Rotor Training Operations on Public Lands
TIMELINE / PROPOSED SCHEDULE FOR ENVIRONMENTAL ASSESSMENT

-Public Meetings (3 days)	29 to 31 JUN
-Final EA & FONSI (assuming informal Sect 7 consultation)	JUL 2012
-Signed FONSI	AUG 2012
-USFS Public Appeal Period (45 days)	SEPT 2012
-Publication of FONSI NOA ***IF NO APPEALS	SEPT 2012
-EA for Cleveland and El Centro LZs ALL ACTIONS COMPLETED	SEPT 2012

USDA United States Department of Agriculture
Forest Service
Cleveland National Forest SO
10845 Rancho Bernardo Rd.
Suite 200
San Diego, CA 92127-2107
(858) 673-6180
(858) 673-6192 FAX
(800) 735-2922 CRS

File Code: 2700
Date: March 26, 2012

Patrick L. Christman
Assistant Chief of Staff G-7
USMC
Marine Corps Installations West
Box 555200
Camp Pendleton, CA 92055-5200

Dear Mr. Christman:

Thank you for your correspondence of February 27, 2012 regarding the above subject matter. I apologize for the delay in responding back to you.

The Cleveland National Forest (CNF) accepts your offer to become a Cooperating Agency on this project with the US Marine Corps.

I would like to clarify roles and responsibilities on a couple of items addressed in your correspondence:

The CNF requests to be actively involved with all US Marine Corps consultation activities associated with the US Fish and Wildlife Service and California State Historic Preservation Office. Our mutual involvement will be an asset in moving this process forward.

The Environmental Assessment is the document that will be used by a Forest Service Line Officer to make a final decision on the proposed project, so it is important that the document meets the intent and needs of the CNF.

Thank you for ensuring that our staffs are working closely together through all phases of this proposed project.

If you have any questions regarding this matter, please contact Jake Rodriguez, Recreation and Land Staff Officer, Trabuco Ranger District, at (951) 736-1811, Ext 3275.

Sincerely,

Carla M Joseph
Acting for:
WILLIAM METZ
Forest Supervisor

cc: Keith W Fletcher, Jacob F Rodriguez, Steve Eastwood, Debra S Hobbs, Gloria Silva

APPENDIX A-5

State Historic Preservation Officer

UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS WEST-MARINE CORPS BASE CAMP PENDLETON
BOX 555200
CAMP PENDLETON, CALIFORNIA 92055-5200

IN REPLY REFER TO:
3000
G-7
24 Jul 2012

Mr. M. Wayne Donaldson
State Historic Preservation Officer
California Department of Parks and Recreation
1725 23rd Street, Suite 100
Sacramento, CA 95816

Subj: SECTION 106 NATIONAL HISTORIC PRESERVATION ACT CONSULTATION – ROTARY WING AND TILT-ROTOR TRAINING OPERATIONS ON PUBLIC LANDS WITHIN SOUTHERN CALIFORNIA

Dear Mr. Donaldson,

Marine Corps Installations West-Marine Corps Base Camp Pendleton (MCIWEST-MCB CAMPEN) is initiating consultation in accordance with 36 Code of Federal Regulations (CFR) 800, regulations implementing Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended (16 Untied States Code [USC] 470-470x-6) for a project that would allow the United States Marine Corps (USMC) to continue rotary wing aircraft (helicopter) training on non-Department of Defense (DoD) lands within southern California, as well as introducing tilt-rotor aircraft training on those lands. This includes continued aircraft training on public lands managed by the United States Forest Service (USFS) Cleveland National Forest (Trabuco Ranger District) and the Bureau of Land Management (BLM) El Centro Field Office (Figure 1).

Section 106 Process

Regarding proposed training operations on USFS lands, the USFS will follow procedures set forth in the 1996 *Programmatic Agreement Among the United States Department of Agriculture Forest Service, Pacific Southwest Region, California State Historic Preservation Office (SHPO), and Advisory Council on Historic Preservation Regarding the Process for Compliance with Section 106 of the NHPA for Undertakings on the National Forests of the Pacific Southwest Region*. As per the Programmatic Agreement, the proposed undertaking on USFS lands may be implemented without further review or consultation with SHPO because no historic properties will be affected and the undertaking can be implemented without the adoption of management measures to protect historic properties (Section D.2 of the Programmatic Agreement). Therefore, the remainder of this consultation letter focuses on the Section 106 process for the proposed training operations on BLM managed lands.

MCIWEST is providing the following information for the proposed training operations on BLM managed lands to comply with Section 106 of the NHPA: (a) description of the proposed undertaking, (b) proposed Area of Potential Effects (APE), (c) identification of historic properties, and (d) MCIWEST's finding that the subject undertaking will cause "no adverse effects" to National Register of Historic Places (National Register) – eligible properties.

Description of the Proposed Undertaking

The purpose of the proposed undertaking is to allow continued military aviation training operations on non-DoD lands within southern California that have previously been used for approximately 40 years by Marine Corps helicopters. The types of aircraft involved with this undertaking include various helicopters (AH-1W/Z, UH-1N/Y, CH-53E, and CH-46E) as well as the recently acquired Osprey tilt-rotor (MV-22) aircraft. The use of these public lands by USMC helicopter and MV-22 squadrons is needed to develop and sustain critical pilot skills that meet USMC standards for certifications, safety, combat effectiveness, and combat survivability. Current DoD installations and ranges are able to fulfill most mission requirements, but they do not offer the full variability needed to simulate real world conditions and often experience crowded airspace conditions. Therefore, continued use of non-DoD lands is critical to the quality, variety, and quantity of training and the ability of USMC aviation to maintain readiness.

The project involves landing and takeoff operations at specified "landing zones" (LZs) (Table 1; Figures 1 - 2). No new construction or improvements are proposed at any LZ. Pilots would be restricted to landing only within the designated LZs listed in Table 1. Pilots would be provided with briefing materials for each LZ showing where they can land, and would use their precision navigation systems to follow the landing restrictions listed in the briefing materials.

Typical practice landing and takeoff operations consist of a low level approach to the LZ to allow a pilot to visually inspect the area and select a specific landing site that is free of all obstacles (e.g., uneven terrain) and civilians (e.g., recreational users). The pilot lands the aircraft only when the area is determined safe. This type of training enables pilots and flight crews to identify an LZ, transition into an appropriate approach, land, and then subsequently take off in a variety of weather conditions (i.e., rain, cross-winds, cloud cover, etc.) and in different types of terrain. Training would not include ground maneuvers (i.e., no trucks or people on the ground), refueling operations, the use of flares or ordnance, or the need for any type of construction. Rotary wing and tilt-rotor aircraft landing gear typically touch the ground in three or four contact points, with each contact no more than one foot square. Other impacts of aircraft landing and departing include engine noise and rotor-induced downwash of ground sediment. The potential effects of downwash are described further below under *Area of Potential Effects*.

Aircraft operations would primarily originate from Marine Corps Air Station (MCAS) Miramar and MCAS Camp Pendleton in California. Operations may also originate out of MCAS Yuma in Arizona, especially during large training exercises. Aircraft would fly along normal departure routes from an airfield and then along established routes to reach a general LZ area. While transitioning to the LZs from an airfield, helicopters usually would fly between 1,000 to 2,000 feet above ground level, while the tilt-rotor aircraft usually would fly similar to a turboprop airplane between 8,000 to 12,000 feet above ground level.

Area of Potential Effects

In accordance with 36 CFR 800.4(a)(1), MCIWEST has established the APE for the proposed undertaking. The APE includes all areas of potential ground disturbance from hovering and/or landing operations at 13 designated LZs on lands managed by the BLM El Centro Field Office (Table 1; Figures 3 - 14). For the proposed undertaking, the APE for each of the LZs were individually shaped and sized, mostly due to the unique geography of each location. The LZ, itself, consists of a "use area" or "landing area" where all proposed aircraft landings would occur. Each LZ also has a buffer area that extends 350

feet in all directions due to potential rotor wash issues (see below); no aircraft landings or any other training activity would take place within the buffer area. The APE, therefore, includes both the LZ and the buffer area (see Table 1).

Although no new construction or improvements are proposed at any LZ, ground disturbance from hovering and landing of aircraft could occur due to dust and debris being scattered and becoming airborne from aircraft rotor wash. Downdraft (and outwash) forces, collectively known as rotor wash, are relative to the engine power settings and the aircraft's proximity to the ground. Rotor wash from the MV-22, which would be greater than most medium- and heavy-lift helicopters (e.g., CH-46 and CH-53), would reach 50 knots at a distance of 150 feet from the aircraft when hovering at 20 feet above ground level. The outwash velocities would rapidly diminish very near the ground surface. As a result, rotor wash from an aircraft during landing, takeoff, and hovering operations immediately above the ground may disturb archaeological artifacts lying on the surface in the immediate vicinity of the hovering aircraft, although the extent of this disturbance would depend on local soil characteristics, topography, presence of vegetation, and size/weight of artifacts. To account for this rotor wash, the APE includes a 350-foot buffer area around each LZ. The 350-foot buffer area was based on the Navy Program Office's review of existing rotor wash information for the MV-22, and is consistent with the approach used for the *West Coast Basing and Operation of the MV-22 Osprey* project. For Native American sensitive resources, the APE is the same as described above (i.e., LZ plus the 350-foot buffer area).

MCIWEST requests SHPO agreement on our identification of the APE.

Identification of Historic Properties

In accordance with 36 CFR 800.4(a)(2)&(3) and 800.4(b)&(c), MCIWEST has completed record searches at the appropriate Information Center of the California Historical Resources Information System and has conducted a Class III intensive field survey to identify the presence of historic properties within the APE. A copy of the survey report (SAIC 2011), along with associated site record form is enclosed with this letter on a CD. A paper copy can be forward if required.

The field survey covered 23 proposed LZs (SAIC 2011). The results of the survey led to the documentation of 37 newly recorded archaeological sites and 3 previously recorded archaeological sites. The 40 archaeological sites consist of the following:

- Seven prehistoric trails or trail complexes;
- One snake geoglyph;
- Twenty-two rock cairns or rock alignments;
- Six small prehistoric lithic scatters;
- One prehistoric lithic scatter with a stacked rock feature;
- One historic slaughter house; and
- Two historic-era mining claim markers.

As described below under *Finding of Effect*, 10 of the 23 LZs were subsequently dropped from further consideration due to potential impacts on archaeological resources and are no longer part of the proposed undertaking. The following summary provides information on archaeological sites associated with the 13 LZs that are still under consideration.

There are no archaeological sites or isolates within any of the 13 landing zones, but there are 23 archaeological sites located within the buffer zone (see Figures 3 – 14). Of these 23 sites, three are recommended as eligible for inclusion on the National Register based on survey observations, and five are recommended as not eligible for inclusion on the National Register. The three sites recommended as eligible for listing on the National Register under Criterion D are prehistoric trail sites (CA-IMP-11649, CA-IMP-11665, and CA-IMP-11667), which may provide information on prehistoric and ethnohistoric Native American culture history, trail usage, transport, and symbolic behavior. An additional 15 sites consisting of rock cairns and rock alignments may represent trail markers, shrines, hunting blinds, or mark the locations of prehistoric burials or places of traditional cultural importance, but this cannot be verified without further study. These 15 sites are considered eligible for inclusion on the National Register under Criterion D for the purposes of determining effect. Therefore, 18 sites within the APE are considered historic properties for the purposes of determining effect.

MCIWEST requests SHPO agreement on the recommendations regarding National Register eligibility described in the survey report noted above. We also solicit any comments you have regarding our efforts to seek information and identify historic properties within the APE.

Finding of Effect

As noted above under *Identification of Historic Properties*, the archaeological field survey (SAIC 2011) investigated 23 proposed LZs. As part of this survey effort, a site-by-site analysis was conducted to determine potential adverse effects on archaeological sites recommended as or considered eligible for inclusion in the National Register. Based on this analysis, recommendations were provided for each LZ regarding the need for avoidance measures, such as potential redesign of an LZ and/or possible removal of an LZ from further consideration. Based on these recommendations and coordination with BLM and interested Indian tribes, the USMC subsequently dropped ten LZs from further consideration (Canary, Canary Option, IP1, ME1, ME1 Option, ME3, MW4, MW4 Option, PC3 Option, and PM3). Of the remaining 13 LZs, the layout of LZs Eider and ME3 Option was reconfigured to minimize impacts on nearby archaeological sites (see Figures 6 and 9).

The result of these measures is that no archaeological sites or isolates are located within any of the 13 landing zones, and 18 archaeological sites considered historic properties are located within the buffer area. The 15 eligible rock cairn/rock alignment sites are located between 200 to 350 feet from aircraft landing and takeoff operations within a landing zone. It is unlikely that rotor wash from aircraft operations would adversely affect these sites at this distance because the sites are composed of heavy rocks that would not be easily dislodged.

Regarding the three prehistoric trail sites, LZ Eider was redesigned to ensure operations are at least 150 feet from the recorded site boundary of CA-IMP-11649 (prehistoric trail site), while operations are at least 260 feet from the recorded site boundary of CA-IMP-11667 (prehistoric trail site). Please note the site boundaries for trail sites included a 65-foot width buffer on either side of the trail, so proposed operations would actually be at least 215 feet from the prehistoric trail associated with CA-IMP-11649 and at least 330 feet from the prehistoric trail associated with CA-IMP-11667. It is unlikely that rotor wash from aircraft operations would adversely affect these types of sites at this distance. Additionally, LZ ME3 Option was slightly redesigned to ensure that all operations would occur within a modern borrow pit that has been disturbed from prior excavations to a depth of 10 to 15 feet. Although CA-IMP-

11665 (prehistoric trail site) is recorded adjacent to this LZ, all of the cultural features associated with the site are located on the plateau above the borrow pit and, therefore, would be protected against much of the rotor wash associated with operations within the borrow pit. With the implementation of these avoidance and minimization measures, MCIWEST has found that the proposed undertaking would have no adverse effect on recorded historic properties within the APE.

In accordance with 36 CFR 800.5, MCIWEST requests SHPO agreement on our finding of no adverse effect.

Consultation

Indian Tribe Consultation. MCIWEST, in cooperation with BLM and USFS, initiated consultation with non-federally recognized Indian tribes subject to 36 CFR 800.3(f) (consulting parties) and federally recognized Indian tribes affiliated with lands involved in this undertaking (Table 2). The purpose, pursuant to 36 CFR 800.3(f)(2), is to determine if they (the Tribes) have any religious or cultural interest in the lands involved with the proposed undertaking. Seventy-two letters were sent in April 2012 to initiate the consultation process. These were followed up by ohone calls to the Tribal Offices. To date, responses have been received by the Quechan Indian Tribe, Cocopah Indian Tribe, Cabazon Band of Mission Indians, Soboba Band of Luiseño Indians, Rincon Band of Luiseño Indians, and Agua Caliente Band of Cahuilla Indians. MCIWEST has conducted one coordination telephone call with the Cocopah and two government-to-government meetings with the Quechan in addition to multiple email communications with these two tribes. The Cocopah tribe has no further questions and the Quechan Indian Nation is in the processes of final review of material we provided to them at a 9 July 2012 meeting.

Public Outreach per the National Environmental Policy Act. Pursuant to 36 CFR 800.3(e), the USMC, in cooperation with the USFS, is preparing an Environmental Assessment (EA) with regards to this undertaking. The USFS issued public scoping letters in March 2012 for a 30-day scoping period that ended on 15 April 2012; there were no comments received in response to the scoping letters. The Draft EA is currently being circulated for review and comment to government agencies, local organizations, tribal Nations, and interested private citizens for 30 days (2 July through 31 July 2012), and public meetings are being held in local southern California communities on 17 and 25 July 2012.

MCIWEST will provide follow-up information to SHPO regarding the above consultation and outreach efforts. Please provide any comments you have regarding our planned efforts to identify all potential consulting parties and gather information as outlined in 36 CFR 800.3(f) and 800.4(a)(4).

If you have any questions, please contact Mr. Charles (Mike) Hamilton at 760-725-2635; charles.hamilton@usmc.mil.

Sincerely,

Patrick L. Christman
Assistant Chief of Staff G-7
Marine Corps Installations West-
Marine Corps Base Camp Pendleton

Attachments: Tables 1 and 2
Figures 1 - 14
Enclosure: BLM El Centro Survey Report (SAIC 2011)

Copy to: BLM El Centro Field Office

Table 1. Size and Location of Proposed LZs on BLM Managed Lands

LZ Site Name	*LZ Size (acres)*	*APE Size (LZ and buffer) (acres)*	*Long DM*	*Lat DM*	*Long DD*	*Lat DD*	*Long DMS*	*Lat DMS*	*UTM X*	*UTM Y*
Bull	3.8	26.0	-115° 01.634'	33° 03.420'	-115.0272267	33.05700808	-115° 01' 38.02"	33° 03' 25.23"	684184.5	3659337
C1	1.8	20.4	-115° 58.167'	32° 53.896'	-115.9694455	32.8982760	-115° 58' 10.00"	32° 53' 53.79"	596382.6	3640480.7
Cupcake	2.0	20.4	-114° 44.896'	32° 52.681'	-114.7482759	32.87801945	-114° 44' 53.79"	32° 52' 40.87"	710658.1	3640012
Eider	5.9	35.8	-114° 35.193'	32° 50.747'	-114.5865456	32.8457840	-114° 35' 11.56"	32° 50' 44.82"	725874.0	3636771.9
IP1 Option	2.3	21.8	-114° 47.456'	33° 0.407'	-114.7909316	33.0067806	-114° 47' 27.35"	33° 0' 24.41"	706367.1	3654206.4
Mallard	1.8	24.0	-114° 43.402'	32° 52.154'	-114.7233669	32.8692252	-114° 43' 24.12"	32° 52' 09.21"	713010.0	3639086.9
ME3 Option	13.0	46.8	-114° 30.596'	32° 51.466'	-114.5099422	32.85776587	-114° 30' 35.79"	32° 51' 27.96"	733013.7	3638267
MW1	3.2	25.2	-114° 35.790'	32° 50.407'	-114.5965029	32.84010884	-114° 35' 47.41"	32° 52' 24.39"	724956.2	3636121
MW1 Option	5.4	33.2	-114° 35.808'	32° 50.490'	-114.5967936	32.84149827	-114° 35' 48.46"	32° 50' 29.39"	724925.4	3636275
PC3	0.8	16.6	-114° 40.117'	32° 59.299'	-114.6686150	32.9883110	-114° 40' 7.01"	32° 59' 17.92"	717841.6	3652405.0
Pelican	0.3	13.2	-114° 50.102'	33° 03.793'	-114.8350294	33.0632204	-114° 50' 06.11"	33° 03' 47.59"	702117.8	3660379
Sparrow	13.6	63.1	-114° 59.469'	32° 58.681'	-114.9911477	32.9780211	-114° 59' 28.13"	32° 58' 40.88"	687720.9	3650642.1
Wolf	31.0	73.0	-115° 54.640'	32° 49.640'	-115.9106736	32.8273336	-115° 54' 38.42"	32° 49' 38.40"	601960.6	3632670.8

Notes:

* Area of Potential Effects (APE), Landing Zone (LZ), Decimal Minutes (DM), Decimal Degrees (DD), Degrees Minutes Seconds (DMS), and Universal Transverse Mercator (UTM) Zone 11N
The datum for all coordinates is WGS84.

Table 2. Federally and Non-Federally Recognized Indian Tribes Included in the Consultation Process

Agua Caliente Band of Cahuilla Indians
Ak-Chin Indian Community
Augustine Band of Cahuilla Mission Indians
Barona Band of Mission Indians
Cabazon Band of Mission Indians
Cahuilla Band of Mission Indians
Campo Band of Mission Indians
Campo Kumeyaay Nation
Chemehuevi Indian Tribe
Cocopah Indian Tribe
Colorado River Indian Tribes
Colorado River Reservation
Ewiiaapaayp Band of Kumeyaay Indians
Fort McDowell Yavapai Nation
Fort Mojave Indian Tribe
Fort Yuma Indian Reservation – Quechan Tribe
Gila River Indian Community
Iipay Nation of Santa Ysabel
Inaja/Cosmit Reservation
Jamul Indian Village
Juaneño Band of Mission Indians
Kumeyaay Cultural Historic Committee
Kumeyaay Cultural Repatriation Committee
Kwaaymii Laguna Band of Mission Indians
La Jolla Band of Luiseño Indians
La Posta Band of Mission Indians
Los Coyotes Band of Cahuilla and Cupeño Indians
Manzanita Band of Mission Indians
Mesa Grande Band of Mission Indians
Morongo Band of Mission Indians
Pala Band of Mission Indians
Pauma Band of Luiseño Indians
Pechanga Band of Luiseño Indians
Quechan Cultural Committee
Ramona Band of Cahuilla Indians
Rincon Band of Mission Indians
Salt River Pima-Maricopa Indian Community
San Luis Rey Band of Luiseño Indians
San Luis Rey Band of Mission Indians
San Manuel Band of Mission Indians
San Pasqual Band of Diegueño Indians
Santa Rosa Band of Cahuilla Mission Indians
Santa Ysabel Band of Diegueno Indians
Soboba Band of Luiseño Indians
Sycuan Band of the Kumeyaay Nation
Tohono O'odham Nation
Torres-Martinez Desert Cahuilla Indians
Twentynine Palms Band of Mission Indians
Viejas Band of Kumeyaay Indians

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
1725 23rd Street, Suite 100
SACRAMENTO, CA 95816-7100
(916) 445-7000 Fax: (916) 445-7053
calshpo@parks.ca.gov
www.ohp.parks.ca.gov

October 03, 2012

Reply in Reference To: USMC120802A

Patrick L. Christman
Assistant Chief of Staff, G-7
Marine Corps Installations West-Marine Corps Camp Pendleton
United States Marine Corps
Box 555200
Camp Pendleton, CA 92055-5200

Re: Section 106 National Historic Preservation Act Consultation – Rotary Wing and Tilt-Rotor Training Operations on Public Lands within Southern California (3000, G-7, 24 Jul 2012)

Dear Mr. Christman:

Thank you for requesting my comments on the above cited undertaking in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended, and the implementing regulations found in 36 CFR Part 800; and Stipulations V.A., V.B., and V.C. of the *Programmatic Agreement Among the United States Marine Corps, The Arizona and California State Historic Preservation Officers, and the Advisory Council on Historic Preservation Regarding the Process for Compliance with Section 106 of the National Historic Preservation Act for West Coast Basing and Operation of the MV-22 Osprey,* dated March 17, 2010 (PA). Although the submission by the USMC for this proposed undertaking does not reference the PA, I have reviewed that submission pursuant to Stipulation I.A. of the PA. That Stipulation states "This PA applies to all activities associated with training, readiness, and special exercise operations of the West Coast Basing of the MV-22 Osprey …"

The proposed undertaking will allow the United States Marine Corps (USMC) to continue rotary wing aircraft (i.e., helicopters) training on public lands managed by the Bureau of Land Management in southern California, as well as introducing tilt-rotor aircraft (i.e., MV-22 Osprey) training on those lands. Thirteen landing zones (LZ) have been identified and grouped into 12 areas of potential effects (APE) [two of the LZs – MW1 and MW1 Option are adjacent to each other and have been grouped into one APE]. Since both the helicopters and MV-22 Ospreys are vertical take-off and landing aircraft, downdraft from the aircraft during landing, take-offs, and hovering immediately above the ground may disturb artifacts lying on the surface of the ground in the immediate area of the LZs. For the proposed undertaking, the APE for each of the LZs were individually shaped and sized, mostly due to the unique geography of each location. The LZ, itself, consists of the "use area" or "landing area", where all proposed aircraft landings and take-offs would occur. Each LZ also has a buffer area that extends 350 feet in all directions from the LZ to minimize the potential effect that downdraft could have on artifacts lying on the surface. The 350-foot buffer area was based on the Navy Program Office's review of existing rotor wash information for the MV-22 Osprey and is consistent with the provisions of the MV-22 Osprey PA cited above. Each of the 12 APEs consists of a LZ and its buffer area.

Rotary wing and tilt-rotor aircraft landing gear typically touch the ground at three or four contact points, with each contact point being no more than one foot square in size. The purpose of the proposed undertaking is to allow the pilots and flight crews to become proficient in the landing and take-off of the

aircrafts in various terrains (ranging in elevation from 161 to 1,952 feet above mean sea level), and in a variety of weather conditions. In each of the APEs, the proposed undertaking would not include ground maneuvers (e.g., vehicles or people on the ground), refueling operations, the use of flares or ordnance, or the need for any type of construction. Aircraft operations would primarily originate from Marine Corps Air Station (MCAS) Miramar and MCAS Camp Pendleton in California, although they also may originate out of MCAS Yuma located in Arizona, especially during large training operations.

Initially there were 23 proposed landing zones, containing 739.8 acres, that were surveyed by Science Applications International Corporation (SAIC) over 11 days during two five-days periods from 10-14 May 2010 and 18-22 October 2010, and a one-day survey of LZ Wolf APE on 26 April 2011. After analyzing the results of that survey, USMC selected the 13 LZs that are included in this proposed undertaking. The other 10 proposed LZs were dropped from further consideration due to potential impacts on archaeological resources. Collectively the 13 LZs contain a total of 512.1 acres, ranging in size from 13.5 to 104 acres (with the median being 27.8 acres). The pedestrian survey identified 26 archaeological sites and 10 isolates as being located in or adjacent to the 12 APEs. Of those 26 sites, 25 were new and 1 was a previously recorded archaeological site. You included in your letter the report prepared by SAIC in September 2011 of the archaeological survey of the APEs. In Attachment 1, I have prepared a summary of SAIC's findings, descriptions of the current conditions of those sites, and USMC's determination of eligibility of 20 sites for listing on the National Register of Historic Places (NRHP). For the purpose of this submission, USMC's recommendations for NRHP's eligibility are based on the analysis of their pedestrian surveys, archival research, and literature review. It has not completed any formal Determinations of Eligibility pursuant to 36 CFR Parts 60 and 63.

The USMC conducted a site by site analysis to determine potential adverse effects on archaeological sites recommended or considered to be eligible for listing on the National Register of Historic Places (NRHP). Each of the 13 LZs included in this proposed undertaking were designed so that none of the identified archaeological sites or isolates are located in a LZ. All of the archaeological sites and isolates, discussed in Attachment 1, are located in a buffer zone and not inside of a LZ. Consequently, each of those archaeological sites and isolates are located at least 200 feet away from the aircraft landing and takeoff operations within any of the LZs. USMC has concluded that it is unlikely that rotor wash from aircraft operations would adversely affect the archaeological sites or isolates at that distance. The use of buffer zones to minimize any effect on the archaeological sites and isolates is consistent with Section 1.c of Attachment F of the PA – Standard Resource Protection Measures. With the implementation of these avoidance and minimization measures, USMC has concluded that the proposed undertaking would have no adverse effect on any of the archaeological sites or isolates located in any of the APEs.

In your letter, you requested my concurrence with: (1) your identification of the APEs, (2) your determinations of eligibility for listing on the NRHP for the 20 archaeological sites identified in Attachment 1, and (3) your finding that the proposed undertaking will not adversely affect historic properties. After reviewing your letter of July 24, 2012, I have the following comments:

- I concur that the APEs have been properly determined and documented pursuant to 36 CFR Parts 800.4(a)(1) and 800.16(d), and Stipulation IV of the PA;
- In your letter, you asked us to concur with your determination that 20 sites are eligible for listing on the NRHP. However, the discussion of context and evaluation, in the attached cultural resource inventory, is insufficient to support a conclusive determination of eligibility. Therefore, I decline to either concur or not concur with your determinations of eligibility.

- Since you included in this consultation the belief that the 20 archaeological sites are eligible for listing on the NRHP, I recommend that the USMC treat those sites as eligible for the purposes of this undertaking.
- If the USMC prefers to produce a full evaluation with a context and application of NRHP criteria sufficient to support eligibility, I will review that instead of assuming eligibility.
- Recognizing that all of the identified historic properties are located in the buffer zones of the APEs and that the USMC has designed both the extent of LZs and how the aircraft operations will be conducted so that they will minimize any effects on the identified historic properties, I have determined that the proposed undertaking would have an effect on any identified historic properties, but not an adverse effect. Therefore, I concur that pursuant to 36 CFR Part 800.5(b) and Stipulation VIII.B of the PA, that a Finding of No Adverse Effect is appropriate for the proposed undertaking as described and that the documentation supporting that finding has been provided pursuant to 36 CFR Part 800.11(e) and Stipulation VIII.B of the PA.
- I remind you that Section 1.e of Attachment F of the PA states that "Long-term monitoring may be used to enhance the effectiveness of protection measures in conjunction with other measures (per Stipulation IX.A.3, Monitoring). The results of any monitoring inspections shall be included in the Annual Report (per Stipulation VIII, Reporting Requirements"). If you choose to conduct monitoring, I look forward to receiving your report discussing the effectiveness of the protection measures during the operations of both rotary wing and tilt-rotor aircraft during this proposed undertaking.

Be advised that under certain circumstances, such as an unanticipated discovery or a change in project description, you may have additional future responsibilities for this undertaking under 36 CFR Part 800. Should you encounter cultural artifacts during any activities, please halt all work until a qualified archaeologist can be consulted on the nature and significance of such artifacts.

Thank you for seeking my comments and considering historic properties as part of your project planning. If you have any questions or concerns, please contact Ed Carroll of my staff at (916) 445-7006 or by email at ecarroll@parks.ca.gov.

Sincerely,

Susan K Stratton for

Jenan Saunders
Acting State Historic Preservation Officer

Attachment
Summary of 26 archaeological sites and 10 isolates

cc: Mr. Zachery Likins, Marine Corps Installations West (w/ attachment)
Ms. Carrie Simmons, El Centro FO, Bureau of Land Management (w/attachment)

APPENDIX B

Air Quality Emissions Calculations
and Clean Air Act Conformity Analyses

APPENDIX B-1

Air Quality Emissions Calculations

Appendix B-1 Table of Contents - Air Emission Calculations for the USMC Rotary Wing and Tilt-Rotor Training Operations Project

Table B1-1. Annual Helicopter Transit Flights to Landing Zones - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-2. Helicopter Transit Flights Distances/Durations within Affected Air Basins - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-3. Existing Aircraft Operations within Landing Zones - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-4. Annual Proposed Aircraft Landing Zone Operations - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-5. AH-1W/Z Aircraft Emission Factors - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations.
Table B1-6. CH-46E Aircraft Emission Factors - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations.
Table B1-7. CH-53E Aircraft Emission Factors - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations.
Table B1-8. UH-1N/Y Aircraft Emission Factors - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations.
Table B1-9. MV-22 Aircraft Emission Factors - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations.
Table B1-10. Fugitive Dust Emission Factors for One Aircraft Pad Landing within Imperial County - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations.
Table B1-11 Fugitive Dust Emission Factors for One Aircraft Pad Landing within CNF - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations.
Table B1-12. Existing Emissions from Helicopter Transits within the San Diego Air Basin - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-13. Proposed Emissions from Helicopter Transits within the San Diego Air Basin - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-14. Existing Emissions from Helicopter Transits within the South Coast Air Basin - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-15. Proposed Emissions from Helicopter Transits in the South Coast Air Basin - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-16. Existing Emissions from Helicopter Transits within the Imperial County IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-17. Propsed Emissions from Helicopter Transits within the Imperial County IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-18. Existing Emissions from Helicopter Transits in Imperial County Non-IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-19. Propsed Emissions from Helicopter Transits in Imperial County Non-IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-20. Existing Emissions from Aircraft Landing Zone Operations within the South Coast Air Basin - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-21. Proposed Emissions from Aircraft Landing Zone Operations within the South Coast Air Basin - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-22. Existing Emissions from Aircraft Landing Zone Operations within the Imperial County IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-23. Propsed Emissions from Aircraft Landing Zone Operations within the Imperial County IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-24. Existing Emissions from Aircraft Landing Zone Operations within the Imperial County Non-IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-25. Propsed Emissions from Aircraft Landing Zone Operations within the Imperial County Non-IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-26. Emissions Summary for Aircraft Operations within the San Diego Air Basin - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-27. Emissions Summary for Aircraft Operations within the South Coast Air Basin - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-28. Emissions Summary from Aircraft Operations within the Imperial County IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-29. Emissions Summary from Aircraft Operations within the Imperial County Non-IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations
Table B1-30. Emissions Summary from Aircraft Operations within Imperial County - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

Table B1-1. Annual Helicopter Transit Flights to Landing Zones - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Sorties	
Destination/Aircraft	*Existing*	*Proposed*
Trabuco Ranger District		
AH-1W/Z	228	154
CH-46E	68	-
CH-53	24	24
UH-1N/Y	132	138
MV-22		106
Total	452	422
Imperial County - Total		
AH-1W/Z	49	37
CH-46E	206	-
CH-53	197	196
UH-1N/Y	31	33
MV-22		1,814
Total	483	2,080
Imperial County - West LZs (1)		
AH-1W/Z	5	3
CH-46E	21	-
CH-53	20	20
UH-1N/Y	3	3
MV-22	-	183
Total	49	210
Imperial County - East LZs within IVPA (2)		
AH-1W/Z	23	16
CH-46E	93	-
CH-53	91	91
UH-1N/Y	14	14
MV-22	-	828
Total	220	949
Imperial County - East LZs outside IVPA (3)		
AH-1W/Z	20	18
CH-46E	93	-
CH-53	86	85
UH-1N/Y	14	15
MV-22		802
Total	214	921

Notes: (1) Operations at the C1 and Wolf LZs.

(2) Operations at the Bull, Pelican, and Sparrow LZs.

(3) Operations at the remaining LZs in southeast Imperial County..

Table B1-2. Helicopter Transit Flights Distances/Durations within Affected Air Basins - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Cruising	*Air Basin/Round Trip Distance (NM)*				*Air Basin/Round Trip Cruise Duration (Hrs)*			
Destination/Aircraft	*Speed (Kts)*	*SD Co.*	*SCAB*	*I. Co. IVPA*	*I. Co. Non-IVPA*	*SD Co.*	*SCAB*	*I. Co. IVPA*	*I. Co. Non-IVPA*
Trabuco Ranger District									
AH-1W/Z	134	29.5	15.6	-	-	0.22	0.12	-	-
CH-46E	120	29.5	15.6	-	-	0.25	0.13	-	-
CH-53	150	29.5	15.6	-	-	0.20	0.10	-	-
UH-1N/Y	127	29.5	15.6	-	-	0.23	0.12	-	-
MV-22	240	29.5	15.6	-	-	0.12	0.07	-	-
Imperial County - West LZs (1)									
AH-1W/Z	134	61.7	-	9.6	-	0.46	-	0.07	-
CH-46E	120	61.7	-	9.6	-	0.51	-	0.08	-
CH-53	150	61.7	-	9.6	-	0.41	-	0.06	-
UH-1N/Y	127	61.7	-	9.6	-	0.49	-	0.08	-
MV-22	240	61.7	-	9.6	-	0.26	-	0.04	-
Imperial County - East LZs within IVPA (2)									
AH-1W/Z	134	59.9	-	62.5	-	0.45	-	0.47	-
CH-46E	120	59.9	-	62.5	-	0.50	-	0.52	-
CH-53	150	59.9	-	62.5	-	0.40	-	0.42	-
UH-1N/Y	127	59.9	-	62.5	-	0.47	-	0.49	-
MV-22	240	59.9	-	62.5	-	0.25	-	0.26	-
Imperial County - East LZs outside IVPA (3)									
AH-1W/Z	134	59.9	-	71.2	6.9	0.45	-	0.53	0.05
CH-46E	120	59.9	-	71.2	6.9	0.50	-	0.59	0.06
CH-53	150	59.9	-	71.2	6.9	0.40	-	0.47	0.05
UH-1N/Y	127	59.9	-	71.2	6.9	0.47	-	0.56	0.05
MV-22	240	59.9	-	71.2	6.9	0.25	-	0.30	0.03

Notes: (1) Route to the C1 and Wolf LZs.

(2) Route to the Bull, Pelican, and Sparrow LZs.

(2) Route to the remaining LZs in southeast Imperial County..

Table B1-3. Existing Aircraft Operations within Landing Zones - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

Destination/Aircraft	*Annual CAL Sorties*	*Landings/Sortie*	*Total Annual Landings*	*Total Annual Cruise Mode (Hr)*
Trabuco Ranger District				
AH-1W/Z	124	6	744	26.0
CH-46E	42	10	420	6.6
CH-53	14	10	140	2.7
UH-1N/Y	69	12	828	15.8
Total	249		2,132	51.1
Imperial County - Total				
AH-1W/Z	25	6	150	6.4
CH-46E	132	10	1,320	18.8
CH-53	111	10	1,110	21.6
UH-1N/Y	15	12	180	4.0
Total	283		2,760	50.8
Imperial County - West LZs (1)				
AH-1W/Z	3	6	17	0.6
CH-46E	13	10	133	1.7
CH-53	11	10	114	2.0
UH-1N/Y	2	12	19	0.4
Total	29		282	4.6
Imperial County - East LZs within IVPA (2)				
AH-1W/Z	13	6	76	2.6
CH-46E	60	10	599	7.7
CH-53	51	10	513	8.9
UH-1N/Y	7	12	84	1.6
Total	131		1,272	20.8
Imperial County - East LZs outside IVPA (3)				
AH-1W/Z	9	6	57	3.2
CH-46E	59	10	588	9.4
CH-53	48	10	483	10.8
UH-1N/Y	6	12	78	2.0
Total	123		1,206	25.3

Notes: (1) Operations at the C1 and Wolf LZs.

(2) Operations at the Bull, Pelican, and Sparrow LZs.

(2) Operations at the remaining LZs in southeast Imperial County..

Table B1-4. Annual Proposed Aircraft Landing Zone Operations - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

Destination/Aircraft	*Annual CAL Sorties*	*Landings/Sortie*	*Total Annual Landings*	*Total Annual Cruise Mode (Hr)*
Trabuco Ranger District				
AH-1W/Z	82	6	492	18.0
CH-46E	-	10	-	-
CH-53	14	10	140	2.7
UH-1N/Y	71	12	852	16.8
MV-22	103	7	721	0.9
Total	270		2,205	38.4
Imperial County - Total				
AH-1W/Z	19	6	114	4.5
CH-46E		10	-	-
CH-53	110	10	1,100	21.6
UH-1N/Y	16	12	192	4.2
MV-22	1,750	7	12,250	15.9
Total	1,895		13,656	46.2
Imperial County - West LZs (1)				
AH-1W/Z	2	6	11	0.4
CH-46E	-	10	-	-
CH-53	11	10	114	2.0
UH-1N/Y	2	12	20	1.4
MV-22	177	7	1,239	4.2
Total	192		1,383	8.0
Imperial County - East LZs within IVPA (2)				
AH-1W/Z	8	6	49	1.8
CH-46E	-	10	-	-
CH-53	51	10	513	8.9
UH-1N/Y	7	12	89	1.7
MV-22	800	7	5,597	6.5
Total	866		6,248	19.0
Imperial County - East LZs outside IVPA (3)				
AH-1W/Z	9	6	54	2.2
CH-46E	-	10	-	-
CH-53	47	10	473	10.8
UH-1N/Y	7	12	84	1.0
MV-22	773	7	5,414	5.2
Total	837		6,025	19.2

Notes: (1) Operations at the C1 and Wolf LZs.

(2) Operations at the Bull, Pelican, and Sparrow LZs.

(2) Operations at the remaining LZs in southeast Imperial County..

Table B1-5. AH-1W/Z Aircraft Emission Factors - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations.

Operation Type	*Engine Power Setting*	*Fuel Flow Rate/ Aircraft (Lb/Hr)*	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*	*References*
			Engine Emission Factors - Pounds/1000 Pounds Fuel							
Cruise	38% Q	850	0.56	10.54	5.55	0.40	4.20	4.20	3,216	1
		Fuel/Operation (Lb)	*Emissions per Operation - Pounds*							
Mountain Pad Landing		67	0.04	0.76	0.36	0.03	0.28	0.28	214	2

Notes: The AH-1W/Z helicopters have 2 T700-GE-401C engines.

(1) AESO Memorandum Report No. 9824, Revision B, Aircraft Emissions Estimates: AH-1W Takeoff and Landing Cycle and In-Frame, Maintenance Testing Using JP-5, November 2009.

(2) AESO Memorandum Report No. 9961, Revision A, Aircraft Emissions Estimates: AH-1 Mission Operations Using JP-5, November 2009.

Table B1-6. CH-46E Aircraft Emission Factors - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations.

Operation Type	*Engine Power Setting*	*Fuel Flow Rate/ Aircraft (Lb/Hr)*	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*	*References*
			Engine Emission Factors - Pounds/1000 Pounds Fuel							
Cruise	91% Ng RPM	1,120	3.43	19.74	3.94	0.40	1.78	1.78	3,176	1
		Fuel/Aircraft Op (Lb)	*Emissions per Operation - Pounds*							
Mountain Pad Landing		95	0.35	1.87	0.39	0.04	0.19	0.19	302	2

Notes: The CH-46 helicopter has 2 T58-GE-16 engines.

(1) AESO Memorandum Report No. 9816, Revision F, Aircraft Emissions Estimates: H-46 Takeoff and Landing Cycle and In-Frame, Maintenance Testing Using JP-5, January 2001.

(2) AESO Memorandum Report No. 9959, Revision B, Aircraft Emissions Estimates: H-46 Mission Operations Using JP-5, January 2001.

Table B1-7. CH-53E Aircraft Emission Factors - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations.

Operation Type	*Engine Power Setting*	*Fuel Flow Rate/ Aircraft (Lb/Hr)*	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*	*References*
			Engine Emission Factors - Pounds/1000 Pounds Fuel							
Cruise	70% Qeng	4,464	0.15	2.13	8.08	0.40	2.21	2.21	3,220	1
		Fuel/Aircraft Op (Lb)	*Emissions per Operation - Pounds*							
Mountain Pad Landing		540	0.52	1.94	4.03	0.22	1.19	1.19	1,739	2

Notes: The CH-53 helicopter has 3 T64-GE-415 engines.

(1) AESO Memorandum Report No. 9822, Revision C, Aircraft Emissions Estimates: H-53 Takeoff and Landing Cycle and In-Frame, Maintenance Testing Using JP-5, February 2000. except that CO2 emissions based upon a factor of 3,200 lb/1000 lb fuel.

(2) AESO Memorandum Report No. 9960, Revision B, Aircraft Emissions Estimates: H-53 Mission Operations Using JP-5, April 2000.

Table B1-8. UH-1N/Y Aircraft Emission Factors - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations.

Operation Type	*Engine Power Setting*	*Fuel Flow Rate/ Aircraft (Lb/Hr)*	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*	*References*
			Engine Emission Factors - Pounds/1000 Pounds Fuel							
Cruise	65% Torque	1,200	0.55	6.25	6.40	0.40	4.20	4.20	3,221	1
		Fuel/Aircraft Op (Lb)	*Emissions per Operation - Pounds*							
Mountain Pad Landing		181	0.10	0.91	1.23	0.07	0.76	0.76	582	2

Notes: Based upon data for the UH-1Y helicopter, which has 2 T700-GE-401C engines.

(1) AESO Memorandum Report No. 9929, Revision A, Aircraft Emissions Estimates: H-60 Takeoff and Landing Cycle and In-Frame, Maintenance Testing Using JP-5, November 2009.

(2) AESO Memorandum Report No. 9953, Revision B, Aircraft Emissions Estimates: H-60 Mission Operations Using JP-5, June 2011.

Table B1-9. MV-22 Aircraft Emission Factors - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations.

Operation Type	*Engine Power Setting*	*Fuel Flow Rate/ Engine (Lb/Hr)*	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*	*References*
			Individual Engine Emission Factors - Pounds/1000 Pounds Fuel							
FW (0°) Cruise		3,820	0.01	0.52	14.09	0.40	1.58	1.56	3,209	1
Helo (16°) Cruise		3,060	0.01	0.79	11.64	0.40	1.58	1.56	3,212	1
Average Cruise		3,440	0.01	0.66	12.87	0.40	1.58	1.56	3,211	1
		Fuel/Aircraft Op (Lb)	*Emissions per Operation - Pounds*							
Single Pad or Confined Area Landing - Pounds		591	0.01	0.29	8.87	0.24	0.94	0.93	1,899	2

Notes: The MV-22 aircraft has 2 T406-AD-400 engines.

(1) AESO Memorandum Report No. 9946, Revision E, Aircraft Emissions Estimates: V-22 Landing and Takeoff Cycle and In-Frame, Engine Maintenance Testing Using JP-5, January 2001.

(2) AESO Memorandum Report No. 9965, Revision B, Aircraft Emissions Estimates: V-22 Mission Operations Using JP-5, January 2001.

	A	B	C	D	E	F	G	H	I	J	K
1	Table B1-10. Fugitive Dust Emission Factors for One Aircraft Pad Landing within Imperial County - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations.										
2		*Total Engine Hp*	*Rotor Diameter*	*Disturbed Area*	*U_{10} (m/s)*	*Threshold Friction*	*Friction Velocity*	*P*	*Pounds/LTO (7)*		
3	*Aircraft*	*Rating*	*(Ft) (1)*	*(m^2) (2)*	*(3)*	*Velocity u_t (m/s) (4)*	*u* (m/s) (5)*	*(Gm/m^2) (6)*	*PM*	*PM10*	*PM2.5*
4	AH-1W/Z	3,380	48.0	1,513	32.3	1.70	1.710	0.24	0.82	0.41	0.06
5	CH-46	3,740	84.3	4,666	32.3	1.70	1.710	0.27	2.73	1.36	0.20
6	CH-53	7,850	79.0	4,098	32.5	1.70	1.721	0.56	5.06	2.53	0.38
7	MV-22	12,300	84.0	4,633	32.7	1.70	1.732	0.87	8.87	4.43	0.66
8	UH-1N	2,500	48.0	1,513	32.2	1.70	1.707	0.18	0.61	0.31	0.05
9	UH-1Y	3,656	49.0	1,576	32.3	1.70	1.710	0.27	0.92	0.46	0.07
10	Notes: (1) Due to rotor overlap, actual diameters for CH-46 and MV-22 used in the calculations = 84.3' and 84', respectively.										
11	(2) Equal to 3 times the rotor diameter - the area of disturbance expected from rotary wing aircraft during a desert landing and take-off.										
12	(3) Wind speeds at 10 meter level (U_{10}) for the MV-22 based upon wind speeds measured at 1 meter above ground when this aircraft hovered at 20' AGL (Bell Boeing 2008).										
13	Equates to equation #5 presented in AP-42 Section 13.2.5 (EPA 2006). This approach assumes that the maximum aircraft downdraft approaches the fastest mile wind speed.										
14	Wind speeds for all other aircraft estimated by multiplying U_{10} for the MV-22 times the ratio of the horsepower rating of each aircraft divided by the horsepower rating of the MV-22.										
15	This approach was taken, as data are not available to adequately estimate the down draft wind speeds for these aircraft, yet aircraft horsepower rating is proportional t										
16	potential thrust or the ability of an aircraft to generate down draft.										
17	(4) Threshold friction velocity value chosen from values listed for surface types identified in Table 8-3 in the WRAP Fugitive Dust Handbook (Countess Environmental 2006).										
18	Data on climatic conditions, soil and vegetation conditions described in Archaeological and Biological surveys for the proposed landing zones (LZs), and observations of										
19	dust emissions generated by a CH-46 landing at the existing Canary LZ, were used in this selection process (SAIC 2011 and 2012b).										
20	(5) Equates to equation #4 presented in AP-42 Section 13.2.5.										
21	(6) Equates to equation #3 presented in AP-42 Section 13.2.5.										
22	(7) Equal to Disturbed Area times P. These values are annual averages.										
23											
24											
25	Table B1-11 Fugitive Dust Emission Factors for One Aircraft Pad Landing within CNF - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations.										
26		*Total Engine Hp*	*Rotor Diameter*	*Disturbed Area*		*Threshold Friction*	*U**	*P*	*Pounds/LTO (4)*		
27	*Aircraft*	*Rating*	*(Ft) (1)*	*(m^2) (2)*	*U_{10} (m/s)*	*Velocity (m/s)*	*(m/s)*	*(Gm/m^2) (3)*	*PM*	*PM10*	*PM2.5*
28	AH-1W/Z	3,380	48.0	1,513				0.05	0.16	0.08	0.01
29	CH-46	3,740	84.3	4,666				0.05	0.55	0.27	0.04
30	CH-53	7,850	79.0	4,098				0.11	1.01	0.51	0.08
31	MV-22	12,300	84.0	4,633				0.17	1.77	0.89	0.13
32	UH-1N	2,500	48.0	1,513				0.04	0.12	0.06	0.01
33	UH-1Y	3,656	49.0	1,576				0.05	0.18	0.09	0.01
34	Notes: (1) Due to rotor overlap, actual diameters for CH-46 and MV-22 used in the calculations = 84.3' and 84', respectively.										
35	(2) Equal to 3 times the rotor diameter - the area of disturbance expected from rotary wing aircraft during a desert landing and take-off.										
36	(3) P values = 20% of those defined for the Imperial Valley (IV) project region, as (a) the Cleveland National Forest (CNF) project region is cooler and more humid that the IV,										
37	(b) the LZs in the CNF have soils that are less silty and are more vegetated than the LZs in the IV (SAIC 2012a and 2012c), and (c) observations of a CH-46 landing at LZs										
38	within the CNF determined that this activity generated lower dust emissions than those observed in the IV project region.										
39	(4) Equal to Disturbed Area times P. These values are annual averages.										

Table B1-12. Existing Emissions from Helicopter Transits within the San Diego Air Basin - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)						
Destination/Flight Details	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
Trabuco Ranger District							
AH-1W/Z	0.01	0.23	0.12	0.01	0.09	0.09	68.68
CH-46E	0.03	0.18	0.04	0.00	0.02	0.02	29.76
CH-53	0.00	0.02	0.09	0.00	0.02	0.02	33.95
UH-1N/Y	0.01	0.12	0.12	0.01	0.08	0.08	59.54
Subtotal	0.06	0.55	0.36	0.02	0.21	0.21	191.92
Imperial County - West LZs							
AH-1W/Z	0.00	0.01	0.01	0.00	0.00	0.00	3.26
CH-46E	0.02	0.12	0.02	0.00	0.01	0.01	18.76
CH-53	0.00	0.04	0.15	0.01	0.04	0.04	59.30
UH-1N/Y	0.00	0.01	0.01	0.00	0.00	0.00	2.82
Subtotal	0.02	0.17	0.18	0.01	0.06	0.06	84.14
Imperial County - East LZs							
AH-1W/Z	0.00	0.09	0.05	0.00	0.03	0.03	26.79
CH-46E	0.18	1.02	0.20	0.02	0.09	0.09	164.71
CH-53	0.02	0.34	1.27	0.06	0.35	0.35	507.92
UH-1N/Y	0.00	0.05	0.05	0.00	0.03	0.03	25.63
Subtotal	0.21	1.50	1.58	0.09	0.51	0.51	725.05
Total	0.29	2.22	2.12	0.12	0.78	0.78	1,001.11

Table B1-13. Proposed Emissions from Helicopter Transits within the San Diego Air Basin - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)						
Destination/Flight Details	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
Trabuco Ranger District							
AH-1W/Z	0.01	0.15	0.08	0.01	0.06	0.06	46.39
CH-46E	-	-	-	-	-	-	-
CH-53	0.00	0.02	0.09	0.00	0.02	0.02	33.95
UH-1N/Y	0.01	0.12	0.12	0.01	0.08	0.08	62.25
MV-22							72.01
Subtotal	0.02	0.30	0.29	0.02	0.17	0.17	214.59
Imperial County - West LZs							
AH-1W/Z	0.00	0.01	0.00	0.00	0.00	0.00	2.17
CH-46E	-	-	-	-	-	-	-
CH-53	0.00	0.04	0.15	0.01	0.04	0.04	59.30
UH-1N/Y	0.00	0.01	0.01	0.00	0.00	0.00	2.99
MV-22							260.02
Subtotal	0.00	0.05	0.16	0.01	0.05	0.05	324.48
Imperial County - East LZs							
AH-1W/Z	0.00	0.07	0.04	0.00	0.03	0.03	20.51
CH-46E	-	-	-	-	-	-	-
CH-53	0.02	0.33	1.27	0.06	0.35	0.35	505.05
UH-1N/Y	0.00	0.05	0.05	0.00	0.04	0.04	27.30
MV-22							2,248.08
Subtotal	0.03	0.45	1.36	0.07	0.41	0.41	2,800.94
Total	0.06	0.80	1.80	0.09	0.62	0.62	3,340.01
Proposed - Existing Emissions	(0.23)	(1.42)	(0.31)	(0.03)	(0.15)	(0.15)	2,338.90

Note: Since MV-22 transit operations occur above 3,000 AGL, the analysis does not consider criteria pollutant emissions from this operation.

Table B1-14. Existing Emissions from Helicopter Transits within the South Coast Air Basin - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)						
Destination/Flight Details	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
Trabuco Ranger District							
AH-1W/Z	0.01	0.12	0.06	0.00	0.05	0.05	36.36
CH-46E	0.02	0.10	0.02	0.00	0.01	0.01	15.75
CH-53	0.00	0.01	0.05	0.00	0.01	0.01	17.97
UH-1N/Y	0.01	0.06	0.06	0.00	0.04	0.04	31.52
Total	0.03	0.29	0.19	0.01	0.11	0.11	101.61

Table B1-15. Proposed Emissions from Helicopter Transits in the South Coast Air Basin - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)						
Destination/Flight Details	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
Trabuco Ranger District							
AH-1W/Z	0.00	0.08	0.04	0.00	0.03	0.03	24.56
CH-46E	-	-	-	-	-	-	-
CH-53	0.00	0.01	0.05	0.00	0.01	0.01	17.97
UH-1N/Y	0.01	0.06	0.07	0.00	0.04	0.04	32.95
MV-22							38.12
Total	0.01	0.16	0.15	0.01	0.09	0.09	113.61
Proposed - Existing Emissions	(0.02)	(0.13)	(0.04)	(0.00)	(0.02)	(0.02)	12.00

Note: Since MV-22 transit operations occur above 3,000 AGL, the analysis does not consider criteria pollutant emissions from this operation.

Table B1-16. Existing Emissions from Helicopter Transits within the Imperial County IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)						
Destination/Flight Details	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
West LZs							
AH-1W/Z	0.00	0.00	0.00	0.00	0.00	0.00	0.50
CH-46E	0.00	0.02	0.00	0.00	0.00	0.00	2.91
CH-53	0.00	0.01	0.02	0.00	0.01	0.01	9.19
UH-1N/Y	0.00	0.00	0.00	0.00	0.00	0.00	0.44
Subtotal	0.00	0.03	0.03	0.00	0.01	0.01	13.04
East LZs - Within IVPA							
AH-1W/Z	0.00	0.05	0.03	0.00	0.02	0.02	14.92
CH-46E	0.09	0.53	0.11	0.01	0.05	0.05	85.96
CH-53	0.01	0.18	0.68	0.03	0.19	0.19	271.74
UH-1N/Y	0.00	0.03	0.03	0.00	0.02	0.02	12.94
Subtotal	0.11	0.79	0.84	0.05	0.27	0.27	385.57
East LZs - Outside IVPA							
AH-1W/Z	0.00	0.05	0.03	0.00	0.02	0.02	14.84
CH-46E	0.01	0.25	0.13	0.01	0.10	0.10	75.21
CH-53	0.01	0.18	0.10	0.01	0.07	0.07	55.95
UH-1N/Y	0.00	0.04	0.02	0.00	0.01	0.01	11.13
Subtotal	0.03	0.51	0.27	0.02	0.21	0.21	157.12
Total	0.14	1.33	1.14	0.07	0.49	0.49	555.72

Table B1-17. Propsed Emissions from Helicopter Transits within the Imperial County IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)						
Destination/Flight Details	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
West LZs							
AH-1W/Z	0.00	0.00	0.00	0.00	0.00	0.00	0.34
CH-46E	-	-	-	-	-	-	-
CH-53	0.00	0.01	0.02	0.00	0.01	0.01	9.19
UH-1N/Y	0.00	0.00	0.00	0.00	0.00	0.00	0.46
MV-22							40.28
Subtotal	0.00	0.01	0.02	0.00	0.01	0.01	50.27
East LZs - Within IVPA							
AH-1W/Z	0.00	0.03	0.02	0.00	0.01	0.01	9.95
CH-46E	-	-	-	-	-	-	-
CH-53	0.01	0.18	0.68	0.03	0.19	0.19	271.74
UH-1N/Y	0.00	0.03	0.03	0.00	0.02	0.02	13.72
MV-22							1,191.57
Subtotal	0.02	0.24	0.73	0.04	0.22	0.22	1,486.99
East LZs - Outside IVPA							
AH-1W/Z	0.00	0.04	0.02	0.00	0.02	0.02	13.04
CH-46E	-	-	-	-	-	-	-
CH-53	0.01	0.18	0.10	0.01	0.07	0.07	55.30
UH-1N/Y	0.00	0.04	0.02	0.00	0.02	0.02	11.89
MV-22							1,314.57
Subtotal	0.01	0.26	0.14	0.01	0.10	0.10	1,394.80
Total	0.03	0.51	0.89	0.05	0.33	0.33	2,932.06
Proposed - Existing Emissions	(0.11)	(0.82)	(0.25)	(0.02)	(0.16)	(0.16)	2,376.34

Note: Since MV-22 transit operations occur above 3,000 AGL, the analysis does not consider criteria pollutant emissions from this operation.

Table B1-18. Existing Emissions from Helicopter Transits in Imperial County Non-IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)						
Destination/Flight Details	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
East LZs - Outside IVPA							
AH-1W/Z	0.00	0.00	0.00	0.00	0.00	0.00	1.45
CH-46E	0.01	0.06	0.01	0.00	0.01	0.01	9.55
CH-53	0.00	0.02	0.07	0.00	0.02	0.02	28.70
UH-1N/Y	0.00	0.00	0.00	0.00	0.00	0.00	1.53
Total	0.01	0.09	0.09	0.01	0.03	0.03	41.22

Table B1-19. Propsed Emissions from Helicopter Transits in Imperial County Non-IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)						
Destination/Flight Details	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
East LZs - Outside IVPA							
AH-1W/Z	0.00	0.00	0.00	0.00	0.00	0.00	1.27
CH-46E	-	-	-	-	-	-	-
CH-53	0.00	0.02	0.07	0.00	0.02	0.02	28.36
UH-1N/Y	0.00	0.00	0.00	0.00	0.00	0.00	1.64
MV-22							44.88
Total	0.00	0.03	0.08	0.00	0.02	0.02	76.16
Proposed - Existing Emissions	(0.01)	(0.06)	(0.01)	(0.00)	(0.01)	(0.01)	34.94

Note: Since MV-22 transit operations occur above 3,000 AGL, the analysis does not consider criteria pollutant emissions from this operation.

Table B1-20. Existing Emissions from Aircraft Landing Zone Operations within the South Coast Air Basin - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)						
Aircraft/Operation	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
AH-1W/Z							
Pad Landings	0.01	0.28	0.13	0.01	0.10	0.10	79.61
Fugitive Dust					0.03	0.00	
Cruise (Non CAL Sorties)	0.01	0.12	0.06	0.00	0.05	0.05	35.55
Subtotal	0.02	0.40	0.20	0.02	0.18	0.16	115.15
CH-46E							
Pad Landings	0.07	0.39	0.08	0.01	0.04	0.04	63.42
Fugitive Dust					0.06	0.01	
Cruise (Non CAL Sorties)	0.01	0.07	0.01	0.00	0.01	0.01	11.74
Subtotal	0.09	0.47	0.10	0.01	0.10	0.06	75.16
CH-53							
Pad Landings	0.04	0.14	0.28	0.02	0.08	0.08	121.72
Fugitive Dust					0.04	0.01	
Cruise (Non CAL Sorties)	0.00	0.01	0.05	0.00	0.01	0.01	19.41
Subtotal	0.04	0.15	0.33	0.02	0.13	0.10	141.12
UH-1N/Y							
Pad Landings	0.04	0.38	0.51	0.03	0.31	0.31	240.95
Fugitive Dust					0.04	0.01	
Cruise (Non CAL Sorties)	0.01	0.06	0.06	0.00	0.04	0.04	30.54
Subtotal	0.05	0.44	0.57	0.03	0.39	0.36	271.48
Total	0.19	1.45	1.19	0.08	0.81	0.67	602.92

Table B1-21. Proposed Emissions from Aircraft Landing Zone Operations within the South Coast Air Basin - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)						
Aircraft/Operation	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
AH-1W/Z							
Pad Landings	0.01	0.19	0.09	0.01	0.07	0.07	52.64
Fugitive Dust					0.02	0.00	
Cruise (Non CAL Sorties)	0.00	0.08	0.04	0.00	0.03	0.03	24.61
Subtotal	0.01	0.27	0.13	0.01	0.12	0.10	77.25
CH-46E							
Pad Landings							
Fugitive Dust							
Cruise (Non CAL Sorties)							
Subtotal							
CH-53							
Pad Landings	0.04	0.14	0.28	0.02	0.08	0.08	121.72
Fugitive Dust					0.04	0.01	
Cruise (Non CAL Sorties)	0.00	0.01	0.05	0.00	0.01	0.01	19.41
Subtotal	0.04	0.15	0.33	0.02	0.13	0.10	141.12
UH-1N/Y							
Pad Landings	0.04	0.39	0.52	0.03	0.32	0.32	247.93
Fugitive Dust					0.04	0.01	
Cruise (Non CAL Sorties)	0.01	0.06	0.06	0.00	0.04	0.04	32.47
Subtotal	0.05	0.45	0.59	0.03	0.41	0.37	280.40
MV-22							
Pad Landings	0.00	0.10	3.20	0.09	0.34	0.34	684.59
Fugitive Dust					0.32	0.05	
Cruise (Non CAL Sorties)	0.00	0.00	0.02	0.00	0.00	0.00	4.97
Subtotal	0.00	0.11	3.22	0.09	0.66	0.39	689.56
Total	0.10	0.97	4.27	0.15	1.32	0.96	1,188.33
Proposed - Existing Emissions	(0.09)	(0.48)	3.08	0.07	0.51	0.29	585.42

Table B1-22. Existing Emissions from Aircraft Landing Zone Operations within the Imperial County IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)						
Aircraft/Operation	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
AH-1W/Z							
Pad Landings	0.00	0.04	0.02	0.00	0.01	0.01	9.98
Fugitive Dust					0.02	0.00	
Cruise (Non CAL Sorties)	0.00	0.01	0.01	0.00	0.01	0.01	4.39
Subtotal	0.00	0.05	0.02	0.00	0.04	0.02	14.36
CH-46E							
Pad Landings	0.13	0.68	0.14	0.01	0.07	0.07	110.52
Fugitive Dust					0.50	0.07	
Cruise (Non CAL Sorties)	0.02	0.10	0.02	0.00	0.01	0.01	16.77
Subtotal	0.15	0.79	0.16	0.02	0.58	0.15	127.29
CH-53							
Pad Landings	0.16	0.61	1.26	0.07	0.37	0.37	544.79
Fugitive Dust					0.79	0.12	
Cruise (Non CAL Sorties)	0.00	0.05	0.20	0.01	0.05	0.05	77.82
Subtotal	0.17	0.66	1.46	0.08	1.22	0.55	622.61
UH-1N/Y							
Pad Landings	0.01	0.05	0.06	0.00	0.04	0.04	29.76
Fugitive Dust					0.02	0.00	
Cruise (Non CAL Sorties)	0.00	0.01	0.01	0.00	0.00	0.00	3.83
Subtotal	0.01	0.05	0.07	0.00	0.07	0.05	33.59
Total	0.32	1.55	1.72	0.10	1.90	0.77	797.84

Table B1-23. Propsed Emissions from Aircraft Landing Zone Operations within the Imperial County IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)						
Aircraft/Operation	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
AH-1W/Z							
Pad Landings	0.00	0.02	0.01	0.00	0.01	0.01	6.44
Fugitive Dust					0.01	0.00	
Cruise (Non CAL Sorties)	0.00	0.01	0.01	0.00	0.00	0.00	3.08
Subtotal	0.00	0.03	0.02	0.00	0.02	0.01	9.52
CH-46E							
Pad Landings							
Fugitive Dust							
Cruise (Non CAL Sorties)							
Subtotal							
CH-53							
Pad Landings	0.16	0.61	1.26	0.07	0.37	0.37	544.79
Fugitive Dust					0.79	0.12	
Cruise (Non CAL Sorties)	0.00	0.05	0.20	0.01	0.05	0.05	77.82
Subtotal	0.17	0.66	1.46	0.08	1.22	0.55	622.61
UH-1N/Y							
Pad Landings	0.01	0.05	0.07	0.00	0.04	0.04	31.51
Fugitive Dust					0.02	0.00	
Cruise (Non CAL Sorties)	0.00	0.01	0.01	0.00	0.01	0.01	6.12
Subtotal	0.01	0.06	0.08	0.00	0.07	0.05	37.63
MV-22							
Pad Landings	0.03	0.99	30.32	0.82	3.21	3.18	6,490.49
Fugitive Dust					15.15	2.27	
Cruise (Non CAL Sorties)	0.00	0.01	0.24	0.01	0.03	0.03	59.25
Subtotal	0.03	1.00	30.55	0.83	18.39	5.48	6,549.74
Total	0.21	1.76	32.11	0.91	19.71	6.09	7,219.50
Proposed - Existing Emissions	(0.11)	0.21	30.39	0.81	17.81	5.33	6,421.66

Table B1-24. Existing Emissions from Aircraft Landing Zone Operations within the Imperial County Non-IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)						
Aircraft/Operation	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
AH-1W/Z							
Pad Landings	0.00	0.02	0.01	0.00	0.01	0.01	6.07
Fugitive Dust					0.01	0.00	
Cruise (Non CAL Sorties)	0.00	0.01	0.01	0.00	0.01	0.01	4.36
Subtotal	0.00	0.04	0.02	0.00	0.03	0.02	10.44
CH-46E							
Pad Landings	0.10	0.55	0.11	0.01	0.06	0.06	88.80
Fugitive Dust					0.40	0.06	
Cruise (Non CAL Sorties)	0.02	0.10	0.02	0.00	0.01	0.01	16.68
Subtotal	0.12	0.65	0.14	0.01	0.47	0.13	105.49
CH-53							
Pad Landings	0.13	0.47	0.97	0.05	0.29	0.29	420.25
Fugitive Dust					0.61	0.09	
Cruise (Non CAL Sorties)	0.00	0.05	0.19	0.01	0.05	0.05	77.42
Subtotal	0.13	0.52	1.17	0.06	0.95	0.43	497.67
UH-1N/Y							
Pad Landings	0.00	0.04	0.05	0.00	0.03	0.03	22.62
Fugitive Dust					0.02	0.00	
Cruise (Non CAL Sorties)	0.00	0.01	0.01	0.00	0.00	0.00	3.81
Subtotal	0.00	0.04	0.06	0.00	0.05	0.04	26.43
Total	0.26	1.25	1.38	0.08	1.50	0.61	640.02

Table B1-25. Propsed Emissions from Aircraft Landing Zone Operations within the Imperial County Non-IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)						
Aircraft/Operation	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
AH-1W/Z							
Pad Landings	0.00	0.02	0.01	0.00	0.01	0.01	5.76
Fugitive Dust					0.01	0.00	
Cruise (Non CAL Sorties)	0.00	0.01	0.01	0.00	0.00	0.00	3.07
Subtotal	0.00	0.03	0.01	0.00	0.02	0.01	8.83
CH-46E							
Pad Landings							
Fugitive Dust							
Cruise (Non CAL Sorties)							
Subtotal							
CH-53							
Pad Landings	0.12	0.46	0.95	0.05	0.28	0.28	411.55
Fugitive Dust					0.60	0.09	
Cruise (Non CAL Sorties)	0.00	0.05	0.19	0.01	0.05	0.05	77.42
Subtotal	0.13	0.51	1.15	0.06	0.93	0.42	488.97
UH-1N/Y							
Pad Landings	0.00	0.04	0.05	0.00	0.03	0.03	24.36
Fugitive Dust					0.02	0.00	
Cruise (Non CAL Sorties)	0.00	0.00	0.00	0.00	0.00	0.00	1.99
Subtotal	0.00	0.04	0.06	0.00	0.05	0.04	26.35
MV-22							
Pad Landings	0.03	0.79	24.01	0.65	2.54	2.52	5,140.88
Fugitive Dust					12.00	1.80	
Cruise (Non CAL Sorties)	0.00	0.01	0.11	0.00	0.01	0.01	28.62
Subtotal	0.03	0.79	24.13	0.65	14.56	4.33	5,169.51
Total	0.16	1.37	25.35	0.72	15.57	4.81	5,693.66
Proposed - Existing Emissions	(0.10)	0.12	23.97	0.64	14.07	4.20	5,053.65

Table B1-26. Emissions Summary for Aircraft Operations within the San Diego Air Basin - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)						
Scenario/Activity	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
Existing Conditions							
Transit to CNF	0.06	0.55	0.36	0.02	0.21	0.21	192
Transit to Imperial County West LZs	0.02	0.17	0.18	0.01	0.06	0.06	84
Transit to Imperial County East LZs	0.21	1.50	1.58	0.09	0.51	0.51	725
Subtotal	0.29	2.22	2.12	0.12	0.78	0.78	1,001
Proposed Action							
Transit to CNF	0.02	0.30	0.29	0.02	0.17	0.17	215
Transit to Imperial County West LZs	0.00	0.05	0.16	0.01	0.05	0.05	324
Transit to Imperial County East LZs	0.03	0.45	1.36	0.07	0.41	0.41	2,801
Subtotal	0.06	0.80	1.80	0.09	0.62	0.62	3,340
Proposed - Existing Emissions	(0.23)	(1.42)	(0.31)	(0.03)	(0.15)	(0.15)	2,339
SDAB NEPA Thresholds	100	100	100	250	250	250	NA

Table B1-27. Emissions Summary for Aircraft Operations within the South Coast Air Basin - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)						
Scenario/Activity	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
Existing Conditions							
Transit to CNF	0.03	0.29	0.19	0.01	0.11	0.11	102
Pad Landings	0.17	1.19	1.01	0.06	0.54	0.54	506
Fugitive Dust					0.16	0.02	
Cruise (Non CAL Sorties)	0.02	0.26	0.19	0.01	0.11	0.11	97
Subtotal	0.22	1.74	1.38	0.09	0.92	0.78	705
Proposed Action							
Transit to CNF	0.01	0.16	0.15	0.01	0.09	0.09	114
Pad Landings	0.09	0.81	4.09	0.14	0.81	0.81	1,107
Fugitive Dust					0.41	0.06	
Cruise (Non CAL Sorties)	0.01	0.16	0.18	0.01	0.09	0.09	81
Subtotal	0.11	1.13	4.42	0.16	1.41	1.05	1,302
Proposed - Existing Emissions	(0.11)	(0.61)	3.04	0.07	0.49	0.27	597
SCAB NEPA Thresholds	10	100	10	250	70	100	NA

Table B1-28. Emissions Summary from Aircraft Operations within the Imperial County IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)						
Scenario/Activity	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
Existing Conditions							
Transit to West LZs	0.00	0.03	0.03	0.00	0.01	0.01	13
Transit to East LZs - Within IVPA	0.11	0.79	0.84	0.05	0.27	0.27	386
Transit to East LZs - Outside IVPA	0.03	0.51	0.27	0.02	0.21	0.21	157
Pad Landings	0.30	1.37	1.49	0.09	0.49	0.49	695
Fugitive Dust					1.33	0.20	
Cruise (Non CAL Sorties)	0.02	0.18	0.23	0.01	0.07	0.07	103
Subtotal	0.46	2.88	2.86	0.17	2.39	1.25	1,354
Proposed Action							
Transit to West LZs	0.00	0.01	0.02	0.00	0.01	0.01	50
Transit to East LZs - Within IVPA	0.02	0.24	0.73	0.04	0.22	0.22	1,487
Transit to East LZs - Outside IVPA	0.01	0.26	0.14	0.01	0.10	0.10	1,395
Pad Landings	0.20	1.67	31.66	0.89	3.64	3.60	7,073
Fugitive Dust					15.98	2.40	
Cruise (Non CAL Sorties)	0.01	0.09	0.45	0.02	0.09	0.09	146
Subtotal	0.24	2.27	33.00	0.96	20.04	6.42	10,152
Proposed - Existing Emissions	(0.22)	(0.61)	30.14	0.79	17.65	5.17	8,798
IC IVPA NEPA Thresholds	NA	NA	NA	NA	70	100	NA

Table B1-29. Emissions Summary from Aircraft Operations within the Imperial County Non-IVPA - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)						
Scenario/Activity	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
Existing Conditions							
Transit to East LZs - Outside IVPA	0.01	0.09	0.09	0.01	0.03	0.03	41
Pad Landings	0.23	1.08	1.15	0.07	0.38	0.38	538
Fugitive Dust					1.04	0.16	
Cruise (Non CAL Sorties)	0.02	0.18	0.23	0.01	0.07	0.07	102
Subtotal	0.27	1.34	1.47	0.09	1.52	0.64	681
Proposed Action							
Transit to East LZs - Outside IVPA	0.00	0.03	0.08	0.00	0.02	0.02	76
Pad Landings	0.16	1.30	25.03	0.71	2.87	2.84	5,583
Fugitive Dust					12.63	1.89	
Cruise (Non CAL Sorties)	0.00	0.07	0.32	0.01	0.07	0.07	111
Subtotal	0.16	1.40	25.42	0.72	15.59	4.83	5,770
Proposed - Existing Emissions	(0.11)	0.06	23.96	0.64	14.07	4.19	5,089
IC Non-IVPA NEPA Thresholds	NA	NA	NA	NA	250	250	NA

Table B1-30. Emissions Summary from Aircraft Operations within Imperial County - Proposed USMC Rotary Wing and Tilt-Rotor Training Operations

	Annual Emissions (Tons)							
Scenario/Activity	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*	
Existing Conditions								
Transit	0.15	1.42	1.23	0.07	0.51	0.51	597	
Pad Landings	0.53	2.45	2.63	0.16	0.88	0.88	1,233	
Fugitive Dust	-	-	-	-	2.37	0.36	-	
Cruise (Non CAL Sorties)	0.05	0.35	0.46	0.03	0.15	0.15	205	
Subtotal	0.73	4.22	4.32	0.26	3.91	1.89	2,035	
Proposed Action								
Transit	0.03	0.54	0.97	0.05	0.35	0.35	3,008	
Pad Landings	0.36	2.97	56.68	1.60	6.50	6.44	12,656	
Fugitive Dust	-	-	-	-	28.61	4.29	-	
Cruise (Non CAL Sorties)	0.01	0.16	0.77	0.03	0.17	0.17	257	
Subtotal	0.40	3.67	58.42	1.68	35.63	11.26	15,921	
Proposed - Existing Emissions	(0.33)	(0.55)	54.10	1.43	31.72	9.36	13,887	
IC IVPA NEPA Thresholds	100	250	100	250	NA	NA	NA	Metric Tons
Total Project Baseline Annual CO2							3,740	3,400
Total Alternative 1 Annual CO2							20,563	18,694
Proposed Net Change Annual CO2 Emissions							16,823	15,294
US 2009 Annual CO2 Inventory - Metric Tons								5,618,200,000
Proposed Net Change % of Baseline								450
Proposed Net Change % of US Inventory								0.00027

APPENDIX B-2

Clean Air Act Conformity Record of Non-Applicability (RONA)

UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS WEST-MARINE CORPS BASE
BOX 555010
CAMP PENDLETON, CALIFORNIA 92055-5010

5090
ENV/PLN

12 MAR 2013

MEMORANDUM FOR THE RECORD

From: Commanding General
To: Director, Environmental Security

Subj: RECORD OF NON-APPLICABILITY (RONA) FOR MARINE CORPS ROTARY WING AND TILT-ROTOR TRAINING OPERATIONS ON PUBLIC LANDS WITHIN SOUTHERN CALIFORNIA

Ref: (a) U.S. Environmental Protection Agency, Determining Conformity of General Federal Actions to State or Federal Implementation Plans; Final Rule, published in the Federal Register on 30 November 1993 (40 CFR Parts 6, 51, and 93)
(b) U.S. Environmental Protection Agency, Revisions to the General Conformity Regulations; Final Rule, published in the Federal Register on 5 April 2010 (40 CFR Parts 51 and 93)
(c) OPNAVINST 5090.1C.

Encl: (1) Marine Corps Rotary Wing and Tilt-Rotor Training Operations on Public Lands Within Southern California Project Emissions Analysis for Clean Air Act Conformity Applicability

1. The references (a), (b), and (c) provide implementing guidance for documenting Clean Air Act (CAA) Conformity Determination requirements. The General Conformity Rule applies to federal actions proposed within areas which are designated as either non-attainment or maintenance areas for a National Ambient Air Quality Standard (NAAQS) for any of the criteria pollutants.

2. The United States Marine Corps (USMC) Rotary Wing and Tilt-Rotor Training Operations Project proposes continued training activities for existing Marine Corps rotary wing aircraft and add new MV-22B Osprey tilt-rotor aircraft as part of landing and takeoff operations on public lands.

3. Operations would occur within the Cleveland National Forest (Orange County and Riverside County) and Bureau of Land

Management (BLM) El Centro (Imperial County) training areas and aircraft flight routes between these areas and aircraft basing locations in San Diego County.

4. The Navy proposes to continue training activities for existing Marine Corps rotary wing aircraft and add new MV-22B Osprey tilt-rotor aircraft as part of landing and takeoff operations on public lands. The rotary wing aircraft associated with the proposed action include the Sea Knight (CH-46E), Super Stallion (CH-53E), Super Cobra (AH-1W), Viper (AH-1Z), Huey (UH-1N), and Venom (UH-1Y). By year 2017, the action would replace the CH-46E aircraft and its operations with those from the MV-22B aircraft.

5. Air emissions due to the proposed aircraft training operations would occur from (1) the combustion of aviation fuel and (2) fugitive dust generated from pad landings on exposed soils. Proposed flight activities would include landing and takeoff operations in and over public lands managed by the U.S. Forest Service Cleveland National Forest and the BLM El Centro Field Office and aircraft transits between these areas and aircraft basing locations in San Diego County (Marine Corps Air Station [MCAS] Miramar and MCAS Camp Pendleton). Aircraft landing and takeoff operations would occur at designated landing zones. The proposed action does not include ground troop movements or training, refueling operations, use of flares or ordnance, or construction activities.

6. The number of future AH-1W/Z, UH-1N/Y, and CH-53E sorties would fluctuate slightly from existing conditions due to slight changes in future aircraft inventories. Over time, the MV-22B aircraft would replace CH-46E operations by year 2017. The number of proposed sorties at the Cleveland National Forest is expected to go down about seven percent compared to existing conditions, and the number of proposed sorties on BLM El Centro managed lands is expected about 170 sorties per month and an estimated annual sortie rate up to approximately 2,080. The analysis of proposed aircraft operations is limited to emissions that would 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. Since project helicopters

would transit within 3,000 feet above ground level (AGL) in San Diego County, this analysis considers emissions generated by this operation within this region, in addition to emission generated within the Cleveland National Forest and BLM El Centro project regions. However, since MV-22B aircraft would transit above 3,000 feet AGL, emissions from this operation are not considered in the analysis.

7. The project regions are within the South Coast Air Basin (SCAB), Salton Sea Air Basin (SSAB), and San Diego Air Basin (SDAB). The focus of this conformity applicability evaluation compares project emissions to *de minimis* levels which are applicable to the SCAB, SSAB, and SDAB.

8. The General Conformity Rule requires conformity evaluations for proposed emissions that would occur within areas that are in nonattainment or maintenance of a National Ambient Air Quality Standard (NAAQS). The proposed aircraft training operations would occur within several of these areas. Therefore, the following summarizes the NAAQS nonattainment/maintenance designations for each air basin affected by the proposed action and their associated conformity *de minimis* thresholds used in the project conformity applicability analyses:

a. The Cleveland National Forest project area is located within the SCAB, which consists of Orange County and the urbanized areas of Los Angeles, Riverside, and San Bernardino Counties. The SCAB presently is classified as extreme nonattainment for ozone (O3), serious nonattainment for particulate matter less than 10 microns in diameter (PM10), nonattainment for particulate matter less than 2.5 microns in diameter (PM2.5), and in maintenance for nitrogen dioxide (NO2) and carbon monoxide (CO). Based upon these designations, the applicable annual conformity *de minimis* thresholds for the SCAB are (1) 10 tons of volatile organic compounds (VOCs) and nitrogen oxides (NOx), (2) 70 tons of PM10, and (3) 100 tons of CO and PM2.5.

b. The BLM El Centro project region occurs within the SSAB, which includes all of Imperial County and the southwest third of Riverside County. The entire Imperial County presently is in moderate nonattainment for O3. Additionally, the western two-thirds of Imperial County, which includes project landing zones C1 and Wolf in the west and Bull, Pelican, and Sparrow in

the east, is in serious nonattainment for PM10. This nonattainment area is known as the Imperial Valley Planning Area (IVPA). Lastly, the south-central portion of Imperial County is in nonattainment for PM2.5. Based upon these designations, the applicable annual conformity *de minimis* thresholds for these areas are (1) 100 tons of VOCs, NOx, and PM2.5, and (2) 70 tons of PM10.

c. The San Diego County project region is synonymous to the SDAB. The SDAB presently is classified as in nonattainment for O3. The western portion of the SDAB (the portion of the county generally west of the interior desert region) is in maintenance for CO. Based upon these designations, the applicable annual conformity *de minimis* thresholds for these areas are 100 tons of VOCs, CO, and NOx.

11. To the best of my knowledge, the information presented in this RONA is correct and accurate, and I concur in the finding that implementation of the Proposed Action does not require a formal CAA Conformity Determination.

Vincent A Coglianese

VINCENT A. COGLIANESE

Copy to:
Files
ENV

APPENDIX C

Noise

APPENDIX C-1

Aircraft Noise Modeling Data
(Wyle 2011)

Noise Tables

Note: LZ Canary and LZ PC3 Option, which were addressed in the Public Draft EA, have been subsequently dropped from further consideration. Some noise tables include information about these dropped LZs.

Potential Annual Sorties for Noise Analysis for SoCal Rotary-Wing Training EA

Aircraft Type / Group	Sortie Category	Baseline (CY10; derived) Day (0700-1900)	Evening (1900-2200)	Night (2200-0700)	Total	Prospective (CY16) Day (0700-1900)	Evening (1900-2200)	Night (2200-0700)	Total
CH-46E	CAL	63	80	13	156	-	-	-	-
	Non CAL	52	35	12	99	-	-	-	-
CH-46E FRS	CAL	12	5	1	18	-	-	-	-
	Non CAL	1	0	0	1	-	-	-	-
MV-22B	CAL	0	0	0	0	700	1,033	120	1,853
	Non CAL	0	0	0	0	28	27	12	67
CH-53	CAL	43	72	10	125	42	72	10	124
	Non CAL	35	50	11	96	35	50	11	96
UH-1N/Y	CAL	49	29	6	84	53	29	5	87
	Non CAL	44	28	7	79	43	33	8	84
AH-1W/Z	CAL	89	51	9	149	62	34	5	101
	Non CAL	74	45	9	128	47	36	7	90
Sub Totals									
CH-46E		115	115	25	255	-	-	-	-
CH-46E FRS		13	5	1	19	-	-	-	-
MV-22B		-	-	-	-	728	1,060	132	1,920
CH-53		78	122	21	221	77	122	21	220
UH-1N/Y		93	57	13	163	96	62	13	171
AH-1W/Z		163	96	18	277	109	70	12	191
TOTAL		**462**	**395**	**78**	**935**	**1,010**	**1,314**	**178**	**2,502**

Notes:
1) Busiest Month is 1.4 times the ops of the Average Month
2) 20 flying days per busiest month

LZ Group Day/Evening/Night Utilization Percentages for All Sortie Types by Aircraft Type

Aircraft Type / Group	Group of LZs		
	El Centro	Cleveland	Total
CH-46E	75%	25%	100%
CH-46E FRS	100%	0%	100%
MV-22B	95%	5%	100%
CH-53	90%	10%	100%
UH-1N/Y	20%	80%	100%
AH-1W/Z	20%	80%	100%

LZ Group Utilization for All Sortie Types by Aircraft Type

Aircraft Type / Group	Baseline (CY10 Sorties)			Proposed (CY16 Sorties)		
	El Centro	Cleveland	Total	El Centro	Cleveland	Total
CH-46E	186	68	254	0	0	0
CH-46E FRS	20	0	20	0	0	0
MV-22B	0	0	0	1814	106	1920
CH-53	197	24	221	196	24	220
UH-1N/Y	31	132	163	33	138	171
AH-1W/Z	49	228	277	37	154	191
Totals	**483**	**452**	**935**	**2080**	**422**	**2502**

Day/Evening/Night LZ Utilization Percentages for all Sortie Types and Applicable Airframes

LZ Group	Subgroup	Subgroup %	LZ ID	Include = 1	LZ Utilization
El Centro	Bull/Sparrow/ Pelican	45%	Bull	1	33.3%
			Sparrow	1	33.3%
			Pelican	1	33.4%
	Other	55%	IP1 Option	1	9.1%
			PC3/ Option	1	9.1%
			Cupcake	1	9.1%
			Mallard	1	9.1%
			PM3	0	0.0%
			Canary	1	9.1%
			MW1/ Option	1	9.1%
			Eider	1	9.1%
			MW4/ Option	0	0.0%
			Wolf	1	9.1%
			ME3 Option	1	9.1%
			C1	1	9.0%
Cleveland NF	no pad	60%	3	1	14.3%
			5	1	14.3%
			7	1	14.3%
			8	1	14.3%
			9	1	14.3%
			9 alt	0	0.0%
			10	1	14.3%
			11	1	14.2%
	pad	40%	6	0	0.0%
			6 alt	1	100.0%

Day/Evening/Night LZ CAL Flight Profiles within Modeled Flight Areas

Aircraft Type / Group	at LZ (area model)					
	Avg Airspeed (KIAS)	Altitude (ft above LZ Elevation)				Duration (minutes per sortie)
		0-200	200-300	300-1000	1000-3000	CAL [1,2]
CH-46 (fleet & FRS)	80	3%	95%	2%	-	45
MV-22 (proposed)	210	1%	2%	95%	2%	45
CH-53	80	3%	95%	2%	-	45
AH-1	80	5%	45%	50%	-	45
UH-1	80	5%	45%	50%	-	45

Notes: (1) The CAL-High includes all activity at an altitude of 200 feet or greater modeled in larger areas

(2) The CAL-Low includes the portion of the sortie below an altitude of 200 feet and is modeled in the 750 ft diameter area at each LZ

Day/Evening/Night LZ Non-CAL Flight Profiles within Modeled Flight Areas

Aircraft Type / Group	at LZ (area model)					
	Avg Airspeed (KIAS)	Altitude (ft above LZ Elevation)				Duration (minutes per sortie)
		0-200	200-300	300-1000	1000-3000	Non-CAL [3]
CH-46 (fleet & FRS)	80	-	98%	2%	-	15
MV-22 (proposed)	210	-	2%	96%	2%	15
CH-53	80	-	98%	2%	-	15
AH-1	80	-	47%	53%	-	15
UH-1	80	-	47%	53%	-	15

Notes: (1) The Non-CAL soties do not include the landing portion (altitude below 200 feet)

Modeled Flight Areas for each LZ

Group	Airframe	Sortie Type	Shape	Dimension
El Centro	MV-22	CAL-High	Circular	5 nm radius
		CAL-Low	Circular	750 ft diameter
		Non-CAL	Circular	5 nm radius
	Helicopters	CAL-High	Circular	1.5 nm radius
		CAL-Low	Circular	750 ft diameter
		Non-CAL	Circular	5 nm radius
Cleveland	MV-22	CAL-High	Rectangle	10 nm length, 2 nm width
		CAL-Low	Circular	750 ft diameter
		Non-CAL	Rectangle	10 nm length, 2 nm width
	Helicopters	CAL-High	Rectangle	3 nm length, 1 nm width
		CAL-Low	Circular	750 ft diameter
		Non-CAL	Rectangle	3 nm length, 1 nm width

Notes:
1) CAL - High represents the portion of the CAL sortie at higher altitudes
2) CAL - Low represents the portion of the sortie that takes place in the direct vicinity of the LZ and contains the Hover and/or Land activity

Cleveland Modeled Profiles - Baseline Scenario

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				Total
										0	200	300	1000	
										200	300	1000	3000	
ST 3	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.16	43	0	98	2	0	100
ST 3	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.2	43	0	98	2	0	100
ST 3	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
ST 3	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	43	0	98	2	0	100
ST 3	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	43	0	98	2	0	100
ST 3	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	43	0	98	2	0	100
ST 3	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.69	42	0	47	53	0	100
ST 3	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.39	42	0	47	53	0	100
ST 3	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	42	0	47	53	0	100
ST 3	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.38	42	0	47	53	0	100
ST 3	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	42	0	47	53	0	100
ST 3	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	42	0	47	53	0	100
ST 3	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.13	15	0	98	2	0	100
ST 3	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.09	15	0	98	2	0	100
ST 3	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	15	0	98	2	0	100
ST 3	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.03	15	0	98	2	0	100
ST 3	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.05	15	0	98	2	0	100
ST 3	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	15	0	98	2	0	100
ST 3	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.57	15	0	47	53	0	100
ST 3	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.33	15	0	47	53	0	100
ST 3	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	15	0	47	53	0	100
ST 3	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.33	15	0	47	53	0	100
ST 3	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	15	0	47	53	0	100
ST 3	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	15	0	47	53	0	100
ST 5	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.16	43	0	98	2	0	100
ST 5	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.2	43	0	98	2	0	100
ST 5	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
ST 5	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	43	0	98	2	0	100
ST 5	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	43	0	98	2	0	100
ST 5	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	43	0	98	2	0	100
ST 5	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.69	42	0	47	53	0	100
ST 5	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.39	42	0	47	53	0	100
ST 5	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	42	0	47	53	0	100
ST 5	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.38	42	0	47	53	0	100
ST 5	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	42	0	47	53	0	100
ST 5	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	42	0	47	53	0	100
ST 5	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.13	15	0	98	2	0	100
ST 5	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.09	15	0	98	2	0	100
ST 5	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	15	0	98	2	0	100
ST 5	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.03	15	0	98	2	0	100
ST 5	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.05	15	0	98	2	0	100
ST 5	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	15	0	98	2	0	100
ST 5	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.57	15	0	47	53	0	100
ST 5	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.33	15	0	47	53	0	100
ST 5	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	15	0	47	53	0	100
ST 5	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.33	15	0	47	53	0	100
ST 5	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	15	0	47	53	0	100
ST 5	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	15	0	47	53	0	100

Cleveland Modeled Profiles - Baseline Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				Total
										0	200	300	1000	
										200	300	1000	3000	
ST 6 ALT	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.8	43	0	98	2	0	100
ST 6 ALT	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	1	43	0	98	2	0	100
ST 6 ALT	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.17	43	0	98	2	0	100
ST 6 ALT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.23	43	0	98	2	0	100
ST 6 ALT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.37	43	0	98	2	0	100
ST 6 ALT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.07	43	0	98	2	0	100
ST 6 ALT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	3.47	42	0	47	53	0	100
ST 6 ALT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	1.97	42	0	47	53	0	100
ST 6 ALT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.33	42	0	47	53	0	100
ST 6 ALT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	1.9	42	0	47	53	0	100
ST 6 ALT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	1.07	42	0	47	53	0	100
ST 6 ALT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.23	42	0	47	53	0	100
ST 6 ALT	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.67	15	0	98	2	0	100
ST 6 ALT	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.43	15	0	98	2	0	100
ST 6 ALT	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.13	15	0	98	2	0	100
ST 6 ALT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.17	15	0	98	2	0	100
ST 6 ALT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.27	15	0	98	2	0	100
ST 6 ALT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.07	15	0	98	2	0	100
ST 6 ALT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	2.83	15	0	47	53	0	100
ST 6 ALT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	1.67	15	0	47	53	0	100
ST 6 ALT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.33	15	0	47	53	0	100
ST 6 ALT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	1.63	15	0	47	53	0	100
ST 6 ALT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	1.03	15	0	47	53	0	100
ST 6 ALT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.27	15	0	47	53	0	100
ST 7	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.16	43	0	98	2	0	100
ST 7	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.2	43	0	98	2	0	100
ST 7	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
ST 7	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	43	0	98	2	0	100
ST 7	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	43	0	98	2	0	100
ST 7	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	43	0	98	2	0	100
ST 7	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.69	42	0	47	53	0	100
ST 7	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.39	42	0	47	53	0	100
ST 7	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	42	0	47	53	0	100
ST 7	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.38	42	0	47	53	0	100
ST 7	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	42	0	47	53	0	100
ST 7	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	42	0	47	53	0	100
ST 7	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.13	15	0	98	2	0	100
ST 7	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.09	15	0	98	2	0	100
ST 7	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	15	0	98	2	0	100
ST 7	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.03	15	0	98	2	0	100
ST 7	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.05	15	0	98	2	0	100
ST 7	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	15	0	98	2	0	100
ST 7	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.57	15	0	47	53	0	100
ST 7	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.33	15	0	47	53	0	100
ST 7	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	15	0	47	53	0	100
ST 7	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.33	15	0	47	53	0	100
ST 7	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	15	0	47	53	0	100
ST 7	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	15	0	47	53	0	100

Cleveland Modeled Profiles - Baseline Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				Total
										0	200	300	1000	
										200	300	1000	3000	
ST 8	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.16	43	0	98	2	0	100
ST 8	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.2	43	0	98	2	0	100
ST 8	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
ST 8	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	43	0	98	2	0	100
ST 8	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	43	0	98	2	0	100
ST 8	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	43	0	98	2	0	100
ST 8	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.69	42	0	47	53	0	100
ST 8	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.39	42	0	47	53	0	100
ST 8	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	42	0	47	53	0	100
ST 8	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.38	42	0	47	53	0	100
ST 8	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	42	0	47	53	0	100
ST 8	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	42	0	47	53	0	100
ST 8	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.13	15	0	98	2	0	100
ST 8	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.09	15	0	98	2	0	100
ST 8	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	15	0	98	2	0	100
ST 8	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.03	15	0	98	2	0	100
ST 8	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.05	15	0	98	2	0	100
ST 8	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	15	0	98	2	0	100
ST 8	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.57	15	0	47	53	0	100
ST 8	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.33	15	0	47	53	0	100
ST 8	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	15	0	47	53	0	100
ST 8	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.33	15	0	47	53	0	100
ST 8	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	15	0	47	53	0	100
ST 8	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	15	0	47	53	0	100
ST 9	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.16	43	0	98	2	0	100
ST 9	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.2	43	0	98	2	0	100
ST 9	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
ST 9	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	43	0	98	2	0	100
ST 9	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	43	0	98	2	0	100
ST 9	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	43	0	98	2	0	100
ST 9	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.69	42	0	47	53	0	100
ST 9	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.39	42	0	47	53	0	100
ST 9	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	42	0	47	53	0	100
ST 9	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.38	42	0	47	53	0	100
ST 9	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	42	0	47	53	0	100
ST 9	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	42	0	47	53	0	100
ST 9	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.13	15	0	98	2	0	100
ST 9	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.09	15	0	98	2	0	100
ST 9	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	15	0	98	2	0	100
ST 9	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.03	15	0	98	2	0	100
ST 9	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.05	15	0	98	2	0	100
ST 9	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	15	0	98	2	0	100
ST 9	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.57	15	0	47	53	0	100
ST 9	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.33	15	0	47	53	0	100
ST 9	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	15	0	47	53	0	100
ST 9	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.33	15	0	47	53	0	100
ST 9	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	15	0	47	53	0	100
ST 9	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	15	0	47	53	0	100

Cleveland Modeled Profiles - Baseline Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				Total
										0	200	300	1000	
										200	300	1000	3000	
ST 10	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.16	43	0	98	2	0	100
ST 10	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.2	43	0	98	2	0	100
ST 10	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
ST 10	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	43	0	98	2	0	100
ST 10	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	43	0	98	2	0	100
ST 10	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	43	0	98	2	0	100
ST 10	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.69	42	0	47	53	0	100
ST 10	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.39	42	0	47	53	0	100
ST 10	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	42	0	47	53	0	100
ST 10	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.38	42	0	47	53	0	100
ST 10	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	42	0	47	53	0	100
ST 10	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	42	0	47	53	0	100
ST 10	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.13	15	0	98	2	0	100
ST 10	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.09	15	0	98	2	0	100
ST 10	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	15	0	98	2	0	100
ST 10	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.03	15	0	98	2	0	100
ST 10	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.05	15	0	98	2	0	100
ST 10	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	15	0	98	2	0	100
ST 10	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.57	15	0	47	53	0	100
ST 10	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.33	15	0	47	53	0	100
ST 10	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	15	0	47	53	0	100
ST 10	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.33	15	0	47	53	0	100
ST 10	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	15	0	47	53	0	100
ST 10	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	15	0	47	53	0	100
ST 11	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.16	43	0	98	2	0	100
ST 11	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.2	43	0	98	2	0	100
ST 11	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
ST 11	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	43	0	98	2	0	100
ST 11	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	43	0	98	2	0	100
ST 11	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	43	0	98	2	0	100
ST 11	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.69	42	0	47	53	0	100
ST 11	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.39	42	0	47	53	0	100
ST 11	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	42	0	47	53	0	100
ST 11	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.38	42	0	47	53	0	100
ST 11	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	42	0	47	53	0	100
ST 11	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	42	0	47	53	0	100
ST 11	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.13	15	0	98	2	0	100
ST 11	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.09	15	0	98	2	0	100
ST 11	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	15	0	98	2	0	100
ST 11	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.03	15	0	98	2	0	100
ST 11	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.05	15	0	98	2	0	100
ST 11	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	15	0	98	2	0	100
ST 11	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.57	15	0	47	53	0	100
ST 11	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.33	15	0	47	53	0	100
ST 11	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	15	0	47	53	0	100
ST 11	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.33	15	0	47	53	0	100
ST 11	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	15	0	47	53	0	100
ST 11	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	15	0	47	53	0	100

Cleveland Modeled Profiles - Baseline Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
ST 3B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.16	2	100	0	0	0	100
ST 3B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.2	2	100	0	0	0	100
ST 3B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
ST 3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	2	100	0	0	0	100
ST 3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	2	100	0	0	0	100
ST 3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	2	100	0	0	0	100
ST 3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.69	3	100	0	0	0	100
ST 3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.39	3	100	0	0	0	100
ST 3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	3	100	0	0	0	100
ST 3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.38	3	100	0	0	0	100
ST 3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	3	100	0	0	0	100
ST 3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	3	100	0	0	0	100
ST 5B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.16	2	100	0	0	0	100
ST 5B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.2	2	100	0	0	0	100
ST 5B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
ST 5B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	2	100	0	0	0	100
ST 5B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	2	100	0	0	0	100
ST 5B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	2	100	0	0	0	100
ST 5B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.69	3	100	0	0	0	100
ST 5B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.39	3	100	0	0	0	100
ST 5B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	3	100	0	0	0	100
ST 5B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.38	3	100	0	0	0	100
ST 5B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	3	100	0	0	0	100
ST 5B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	3	100	0	0	0	100
ST 6 ALTB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.8	2	100	0	0	0	100
ST 6 ALTB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	1	2	100	0	0	0	100
ST 6 ALTB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.17	2	100	0	0	0	100
ST 6 ALTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.23	2	100	0	0	0	100
ST 6 ALTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.37	2	100	0	0	0	100
ST 6 ALTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.07	2	100	0	0	0	100
ST 6 ALTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	3.47	3	100	0	0	0	100
ST 6 ALTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	1.97	3	100	0	0	0	100
ST 6 ALTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.33	3	100	0	0	0	100
ST 6 ALTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	1.9	3	100	0	0	0	100
ST 6 ALTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	1.07	3	100	0	0	0	100
ST 6 ALTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.23	3	100	0	0	0	100
ST 7B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.16	2	100	0	0	0	100
ST 7B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.2	2	100	0	0	0	100
ST 7B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
ST 7B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	2	100	0	0	0	100
ST 7B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	2	100	0	0	0	100
ST 7B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	2	100	0	0	0	100
ST 7B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.69	3	100	0	0	0	100
ST 7B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.39	3	100	0	0	0	100
ST 7B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	3	100	0	0	0	100
ST 7B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.38	3	100	0	0	0	100
ST 7B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	3	100	0	0	0	100
ST 7B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	3	100	0	0	0	100

Cleveland Modeled Profiles - Baseline Scenario (concluded)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
ST 8B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.16	2	100	0	0	0	100
ST 8B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.2	2	100	0	0	0	100
ST 8B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
ST 8B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	2	100	0	0	0	100
ST 8B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	2	100	0	0	0	100
ST 8B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	2	100	0	0	0	100
ST 8B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.69	3	100	0	0	0	100
ST 8B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.39	3	100	0	0	0	100
ST 8B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	3	100	0	0	0	100
ST 8B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.38	3	100	0	0	0	100
ST 8B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	3	100	0	0	0	100
ST 8B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	3	100	0	0	0	100
ST 9B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.16	2	100	0	0	0	100
ST 9B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.2	2	100	0	0	0	100
ST 9B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
ST 9B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	2	100	0	0	0	100
ST 9B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	2	100	0	0	0	100
ST 9B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	2	100	0	0	0	100
ST 9B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.69	3	100	0	0	0	100
ST 9B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.39	3	100	0	0	0	100
ST 9B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	3	100	0	0	0	100
ST 9B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.38	3	100	0	0	0	100
ST 9B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	3	100	0	0	0	100
ST 9B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	3	100	0	0	0	100
ST 10B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.16	2	100	0	0	0	100
ST 10B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.2	2	100	0	0	0	100
ST 10B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
ST 10B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	2	100	0	0	0	100
ST 10B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	2	100	0	0	0	100
ST 10B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	2	100	0	0	0	100
ST 10B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.69	3	100	0	0	0	100
ST 10B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.39	3	100	0	0	0	100
ST 10B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	3	100	0	0	0	100
ST 10B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.38	3	100	0	0	0	100
ST 10B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	3	100	0	0	0	100
ST 10B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	3	100	0	0	0	100
ST 11B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.16	2	100	0	0	0	100
ST 11B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.2	2	100	0	0	0	100
ST 11B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
ST 11B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	2	100	0	0	0	100
ST 11B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	2	100	0	0	0	100
ST 11B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	2	100	0	0	0	100
ST 11B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.69	3	100	0	0	0	100
ST 11B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.39	3	100	0	0	0	100
ST 11B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.07	3	100	0	0	0	100
ST 11B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.38	3	100	0	0	0	100
ST 11B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	3	100	0	0	0	100
ST 11B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.05	3	100	0	0	0	100

El Centro Modeled Profiles - Baseline Scenario

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
MW1-BOE	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	43	0	98	2	0	100
MW1-BOE	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	43	0	98	2	0	100
MW1-BOE	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
MW1-BOE	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	43	0	98	2	0	100
MW1-BOE	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	43	0	98	2	0	100
MW1-BOE	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
MW1-BOE	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	42	0	47	53	0	100
MW1-BOE	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	42	0	47	53	0	100
MW1-BOE	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	42	0	47	53	0	100
MW1-BOE	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	42	0	47	53	0	100
MW1-BOE	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	42	0	47	53	0	100
MW1-BOE	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	42	0	47	53	0	100
MW1-BOE	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.2	15	0	98	2	0	100
MW1-BOE	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.13	15	0	98	2	0	100
MW1-BOE	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.04	15	0	98	2	0	100
MW1-BOE	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.16	15	0	98	2	0	100
MW1-BOE	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.23	15	0	98	2	0	100
MW1-BOE	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	15	0	98	2	0	100
MW1-BOE	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.07	15	0	47	53	0	100
MW1-BOE	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.04	15	0	47	53	0	100
MW1-BOE	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	15	0	47	53	0	100
MW1-BOE	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.04	15	0	47	53	0	100
MW1-BOE	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	15	0	47	53	0	100
MW1-BOE	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	15	0	47	53	0	100
PC3	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.15	43	0	98	2	0	100
PC3	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.16	43	0	98	2	0	100
PC3	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
PC3	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.1	43	0	98	2	0	100
PC3	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.17	43	0	98	2	0	100
PC3	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
PC3	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	42	0	47	53	0	100
PC3	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	42	0	47	53	0	100
PC3	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	42	0	47	53	0	100
PC3	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.02	42	0	47	53	0	100
PC3	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	42	0	47	53	0	100
PC3	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	42	0	47	53	0	100
PC3	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.1	15	0	98	2	0	100
PC3	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.06	15	0	98	2	0	100
PC3	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.02	15	0	98	2	0	100
PC3	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.08	15	0	98	2	0	100
PC3	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.11	15	0	98	2	0	100
PC3	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	15	0	98	2	0	100
PC3	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	15	0	47	53	0	100
PC3	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.02	15	0	47	53	0	100
PC3	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	15	0	47	53	0	100
PC3	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.02	15	0	47	53	0	100
PC3	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	15	0	47	53	0	100
PC3	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	15	0	47	53	0	100

El Centro Modeled Profiles - Baseline Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
PC3 OPT	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.15	43	0	98	2	0	100
PC3 OPT	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.16	43	0	98	2	0	100
PC3 OPT	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
PC3 OPT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.1	43	0	98	2	0	100
PC3 OPT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.17	43	0	98	2	0	100
PC3 OPT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
PC3 OPT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	42	0	47	53	0	100
PC3 OPT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	42	0	47	53	0	100
PC3 OPT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	42	0	47	53	0	100
PC3 OPT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.02	42	0	47	53	0	100
PC3 OPT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	42	0	47	53	0	100
PC3 OPT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	42	0	47	53	0	100
PC3 OPT	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.1	15	0	98	2	0	100
PC3 OPT	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.06	15	0	98	2	0	100
PC3 OPT	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.02	15	0	98	2	0	100
PC3 OPT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.08	15	0	98	2	0	100
PC3 OPT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.11	15	0	98	2	0	100
PC3 OPT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	15	0	98	2	0	100
PC3 OPT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	15	0	47	53	0	100
PC3 OPT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.02	15	0	47	53	0	100
PC3 OPT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	15	0	47	53	0	100
PC3 OPT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.02	15	0	47	53	0	100
PC3 OPT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	15	0	47	53	0	100
PC3 OPT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	15	0	47	53	0	100
LZ SPAR	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	1.15	43	0	98	2	0	100
LZ SPAR	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	1.21	43	0	98	2	0	100
LZ SPAR	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.19	43	0	98	2	0	100
LZ SPAR	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.74	43	0	98	2	0	100
LZ SPAR	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	1.26	43	0	98	2	0	100
LZ SPAR	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.19	43	0	98	2	0	100
LZ SPAR	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.33	42	0	47	53	0	100
LZ SPAR	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.19	42	0	47	53	0	100
LZ SPAR	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	42	0	47	53	0	100
LZ SPAR	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.17	42	0	47	53	0	100
LZ SPAR	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.1	42	0	47	53	0	100
LZ SPAR	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.03	42	0	47	53	0	100
LZ SPAR	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.75	15	0	98	2	0	100
LZ SPAR	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.49	15	0	98	2	0	100
LZ SPAR	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.16	15	0	98	2	0	100
LZ SPAR	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.61	15	0	98	2	0	100
LZ SPAR	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.85	15	0	98	2	0	100
LZ SPAR	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.2	15	0	98	2	0	100
LZ SPAR	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.26	15	0	47	53	0	100
LZ SPAR	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.16	15	0	47	53	0	100
LZ SPAR	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	15	0	47	53	0	100
LZ SPAR	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.15	15	0	47	53	0	100
LZ SPAR	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.1	15	0	47	53	0	100
LZ SPAR	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.03	15	0	47	53	0	100

El Centro Modeled Profiles - Baseline Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
LZ MALL	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	43	0	98	2	0	100
LZ MALL	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	43	0	98	2	0	100
LZ MALL	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
LZ MALL	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	43	0	98	2	0	100
LZ MALL	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	43	0	98	2	0	100
LZ MALL	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
LZ MALL	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	42	0	47	53	0	100
LZ MALL	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	42	0	47	53	0	100
LZ MALL	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	42	0	47	53	0	100
LZ MALL	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	42	0	47	53	0	100
LZ MALL	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	42	0	47	53	0	100
LZ MALL	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	42	0	47	53	0	100
LZ MALL	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.2	15	0	98	2	0	100
LZ MALL	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.13	15	0	98	2	0	100
LZ MALL	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.04	15	0	98	2	0	100
LZ MALL	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.16	15	0	98	2	0	100
LZ MALL	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.23	15	0	98	2	0	100
LZ MALL	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	15	0	98	2	0	100
LZ MALL	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.07	15	0	47	53	0	100
LZ MALL	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.04	15	0	47	53	0	100
LZ MALL	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	15	0	47	53	0	100
LZ MALL	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.04	15	0	47	53	0	100
LZ MALL	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	15	0	47	53	0	100
LZ MALL	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	15	0	47	53	0	100
LZ EIDER	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	43	0	98	2	0	100
LZ EIDER	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	43	0	98	2	0	100
LZ EIDER	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
LZ EIDER	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	43	0	98	2	0	100
LZ EIDER	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	43	0	98	2	0	100
LZ EIDER	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
LZ EIDER	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	42	0	47	53	0	100
LZ EIDER	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	42	0	47	53	0	100
LZ EIDER	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	42	0	47	53	0	100
LZ EIDER	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	42	0	47	53	0	100
LZ EIDER	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	42	0	47	53	0	100
LZ EIDER	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	42	0	47	53	0	100
LZ EIDER	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.2	15	0	98	2	0	100
LZ EIDER	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.13	15	0	98	2	0	100
LZ EIDER	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.04	15	0	98	2	0	100
LZ EIDER	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.16	15	0	98	2	0	100
LZ EIDER	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.23	15	0	98	2	0	100
LZ EIDER	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	15	0	98	2	0	100
LZ EIDER	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.07	15	0	47	53	0	100
LZ EIDER	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.04	15	0	47	53	0	100
LZ EIDER	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	15	0	47	53	0	100
LZ EIDER	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.04	15	0	47	53	0	100
LZ EIDER	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	15	0	47	53	0	100
LZ EIDER	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	15	0	47	53	0	100

El Centro Modeled Profiles - Baseline Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
LZ CAN	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	43	0	98	2	0	100
LZ CAN	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	43	0	98	2	0	100
LZ CAN	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
LZ CAN	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	43	0	98	2	0	100
LZ CAN	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	43	0	98	2	0	100
LZ CAN	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
LZ CAN	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	42	0	47	53	0	100
LZ CAN	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	42	0	47	53	0	100
LZ CAN	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	42	0	47	53	0	100
LZ CAN	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	42	0	47	53	0	100
LZ CAN	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	42	0	47	53	0	100
LZ CAN	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	42	0	47	53	0	100
LZ CAN	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.2	15	0	98	2	0	100
LZ CAN	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.13	15	0	98	2	0	100
LZ CAN	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.04	15	0	98	2	0	100
LZ CAN	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.16	15	0	98	2	0	100
LZ CAN	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.23	15	0	98	2	0	100
LZ CAN	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	15	0	98	2	0	100
LZ CAN	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.07	15	0	47	53	0	100
LZ CAN	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.04	15	0	47	53	0	100
LZ CAN	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	15	0	47	53	0	100
LZ CAN	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.04	15	0	47	53	0	100
LZ CAN	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	15	0	47	53	0	100
LZ CAN	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	15	0	47	53	0	100
IP1 OPT	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.15	43	0	98	2	0	100
IP1 OPT	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.16	43	0	98	2	0	100
IP1 OPT	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
IP1 OPT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.1	43	0	98	2	0	100
IP1 OPT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.17	43	0	98	2	0	100
IP1 OPT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
IP1 OPT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	42	0	47	53	0	100
IP1 OPT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	42	0	47	53	0	100
IP1 OPT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	42	0	47	53	0	100
IP1 OPT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.02	42	0	47	53	0	100
IP1 OPT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	42	0	47	53	0	100
IP1 OPT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	42	0	47	53	0	100
IP1 OPT	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.1	15	0	98	2	0	100
IP1 OPT	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.06	15	0	98	2	0	100
IP1 OPT	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.02	15	0	98	2	0	100
IP1 OPT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.08	15	0	98	2	0	100
IP1 OPT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.11	15	0	98	2	0	100
IP1 OPT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	15	0	98	2	0	100
IP1 OPT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	15	0	47	53	0	100
IP1 OPT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.02	15	0	47	53	0	100
IP1 OPT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	15	0	47	53	0	100
IP1 OPT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.02	15	0	47	53	0	100
IP1 OPT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	15	0	47	53	0	100
IP1 OPT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	15	0	47	53	0	100

El Centro Modeled Profiles - Baseline Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
IP1 OPT	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.15	43	0	98	2	0	100
IP1 OPT	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.16	43	0	98	2	0	100
IP1 OPT	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
IP1 OPT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.1	43	0	98	2	0	100
IP1 OPT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.17	43	0	98	2	0	100
IP1 OPT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
IP1 OPT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	42	0	47	53	0	100
IP1 OPT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	42	0	47	53	0	100
IP1 OPT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	42	0	47	53	0	100
IP1 OPT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.02	42	0	47	53	0	100
IP1 OPT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	42	0	47	53	0	100
IP1 OPT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	42	0	47	53	0	100
IP1 OPT	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.1	15	0	98	2	0	100
IP1 OPT	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.06	15	0	98	2	0	100
IP1 OPT	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.02	15	0	98	2	0	100
IP1 OPT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.08	15	0	98	2	0	100
IP1 OPT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.11	15	0	98	2	0	100
IP1 OPT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	15	0	98	2	0	100
IP1 OPT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	15	0	47	53	0	100
IP1 OPT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.02	15	0	47	53	0	100
IP1 OPT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	15	0	47	53	0	100
IP1 OPT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.02	15	0	47	53	0	100
IP1 OPT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	15	0	47	53	0	100
IP1 OPT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	15	0	47	53	0	100
LZ PEL	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	1.15	43	0	98	2	0	100
LZ PEL	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	1.21	43	0	98	2	0	100
LZ PEL	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.19	43	0	98	2	0	100
LZ PEL	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.74	43	0	98	2	0	100
LZ PEL	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	1.26	43	0	98	2	0	100
LZ PEL	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.19	43	0	98	2	0	100
LZ PEL	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.33	42	0	47	53	0	100
LZ PEL	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.19	42	0	47	53	0	100
LZ PEL	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	42	0	47	53	0	100
LZ PEL	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.17	42	0	47	53	0	100
LZ PEL	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.1	42	0	47	53	0	100
LZ PEL	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.03	42	0	47	53	0	100
LZ PEL	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.75	15	0	98	2	0	100
LZ PEL	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.49	15	0	98	2	0	100
LZ PEL	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.16	15	0	98	2	0	100
LZ PEL	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.61	15	0	98	2	0	100
LZ PEL	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.85	15	0	98	2	0	100
LZ PEL	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.2	15	0	98	2	0	100
LZ PEL	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.26	15	0	47	53	0	100
LZ PEL	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.16	15	0	47	53	0	100
LZ PEL	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	15	0	47	53	0	100
LZ PEL	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.15	15	0	47	53	0	100
LZ PEL	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.1	15	0	47	53	0	100
LZ PEL	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.03	15	0	47	53	0	100

El Centro Modeled Profiles - Baseline Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
CUPCAKE	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	43	0	98	2	0	100
CUPCAKE	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	43	0	98	2	0	100
CUPCAKE	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
CUPCAKE	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	43	0	98	2	0	100
CUPCAKE	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	43	0	98	2	0	100
CUPCAKE	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
CUPCAKE	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	42	0	47	53	0	100
CUPCAKE	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	42	0	47	53	0	100
CUPCAKE	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	42	0	47	53	0	100
CUPCAKE	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	42	0	47	53	0	100
CUPCAKE	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	42	0	47	53	0	100
CUPCAKE	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	42	0	47	53	0	100
CUPCAKE	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.2	15	0	98	2	0	100
CUPCAKE	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.13	15	0	98	2	0	100
CUPCAKE	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.04	15	0	98	2	0	100
CUPCAKE	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.16	15	0	98	2	0	100
CUPCAKE	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.23	15	0	98	2	0	100
CUPCAKE	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	15	0	98	2	0	100
CUPCAKE	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.07	15	0	47	53	0	100
CUPCAKE	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.04	15	0	47	53	0	100
CUPCAKE	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	15	0	47	53	0	100
CUPCAKE	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.04	15	0	47	53	0	100
CUPCAKE	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	15	0	47	53	0	100
CUPCAKE	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	15	0	47	53	0	100
LZ BULL	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	1.15	43	0	98	2	0	100
LZ BULL	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	1.21	43	0	98	2	0	100
LZ BULL	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.19	43	0	98	2	0	100
LZ BULL	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.74	43	0	98	2	0	100
LZ BULL	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	1.26	43	0	98	2	0	100
LZ BULL	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.19	43	0	98	2	0	100
LZ BULL	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.33	42	0	47	53	0	100
LZ BULL	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.19	42	0	47	53	0	100
LZ BULL	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	42	0	47	53	0	100
LZ BULL	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.17	42	0	47	53	0	100
LZ BULL	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.1	42	0	47	53	0	100
LZ BULL	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.03	42	0	47	53	0	100
LZ BULL	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.75	15	0	98	2	0	100
LZ BULL	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.49	15	0	98	2	0	100
LZ BULL	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.16	15	0	98	2	0	100
LZ BULL	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.61	15	0	98	2	0	100
LZ BULL	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.85	15	0	98	2	0	100
LZ BULL	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.2	15	0	98	2	0	100
LZ BULL	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.26	15	0	47	53	0	100
LZ BULL	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.16	15	0	47	53	0	100
LZ BULL	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	15	0	47	53	0	100
LZ BULL	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.15	15	0	47	53	0	100
LZ BULL	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.1	15	0	47	53	0	100
LZ BULL	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.03	15	0	47	53	0	100

El Centro Modeled Profiles - Baseline Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
ME3	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	43	0	98	2	0	100
ME3	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	43	0	98	2	0	100
ME3	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
ME3	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	43	0	98	2	0	100
ME3	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	43	0	98	2	0	100
ME3	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
ME3	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	42	0	47	53	0	100
ME3	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	42	0	47	53	0	100
ME3	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	42	0	47	53	0	100
ME3	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	42	0	47	53	0	100
ME3	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	42	0	47	53	0	100
ME3	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	42	0	47	53	0	100
ME3	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.2	15	0	98	2	0	100
ME3	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.13	15	0	98	2	0	100
ME3	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.04	15	0	98	2	0	100
ME3	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.16	15	0	98	2	0	100
ME3	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.23	15	0	98	2	0	100
ME3	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	15	0	98	2	0	100
ME3	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.07	15	0	47	53	0	100
ME3	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.04	15	0	47	53	0	100
ME3	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	15	0	47	53	0	100
ME3	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.04	15	0	47	53	0	100
ME3	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	15	0	47	53	0	100
ME3	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	15	0	47	53	0	100
MW1-MCI	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	43	0	98	2	0	100
MW1-MCI	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	43	0	98	2	0	100
MW1-MCI	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
MW1-MCI	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	43	0	98	2	0	100
MW1-MCI	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	43	0	98	2	0	100
MW1-MCI	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
MW1-MCI	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	42	0	47	53	0	100
MW1-MCI	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	42	0	47	53	0	100
MW1-MCI	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	42	0	47	53	0	100
MW1-MCI	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	42	0	47	53	0	100
MW1-MCI	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	42	0	47	53	0	100
MW1-MCI	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	42	0	47	53	0	100
MW1-MCI	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.2	15	0	98	2	0	100
MW1-MCI	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.13	15	0	98	2	0	100
MW1-MCI	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.04	15	0	98	2	0	100
MW1-MCI	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.16	15	0	98	2	0	100
MW1-MCI	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.23	15	0	98	2	0	100
MW1-MCI	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	15	0	98	2	0	100
MW1-MCI	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.07	15	0	47	53	0	100
MW1-MCI	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.04	15	0	47	53	0	100
MW1-MCI	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	15	0	47	53	0	100
MW1-MCI	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.04	15	0	47	53	0	100
MW1-MCI	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	15	0	47	53	0	100
MW1-MCI	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	15	0	47	53	0	100

El Centro Modeled Profiles - Baseline Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
PM3B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	2	100	0	0	0	100
PM3B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	2	100	0	0	0	100
PM3B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
PM3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	2	100	0	0	0	100
PM3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	2	100	0	0	0	100
PM3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
PM3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	3	100	0	0	0	100
PM3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	3	100	0	0	0	100
PM3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	3	100	0	0	0	100
PM3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	3	100	0	0	0	100
PM3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	3	100	0	0	0	100
PM3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	3	100	0	0	0	100
PC3B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.15	2	100	0	0	0	100
PC3B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.16	2	100	0	0	0	100
PC3B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
PC3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.1	2	100	0	0	0	100
PC3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.17	2	100	0	0	0	100
PC3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
PC3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	3	100	0	0	0	100
PC3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	3	100	0	0	0	100
PC3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	3	100	0	0	0	100
PC3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.02	3	100	0	0	0	100
PC3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	3	100	0	0	0	100
PC3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	3	100	0	0	0	100
PC3 OPTB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.15	2	100	0	0	0	100
PC3 OPTB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.16	2	100	0	0	0	100
PC3 OPTB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
PC3 OPTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.1	2	100	0	0	0	100
PC3 OPTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.17	2	100	0	0	0	100
PC3 OPTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
PC3 OPTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	3	100	0	0	0	100
PC3 OPTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	3	100	0	0	0	100
PC3 OPTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	3	100	0	0	0	100
PC3 OPTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.02	3	100	0	0	0	100
PC3 OPTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	3	100	0	0	0	100
PC3 OPTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	3	100	0	0	0	100
LZ SPARB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	1.15	2	100	0	0	0	100
LZ SPARB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	1.21	2	100	0	0	0	100
LZ SPARB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.19	2	100	0	0	0	100
LZ SPARB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.74	2	100	0	0	0	100
LZ SPARB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	1.26	2	100	0	0	0	100
LZ SPARB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.19	2	100	0	0	0	100
LZ SPARB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.33	3	100	0	0	0	100
LZ SPARB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.19	3	100	0	0	0	100
LZ SPARB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	3	100	0	0	0	100
LZ SPARB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.17	3	100	0	0	0	100
LZ SPARB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.1	3	100	0	0	0	100
LZ SPARB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.03	3	100	0	0	0	100

El Centro Modeled Profiles - Baseline Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
LZ MALLB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	2	100	0	0	0	100
LZ MALLB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	2	100	0	0	0	100
LZ MALLB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
LZ MALLB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	2	100	0	0	0	100
LZ MALLB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	2	100	0	0	0	100
LZ MALLB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
LZ MALLB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	3	100	0	0	0	100
LZ MALLB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	3	100	0	0	0	100
LZ MALLB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	3	100	0	0	0	100
LZ MALLB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	3	100	0	0	0	100
LZ MALLB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	3	100	0	0	0	100
LZ MALLB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	3	100	0	0	0	100
LZ EIDERB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	2	100	0	0	0	100
LZ EIDERB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	2	100	0	0	0	100
LZ EIDERB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
LZ EIDERB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	2	100	0	0	0	100
LZ EIDERB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	2	100	0	0	0	100
LZ EIDERB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
LZ EIDERB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	3	100	0	0	0	100
LZ EIDERB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	3	100	0	0	0	100
LZ EIDERB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	3	100	0	0	0	100
LZ EIDERB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	3	100	0	0	0	100
LZ EIDERB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	3	100	0	0	0	100
LZ EIDERB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	3	100	0	0	0	100
LZ CANB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	2	100	0	0	0	100
LZ CANB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	2	100	0	0	0	100
LZ CANB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
LZ CANB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	2	100	0	0	0	100
LZ CANB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	2	100	0	0	0	100
LZ CANB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
LZ CANB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	3	100	0	0	0	100
LZ CANB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	3	100	0	0	0	100
LZ CANB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	3	100	0	0	0	100
LZ CANB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	3	100	0	0	0	100
LZ CANB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	3	100	0	0	0	100
LZ CANB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	3	100	0	0	0	100
IP1 OPTB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.15	2	100	0	0	0	100
IP1 OPTB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.16	2	100	0	0	0	100
IP1 OPTB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
IP1 OPTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.1	2	100	0	0	0	100
IP1 OPTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.17	2	100	0	0	0	100
IP1 OPTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
IP1 OPTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	3	100	0	0	0	100
IP1 OPTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	3	100	0	0	0	100
IP1 OPTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	3	100	0	0	0	100
IP1 OPTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.02	3	100	0	0	0	100
IP1 OPTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	3	100	0	0	0	100
IP1 OPTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	3	100	0	0	0	100

El Centro Modeled Profiles - Baseline Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
IP1 OPTB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.15	2	100	0	0	0	100
IP1 OPTB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.16	2	100	0	0	0	100
IP1 OPTB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
IP1 OPTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.1	2	100	0	0	0	100
IP1 OPTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.17	2	100	0	0	0	100
IP1 OPTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
IP1 OPTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	3	100	0	0	0	100
IP1 OPTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	3	100	0	0	0	100
IP1 OPTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	3	100	0	0	0	100
IP1 OPTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.02	3	100	0	0	0	100
IP1 OPTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	3	100	0	0	0	100
IP1 OPTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	3	100	0	0	0	100
LZ PELB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	1.15	2	100	0	0	0	100
LZ PELB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	1.21	2	100	0	0	0	100
LZ PELB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.19	2	100	0	0	0	100
LZ PELB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.74	2	100	0	0	0	100
LZ PELB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	1.26	2	100	0	0	0	100
LZ PELB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.19	2	100	0	0	0	100
LZ PELB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.33	3	100	0	0	0	100
LZ PELB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.19	3	100	0	0	0	100
LZ PELB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	3	100	0	0	0	100
LZ PELB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.17	3	100	0	0	0	100
LZ PELB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.1	3	100	0	0	0	100
LZ PELB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.03	3	100	0	0	0	100
CUPCAKEB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	2	100	0	0	0	100
CUPCAKEB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	2	100	0	0	0	100
CUPCAKEB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
CUPCAKEB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	2	100	0	0	0	100
CUPCAKEB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	2	100	0	0	0	100
CUPCAKEB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
CUPCAKEB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	3	100	0	0	0	100
CUPCAKEB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	3	100	0	0	0	100
CUPCAKEB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	3	100	0	0	0	100
CUPCAKEB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	3	100	0	0	0	100
CUPCAKEB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	3	100	0	0	0	100
CUPCAKEB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	3	100	0	0	0	100
LZ BULLB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	1.15	2	100	0	0	0	100
LZ BULLB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	1.21	2	100	0	0	0	100
LZ BULLB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.19	2	100	0	0	0	100
LZ BULLB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.74	2	100	0	0	0	100
LZ BULLB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	1.26	2	100	0	0	0	100
LZ BULLB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.19	2	100	0	0	0	100
LZ BULLB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.33	3	100	0	0	0	100
LZ BULLB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.19	3	100	0	0	0	100
LZ BULLB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	3	100	0	0	0	100
LZ BULLB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.17	3	100	0	0	0	100
LZ BULLB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.1	3	100	0	0	0	100
LZ BULLB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.03	3	100	0	0	0	100

El Centro Modeled Profiles - Baseline Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
ME3B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	2	100	0	0	0	100
ME3B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	2	100	0	0	0	100
ME3B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
ME3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	2	100	0	0	0	100
ME3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	2	100	0	0	0	100
ME3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
ME3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	3	100	0	0	0	100
ME3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	3	100	0	0	0	100
ME3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	3	100	0	0	0	100
ME3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	3	100	0	0	0	100
ME3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	3	100	0	0	0	100
ME3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	3	100	0	0	0	100
MW1-MCIB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	2	100	0	0	0	100
MW1-MCIB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	2	100	0	0	0	100
MW1-MCIB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
MW1-MCIB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	2	100	0	0	0	100
MW1-MCIB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	2	100	0	0	0	100
MW1-MCIB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
MW1-MCIB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	3	100	0	0	0	100
MW1-MCIB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	3	100	0	0	0	100
MW1-MCIB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	3	100	0	0	0	100
MW1-MCIB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	3	100	0	0	0	100
MW1-MCIB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	3	100	0	0	0	100
MW1-MCIB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	3	100	0	0	0	100
MW1-BOEB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	2	100	0	0	0	100
MW1-BOEB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	2	100	0	0	0	100
MW1-BOEB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
MW1-BOEB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	2	100	0	0	0	100
MW1-BOEB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	2	100	0	0	0	100
MW1-BOEB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
MW1-BOEB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	3	100	0	0	0	100
MW1-BOEB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	3	100	0	0	0	100
MW1-BOEB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	3	100	0	0	0	100
MW1-BOEB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	3	100	0	0	0	100
MW1-BOEB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	3	100	0	0	0	100
MW1-BOEB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	3	100	0	0	0	100
C1	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	43	0	98	2	0	100
C1	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	43	0	98	2	0	100
C1	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
C1	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	43	0	98	2	0	100
C1	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	43	0	98	2	0	100
C1	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
C1	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	42	0	47	53	0	100
C1	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	42	0	47	53	0	100
C1	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	42	0	47	53	0	100
C1	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	42	0	47	53	0	100
C1	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	42	0	47	53	0	100
C1	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	42	0	47	53	0	100

El Centro Modeled Profiles - Baseline Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
C1	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.2	15	0	98	2	0	100
C1	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.13	15	0	98	2	0	100
C1	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.04	15	0	98	2	0	100
C1	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.16	15	0	98	2	0	100
C1	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.23	15	0	98	2	0	100
C1	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	15	0	98	2	0	100
C1	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.07	15	0	47	53	0	100
C1	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.04	15	0	47	53	0	100
C1	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	15	0	47	53	0	100
C1	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.04	15	0	47	53	0	100
C1	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	15	0	47	53	0	100
C1	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	15	0	47	53	0	100
LZ WOLF	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	43	0	98	2	0	100
LZ WOLF	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	43	0	98	2	0	100
LZ WOLF	CH-46 CH	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
LZ WOLF	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	43	0	98	2	0	100
LZ WOLF	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	43	0	98	2	0	100
LZ WOLF	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
LZ WOLF	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	42	0	47	53	0	100
LZ WOLF	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	42	0	47	53	0	100
LZ WOLF	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	42	0	47	53	0	100
LZ WOLF	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	42	0	47	53	0	100
LZ WOLF	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	42	0	47	53	0	100
LZ WOLF	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	42	0	47	53	0	100
LZ WOLF	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.2	15	0	98	2	0	100
LZ WOLF	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.13	15	0	98	2	0	100
LZ WOLF	CH-46 NC	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.04	15	0	98	2	0	100
LZ WOLF	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.16	15	0	98	2	0	100
LZ WOLF	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.23	15	0	98	2	0	100
LZ WOLF	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	15	0	98	2	0	100
LZ WOLF	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.07	15	0	47	53	0	100
LZ WOLF	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.04	15	0	47	53	0	100
LZ WOLF	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	15	0	47	53	0	100
LZ WOLF	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.04	15	0	47	53	0	100
LZ WOLF	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	15	0	47	53	0	100
LZ WOLF	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	15	0	47	53	0	100
C1B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	2	100	0	0	0	100
C1B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	2	100	0	0	0	100
C1B	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
C1B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	2	100	0	0	0	100
C1B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	2	100	0	0	0	100
C1B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
C1B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	3	100	0	0	0	100
C1B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	3	100	0	0	0	100
C1B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	3	100	0	0	0	100
C1B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	3	100	0	0	0	100
C1B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	3	100	0	0	0	100
C1B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	3	100	0	0	0	100

El Centro Modeled Profiles - Baseline Scenario (concluded)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
LZ WOLFB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime	0.31	2	100	0	0	0	100
LZ WOLFB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	evening	0.32	2	100	0	0	0	100
LZ WOLFB	CH-46 CL	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
LZ WOLFB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	2	100	0	0	0	100
LZ WOLFB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	2	100	0	0	0	100
LZ WOLFB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
LZ WOLFB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	3	100	0	0	0	100
LZ WOLFB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	3	100	0	0	0	100
LZ WOLFB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	3	100	0	0	0	100
LZ WOLFB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	3	100	0	0	0	100
LZ WOLFB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	3	100	0	0	0	100
LZ WOLFB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	3	100	0	0	0	100

Cleveland Modeled Profiles - Proposed Scenario

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
ST 3	MV-22 CH	TAKEOFF PO	110		79	VC10	daytime	0.73	44	0	2	96	2	100
ST 3	MV-22 CH	TAKEOFF PO	110		79	VC10	evening	1.07	44	0	2	96	2	100
ST 3	MV-22 CH	TAKEOFF PO	110		79	VC10	nighttime	0.12	44	0	2	96	2	100
ST 3	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	43	0	98	2	0	100
ST 3	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	43	0	98	2	0	100
ST 3	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	43	0	98	2	0	100
ST 3	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.47	42	0	47	53	0	100
ST 3	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.25	42	0	47	53	0	100
ST 3	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	42	0	47	53	0	100
ST 3	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.41	42	0	47	53	0	100
ST 3	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	42	0	47	53	0	100
ST 3	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.04	42	0	47	53	0	100
ST 3	MV-22 NC	TAKEOFF PO	110		79	VC10	daytime	0.03	15	0	2	96	2	100
ST 3	MV-22 NC	TAKEOFF PO	110		79	VC10	evening	0.03	15	0	2	96	2	100
ST 3	MV-22 NC	TAKEOFF PO	110		79	VC10	nighttime	0.01	15	0	2	96	2	100
ST 3	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.03	15	0	98	2	0	100
ST 3	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.05	15	0	98	2	0	100
ST 3	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	15	0	98	2	0	100
ST 3	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.35	15	0	47	53	0	100
ST 3	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.27	15	0	47	53	0	100
ST 3	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.05	15	0	47	53	0	100
ST 3	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.32	15	0	47	53	0	100
ST 3	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.25	15	0	47	53	0	100
ST 3	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.06	15	0	47	53	0	100
ST 5	MV-22 CH	TAKEOFF PO	110		79	VC10	daytime	0.73	44	0	2	96	2	100
ST 5	MV-22 CH	TAKEOFF PO	110		79	VC10	evening	1.07	44	0	2	96	2	100
ST 5	MV-22 CH	TAKEOFF PO	110		79	VC10	nighttime	0.12	44	0	2	96	2	100
ST 5	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	43	0	98	2	0	100
ST 5	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	43	0	98	2	0	100
ST 5	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	43	0	98	2	0	100
ST 5	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.47	42	0	47	53	0	100
ST 5	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.25	42	0	47	53	0	100
ST 5	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	42	0	47	53	0	100
ST 5	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.41	42	0	47	53	0	100
ST 5	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	42	0	47	53	0	100
ST 5	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.04	42	0	47	53	0	100
ST 5	MV-22 NC	TAKEOFF PO	110		79	VC10	daytime	0.03	15	0	2	96	2	100
ST 5	MV-22 NC	TAKEOFF PO	110		79	VC10	evening	0.03	15	0	2	96	2	100
ST 5	MV-22 NC	TAKEOFF PO	110		79	VC10	nighttime	0.01	15	0	2	96	2	100
ST 5	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.03	15	0	98	2	0	100
ST 5	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.05	15	0	98	2	0	100
ST 5	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	15	0	98	2	0	100
ST 5	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.35	15	0	47	53	0	100
ST 5	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.27	15	0	47	53	0	100
ST 5	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.05	15	0	47	53	0	100
ST 5	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.32	15	0	47	53	0	100
ST 5	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.25	15	0	47	53	0	100
ST 5	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.06	15	0	47	53	0	100

Cleveland Modeled Profiles - Proposed Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
ST 6 ALT	MV-22 CH	TAKEOFF PO	110		79	VC10	daytime	3.63	44	0	2	96	2	100
ST 6 ALT	MV-22 CH	TAKEOFF PO	110		79	VC10	evening	5.33	44	0	2	96	2	100
ST 6 ALT	MV-22 CH	TAKEOFF PO	110		79	VC10	nighttime	0.6	44	0	2	96	2	100
ST 6 ALT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.23	43	0	98	2	0	100
ST 6 ALT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.37	43	0	98	2	0	100
ST 6 ALT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.07	43	0	98	2	0	100
ST 6 ALT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	2.37	42	0	47	53	0	100
ST 6 ALT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	1.27	42	0	47	53	0	100
ST 6 ALT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.2	42	0	47	53	0	100
ST 6 ALT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	2.07	42	0	47	53	0	100
ST 6 ALT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	1.07	42	0	47	53	0	100
ST 6 ALT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.2	42	0	47	53	0	100
ST 6 ALT	MV-22 NC	TAKEOFF PO	110		79	VC10	daytime	0.13	15	0	2	96	2	100
ST 6 ALT	MV-22 NC	TAKEOFF PO	110		79	VC10	evening	0.13	15	0	2	96	2	100
ST 6 ALT	MV-22 NC	TAKEOFF PO	110		79	VC10	nighttime	0.07	15	0	2	96	2	100
ST 6 ALT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.17	15	0	98	2	0	100
ST 6 ALT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.27	15	0	98	2	0	100
ST 6 ALT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.07	15	0	98	2	0	100
ST 6 ALT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	1.77	15	0	47	53	0	100
ST 6 ALT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	1.33	15	0	47	53	0	100
ST 6 ALT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.27	15	0	47	53	0	100
ST 6 ALT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	1.6	15	0	47	53	0	100
ST 6 ALT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	1.23	15	0	47	53	0	100
ST 6 ALT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.3	15	0	47	53	0	100
ST 7	MV-22 CH	TAKEOFF PO	110		79	VC10	daytime	0.73	44	0	2	96	2	100
ST 7	MV-22 CH	TAKEOFF PO	110		79	VC10	evening	1.07	44	0	2	96	2	100
ST 7	MV-22 CH	TAKEOFF PO	110		79	VC10	nighttime	0.12	44	0	2	96	2	100
ST 7	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	43	0	98	2	0	100
ST 7	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	43	0	98	2	0	100
ST 7	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	43	0	98	2	0	100
ST 7	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.47	42	0	47	53	0	100
ST 7	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.25	42	0	47	53	0	100
ST 7	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	42	0	47	53	0	100
ST 7	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.41	42	0	47	53	0	100
ST 7	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	42	0	47	53	0	100
ST 7	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.04	42	0	47	53	0	100
ST 7	MV-22 NC	TAKEOFF PO	110		79	VC10	daytime	0.03	15	0	2	96	2	100
ST 7	MV-22 NC	TAKEOFF PO	110		79	VC10	evening	0.03	15	0	2	96	2	100
ST 7	MV-22 NC	TAKEOFF PO	110		79	VC10	nighttime	0.01	15	0	2	96	2	100
ST 7	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.03	15	0	98	2	0	100
ST 7	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.05	15	0	98	2	0	100
ST 7	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	15	0	98	2	0	100
ST 7	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.35	15	0	47	53	0	100
ST 7	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.27	15	0	47	53	0	100
ST 7	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.05	15	0	47	53	0	100
ST 7	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.32	15	0	47	53	0	100
ST 7	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.25	15	0	47	53	0	100
ST 7	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.06	15	0	47	53	0	100

Cleveland Modeled Profiles - Proposed Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
ST 8	MV-22 CH	TAKEOFF PO	110		79	VC10	daytime	0.73	44	0	2	96	2	100
ST 8	MV-22 CH	TAKEOFF PO	110		79	VC10	evening	1.07	44	0	2	96	2	100
ST 8	MV-22 CH	TAKEOFF PO	110		79	VC10	nighttime	0.12	44	0	2	96	2	100
ST 8	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	43	0	98	2	0	100
ST 8	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	43	0	98	2	0	100
ST 8	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	43	0	98	2	0	100
ST 8	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.47	42	0	47	53	0	100
ST 8	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.25	42	0	47	53	0	100
ST 8	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	42	0	47	53	0	100
ST 8	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.41	42	0	47	53	0	100
ST 8	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	42	0	47	53	0	100
ST 8	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.04	42	0	47	53	0	100
ST 8	MV-22 NC	TAKEOFF PO	110		79	VC10	daytime	0.03	15	0	2	96	2	100
ST 8	MV-22 NC	TAKEOFF PO	110		79	VC10	evening	0.03	15	0	2	96	2	100
ST 8	MV-22 NC	TAKEOFF PO	110		79	VC10	nighttime	0.01	15	0	2	96	2	100
ST 8	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.03	15	0	98	2	0	100
ST 8	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.05	15	0	98	2	0	100
ST 8	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	15	0	98	2	0	100
ST 8	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.35	15	0	47	53	0	100
ST 8	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.27	15	0	47	53	0	100
ST 8	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.05	15	0	47	53	0	100
ST 8	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.32	15	0	47	53	0	100
ST 8	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.25	15	0	47	53	0	100
ST 8	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.06	15	0	47	53	0	100
ST 9	MV-22 CH	TAKEOFF PO	110		79	VC10	daytime	0.73	44	0	2	96	2	100
ST 9	MV-22 CH	TAKEOFF PO	110		79	VC10	evening	1.07	44	0	2	96	2	100
ST 9	MV-22 CH	TAKEOFF PO	110		79	VC10	nighttime	0.12	44	0	2	96	2	100
ST 9	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	43	0	98	2	0	100
ST 9	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	43	0	98	2	0	100
ST 9	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	43	0	98	2	0	100
ST 9	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.47	42	0	47	53	0	100
ST 9	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.25	42	0	47	53	0	100
ST 9	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	42	0	47	53	0	100
ST 9	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.41	42	0	47	53	0	100
ST 9	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	42	0	47	53	0	100
ST 9	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.04	42	0	47	53	0	100
ST 9	MV-22 NC	TAKEOFF PO	110		79	VC10	daytime	0.03	15	0	2	96	2	100
ST 9	MV-22 NC	TAKEOFF PO	110		79	VC10	evening	0.03	15	0	2	96	2	100
ST 9	MV-22 NC	TAKEOFF PO	110		79	VC10	nighttime	0.01	15	0	2	96	2	100
ST 9	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.03	15	0	98	2	0	100
ST 9	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.05	15	0	98	2	0	100
ST 9	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	15	0	98	2	0	100
ST 9	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.35	15	0	47	53	0	100
ST 9	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.27	15	0	47	53	0	100
ST 9	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.05	15	0	47	53	0	100
ST 9	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.32	15	0	47	53	0	100
ST 9	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.25	15	0	47	53	0	100
ST 9	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.06	15	0	47	53	0	100

Cleveland Modeled Profiles - Proposed Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
ST 10	MV-22 CH	TAKEOFF PO	110		79	VC10	daytime	0.73	44	0	2	96	2	100
ST 10	MV-22 CH	TAKEOFF PO	110		79	VC10	evening	1.07	44	0	2	96	2	100
ST 10	MV-22 CH	TAKEOFF PO	110		79	VC10	nighttime	0.12	44	0	2	96	2	100
ST 10	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	43	0	98	2	0	100
ST 10	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	43	0	98	2	0	100
ST 10	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	43	0	98	2	0	100
ST 10	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.47	42	0	47	53	0	100
ST 10	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.25	42	0	47	53	0	100
ST 10	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	42	0	47	53	0	100
ST 10	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.41	42	0	47	53	0	100
ST 10	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	42	0	47	53	0	100
ST 10	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.04	42	0	47	53	0	100
ST 10	MV-22 NC	TAKEOFF PO	110		79	VC10	daytime	0.03	15	0	2	96	2	100
ST 10	MV-22 NC	TAKEOFF PO	110		79	VC10	evening	0.03	15	0	2	96	2	100
ST 10	MV-22 NC	TAKEOFF PO	110		79	VC10	nighttime	0.01	15	0	2	96	2	100
ST 10	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.03	15	0	98	2	0	100
ST 10	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.05	15	0	98	2	0	100
ST 10	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	15	0	98	2	0	100
ST 10	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.35	15	0	47	53	0	100
ST 10	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.27	15	0	47	53	0	100
ST 10	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.05	15	0	47	53	0	100
ST 10	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.32	15	0	47	53	0	100
ST 10	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.25	15	0	47	53	0	100
ST 10	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.06	15	0	47	53	0	100
ST 11	MV-22 CH	TAKEOFF PO	110		79	VC10	daytime	0.73	44	0	2	96	2	100
ST 11	MV-22 CH	TAKEOFF PO	110		79	VC10	evening	1.07	44	0	2	96	2	100
ST 11	MV-22 CH	TAKEOFF PO	110		79	VC10	nighttime	0.12	44	0	2	96	2	100
ST 11	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	43	0	98	2	0	100
ST 11	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	43	0	98	2	0	100
ST 11	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	43	0	98	2	0	100
ST 11	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.47	42	0	47	53	0	100
ST 11	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.25	42	0	47	53	0	100
ST 11	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	42	0	47	53	0	100
ST 11	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.41	42	0	47	53	0	100
ST 11	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	42	0	47	53	0	100
ST 11	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.04	42	0	47	53	0	100
ST 11	MV-22 NC	TAKEOFF PO	110		79	VC10	daytime	0.03	15	0	2	96	2	100
ST 11	MV-22 NC	TAKEOFF PO	110		79	VC10	evening	0.03	15	0	2	96	2	100
ST 11	MV-22 NC	TAKEOFF PO	110		79	VC10	nighttime	0.01	15	0	2	96	2	100
ST 11	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.03	15	0	98	2	0	100
ST 11	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.05	15	0	98	2	0	100
ST 11	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	15	0	98	2	0	100
ST 11	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.35	15	0	47	53	0	100
ST 11	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.27	15	0	47	53	0	100
ST 11	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.05	15	0	47	53	0	100
ST 11	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.32	15	0	47	53	0	100
ST 11	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.25	15	0	47	53	0	100
ST 11	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.06	15	0	47	53	0	100

Cleveland Modeled Profiles - Proposed Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
ST 3B	MV-22 CL	TAKEOFF PO	110		79	VC10	daytime	0.73	1	100	0	0	0	100
ST 3B	MV-22 CL	TAKEOFF PO	110		79	VC10	evening	1.07	1	100	0	0	0	100
ST 3B	MV-22 CL	TAKEOFF PO	110		79	VC10	nighttime	0.12	1	100	0	0	0	100
ST 3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	2	100	0	0	0	100
ST 3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	2	100	0	0	0	100
ST 3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	2	100	0	0	0	100
ST 3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.47	3	100	0	0	0	100
ST 3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.25	3	100	0	0	0	100
ST 3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	3	100	0	0	0	100
ST 3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.41	3	100	0	0	0	100
ST 3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	3	100	0	0	0	100
ST 3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.04	3	100	0	0	0	100
ST 5B	MV-22 CL	TAKEOFF PO	110		79	VC10	daytime	0.73	1	100	0	0	0	100
ST 5B	MV-22 CL	TAKEOFF PO	110		79	VC10	evening	1.07	1	100	0	0	0	100
ST 5B	MV-22 CL	TAKEOFF PO	110		79	VC10	nighttime	0.12	1	100	0	0	0	100
ST 5B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	2	100	0	0	0	100
ST 5B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	2	100	0	0	0	100
ST 5B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	2	100	0	0	0	100
ST 5B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.47	3	100	0	0	0	100
ST 5B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.25	3	100	0	0	0	100
ST 5B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	3	100	0	0	0	100
ST 5B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.41	3	100	0	0	0	100
ST 5B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	3	100	0	0	0	100
ST 5B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.04	3	100	0	0	0	100
ST 6 ALTB	MV-22 CL	TAKEOFF PO	110		79	VC10	daytime	3.63	1	100	0	0	0	100
ST 6 ALTB	MV-22 CL	TAKEOFF PO	110		79	VC10	evening	5.33	1	100	0	0	0	100
ST 6 ALTB	MV-22 CL	TAKEOFF PO	110		79	VC10	nighttime	0.6	1	100	0	0	0	100
ST 6 ALTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.23	2	100	0	0	0	100
ST 6 ALTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.37	2	100	0	0	0	100
ST 6 ALTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.07	2	100	0	0	0	100
ST 6 ALTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	2.37	3	100	0	0	0	100
ST 6 ALTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	1.27	3	100	0	0	0	100
ST 6 ALTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.2	3	100	0	0	0	100
ST 6 ALTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	2.07	3	100	0	0	0	100
ST 6 ALTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	1.07	3	100	0	0	0	100
ST 6 ALTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.2	3	100	0	0	0	100
ST 7B	MV-22 CL	TAKEOFF PO	110		79	VC10	daytime	0.73	1	100	0	0	0	100
ST 7B	MV-22 CL	TAKEOFF PO	110		79	VC10	evening	1.07	1	100	0	0	0	100
ST 7B	MV-22 CL	TAKEOFF PO	110		79	VC10	nighttime	0.12	1	100	0	0	0	100
ST 7B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	2	100	0	0	0	100
ST 7B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	2	100	0	0	0	100
ST 7B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	2	100	0	0	0	100
ST 7B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.47	3	100	0	0	0	100
ST 7B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.25	3	100	0	0	0	100
ST 7B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	3	100	0	0	0	100
ST 7B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.41	3	100	0	0	0	100
ST 7B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	3	100	0	0	0	100
ST 7B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.04	3	100	0	0	0	100

Cleveland Modeled Profiles - Proposed Scenario (concluded)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
ST 8B	MV-22 CL	TAKEOFF PO	110		79	VC10	daytime	0.73	1	100	0	0	0	100
ST 8B	MV-22 CL	TAKEOFF PO	110		79	VC10	evening	1.07	1	100	0	0	0	100
ST 8B	MV-22 CL	TAKEOFF PO	110		79	VC10	nighttime	0.12	1	100	0	0	0	100
ST 8B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	2	100	0	0	0	100
ST 8B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	2	100	0	0	0	100
ST 8B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	2	100	0	0	0	100
ST 8B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.47	3	100	0	0	0	100
ST 8B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.25	3	100	0	0	0	100
ST 8B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	3	100	0	0	0	100
ST 8B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.41	3	100	0	0	0	100
ST 8B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	3	100	0	0	0	100
ST 8B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.04	3	100	0	0	0	100
ST 9B	MV-22 CL	TAKEOFF PO	110		79	VC10	daytime	0.73	1	100	0	0	0	100
ST 9B	MV-22 CL	TAKEOFF PO	110		79	VC10	evening	1.07	1	100	0	0	0	100
ST 9B	MV-22 CL	TAKEOFF PO	110		79	VC10	nighttime	0.12	1	100	0	0	0	100
ST 9B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	2	100	0	0	0	100
ST 9B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	2	100	0	0	0	100
ST 9B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	2	100	0	0	0	100
ST 9B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.47	3	100	0	0	0	100
ST 9B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.25	3	100	0	0	0	100
ST 9B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	3	100	0	0	0	100
ST 9B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.41	3	100	0	0	0	100
ST 9B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	3	100	0	0	0	100
ST 9B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.04	3	100	0	0	0	100
ST 10B	MV-22 CL	TAKEOFF PO	110		79	VC10	daytime	0.73	1	100	0	0	0	100
ST 10B	MV-22 CL	TAKEOFF PO	110		79	VC10	evening	1.07	1	100	0	0	0	100
ST 10B	MV-22 CL	TAKEOFF PO	110		79	VC10	nighttime	0.12	1	100	0	0	0	100
ST 10B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	2	100	0	0	0	100
ST 10B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	2	100	0	0	0	100
ST 10B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	2	100	0	0	0	100
ST 10B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.47	3	100	0	0	0	100
ST 10B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.25	3	100	0	0	0	100
ST 10B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	3	100	0	0	0	100
ST 10B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.41	3	100	0	0	0	100
ST 10B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	3	100	0	0	0	100
ST 10B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.04	3	100	0	0	0	100
ST 11B	MV-22 CL	TAKEOFF PO	110		79	VC10	daytime	0.73	1	100	0	0	0	100
ST 11B	MV-22 CL	TAKEOFF PO	110		79	VC10	evening	1.07	1	100	0	0	0	100
ST 11B	MV-22 CL	TAKEOFF PO	110		79	VC10	nighttime	0.12	1	100	0	0	0	100
ST 11B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.05	2	100	0	0	0	100
ST 11B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.07	2	100	0	0	0	100
ST 11B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.01	2	100	0	0	0	100
ST 11B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.47	3	100	0	0	0	100
ST 11B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.25	3	100	0	0	0	100
ST 11B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.04	3	100	0	0	0	100
ST 11B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.41	3	100	0	0	0	100
ST 11B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.21	3	100	0	0	0	100
ST 11B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.04	3	100	0	0	0	100

El Centro Modeled Profiles - Proposed Scenario

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
MW1-BOE	MV-22 CH	TAKEOFF PO	210		210	VC10	daytime	3.44	44	0	2	96	2	100
MW1-BOE	MV-22 CH	TAKEOFF PO	210		210	VC10	evening	5.07	44	0	2	96	2	100
MW1-BOE	MV-22 CH	TAKEOFF PO	210		210	VC10	nighttime	0.59	44	0	2	96	2	100
MW1-BOE	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	43	0	98	2	0	100
MW1-BOE	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	43	0	98	2	0	100
MW1-BOE	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
MW1-BOE	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.06	42	0	47	53	0	100
MW1-BOE	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	42	0	47	53	0	100
MW1-BOE	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	42	0	47	53	0	100
MW1-BOE	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	42	0	47	53	0	100
MW1-BOE	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	42	0	47	53	0	100
MW1-BOE	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	42	0	47	53	0	100
MW1-BOE	MV-22 NC	TAKEOFF PO	210		210	VC10	daytime	0.13	15	0	2	96	2	100
MW1-BOE	MV-22 NC	TAKEOFF PO	210		210	VC10	evening	0.13	15	0	2	96	2	100
MW1-BOE	MV-22 NC	TAKEOFF PO	210		210	VC10	nighttime	0.06	15	0	2	96	2	100
MW1-BOE	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.16	15	0	98	2	0	100
MW1-BOE	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.23	15	0	98	2	0	100
MW1-BOE	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	15	0	98	2	0	100
MW1-BOE	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	15	0	47	53	0	100
MW1-BOE	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	15	0	47	53	0	100
MW1-BOE	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	15	0	47	53	0	100
MW1-BOE	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.04	15	0	47	53	0	100
MW1-BOE	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	15	0	47	53	0	100
MW1-BOE	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	15	0	47	53	0	100
PC3	MV-22 CH	TAKEOFF PO	210		210	VC10	daytime	1.72	44	0	2	96	2	100
PC3	MV-22 CH	TAKEOFF PO	210		210	VC10	evening	2.53	44	0	2	96	2	100
PC3	MV-22 CH	TAKEOFF PO	210		210	VC10	nighttime	0.29	44	0	2	96	2	100
PC3	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.1	43	0	98	2	0	100
PC3	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.17	43	0	98	2	0	100
PC3	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
PC3	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.03	42	0	47	53	0	100
PC3	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.02	42	0	47	53	0	100
PC3	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	42	0	47	53	0	100
PC3	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.03	42	0	47	53	0	100
PC3	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	42	0	47	53	0	100
PC3	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	42	0	47	53	0	100
PC3	MV-22 NC	TAKEOFF PO	210		210	VC10	daytime	0.07	15	0	2	96	2	100
PC3	MV-22 NC	TAKEOFF PO	210		210	VC10	evening	0.06	15	0	2	96	2	100
PC3	MV-22 NC	TAKEOFF PO	210		210	VC10	nighttime	0.03	15	0	2	96	2	100
PC3	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.08	15	0	98	2	0	100
PC3	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.11	15	0	98	2	0	100
PC3	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	15	0	98	2	0	100
PC3	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.02	15	0	47	53	0	100
PC3	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.02	15	0	47	53	0	100
PC3	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	15	0	47	53	0	100
PC3	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.02	15	0	47	53	0	100
PC3	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	15	0	47	53	0	100
PC3	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	15	0	47	53	0	100

El Centro Modeled Profiles - Proposed Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
PC3 OPT	MV-22 CH	TAKEOFF PO	210		210	VC10	daytime	1.72	44	0	2	96	2	100
PC3 OPT	MV-22 CH	TAKEOFF PO	210		210	VC10	evening	2.53	44	0	2	96	2	100
PC3 OPT	MV-22 CH	TAKEOFF PO	210		210	VC10	nighttime	0.29	44	0	2	96	2	100
PC3 OPT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.1	43	0	98	2	0	100
PC3 OPT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.17	43	0	98	2	0	100
PC3 OPT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
PC3 OPT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.03	42	0	47	53	0	100
PC3 OPT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.02	42	0	47	53	0	100
PC3 OPT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	42	0	47	53	0	100
PC3 OPT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.03	42	0	47	53	0	100
PC3 OPT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	42	0	47	53	0	100
PC3 OPT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	42	0	47	53	0	100
PC3 OPT	MV-22 NC	TAKEOFF PO	210		210	VC10	daytime	0.07	15	0	2	96	2	100
PC3 OPT	MV-22 NC	TAKEOFF PO	210		210	VC10	evening	0.06	15	0	2	96	2	100
PC3 OPT	MV-22 NC	TAKEOFF PO	210		210	VC10	nighttime	0.03	15	0	2	96	2	100
PC3 OPT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.08	15	0	98	2	0	100
PC3 OPT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.11	15	0	98	2	0	100
PC3 OPT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	15	0	98	2	0	100
PC3 OPT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.02	15	0	47	53	0	100
PC3 OPT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.02	15	0	47	53	0	100
PC3 OPT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	15	0	47	53	0	100
PC3 OPT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.02	15	0	47	53	0	100
PC3 OPT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	15	0	47	53	0	100
PC3 OPT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	15	0	47	53	0	100
LZ SPAR	MV-22 CH	TAKEOFF PO	210		210	VC10	daytime	12.9	44	0	2	96	2	100
LZ SPAR	MV-22 CH	TAKEOFF PO	210		210	VC10	evening	19	44	0	2	96	2	100
LZ SPAR	MV-22 CH	TAKEOFF PO	210		210	VC10	nighttime	2.2	44	0	2	96	2	100
LZ SPAR	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.74	43	0	98	2	0	100
LZ SPAR	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	1.26	43	0	98	2	0	100
LZ SPAR	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.19	43	0	98	2	0	100
LZ SPAR	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.22	42	0	47	53	0	100
LZ SPAR	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.12	42	0	47	53	0	100
LZ SPAR	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	42	0	47	53	0	100
LZ SPAR	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.19	42	0	47	53	0	100
LZ SPAR	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.1	42	0	47	53	0	100
LZ SPAR	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	42	0	47	53	0	100
LZ SPAR	MV-22 NC	TAKEOFF PO	210		210	VC10	daytime	0.5	15	0	2	96	2	100
LZ SPAR	MV-22 NC	TAKEOFF PO	210		210	VC10	evening	0.49	15	0	2	96	2	100
LZ SPAR	MV-22 NC	TAKEOFF PO	210		210	VC10	nighttime	0.24	15	0	2	96	2	100
LZ SPAR	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.61	15	0	98	2	0	100
LZ SPAR	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.85	15	0	98	2	0	100
LZ SPAR	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.2	15	0	98	2	0	100
LZ SPAR	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.16	15	0	47	53	0	100
LZ SPAR	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.12	15	0	47	53	0	100
LZ SPAR	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.03	15	0	47	53	0	100
LZ SPAR	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.15	15	0	47	53	0	100
LZ SPAR	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.11	15	0	47	53	0	100
LZ SPAR	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.03	15	0	47	53	0	100

El Centro Modeled Profiles - Proposed Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
LZ MALL	MV-22 CH	TAKEOFF PO	210		210	VC10	daytime	3.44	44	0	2	96	2	100
LZ MALL	MV-22 CH	TAKEOFF PO	210		210	VC10	evening	5.07	44	0	2	96	2	100
LZ MALL	MV-22 CH	TAKEOFF PO	210		210	VC10	nighttime	0.59	44	0	2	96	2	100
LZ MALL	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	43	0	98	2	0	100
LZ MALL	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	43	0	98	2	0	100
LZ MALL	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
LZ MALL	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.06	42	0	47	53	0	100
LZ MALL	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	42	0	47	53	0	100
LZ MALL	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	42	0	47	53	0	100
LZ MALL	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	42	0	47	53	0	100
LZ MALL	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	42	0	47	53	0	100
LZ MALL	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	42	0	47	53	0	100
LZ MALL	MV-22 NC	TAKEOFF PO	210		210	VC10	daytime	0.13	15	0	2	96	2	100
LZ MALL	MV-22 NC	TAKEOFF PO	210		210	VC10	evening	0.13	15	0	2	96	2	100
LZ MALL	MV-22 NC	TAKEOFF PO	210		210	VC10	nighttime	0.06	15	0	2	96	2	100
LZ MALL	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.16	15	0	98	2	0	100
LZ MALL	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.23	15	0	98	2	0	100
LZ MALL	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	15	0	98	2	0	100
LZ MALL	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	15	0	47	53	0	100
LZ MALL	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	15	0	47	53	0	100
LZ MALL	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	15	0	47	53	0	100
LZ MALL	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.04	15	0	47	53	0	100
LZ MALL	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	15	0	47	53	0	100
LZ MALL	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	15	0	47	53	0	100
LZ EIDER	MV-22 CH	TAKEOFF PO	210		210	VC10	daytime	3.44	44	0	2	96	2	100
LZ EIDER	MV-22 CH	TAKEOFF PO	210		210	VC10	evening	5.07	44	0	2	96	2	100
LZ EIDER	MV-22 CH	TAKEOFF PO	210		210	VC10	nighttime	0.59	44	0	2	96	2	100
LZ EIDER	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	43	0	98	2	0	100
LZ EIDER	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	43	0	98	2	0	100
LZ EIDER	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
LZ EIDER	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.06	42	0	47	53	0	100
LZ EIDER	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	42	0	47	53	0	100
LZ EIDER	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	42	0	47	53	0	100
LZ EIDER	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	42	0	47	53	0	100
LZ EIDER	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	42	0	47	53	0	100
LZ EIDER	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	42	0	47	53	0	100
LZ EIDER	MV-22 NC	TAKEOFF PO	210		210	VC10	daytime	0.13	15	0	2	96	2	100
LZ EIDER	MV-22 NC	TAKEOFF PO	210		210	VC10	evening	0.13	15	0	2	96	2	100
LZ EIDER	MV-22 NC	TAKEOFF PO	210		210	VC10	nighttime	0.06	15	0	2	96	2	100
LZ EIDER	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.16	15	0	98	2	0	100
LZ EIDER	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.23	15	0	98	2	0	100
LZ EIDER	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	15	0	98	2	0	100
LZ EIDER	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	15	0	47	53	0	100
LZ EIDER	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	15	0	47	53	0	100
LZ EIDER	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	15	0	47	53	0	100
LZ EIDER	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.04	15	0	47	53	0	100
LZ EIDER	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	15	0	47	53	0	100
LZ EIDER	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	15	0	47	53	0	100

El Centro Modeled Profiles - Proposed Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
LZ CAN	MV-22 CH	TAKEOFF PO	210		210	VC10	daytime	3.44	44	0	2	96	2	100
LZ CAN	MV-22 CH	TAKEOFF PO	210		210	VC10	evening	5.07	44	0	2	96	2	100
LZ CAN	MV-22 CH	TAKEOFF PO	210		210	VC10	nighttime	0.59	44	0	2	96	2	100
LZ CAN	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	43	0	98	2	0	100
LZ CAN	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	43	0	98	2	0	100
LZ CAN	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
LZ CAN	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.06	42	0	47	53	0	100
LZ CAN	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	42	0	47	53	0	100
LZ CAN	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	42	0	47	53	0	100
LZ CAN	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	42	0	47	53	0	100
LZ CAN	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	42	0	47	53	0	100
LZ CAN	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	42	0	47	53	0	100
LZ CAN	MV-22 NC	TAKEOFF PO	210		210	VC10	daytime	0.13	15	0	2	96	2	100
LZ CAN	MV-22 NC	TAKEOFF PO	210		210	VC10	evening	0.13	15	0	2	96	2	100
LZ CAN	MV-22 NC	TAKEOFF PO	210		210	VC10	nighttime	0.06	15	0	2	96	2	100
LZ CAN	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.16	15	0	98	2	0	100
LZ CAN	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.23	15	0	98	2	0	100
LZ CAN	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	15	0	98	2	0	100
LZ CAN	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	15	0	47	53	0	100
LZ CAN	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	15	0	47	53	0	100
LZ CAN	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	15	0	47	53	0	100
LZ CAN	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.04	15	0	47	53	0	100
LZ CAN	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	15	0	47	53	0	100
LZ CAN	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	15	0	47	53	0	100
IP1 OPT	MV-22 CH	TAKEOFF PO	210		210	VC10	daytime	1.72	44	0	2	96	2	100
IP1 OPT	MV-22 CH	TAKEOFF PO	210		210	VC10	evening	2.53	44	0	2	96	2	100
IP1 OPT	MV-22 CH	TAKEOFF PO	210		210	VC10	nighttime	0.29	44	0	2	96	2	100
IP1 OPT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.1	43	0	98	2	0	100
IP1 OPT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.17	43	0	98	2	0	100
IP1 OPT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
IP1 OPT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.03	42	0	47	53	0	100
IP1 OPT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.02	42	0	47	53	0	100
IP1 OPT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	42	0	47	53	0	100
IP1 OPT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.03	42	0	47	53	0	100
IP1 OPT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	42	0	47	53	0	100
IP1 OPT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	42	0	47	53	0	100
IP1 OPT	MV-22 NC	TAKEOFF PO	210		210	VC10	daytime	0.07	15	0	2	96	2	100
IP1 OPT	MV-22 NC	TAKEOFF PO	210		210	VC10	evening	0.06	15	0	2	96	2	100
IP1 OPT	MV-22 NC	TAKEOFF PO	210		210	VC10	nighttime	0.03	15	0	2	96	2	100
IP1 OPT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.08	15	0	98	2	0	100
IP1 OPT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.11	15	0	98	2	0	100
IP1 OPT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	15	0	98	2	0	100
IP1 OPT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.02	15	0	47	53	0	100
IP1 OPT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.02	15	0	47	53	0	100
IP1 OPT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	15	0	47	53	0	100
IP1 OPT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.02	15	0	47	53	0	100
IP1 OPT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	15	0	47	53	0	100
IP1 OPT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	15	0	47	53	0	100

El Centro Modeled Profiles - Proposed Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
IP1 OPT	MV-22 CH	TAKEOFF PO	210		210	VC10	daytime	1.72	44	0	2	96	2	100
IP1 OPT	MV-22 CH	TAKEOFF PO	210		210	VC10	evening	2.53	44	0	2	96	2	100
IP1 OPT	MV-22 CH	TAKEOFF PO	210		210	VC10	nighttime	0.29	44	0	2	96	2	100
IP1 OPT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.1	43	0	98	2	0	100
IP1 OPT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.17	43	0	98	2	0	100
IP1 OPT	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	43	0	98	2	0	100
IP1 OPT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.03	42	0	47	53	0	100
IP1 OPT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.02	42	0	47	53	0	100
IP1 OPT	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	42	0	47	53	0	100
IP1 OPT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.03	42	0	47	53	0	100
IP1 OPT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	42	0	47	53	0	100
IP1 OPT	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	42	0	47	53	0	100
IP1 OPT	MV-22 NC	TAKEOFF PO	210		210	VC10	daytime	0.07	15	0	2	96	2	100
IP1 OPT	MV-22 NC	TAKEOFF PO	210		210	VC10	evening	0.06	15	0	2	96	2	100
IP1 OPT	MV-22 NC	TAKEOFF PO	210		210	VC10	nighttime	0.03	15	0	2	96	2	100
IP1 OPT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.08	15	0	98	2	0	100
IP1 OPT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.11	15	0	98	2	0	100
IP1 OPT	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	15	0	98	2	0	100
IP1 OPT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.02	15	0	47	53	0	100
IP1 OPT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.02	15	0	47	53	0	100
IP1 OPT	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	15	0	47	53	0	100
IP1 OPT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.02	15	0	47	53	0	100
IP1 OPT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	15	0	47	53	0	100
IP1 OPT	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	15	0	47	53	0	100
LZ PEL	MV-22 CH	TAKEOFF PO	210		210	VC10	daytime	12.9	44	0	2	96	2	100
LZ PEL	MV-22 CH	TAKEOFF PO	210		210	VC10	evening	19	44	0	2	96	2	100
LZ PEL	MV-22 CH	TAKEOFF PO	210		210	VC10	nighttime	2.2	44	0	2	96	2	100
LZ PEL	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.74	43	0	98	2	0	100
LZ PEL	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	1.26	43	0	98	2	0	100
LZ PEL	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.19	43	0	98	2	0	100
LZ PEL	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.22	42	0	47	53	0	100
LZ PEL	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.12	42	0	47	53	0	100
LZ PEL	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	42	0	47	53	0	100
LZ PEL	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.19	42	0	47	53	0	100
LZ PEL	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.1	42	0	47	53	0	100
LZ PEL	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	42	0	47	53	0	100
LZ PEL	MV-22 NC	TAKEOFF PO	210		210	VC10	daytime	0.5	15	0	2	96	2	100
LZ PEL	MV-22 NC	TAKEOFF PO	210		210	VC10	evening	0.49	15	0	2	96	2	100
LZ PEL	MV-22 NC	TAKEOFF PO	210		210	VC10	nighttime	0.24	15	0	2	96	2	100
LZ PEL	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.61	15	0	98	2	0	100
LZ PEL	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.85	15	0	98	2	0	100
LZ PEL	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.2	15	0	98	2	0	100
LZ PEL	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.16	15	0	47	53	0	100
LZ PEL	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.12	15	0	47	53	0	100
LZ PEL	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.03	15	0	47	53	0	100
LZ PEL	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.15	15	0	47	53	0	100
LZ PEL	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.11	15	0	47	53	0	100
LZ PEL	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.03	15	0	47	53	0	100

El Centro Modeled Profiles - Proposed Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
CUPCAKE	MV-22 CH	TAKEOFF PO	210		210	VC10	daytime	3.44	44	0	2	96	2	100
CUPCAKE	MV-22 CH	TAKEOFF PO	210		210	VC10	evening	5.07	44	0	2	96	2	100
CUPCAKE	MV-22 CH	TAKEOFF PO	210		210	VC10	nighttime	0.59	44	0	2	96	2	100
CUPCAKE	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	43	0	98	2	0	100
CUPCAKE	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	43	0	98	2	0	100
CUPCAKE	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
CUPCAKE	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.06	42	0	47	53	0	100
CUPCAKE	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	42	0	47	53	0	100
CUPCAKE	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	42	0	47	53	0	100
CUPCAKE	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	42	0	47	53	0	100
CUPCAKE	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	42	0	47	53	0	100
CUPCAKE	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	42	0	47	53	0	100
CUPCAKE	MV-22 NC	TAKEOFF PO	210		210	VC10	daytime	0.13	15	0	2	96	2	100
CUPCAKE	MV-22 NC	TAKEOFF PO	210		210	VC10	evening	0.13	15	0	2	96	2	100
CUPCAKE	MV-22 NC	TAKEOFF PO	210		210	VC10	nighttime	0.06	15	0	2	96	2	100
CUPCAKE	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.16	15	0	98	2	0	100
CUPCAKE	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.23	15	0	98	2	0	100
CUPCAKE	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	15	0	98	2	0	100
CUPCAKE	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	15	0	47	53	0	100
CUPCAKE	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	15	0	47	53	0	100
CUPCAKE	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	15	0	47	53	0	100
CUPCAKE	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.04	15	0	47	53	0	100
CUPCAKE	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	15	0	47	53	0	100
CUPCAKE	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	15	0	47	53	0	100
LZ BULL	MV-22 CH	TAKEOFF PO	210		210	VC10	daytime	12.9	44	0	2	96	2	100
LZ BULL	MV-22 CH	TAKEOFF PO	210		210	VC10	evening	19	44	0	2	96	2	100
LZ BULL	MV-22 CH	TAKEOFF PO	210		210	VC10	nighttime	2.2	44	0	2	96	2	100
LZ BULL	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.74	43	0	98	2	0	100
LZ BULL	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	1.26	43	0	98	2	0	100
LZ BULL	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.19	43	0	98	2	0	100
LZ BULL	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.22	42	0	47	53	0	100
LZ BULL	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.12	42	0	47	53	0	100
LZ BULL	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	42	0	47	53	0	100
LZ BULL	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.19	42	0	47	53	0	100
LZ BULL	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.1	42	0	47	53	0	100
LZ BULL	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	42	0	47	53	0	100
LZ BULL	MV-22 NC	TAKEOFF PO	210		210	VC10	daytime	0.5	15	0	2	96	2	100
LZ BULL	MV-22 NC	TAKEOFF PO	210		210	VC10	evening	0.49	15	0	2	96	2	100
LZ BULL	MV-22 NC	TAKEOFF PO	210		210	VC10	nighttime	0.24	15	0	2	96	2	100
LZ BULL	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.61	15	0	98	2	0	100
LZ BULL	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.85	15	0	98	2	0	100
LZ BULL	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.2	15	0	98	2	0	100
LZ BULL	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.16	15	0	47	53	0	100
LZ BULL	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.12	15	0	47	53	0	100
LZ BULL	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.03	15	0	47	53	0	100
LZ BULL	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.15	15	0	47	53	0	100
LZ BULL	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.11	15	0	47	53	0	100
LZ BULL	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.03	15	0	47	53	0	100

El Centro Modeled Profiles - Proposed Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
ME3	MV-22 CH	TAKEOFF PO	210		210	VC10	daytime	3.44	44	0	2	96	2	100
ME3	MV-22 CH	TAKEOFF PO	210		210	VC10	evening	5.07	44	0	2	96	2	100
ME3	MV-22 CH	TAKEOFF PO	210		210	VC10	nighttime	0.59	44	0	2	96	2	100
ME3	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	43	0	98	2	0	100
ME3	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	43	0	98	2	0	100
ME3	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
ME3	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.06	42	0	47	53	0	100
ME3	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	42	0	47	53	0	100
ME3	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	42	0	47	53	0	100
ME3	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	42	0	47	53	0	100
ME3	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	42	0	47	53	0	100
ME3	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	42	0	47	53	0	100
ME3	MV-22 NC	TAKEOFF PO	210		210	VC10	daytime	0.13	15	0	2	96	2	100
ME3	MV-22 NC	TAKEOFF PO	210		210	VC10	evening	0.13	15	0	2	96	2	100
ME3	MV-22 NC	TAKEOFF PO	210		210	VC10	nighttime	0.06	15	0	2	96	2	100
ME3	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.16	15	0	98	2	0	100
ME3	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.23	15	0	98	2	0	100
ME3	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	15	0	98	2	0	100
ME3	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	15	0	47	53	0	100
ME3	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	15	0	47	53	0	100
ME3	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	15	0	47	53	0	100
ME3	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.04	15	0	47	53	0	100
ME3	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	15	0	47	53	0	100
ME3	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	15	0	47	53	0	100
MW1-MCI	MV-22 CH	TAKEOFF PO	210		210	VC10	daytime	3.44	44	0	2	96	2	100
MW1-MCI	MV-22 CH	TAKEOFF PO	210		210	VC10	evening	5.07	44	0	2	96	2	100
MW1-MCI	MV-22 CH	TAKEOFF PO	210		210	VC10	nighttime	0.59	44	0	2	96	2	100
MW1-MCI	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	43	0	98	2	0	100
MW1-MCI	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	43	0	98	2	0	100
MW1-MCI	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	43	0	98	2	0	100
MW1-MCI	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.06	42	0	47	53	0	100
MW1-MCI	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	42	0	47	53	0	100
MW1-MCI	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	42	0	47	53	0	100
MW1-MCI	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	42	0	47	53	0	100
MW1-MCI	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	42	0	47	53	0	100
MW1-MCI	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	42	0	47	53	0	100
MW1-MCI	MV-22 NC	TAKEOFF PO	210		210	VC10	daytime	0.13	15	0	2	96	2	100
MW1-MCI	MV-22 NC	TAKEOFF PO	210		210	VC10	evening	0.13	15	0	2	96	2	100
MW1-MCI	MV-22 NC	TAKEOFF PO	210		210	VC10	nighttime	0.06	15	0	2	96	2	100
MW1-MCI	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.16	15	0	98	2	0	100
MW1-MCI	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.23	15	0	98	2	0	100
MW1-MCI	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	15	0	98	2	0	100
MW1-MCI	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.04	15	0	47	53	0	100
MW1-MCI	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	15	0	47	53	0	100
MW1-MCI	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	15	0	47	53	0	100
MW1-MCI	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.04	15	0	47	53	0	100
MW1-MCI	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	15	0	47	53	0	100
MW1-MCI	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	15	0	47	53	0	100

El Centro Modeled Profiles - Proposed Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
PM3B	MV-22 CL	TAKEOFF PO	210		210	VC10	daytime	3.44	1	100	0	0	0	100
PM3B	MV-22 CL	TAKEOFF PO	210		210	VC10	evening	5.07	1	100	0	0	0	100
PM3B	MV-22 CL	TAKEOFF PO	210		210	VC10	nighttime	0.59	1	100	0	0	0	100
PM3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	2	100	0	0	0	100
PM3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	2	100	0	0	0	100
PM3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
PM3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.06	3	100	0	0	0	100
PM3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	3	100	0	0	0	100
PM3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	3	100	0	0	0	100
PM3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	3	100	0	0	0	100
PM3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	3	100	0	0	0	100
PM3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	3	100	0	0	0	100
PC3B	MV-22 CL	TAKEOFF PO	210		210	VC10	daytime	1.72	1	100	0	0	0	100
PC3B	MV-22 CL	TAKEOFF PO	210		210	VC10	evening	2.53	1	100	0	0	0	100
PC3B	MV-22 CL	TAKEOFF PO	210		210	VC10	nighttime	0.29	1	100	0	0	0	100
PC3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.1	2	100	0	0	0	100
PC3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.17	2	100	0	0	0	100
PC3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
PC3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.03	3	100	0	0	0	100
PC3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.02	3	100	0	0	0	100
PC3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	3	100	0	0	0	100
PC3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.03	3	100	0	0	0	100
PC3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	3	100	0	0	0	100
PC3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	3	100	0	0	0	100
PC3 OPTB	MV-22 CL	TAKEOFF PO	210		210	VC10	daytime	1.72	1	100	0	0	0	100
PC3 OPTB	MV-22 CL	TAKEOFF PO	210		210	VC10	evening	2.53	1	100	0	0	0	100
PC3 OPTB	MV-22 CL	TAKEOFF PO	210		210	VC10	nighttime	0.29	1	100	0	0	0	100
PC3 OPTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.1	2	100	0	0	0	100
PC3 OPTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.17	2	100	0	0	0	100
PC3 OPTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
PC3 OPTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.03	3	100	0	0	0	100
PC3 OPTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.02	3	100	0	0	0	100
PC3 OPTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	3	100	0	0	0	100
PC3 OPTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.03	3	100	0	0	0	100
PC3 OPTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	3	100	0	0	0	100
PC3 OPTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	3	100	0	0	0	100
LZ SPARB	MV-22 CL	TAKEOFF PO	210		210	VC10	daytime	12.9	1	100	0	0	0	100
LZ SPARB	MV-22 CL	TAKEOFF PO	210		210	VC10	evening	19	1	100	0	0	0	100
LZ SPARB	MV-22 CL	TAKEOFF PO	210		210	VC10	nighttime	2.2	1	100	0	0	0	100
LZ SPARB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.74	2	100	0	0	0	100
LZ SPARB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	1.26	2	100	0	0	0	100
LZ SPARB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.19	2	100	0	0	0	100
LZ SPARB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.22	3	100	0	0	0	100
LZ SPARB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.12	3	100	0	0	0	100
LZ SPARB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	3	100	0	0	0	100
LZ SPARB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.19	3	100	0	0	0	100
LZ SPARB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.1	3	100	0	0	0	100
LZ SPARB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	3	100	0	0	0	100

El Centro Modeled Profiles - Proposed Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
LZ MALLB	MV-22 CL	TAKEOFF PO	210		210	VC10	daytime	3.44	1	100	0	0	0	100
LZ MALLB	MV-22 CL	TAKEOFF PO	210		210	VC10	evening	5.07	1	100	0	0	0	100
LZ MALLB	MV-22 CL	TAKEOFF PO	210		210	VC10	nighttime	0.59	1	100	0	0	0	100
LZ MALLB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	2	100	0	0	0	100
LZ MALLB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	2	100	0	0	0	100
LZ MALLB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
LZ MALLB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.06	3	100	0	0	0	100
LZ MALLB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	3	100	0	0	0	100
LZ MALLB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	3	100	0	0	0	100
LZ MALLB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	3	100	0	0	0	100
LZ MALLB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	3	100	0	0	0	100
LZ MALLB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	3	100	0	0	0	100
LZ EIDERB	MV-22 CL	TAKEOFF PO	210		210	VC10	daytime	3.44	1	100	0	0	0	100
LZ EIDERB	MV-22 CL	TAKEOFF PO	210		210	VC10	evening	5.07	1	100	0	0	0	100
LZ EIDERB	MV-22 CL	TAKEOFF PO	210		210	VC10	nighttime	0.59	1	100	0	0	0	100
LZ EIDERB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	2	100	0	0	0	100
LZ EIDERB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	2	100	0	0	0	100
LZ EIDERB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
LZ EIDERB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.06	3	100	0	0	0	100
LZ EIDERB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	3	100	0	0	0	100
LZ EIDERB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	3	100	0	0	0	100
LZ EIDERB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	3	100	0	0	0	100
LZ EIDERB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	3	100	0	0	0	100
LZ EIDERB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	3	100	0	0	0	100
LZ CANB	MV-22 CL	TAKEOFF PO	210		210	VC10	daytime	3.44	1	100	0	0	0	100
LZ CANB	MV-22 CL	TAKEOFF PO	210		210	VC10	evening	5.07	1	100	0	0	0	100
LZ CANB	MV-22 CL	TAKEOFF PO	210		210	VC10	nighttime	0.59	1	100	0	0	0	100
LZ CANB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	2	100	0	0	0	100
LZ CANB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	2	100	0	0	0	100
LZ CANB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
LZ CANB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.06	3	100	0	0	0	100
LZ CANB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	3	100	0	0	0	100
LZ CANB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	3	100	0	0	0	100
LZ CANB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	3	100	0	0	0	100
LZ CANB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	3	100	0	0	0	100
LZ CANB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	3	100	0	0	0	100
IP1 OPTB	MV-22 CL	TAKEOFF PO	210		210	VC10	daytime	1.72	1	100	0	0	0	100
IP1 OPTB	MV-22 CL	TAKEOFF PO	210		210	VC10	evening	2.53	1	100	0	0	0	100
IP1 OPTB	MV-22 CL	TAKEOFF PO	210		210	VC10	nighttime	0.29	1	100	0	0	0	100
IP1 OPTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.1	2	100	0	0	0	100
IP1 OPTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.17	2	100	0	0	0	100
IP1 OPTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
IP1 OPTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.03	3	100	0	0	0	100
IP1 OPTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.02	3	100	0	0	0	100
IP1 OPTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	3	100	0	0	0	100
IP1 OPTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.03	3	100	0	0	0	100
IP1 OPTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	3	100	0	0	0	100
IP1 OPTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	3	100	0	0	0	100

El Centro Modeled Profiles - Proposed Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
IP1 OPTB	MV-22 CL	TAKEOFF PO	210		210	VC10	daytime	1.72	1	100	0	0	0	100
IP1 OPTB	MV-22 CL	TAKEOFF PO	210		210	VC10	evening	2.53	1	100	0	0	0	100
IP1 OPTB	MV-22 CL	TAKEOFF PO	210		210	VC10	nighttime	0.29	1	100	0	0	0	100
IP1 OPTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.1	2	100	0	0	0	100
IP1 OPTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.17	2	100	0	0	0	100
IP1 OPTB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.03	2	100	0	0	0	100
IP1 OPTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.03	3	100	0	0	0	100
IP1 OPTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.02	3	100	0	0	0	100
IP1 OPTB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	3	100	0	0	0	100
IP1 OPTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.03	3	100	0	0	0	100
IP1 OPTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.01	3	100	0	0	0	100
IP1 OPTB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	3	100	0	0	0	100
LZ PELB	MV-22 CL	TAKEOFF PO	210		210	VC10	daytime	12.9	1	100	0	0	0	100
LZ PELB	MV-22 CL	TAKEOFF PO	210		210	VC10	evening	19	1	100	0	0	0	100
LZ PELB	MV-22 CL	TAKEOFF PO	210		210	VC10	nighttime	2.2	1	100	0	0	0	100
LZ PELB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.74	2	100	0	0	0	100
LZ PELB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	1.26	2	100	0	0	0	100
LZ PELB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.19	2	100	0	0	0	100
LZ PELB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.22	3	100	0	0	0	100
LZ PELB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.12	3	100	0	0	0	100
LZ PELB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	3	100	0	0	0	100
LZ PELB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.19	3	100	0	0	0	100
LZ PELB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.1	3	100	0	0	0	100
LZ PELB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	3	100	0	0	0	100
CUPCAKEB	MV-22 CL	TAKEOFF PO	210		210	VC10	daytime	3.44	1	100	0	0	0	100
CUPCAKEB	MV-22 CL	TAKEOFF PO	210		210	VC10	evening	5.07	1	100	0	0	0	100
CUPCAKEB	MV-22 CL	TAKEOFF PO	210		210	VC10	nighttime	0.59	1	100	0	0	0	100
CUPCAKEB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	2	100	0	0	0	100
CUPCAKEB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	2	100	0	0	0	100
CUPCAKEB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
CUPCAKEB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.06	3	100	0	0	0	100
CUPCAKEB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	3	100	0	0	0	100
CUPCAKEB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	3	100	0	0	0	100
CUPCAKEB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	3	100	0	0	0	100
CUPCAKEB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	3	100	0	0	0	100
CUPCAKEB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	3	100	0	0	0	100
LZ BULLB	MV-22 CL	TAKEOFF PO	210		210	VC10	daytime	12.9	1	100	0	0	0	100
LZ BULLB	MV-22 CL	TAKEOFF PO	210		210	VC10	evening	19	1	100	0	0	0	100
LZ BULLB	MV-22 CL	TAKEOFF PO	210		210	VC10	nighttime	2.2	1	100	0	0	0	100
LZ BULLB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.74	2	100	0	0	0	100
LZ BULLB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	1.26	2	100	0	0	0	100
LZ BULLB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.19	2	100	0	0	0	100
LZ BULLB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.22	3	100	0	0	0	100
LZ BULLB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.12	3	100	0	0	0	100
LZ BULLB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	3	100	0	0	0	100
LZ BULLB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.19	3	100	0	0	0	100
LZ BULLB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.1	3	100	0	0	0	100
LZ BULLB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	3	100	0	0	0	100

El Centro Modeled Profiles - Proposed Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
ME3B	MV-22 CL	TAKEOFF PO	210		210	VC10	daytime	3.44	1	100	0	0	0	100
ME3B	MV-22 CL	TAKEOFF PO	210		210	VC10	evening	5.07	1	100	0	0	0	100
ME3B	MV-22 CL	TAKEOFF PO	210		210	VC10	nighttime	0.59	1	100	0	0	0	100
ME3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	2	100	0	0	0	100
ME3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	2	100	0	0	0	100
ME3B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
ME3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.06	3	100	0	0	0	100
ME3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	3	100	0	0	0	100
ME3B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	3	100	0	0	0	100
ME3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	3	100	0	0	0	100
ME3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	3	100	0	0	0	100
ME3B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	3	100	0	0	0	100
MW1-MCIB	MV-22 CL	TAKEOFF PO	210		210	VC10	daytime	3.44	1	100	0	0	0	100
MW1-MCIB	MV-22 CL	TAKEOFF PO	210		210	VC10	evening	5.07	1	100	0	0	0	100
MW1-MCIB	MV-22 CL	TAKEOFF PO	210		210	VC10	nighttime	0.59	1	100	0	0	0	100
MW1-MCIB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	2	100	0	0	0	100
MW1-MCIB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	2	100	0	0	0	100
MW1-MCIB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
MW1-MCIB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.06	3	100	0	0	0	100
MW1-MCIB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	3	100	0	0	0	100
MW1-MCIB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	3	100	0	0	0	100
MW1-MCIB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	3	100	0	0	0	100
MW1-MCIB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	3	100	0	0	0	100
MW1-MCIB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	3	100	0	0	0	100
MW1-BOEB	MV-22 CL	TAKEOFF PO	210		210	VC10	daytime	3.44	1	100	0	0	0	100
MW1-BOEB	MV-22 CL	TAKEOFF PO	210		210	VC10	evening	5.07	1	100	0	0	0	100
MW1-BOEB	MV-22 CL	TAKEOFF PO	210		210	VC10	nighttime	0.59	1	100	0	0	0	100
MW1-BOEB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.2	2	100	0	0	0	100
MW1-BOEB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	2	100	0	0	0	100
MW1-BOEB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.05	2	100	0	0	0	100
MW1-BOEB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.06	3	100	0	0	0	100
MW1-BOEB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.03	3	100	0	0	0	100
MW1-BOEB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0	3	100	0	0	0	100
MW1-BOEB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.05	3	100	0	0	0	100
MW1-BOEB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.03	3	100	0	0	0	100
MW1-BOEB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0	3	100	0	0	0	100
C1	MV-22 CH	TAKEOFF PO	210		210	VC10	daytime	5.16	44	0	2	96	2	100
C1	MV-22 CH	TAKEOFF PO	210		210	VC10	evening	7.6	44	0	2	96	2	100
C1	MV-22 CH	TAKEOFF PO	210		210	VC10	nighttime	0.88	44	0	2	96	2	100
C1	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.29	43	0	98	2	0	100
C1	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.5	43	0	98	2	0	100
C1	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.08	43	0	98	2	0	100
C1	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	42	0	47	53	0	100
C1	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	42	0	47	53	0	100
C1	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	42	0	47	53	0	100
C1	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.08	42	0	47	53	0	100
C1	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.04	42	0	47	53	0	100
C1	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	42	0	47	53	0	100

El Centro Modeled Profiles - Proposed Scenario (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
C1	MV-22 NC	TAKEOFF PO	210		210	VC10	daytime	0.2	15	0	2	96	2	100
C1	MV-22 NC	TAKEOFF PO	210		210	VC10	evening	0.19	15	0	2	96	2	100
C1	MV-22 NC	TAKEOFF PO	210		210	VC10	nighttime	0.09	15	0	2	96	2	100
C1	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.25	15	0	98	2	0	100
C1	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	15	0	98	2	0	100
C1	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.08	15	0	98	2	0	100
C1	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.07	15	0	47	53	0	100
C1	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	15	0	47	53	0	100
C1	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	15	0	47	53	0	100
C1	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.06	15	0	47	53	0	100
C1	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.05	15	0	47	53	0	100
C1	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	15	0	47	53	0	100
LZ WOLF	MV-22 CH	TAKEOFF PO	210		210	VC10	daytime	5.16	44	0	2	96	2	100
LZ WOLF	MV-22 CH	TAKEOFF PO	210		210	VC10	evening	7.6	44	0	2	96	2	100
LZ WOLF	MV-22 CH	TAKEOFF PO	210		210	VC10	nighttime	0.88	44	0	2	96	2	100
LZ WOLF	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.29	43	0	98	2	0	100
LZ WOLF	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.5	43	0	98	2	0	100
LZ WOLF	CH-53 CH	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.08	43	0	98	2	0	100
LZ WOLF	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	42	0	47	53	0	100
LZ WOLF	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	42	0	47	53	0	100
LZ WOLF	AH-1 CH	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	42	0	47	53	0	100
LZ WOLF	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.08	42	0	47	53	0	100
LZ WOLF	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.04	42	0	47	53	0	100
LZ WOLF	UH-1 CH	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	42	0	47	53	0	100
LZ WOLF	MV-22 NC	TAKEOFF PO	210		210	VC10	daytime	0.2	15	0	2	96	2	100
LZ WOLF	MV-22 NC	TAKEOFF PO	210		210	VC10	evening	0.19	15	0	2	96	2	100
LZ WOLF	MV-22 NC	TAKEOFF PO	210		210	VC10	nighttime	0.09	15	0	2	96	2	100
LZ WOLF	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.25	15	0	98	2	0	100
LZ WOLF	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.34	15	0	98	2	0	100
LZ WOLF	CH-53 NC	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.08	15	0	98	2	0	100
LZ WOLF	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.07	15	0	47	53	0	100
LZ WOLF	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	15	0	47	53	0	100
LZ WOLF	AH-1 NC	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	15	0	47	53	0	100
LZ WOLF	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.06	15	0	47	53	0	100
LZ WOLF	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.05	15	0	47	53	0	100
LZ WOLF	UH-1 NC	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	15	0	47	53	0	100
C1B	MV-22 CL	TAKEOFF PO	210		210	VC10	daytime	5.16	1	100	0	0	0	100
C1B	MV-22 CL	TAKEOFF PO	210		210	VC10	evening	7.6	1	100	0	0	0	100
C1B	MV-22 CL	TAKEOFF PO	210		210	VC10	nighttime	0.88	1	100	0	0	0	100
C1B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.29	2	100	0	0	0	100
C1B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.5	2	100	0	0	0	100
C1B	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.08	2	100	0	0	0	100
C1B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	3	100	0	0	0	100
C1B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	3	100	0	0	0	100
C1B	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	3	100	0	0	0	100
C1B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.08	3	100	0	0	0	100
C1B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.04	3	100	0	0	0	100
C1B	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	3	100	0	0	0	100

El Centro Modeled Profiles - Proposed Scenario (concluded)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER Description	POWER Setting	POWER Unit	PERIOD OF Day	BUSY Month Sorties	TIME PER Sortie (minutes)	TIME (% in Altitude Range; Feet AGL)				
										0	200	300	1000	Total
										200	300	1000	3000	
LZ WOLFB	MV-22 CL	TAKEOFF PO	210		210	VC10	daytime	5.16	1	100	0	0	0	100
LZ WOLFB	MV-22 CL	TAKEOFF PO	210		210	VC10	evening	7.6	1	100	0	0	0	100
LZ WOLFB	MV-22 CL	TAKEOFF PO	210		210	VC10	nighttime	0.88	1	100	0	0	0	100
LZ WOLFB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime	0.29	2	100	0	0	0	100
LZ WOLFB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	evening	0.5	2	100	0	0	0	100
LZ WOLFB	CH-53 CL	CH-53E	120	CRUISE POWER	68	%Q-BPA	nighttime	0.08	2	100	0	0	0	100
LZ WOLFB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime	0.09	3	100	0	0	0	100
LZ WOLFB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	evening	0.05	3	100	0	0	0	100
LZ WOLFB	AH-1 CL	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime	0.01	3	100	0	0	0	100
LZ WOLFB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	daytime	0.08	3	100	0	0	0	100
LZ WOLFB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	evening	0.04	3	100	0	0	0	100
LZ WOLFB	UH-1 CL	UH-1N	80	FLT AT 80 KTS	100	% RPM	nighttime	0.01	3	100	0	0	0	100

Maximum CNELmr at Modeled Landing Zones in BLM El Centro and Cleveland NF

LZ Group	Subgroup	LZ ID	Baseline	Alternative 1	Change relative to Baseline
El Centro	Bull / Sparrow / Pelican	Bull	68	72	+4
		Sparrow	68	71	+3
		Pelican	68	72	+4
	Other	IP1 Option	60	64	+4
		PC3	63	66	+3
		Cupcake	62	66	+4
		Mallard	62	66	+4
		MW1 / MW1 Option	64	68	+4
		Eider	63	67	+4
		Wolf	63	68	+5
		ME3 Option	63	66	+3
		C1	63	68	+5
Cleveland NF	no pad	3	65	64	-1
		5	65	64	-1
		7	65	64	-1
		8	64	64	0
		9 / 9 alt	64	64	0
		10	65	64	-1
		11	64	64	0
	pad	6 / 6 alt	72	71	-1

All levels greater than 70 dB occur within 500 ft of the LZ

Number of LZ Sites by $CNEL_{mr}$ Band for Baseline and Alternative 1

CNELmr (dBA)	El Centro		Cleveland NF	
	Baseline	Alternative 1	Baseline	Alternative 1
65-70	3	8	4	0
70-75	0	3	1	1
75-80	0	0	0	0
80-85	0	0	0	0
85+	0	0	0	0
Total (65+)	3	11	5	1

Noise Figures

Note: LZ Canary and LZ PC3 Option, which were addressed in the Public Draft EA, have been subsequently dropped from further consideration. Some figures note the location of these dropped LZs.

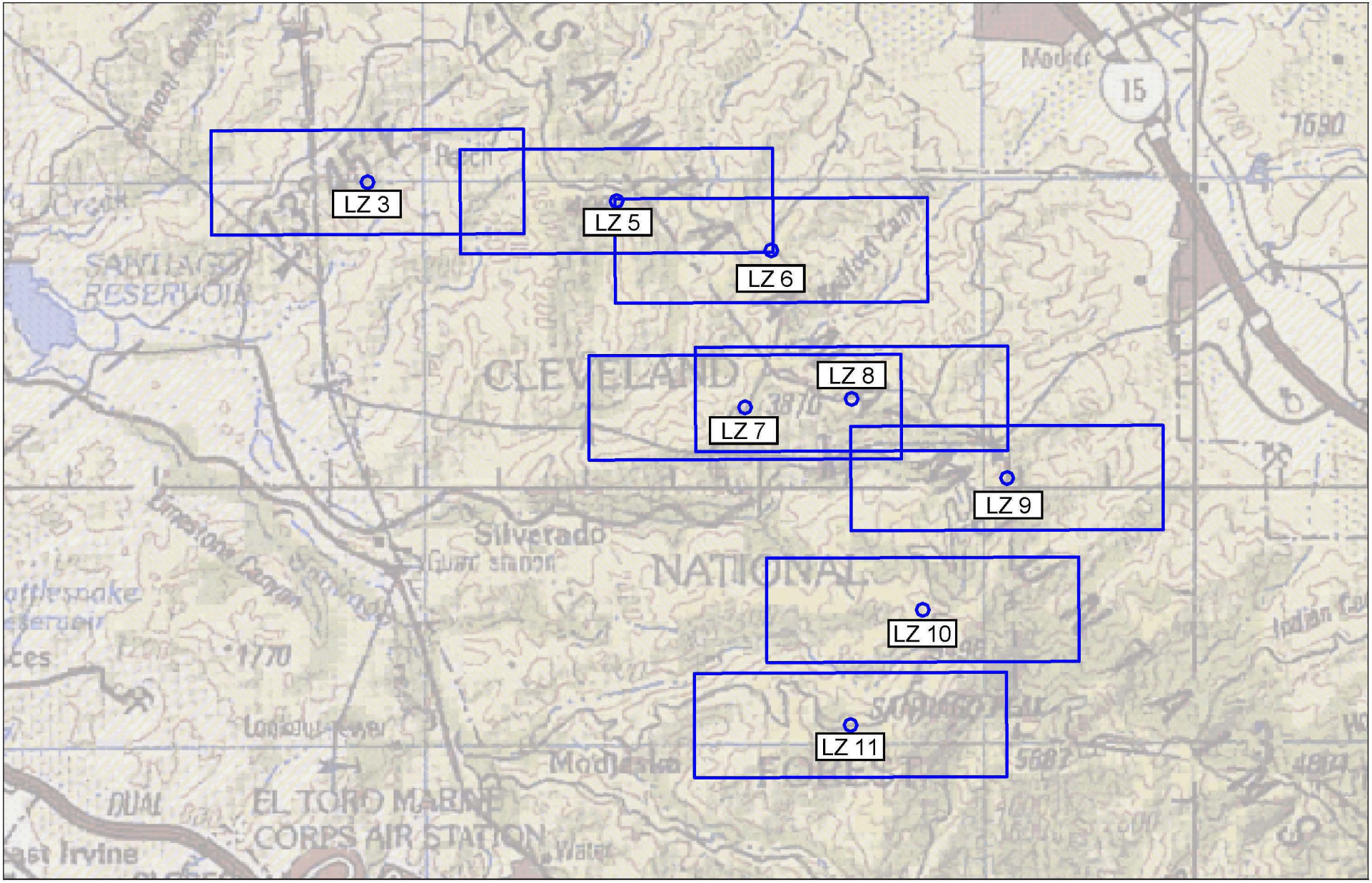


Figure C1-1. Modeled Flight Areas for Helicopters in Cleveland National Forest

N

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000

Scale in Feet 1:96,000 (1 inch = 8,000 feet)

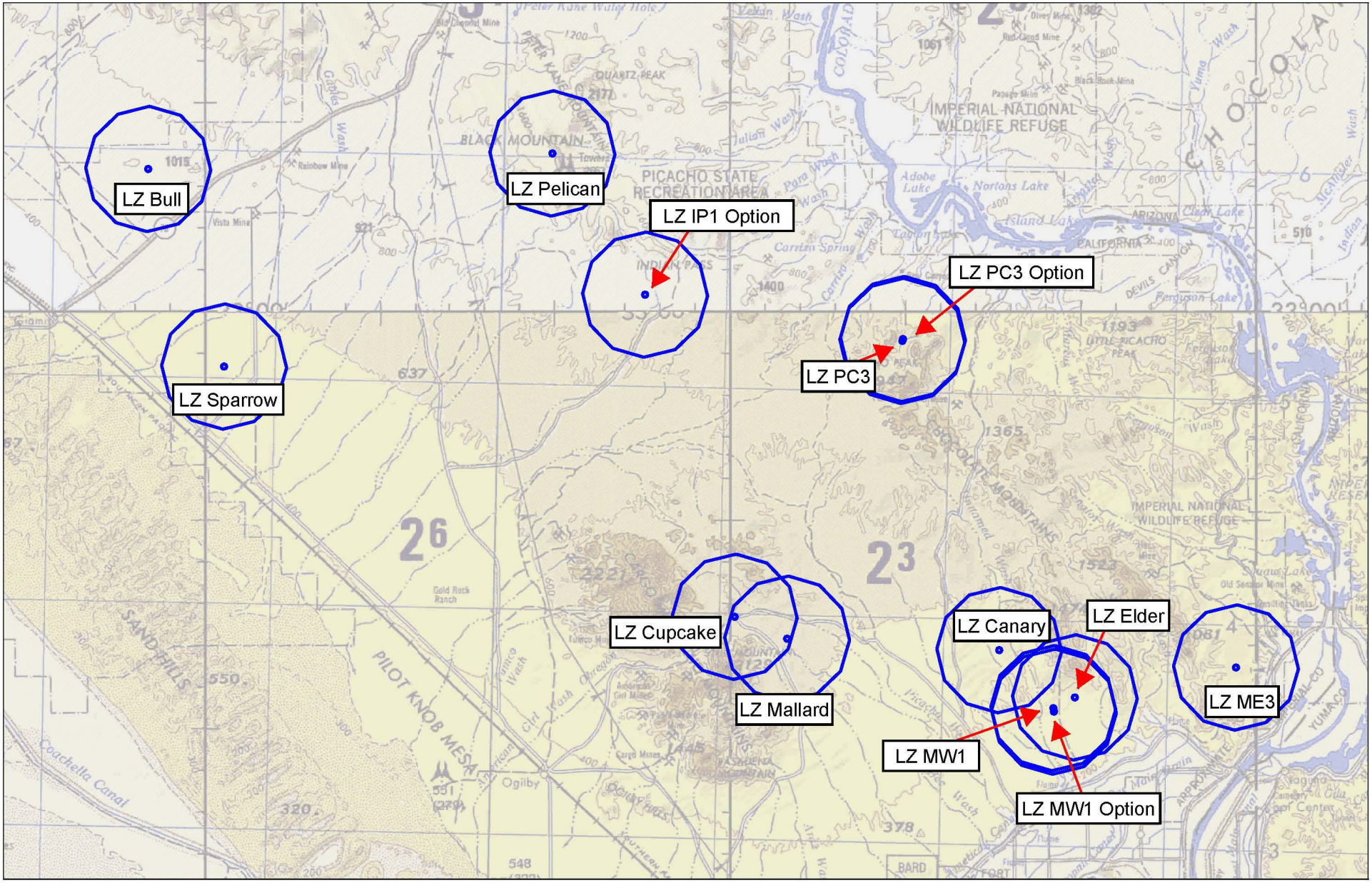


Figure C1-2. Modeled Flight Areas for Helicopters in BLM El Centro Managed-Land

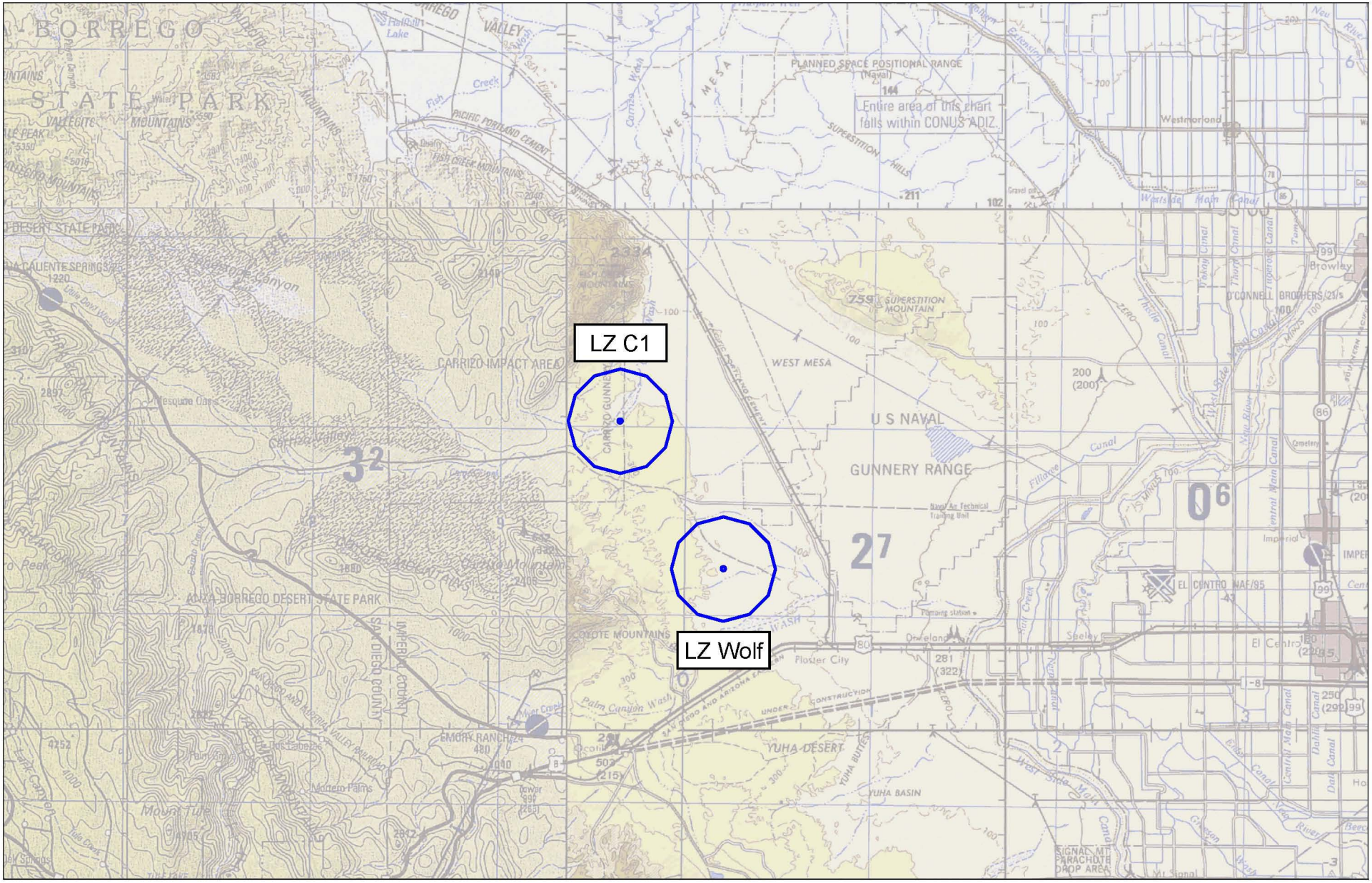


Figure C1-3. Modeled Flight Areas for Helicopters in BLM El Centro Managed-Land

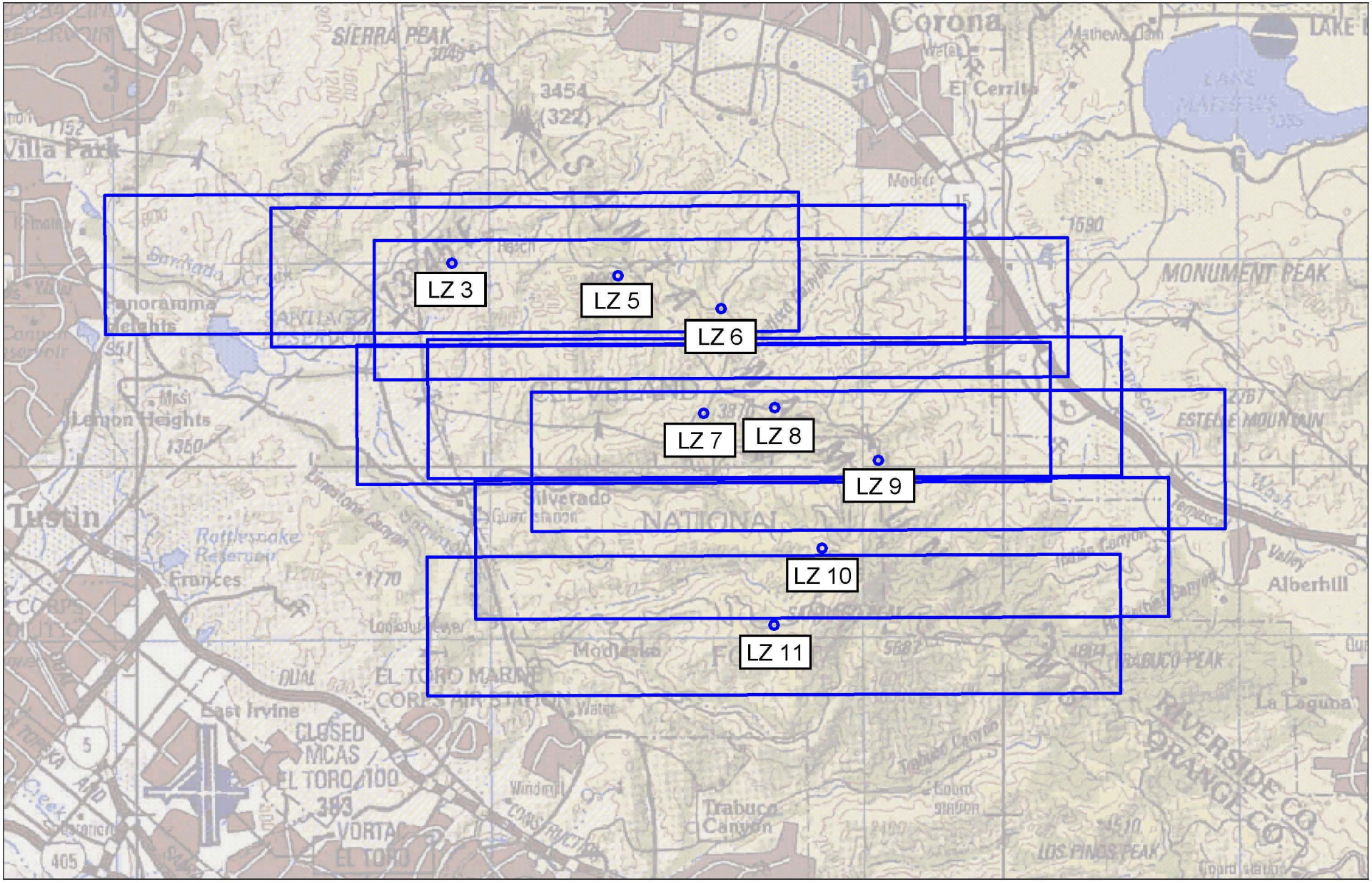


Figure C1-4. Modeled Flight Areas for MV-22 in Cleveland National Forest

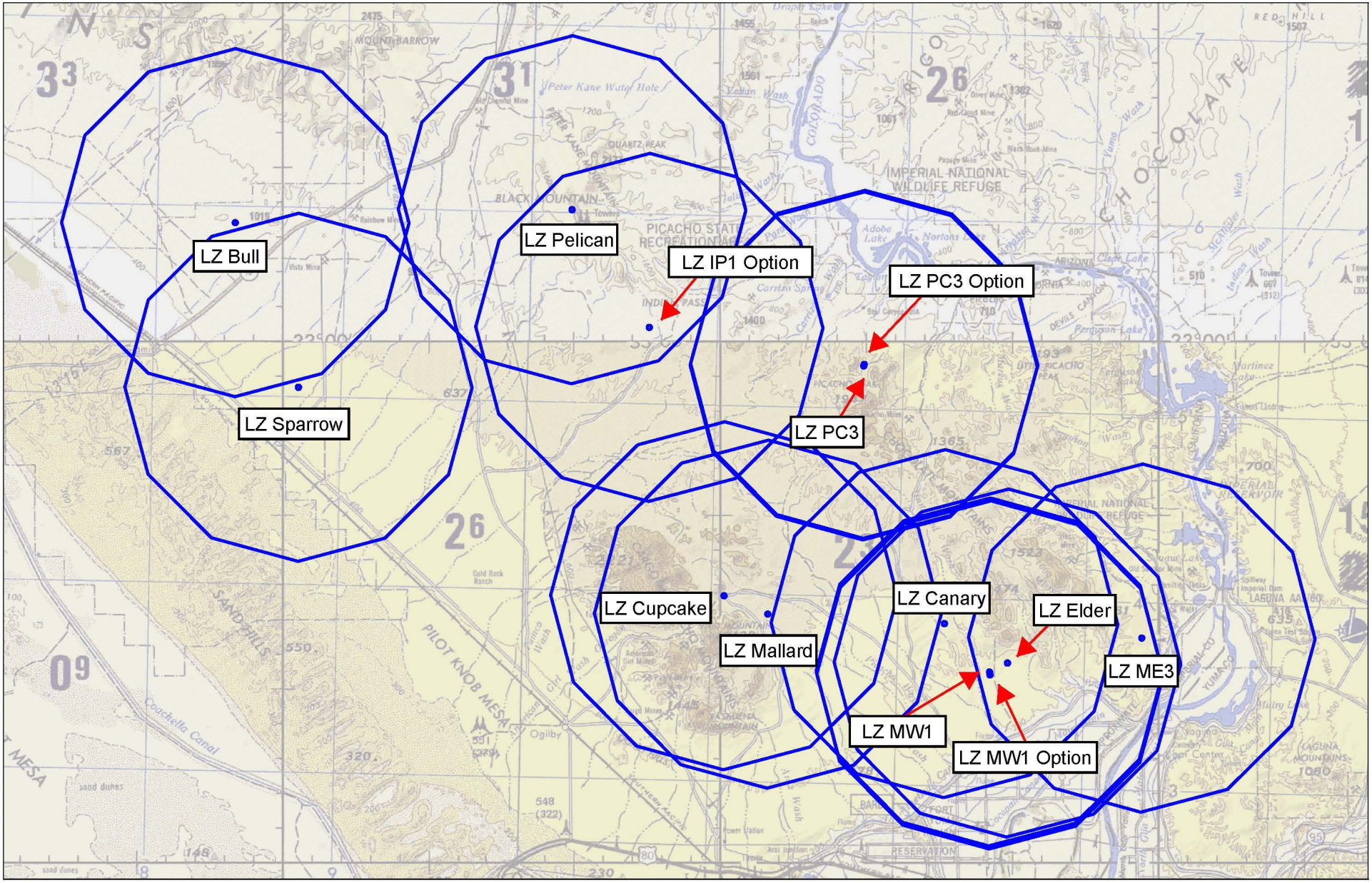


Figure C1-5. Modeled Flight Areas for MV-22 in BLM El Centro Managed-Land

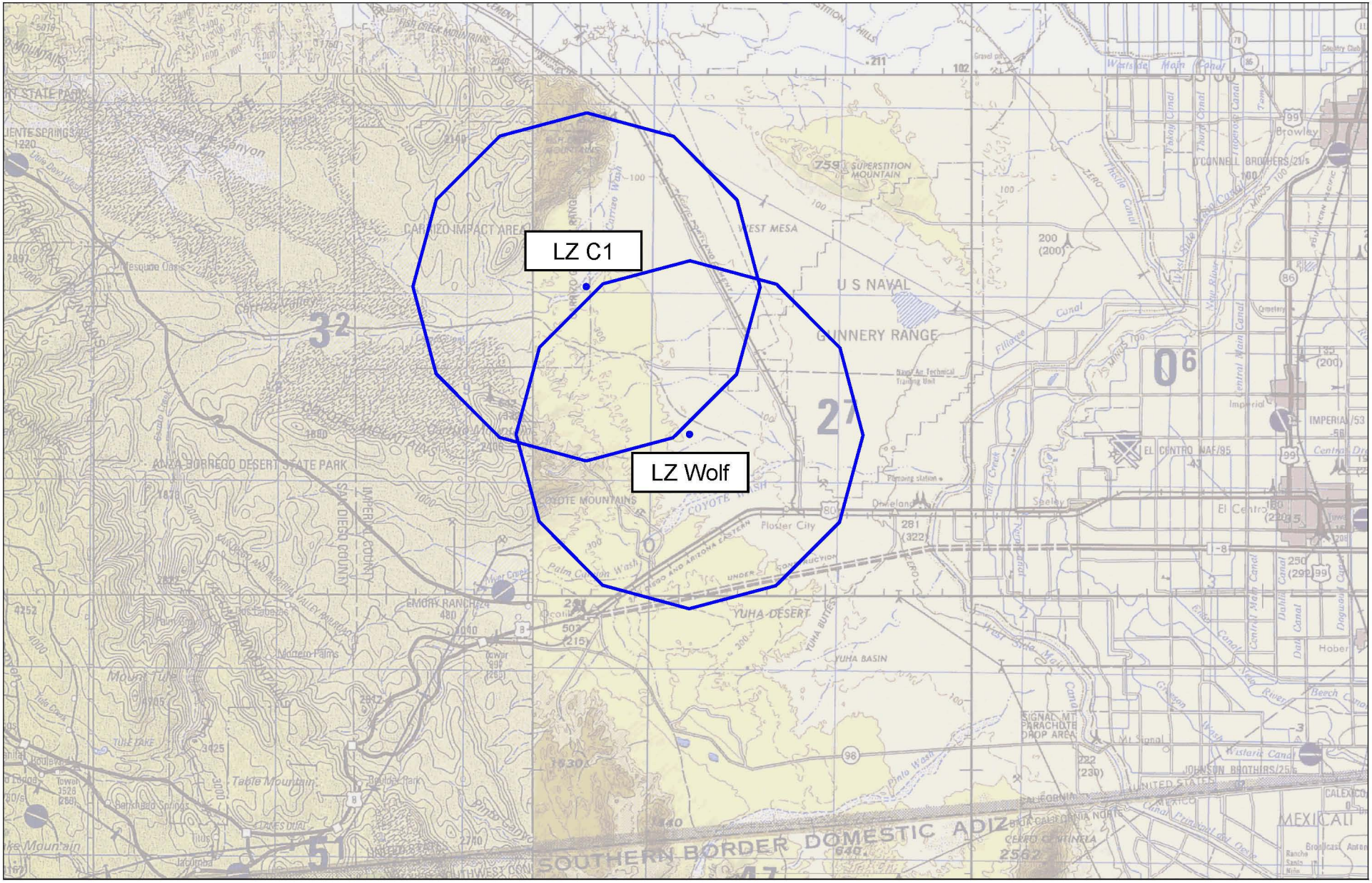


Figure C1-6. Modeled Flight Areas for MV-22 in BLM El Centro Managed-Land

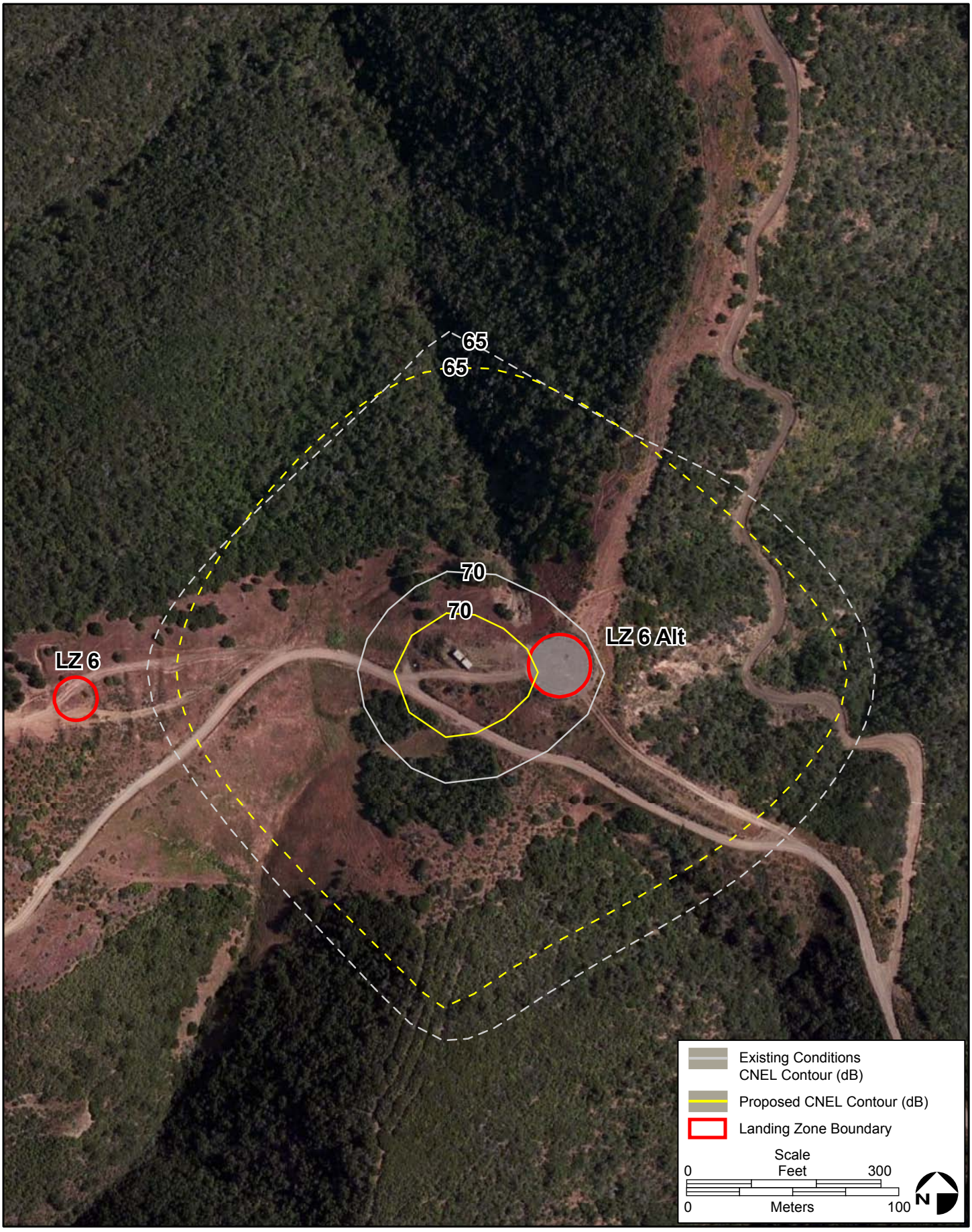


Figure C1-7. Aircraft Noise Contours from Operations at LZ Site 6/6 Alt

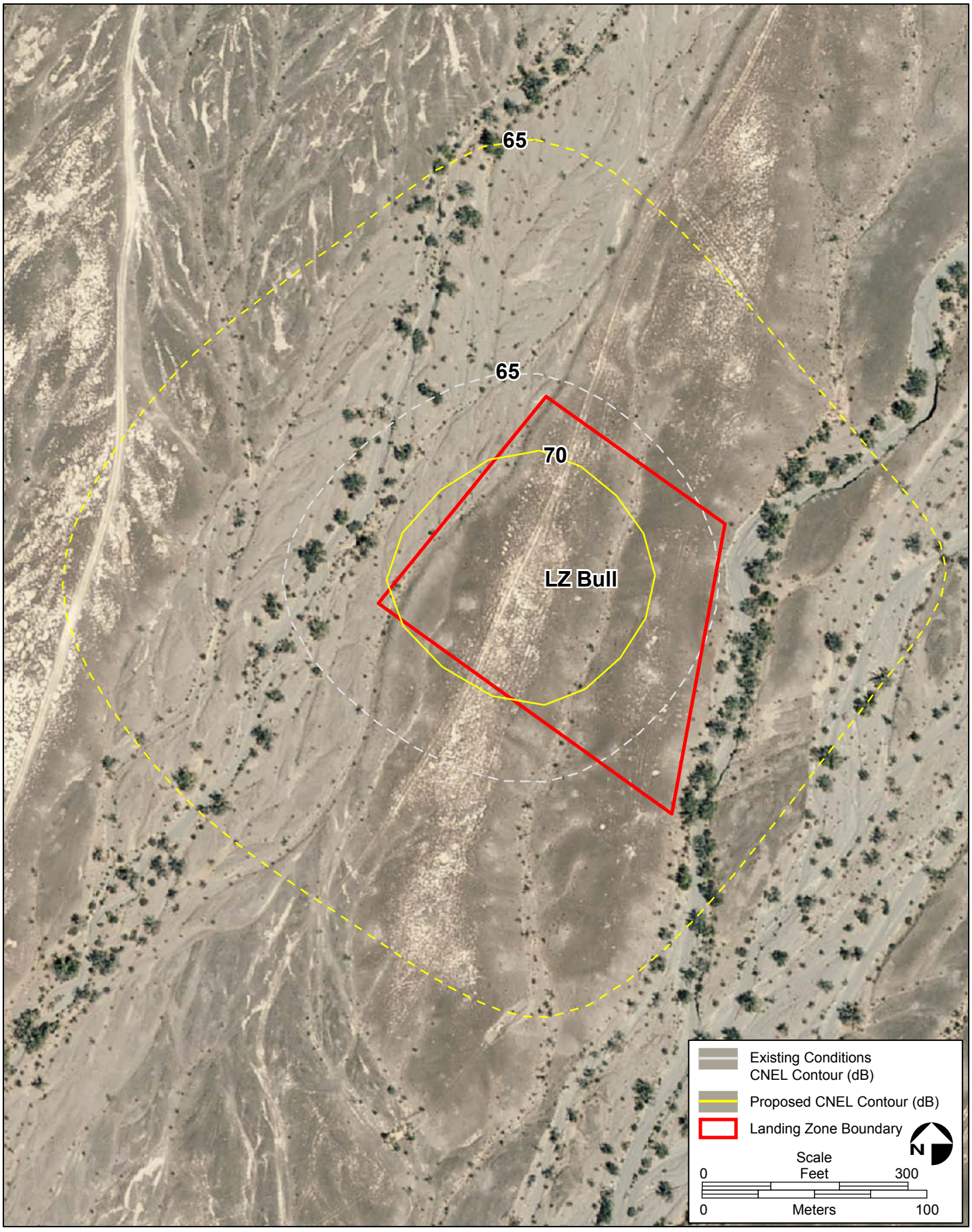


Figure C1-8. Aircraft Noise Contours from Operations at LZ Bull

APPENDIX C-2

Discussion of Noise and Its Effect on the Environment
(Wyle)

C.1 Basics of Sound

Noise is unwanted sound. Sound is all around us; sound becomes noise when it interferes with normal activities, such as sleep or conversation.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Whether that sound is interpreted as pleasant (e.g., music) or unpleasant (e.g., jackhammers) depends largely on the listener's current activity, past experience, and attitude toward the source of that sound.

The measurement and human perception of sound involves three basic physical characteristics: intensity, frequency, and duration. First, intensity is a measure of the acoustic energy of the sound vibrations and is expressed in terms of sound pressure. The greater the sound pressure, the more energy carried by the sound and the louder the perception of that sound. The second important physical characteristic of sound is frequency, which is the number of times per second the air vibrates or oscillates. Low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified by sirens or screeches. The third important characteristic of sound is duration or the length of time the sound can be detected.

The loudest sounds that can be detected comfortably by the human ear have intensities that are a trillion times higher than those of sounds that can barely be detected. Because of this vast range, using a linear scale to represent the intensity of sound becomes very unwieldy. As a result, a logarithmic unit known as the decibel (abbreviated dB) is used to represent the intensity of a sound. Such a representation is called a sound level. 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).

Because of the logarithmic nature of the decibel unit, sound levels cannot be arithmetically added or subtracted and are somewhat cumbersome to handle mathematically. However, some simple rules are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. For example:

60 dB + 60 dB = 63 dB, and

80 dB + 80 dB = 83 dB.

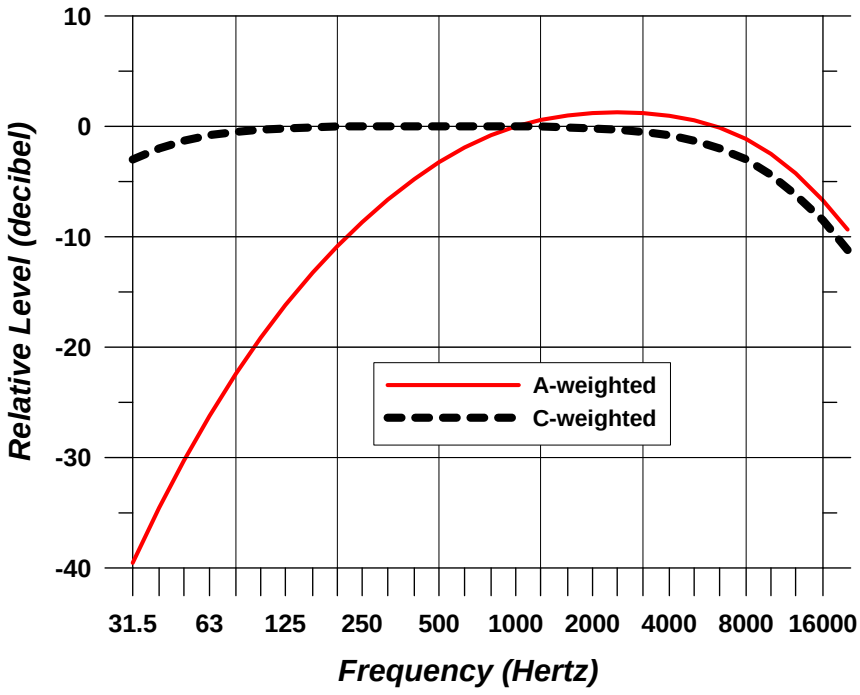
Second, the total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

60.0 dB + 70.0 dB = 70.4 dB.

Because the addition of sound levels is different than that of ordinary numbers, such addition is often referred to as "decibel addition" or "energy addition." The latter term arises from the fact that what we are really doing when we add decibel values is first converting each decibel value to its corresponding acoustic energy, then adding the energies using the normal rules of addition, and finally converting the total energy back to its decibel equivalent.

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 change in sound level of about 10 dB as a doubling (or halving) of the sound's loudness, and this relation holds true for loud and quiet sounds. A decrease in sound level of 10 dB actually represents a 90 percent decrease in sound intensity but only a 50 percent decrease in perceived loudness because of the nonlinear response of the human ear (similar to most human senses).

Sound frequency is measured in terms of cycles per second (cps), or hertz (Hz), which is the standard unit for cps. The normal human ear can detect sounds that range in frequency from about 20 Hz to about 15,000 Hz. All sounds in this wide range of frequencies, however, are not heard equally by the human ear, which is most sensitive to frequencies in the 1,000 to 4,000 Hz range. Weighting curves have been developed to correspond to the sensitivity and perception of different types of sound. A-weighting and C-weighting are the two most common weightings. A-weighting accounts for frequency dependence by adjusting the very high and very low frequencies (below approximately 500 Hz and above approximately 10,000 Hz) to approximate the human ear's lower sensitivities to those frequencies. C-weighting is nearly flat throughout the range of audible frequencies, hardly de-emphasizing the low frequency sound while approximating the human ear's sensitivity to higher intensity sounds. The two curves shown in Figure C-1 are also the most adequate to quantify environmental noises.



Source: ANSI S1.4A -1985 "Specification of Sound Level Meters"

Figure C-1. Frequency Response Characteristics of A- and C-Weighting Networks

C.1.1 A-weighted Sound Level

Sound levels that are measured using A-weighting, called A-weighted sound levels, are often denoted by the unit dBA or dB(A) rather than dB. When the use of A-weighting is understood, the adjective "A-weighted" is often omitted and the measurements are expressed as dB. In this report (as in most environmental impact documents), dB units refer to A-weighted sound levels.

Noise potentially becomes an issue when its intensity exceeds the ambient or background sound pressures. Ambient background noise in metropolitan, urbanized areas typically varies from 60 to 70 dB and can be as high as 80 dB or greater; quiet suburban neighborhoods experience ambient noise levels of approximately 45 to 50 dB (U.S. Environmental Protection Agency [EPA] 1978).

Figure C-2 is a chart of A-weighted sound levels from typical sounds. Some noise sources (air conditioner, vacuum cleaner) are continuous sounds which levels are constant for some time. Some (automobile, heavy truck) are the maximum sound during a vehicle pass-by. Some (urban daytime, urban nighttime) are averages over extended periods. A variety of noise metrics have been developed to describe noise over different time periods, as discussed below.

Aircraft noise consists of two major types of sound events: aircraft takeoffs and landings, and engine maintenance operations. The former can be described as intermittent sounds and the latter as continuous. Noise levels from flight operations exceeding background noise typically occur beneath main approach and departure corridors, in local air traffic patterns around the airfield, and in areas immediately adjacent to parking ramps and aircraft staging areas. As aircraft in flight gain altitude, their noise contribution drops to lower levels, often becoming indistinguishable from the background.

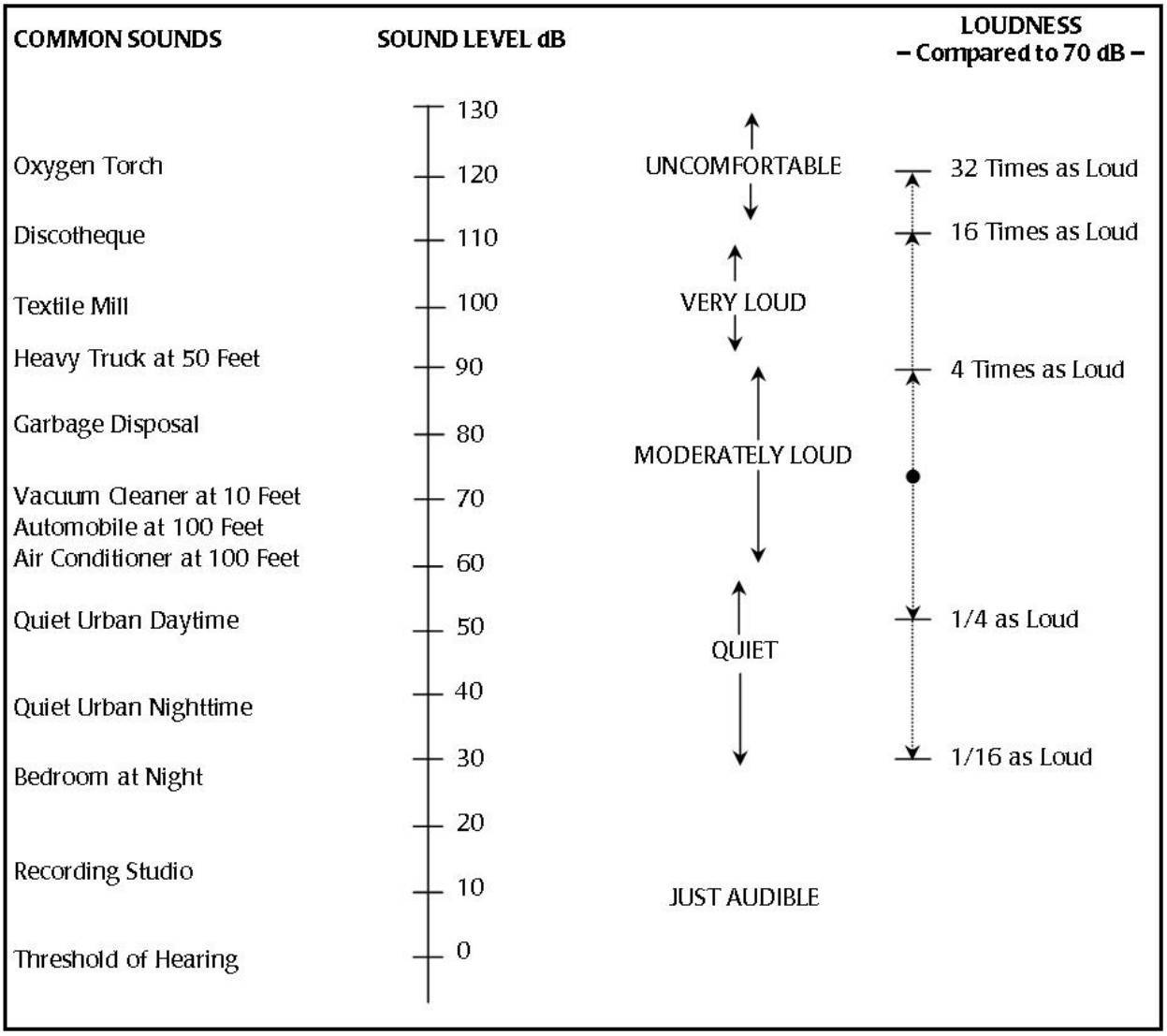
C.1.2 C-weighted Sound Level

Sound levels measured using a C-weighting are most appropriately called C-weighted sound levels (and denoted dBC). C-weighting is nearly flat throughout the audible frequency range, hardly de-emphasizing the low frequency. This weighting scale is generally used to describe impulsive sounds. Sounds that are characterized as impulsive generally contain low frequencies. Impulsive sounds may induce secondary effects, such as shaking of a structure, rattling of windows, inducing vibrations. These secondary effects can cause additional annoyance and complaints.

The following definitions in the American National Standard Institute (ANSI) Report S12.9, Part 4 provide general concepts helpful in understanding impulsive sounds (ANSI 1996).

Impulsive Sound: Sound characterized by brief excursions of sound pressure (acoustic impulses) that significantly exceeds the ambient environmental sound pressure. The duration of a single impulsive sound is usually less than one second (ANSI 1996).

Highly Impulsive Sound: Sound from one of the following enumerated categories of sound sources: small-arms gunfire, metal hammering, wood hammering, drop hammering, pile driving, drop forging, pneumatic hammering, pavement breaking, metal impacts during rail-yard shunting operation, and riveting.



SOURCE: Handbook of Noise Control, *C.M. Harris, Editor McGraw-Hill Book Co., 1979, and FICAN 1997*

Figure C-2. Typical A-weighted Sound Levels of Common Sounds

High-energy Impulsive Sound: Sound from one of the following enumerated categories of sound sources: quarry and mining explosions, sonic booms, demolition and industrial processes that use high explosives, military ordnance (e.g., armor, artillery and mortar fire, and bombs), explosive ignition of rockets and missiles, explosive industrial circuit breakers, and any other explosive source where the equivalent mass of dynamite exceeds 25 grams.

C.2 Noise Metrics

In general, a metric is a statistic for measuring or quantifying. A noise metric quantifies the noise environment. There are three families of noise metrics described herein – one for single noise events such as an aircraft flyby, one for cumulative noise events such as a day's worth of aircraft activity and one which quantifies the events or time relative to single noise events.

Within the single noise event family, metrics described below include Peak Sound Pressure Level, Maximum Sound Level and Sound Exposure Level. Within the cumulative noise events family, metrics described below include Equivalent Sound Level, Day-Night Average Sound Level and several others. Within the events/time family, metrics described below include Number of Events Above a Threshold Level and Time Above a Specified Level.

C.2.1 Maximum Sound Level (L_{max})

The highest A-weighted integrated sound level measured during a single event in which the sound level changes value with time (e.g., an aircraft overflight) is called the maximum A-weighted sound level or Maximum Sound Level.

During an aircraft overflight, the noise level starts at the ambient or background noise level, rises to the maximum level as the aircraft flies closest to the observer, and returns to the background level as the aircraft recedes into the distance. The L_{max} indicates the maximum sound level occurring for a fraction of a second. For aircraft noise, the "fraction of a second" over which the maximum level is defined is generally one-eighth of a second, and is denoted as "fast" response (ANSI 1988). Slowly varying or steady sounds are generally measured over a period of one second, denoted "slow" response. The L_{max} is important in judging the interference caused by a noise event with conversation, TV or radio listening, sleep, or other common activities. Although it provides some measure of the intrusiveness of the event, it does not completely describe the total event, because it does not include the period of time that the sound is heard.

C.2.2 Peak Sound Pressure Level (L_{pk})

The Peak Sound Pressure Level, is the highest instantaneous level obtained by a sound level measurement device. The L_{pk} is typically measured using a 20 microseconds or faster sampling rate, and is typically based on unweighted or linear response of the meter.

C.2.3 Sound Exposure Level (SEL)

Sound Exposure Level is a composite metric that represents both the intensity of a sound and its duration. Individual time-varying noise events (e.g., aircraft overflights) have two main characteristics: a sound level that changes throughout the event and a period of time during which the event is heard. SEL provides a measure of the net impact of the entire acoustic event, but it does not directly represent the sound level heard at any given time. During an aircraft flyover, SEL would include both the L_{max} and the lower noise levels produced during onset and recess periods of the overflight.

SEL is a logarithmic measure of the total acoustic energy transmitted to the listener during the event. Mathematically, it represents the sound level of a constant sound that would, in one second, generate the same acoustic energy as the actual time-varying noise event. For sound from aircraft overflights, which typically lasts more than one second, the SEL is usually greater than the L_{max} because an individual overflight takes seconds and the L_{max} occurs instantaneously. SEL represents the best metric to compare noise levels from overflights.

C.2.4 Equivalent Sound Level (L_{eq})

A cumulative noise metric useful in describing noise is the Equivalent Sound Level. L_{eq} is the continuous sound level that would be present if all of the variations in sound level occurring over a specified time period were smoothed out as to contain the samed total sound energy.

Just as SEL has proven to be a good measure of the noise impact of a single event, L_{eq} has been established to be a good measure of the impact of a series of events during a given time period. Also, while L_{eq} is defined as an average, it is effectively a sum over that time period and is, thus, a measure of the cumulative impact of noise. For example, the sum of all noise-generating events during the period of 7 a.m. to 4 p.m. could provide the relative impact of noise generating events for a school day.

C.2.5 Day-Night Average Sound Level (DNL or L_{dn}) and Community Noise Equivalent Level (CNEL)

Day-Night Average Sound Level and Community Noise Equivalent Level are composite metrics that account for all noise events in a 24-hour period. In order to account for increased human sensitivity to noise at night, a 10 dB penalty is applied to nighttime events (10:00 p.m. to 7:00 a.m. time period). A variant of the DNL, the CNEL includes a 5 dB penalty on noise during the 7:00 a.m. to 10:00 p.m. time period, and a 10 dB penalty on noise during the 10:00 p.m. to 7:00 a.m. time period. The notations DNL and L_{dn} are both used for Day-Night Average Sound Level and are equivalent.

Like L_{eq}, DNL and CNEL without their penalties are average quantities, mathematically representing the continuous A-weighted or C-weighted sound level that would be present if all of the variations in sound level that occur over a 24-hour period were smoothed out so as to contain the same total sound energy. These composite single-measure time-average metrics account for the SELs, L_{max}, the duration of the events (sorties or operations), and the number of events that occur over a 24-hour period but do not provide specific informatation on the number of noise events or the individual sound levels that occur during the 24-hour day. Like SEL, neither DNL nor CNEL represent the sound level heard at any particular time, but quantifies the total sound energy received. While it is normalized as an average, it represents all of the sound energy, and is therefore a cumulative measure.

The nighttime penalties in both DNL and CNEL account for the added intrusiveness of sounds that occur during normal sleeping hours, both because of the increased sensitivity to noise during those hours and because ambient sound levels during nighttime are typically about 10 dB lower than during daytime hours. The evening penalty in CNEL accounts for the added intrusiveness of sounds during that period.

The inclusion of daytime, evening and nighttime periods in the computation of the DNL and CNEL reflects their basic 24-hour definition. They can, however, be applied over periods of multiple days. For application to civil airports, where operations are consistent from day to day, DNL and CNEL are usually applied as an annual average.

The logarithmic nature of the decibel unit causes the noise levels of the loudest events to control the 24-hour average. A DNL of 65 dB could result from a very few noisy events or a large number of quieter events.

As a simple example of this characteristic, consider a case in which only one aircraft overflight occurs during the daytime over a 24-hour period, creating a sound level of 100 dB for 30 seconds. During the remaining 23 hours, 59 minutes, and 30 seconds of the day, the ambient sound level is 50 dB. The DNL for this 24-hour period is 65.9 dB. Assume, as a second example, that 10 such 30-second overflights occur during daytime hours during the next 24-hour period, with the same ambient sound level of 50 dB during the remaining 23 hours and 55 minutes of the day. The DNL for this 24-hour period is 75.5 dB. Clearly, the averaging of noise over a 24-hour period does not ignore the louder single events and tends to emphasize both the sound levels and number of those events.

Daily average sound levels are typically used for the evaluation of community noise effects (i.e., long-term annoyance), and particularly aircraft noise effects. In general, scientific studies and social surveys have found a high correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in DNL (EPA 1978 and Schultz 1978).

C.2.6 Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}) and Onset-Rate Adjusted Monthly Community Noise Equivalent Level ($CNEL_{mr}$)

Military aircraft utilizing Special Use Airspace (SUA) such as Military Training Routes (MTRs), Military Operating Areas (MOAs) and Restricted Areas/Ranges generate a noise environment that is somewhat different from that associated with airfield operations. As opposed to patterned or continuous noise environments associated with airfields, flight activity in SUAs is highly sporadic, and often seasonal ranging from ten per hour to less than one per week. Individual military overflight events also differ from typical community noise events in that noise from a low-altitude, high-airspeed flyover can have a rather sudden onset, exhibiting a rate of increase in sound level (onset rate) of up to 150 dB per second.

To represent these differences, the conventional SEL metric is adjusted to account for the "surprise" effect of the sudden onset of aircraft noise events on humans with an adjustment ranging up to 11 dB above the normal SEL (Stusnick, et al. 1992). Onset rates between 15 to 150 dB per second require an adjustment of 0 to 11 dB, while onset rates below 15 dB per second require no adjustment. The adjusted SEL is designated as the onset-rate adjusted sound exposure level (SEL_r).

Because of the sporadic characteristic of SUA activity and so as not to dilute the resultant noise exposure, the month with the most operations or sorties from a yearly tabulation for the given SUA is examined -- the so-called busiest month. The cumulative exposure to noise in these areas is computed by DNL over the busy month, but using SEL_r instead of SEL. This monthly average is denoted L_{dnmr}. If onset rate adjusted DNL is computed over a period other than a month, it would be designated L_{dnr} and the period must be specified. In the state of California, a variant of the L_{dnmr} includes a penalty for evening operations (7 p.m. to 10 p.m) and is denoted $CNEL_{mr}$.

C.2.7 Number-of-Events Above (NA) a Threshold Level (L)

The Number-of-events Above metric (NA) provides the total number of noise events that exceed the selected noise level threshold during a specified period of time. Combined with the selected threshold level (L), the NA metric is symbolized as NAL. The threshold L can be defined in terms of either the SEL or L_{max} metric, and it is important that this selection is reflected in the nomenclature. When labeling a contour line or point of interest (POI) on a map the NAL will be followed by the number of events in parentheses for that line or POI. For example, the noise environment at a location where 10 events exceed an SEL of 90 dB, over a given period of time, would be represented by the nomenclature NA90SEL(10). Similarly, for L_{max} it would be NA90L_{max}(10). The period of time can be an average 24-hour day, daytime, nighttime, school day, or any other time period appropriate to the nature and application of the analysis.

NA can be portrayed for single or multiple locations, or by means of noise contours on a map similar to the common DNL contours. A threshold level is selected that best meets the need for that situation. An L_{max} threshold is normally selected to analyze speech interference, whereas an SEL threshold is normally selected for analysis of sleep disturbance.

The NA metric is the only supplemental metric that has been developed that combines single-event noise levels with the number of aircraft operations. In essence, it answers the question of how many aircraft (or range of aircraft) fly over a given location or area at or above a selected threshold noise level.

C.2.8 Time Above (TA) a Specified Level (L)

The Time Above (TA) metric is a measure of the total time that the A-weighted aircraft noise level is at or above a defined sound level threshold. Combined with the selected threshold level (L), the TA metric is symbolized as TAL. TA is not a sound level, but rather a time expressed in minutes. TA values can be calculated over a full 24-hour annual average day, the 15-hour daytime and 9-hour nighttime periods, a school day, or any other time period of interest, provided there is operational data to define the time period of interest.

TA has application for describing the noise environment in schools, particularly when comparing the classroom or other noise sensitive environments for different operational scenarios. TA can be portrayed by means of noise contours on a map similar to the common DNL contours.

The TA metric is a useful descriptor of the noise impact of an individual event or for many events occurring over a certain time period. When computed for a full day, the TA can be compared alongside the DNL in order to determine the sound levels and total duration of events that contribute to the DNL. TA analysis is usually conducted along with NA analysis so the results show not only how many events occur above the selected threshold(s), but also the total duration of those events above those levels for the selected time period.

C.3 Noise Effects

This noise effects section includes discussions of annoyance, speech interference and sleep disturbance, and the effects of noise on hearing, health, performance, learning, animals, property values, terrain and archaeological sites.

C.3.1 Annoyance

The primary effect of aircraft noise on exposed communities is one of long-term annoyance, defined by the Environmental Protection Agency (EPA) as any negative subjective reaction on the part of an individual or group. The scientific community has adopted the use of long-term annoyance as a primary indicator of community response because it attempts to account for all negative aspects of effects from noise, e.g., increased annoyance due to being awakened the previous night by aircraft and interference with everyday conversation.

Numerous laboratory studies and field surveys have been conducted to measure annoyance and to account for a number of variables, many of which are dependent on a person's individual circumstances and preferences. Laboratory studies of individual response to noise have helped isolate a number of the factors contributing to annoyance, such as the intensity level and spectral characteristics of the noise, duration, the presence of impulses, pitch, information content, and the degree of interference with activity. Social surveys of community response to noise have allowed the development of general dose-response relationships that can be used to estimate the proportion of people who will be highly annoyed by a given noise level. The results of these studies have formed the basis for criteria established to define areas of compatible land use.

A wide variety of responses have been used to determine intrusiveness of noise and disturbances of speech, sleep, audio/video entertainment, and outdoor living; but the most useful metric for assessing peoples' responses to noise is the percentage of the population expected to be "highly annoyed." The concept of "percent highly annoyed" has provided the most consistent response of a community to a particular noise environment. In his synthesis of several different social surveys that employed different response scales, Schultz (1978) defined "highly annoyed" respondents as those respondents whose self-described annoyance fell within the upper 28 percent of the response scale where the scale was numerical or un-named. For surveys where the response scale was named, Schultz counted those who claimed to be highly annoyed, combining the responses of "very annoyed" and "extremely annoyed." Schultz's definition of "percent highly annoyed" (%HA) became the basis for the Federal policy on environmental noise. Daily average sound levels are typically used for the evaluation of community noise effects, such as long-term annoyance.

In general, scientific studies and social surveys have found a correlation between the percentages of groups of people highly annoyed and the level of average noise exposure. Thus, the results are expressed as the average %HA at various exposure levels measured in DNL. The classic analysis is Schultz's original 1978 study, whose results are shown in Figure C-3. This figure is commonly referred to as the Schultz curve. It represents the synthesis of a large number of social surveys (161 data points in all), that relates the long-term community response to various types of noise sources, measured using the DNL metric.

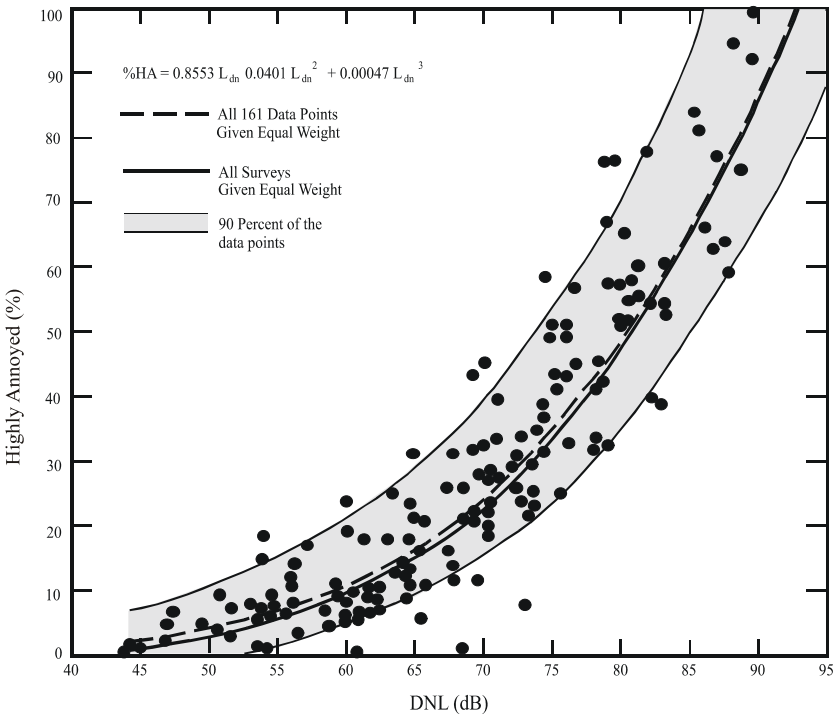
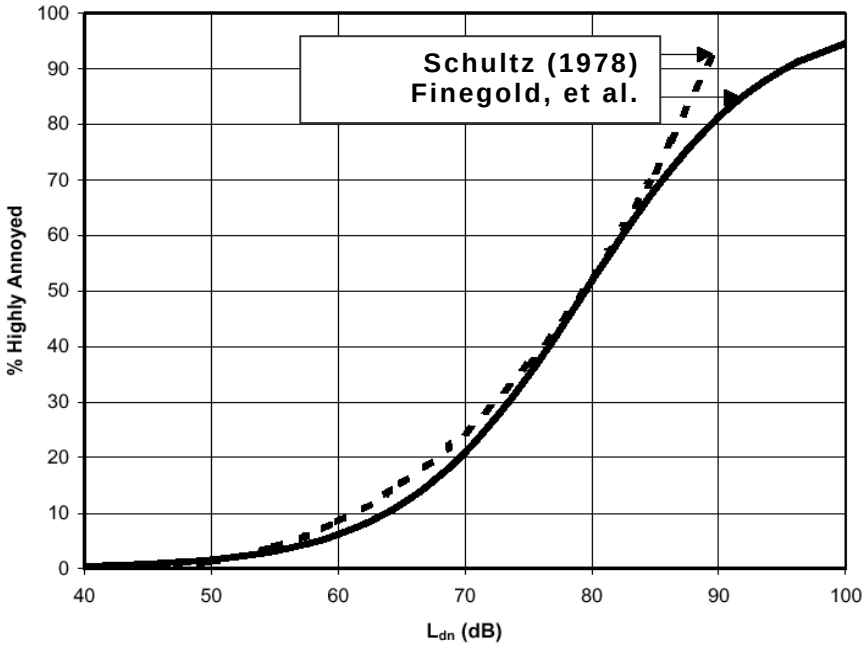


Figure C-3. Community Surveys of Noise Annoyance

An updated study of the original Schultz data based on the analysis of 400 data points collected through 1989 essentially reaffirmed this relationship. Figure C-4 shows an updated form of the curve fit in comparison with the original Schultz curve (Finegold 1994). The updated fit, which does not differ substantially from the original, is the preferred form in the U.S. The relationship between %HA and DNL is:

$$\%HA = 100/[1+ \exp(11.13 - 0.141L_{dn})]$$



SOURCE:(Schultz 1978) andCurrent (Finegold, et al. 1994) Curve Fits

Figure C-4. Response of Communities to Noise; Comparison of Original

In general, correlation coefficients of 0.85 to 0.95 are found between the percentages of groups of people highly annoyed and the level of average noise exposure. However, the correlation coefficients for the annoyance of individuals are relatively low, on the order of 0.5 or less. This is not surprising, considering the varying personal factors that influence the manner in which individuals react to noise.

A number of non-acoustic factors have been identified that may influence the annoyance response of an individual. Newman and Beattie (1985) divided these factors into emotional and physical variables.

Emotional Variables:

- Feelings about the necessity or preventability of the noise;
- Judgment of the importance and value of the activity that is producing the noise;
- Activity at the time an individual hears the noise;
- Attitude about the environment;
- General sensitivity to noise;
- Belief about the effect of noise on health; and
- Feeling of fear associated with the noise.

Physical Variables:

- Type of neighborhood;
- Time of day;
- Season;
- Predictability of noise;
- Control over the noise source; and
- Length of time an individual is exposed to a noise.

The low correlation coefficients for individuals' reactions reflect the large amount of scatter among the data drawn from the various surveys and point to the substantial uncertainty associated with the equation representing the relationship between %HA and DNL. Based on the results of surveys it has been observed that noise exposure can explain less than 50 percent of the observed variance in annoyance, indicating that non-acoustical factors play a major role. As a result, it is not possible to accurately predict individual annoyance in any specific community based on the aircraft noise exposure. Nevertheless, changes in %HA can be useful in giving the decision maker more information about the relative effects that different alternatives may have on the community.

The original Schultz curve and the subsequent updates do not separate out the annoyance from aircraft noise and other transportation noise sources. This was an important element, in that it allowed Schultz to obtain some consensus among the various social surveys from the 1960s and 1970s that were synthesized in the analysis. In essence, the Schultz curve assumes that the effects of long-term annoyance on the general population are the same, regardless of whether the noise source is road, rail, or aircraft. In the years after the classical Schultz analysis, additional social surveys have been conducted to better understand the annoyance effects of various transportation sources.

Miedema & Vos (1998) present synthesis curves for the relationship between DNL and percentage "Annoyed" and percentage "Highly Annoyed" for three transportation noise sources. Separate, non-identical curves were found for aircraft, road traffic, and railway noise. Table C-1 illustrates that, for a DNL of 65 dB, the percent of the people forecasted to be Highly Annoyed is 28 percent for air traffic, 18 percent for road traffic, and 11 percent for railroad traffic. For an outdoor DNL of 55 dB, the percent highly annoyed would be close to 12 percent if the noise is generated by aircraft operations, but only 7 percent and 4 percent, respectively, if the noise is generated by road or rail traffic. Comparing the levels on the Miedema & Vos curve to those on the updated Schultz curve indicates that the percentage of people highly annoyed by aircraft noise may be higher than previously thought when the noise is solely generated by aircraft activity.

Table C-1. Percent Highly Annoyed for Different Transportation Noise Sources

DNL (dB)	Percent Hightly Annoyed (%HA)			
	Miedema and Vos			Schultz Combined
	Air	Road	Rail	
55	12	7	4	3
60	19	12	7	6
65	28	18	11	12
70	37	29	16	22
75	48	40	22	36

Source: Miedema & Vos 1998

As noted by the World Health Organization (WHO), even though aircraft noise seems to produce a stronger annoyance response than road traffic, caution should be exercised when interpreting synthesized data from different studies (WHO 2000). The WHO noted that five major parameters should be randomly distributed for the analyses to be valid: personal, demographic, and lifestyle factors, as well as the duration of noise exposure and the population experience with noise.

The FICON found that the updated Schultz curve remains the best available source of empirical dosage effect information to predict community response to transportation noise without any segregation by transportation source (FICON 1992); a position held by the FICAN in 1997 (FICAN 1997). However, FICON also recommended further research to investigate the differences in perceptions of aircraft noise, ground transportation noise (highways and railroads), and general background noise.

C.3.2 Speech Interference

Speech interference associated with aircraft noise is a primary cause of annoyance for communities. The disruption of routine activities such as radio or television listening, telephone use, or family conversation gives rise to frustration and irritation. The quality of speech communication is particularly important in classrooms and offices. In industrial settings it can cause fatigue and vocal strain in those who attempt to communicate over the noise.

The disruption of speech in the classroom is a primary concern, due to the potential for adverse effects on children's learning ability. There are two aspects to speech comprehension:

1. *Word Intelligibility* - the percent of words transmitted and received. This might be important for students in the lower grades who are learning the English language, and particularly for students who have English as a Second Language.

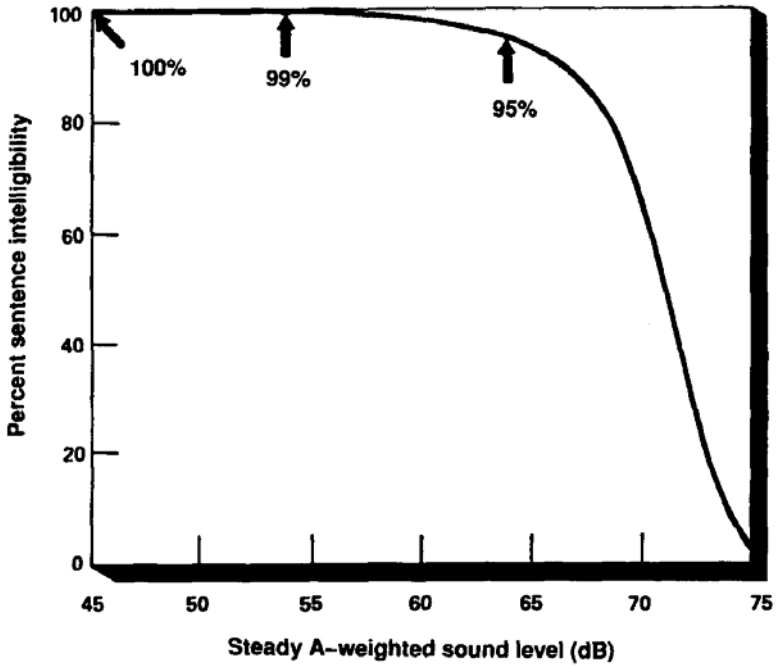
2. S*entence Intelligibility* – the percent of sentences transmitted and understood. This might be important for high-school students and adults who are familiar with the language, and who do not necessarily have to understand each word in order to understand sentences.

For teachers to be clearly understood by their students, it is important that regular voice communication is clear and uninterrupted. Not only does the background sound level have to be low enough for the teacher to be clearly heard, but intermittent outdoor noise events also need to be minimized. It is therefore important to evaluate the steady background level, the level of voice communication, and the single-event level due to aircraft overflights that might interfere with speech.

Several research studies have been conducted and guideline documents been developed resulting in a fairly consistent set of noise level criteria for speech interference. This section provides an overview of the results of these studies.

U.S. Federal Criteria for Interior Noise

In 1974, the EPA identified a goal of an indoor 24-hour average sound level $L_{eq(24)}$ of 45 dB to minimize speech interference based on the intelligibility of sentences in the presence of a steady background noise (EPA 1974). Intelligibility pertains to the percentage of speech units correctly understood out of those transmitted, and specifies the type of speech material used, i.e. sentences or words . The curve displayed in Figure C-5 shows the effect of steady indoor background sound levels on sentence intelligibility. For an average adult with normal hearing and fluency in the language, steady background sound levels indoors of less than 45 dB L_{eq} are expected to allow 100 percent intelligibility of sentences.



Source: EPA 1974

Figure C-5. Speech Intelligibility Curve

The curve shows 99 percent sentence intelligibility for background levels at a L_{eq} of 54 dB, and less than 10 percent intelligibility for background levels above a L_{eq} of 73 dB. Note that the curve is especially sensitive to changes in sound level between 65 dB and 75 dB - an increase of 1 dB in background sound level from 70 dB to 71 dB results in a 14 percent decrease in sentence intelligibility, whereas a 1 dB increase in background sound level from 60 dB to 61 dB results in less than 1 percent decrease in sentence intelligibility.

Classroom Criteria

For listeners with normal hearing and fluency in the language, complete sentence intelligibility can be achieved when the signal-to-noise ratio (i.e., the difference between the speech level and the level of the interfering noise) is in the range 15-18 dB (Lazarus 1990).

Both the ANSI and the American Speech-Language-Hearing Association (ASHLA) recommend at least a 15 dB signal-to-noise ratio in classrooms, to ensure that children with hearing impairments and language disabilities are able to enjoy high speech intelligibility (ANSI 2002; ASHLA 1995). As such, provided that the average adult male or female voice registers a minimum of 50 dB L_{max} in the rear of the classroom, the ANSI standard requires that the continuous background noise level indoors must not exceed a L_{eq} of 35 dB (assumed to apply for the duration of school hours).

The WHO reported for a speaker-to-listener distance of about 1 meter, empirical observations have shown that speech in relaxed conversations is 100 percent intelligible in background noise levels of about 35 dB, and speech can be fairly well understood in the presence of background levels of 45 dB. The WHO recommends a guideline value of 35 dB L_{eq} for continuous background levels in classrooms during school hours (WHO 2000).

Bradley suggests that in smaller rooms, where speech levels in the rear of the classroom are approximately 50 dB L_{max}, steady-state noise levels above 35 dB L_{eq} may interfere with the intelligibility of speech (Bradley 1993).

For the purposes of determining eligibility for noise insulation funding, the Federal Aviation Administration (FAA) guidelines state that the design objective for a classroom environment is 45 dB L_{eq} resulting from aircraft operations during normal school hours (FAA 1985).

However, most aircraft noise is not continuous and consists of individual events where the sound level exceeds the background level for a limited time period as the aircraft flies over. Since speech interference in the presence of aircraft noise is essentially determined by the magnitude and frequency of individual aircraft flyover events, a time-averaged metric alone, such as L_{eq}, is not necessarily appropriate when evaluating the overall effects. In addition to the background level criteria described above, single-event criteria, which account for those sporadic intermittent outdoor noisy events, are also essential to specifying speech interference criteria.

In 1984, a report to the Port Authority of New York and New Jersey recommended utilizing the Speech Interference Level (SIL) metric for classroom noise criteria (Sharp and Plotkin 1984). This metric is based on the maximum sound levels in the frequency range (approximately 500 Hz to 2,000 Hz) that directly affects speech communication. The study identified an SIL (the average of the sound levels in the 500, 1000, and 2000 Hz octave-bands) of 45 dB as the desirable goal, which was estimated to provide 90 percent word intelligibility for the short time periods during aircraft over-flights. Although early classroom level criteria were defined in terms of SIL, the use and measurement of L_{max} as the primary metric has since become more popular. Both metrics take into consideration the L_{max} associated with intermittent noise events and can be related to existing background levels when

determining speech interference percentages. An SIL of 45 dB is approximately equivalent to an A-weighted L_{max} of 50 dB for aircraft noise (Wesler 1986).

In 1998, a report also concluded that if an aircraft noise event's indoor L_{max} reached the speech level of 50 dB, 90 percent of the words would be understood by students seated throughout the classroom (Lind, Pearsons, and Fidell 1998). Since intermittent aircraft noise does not appreciably disrupt classroom communication at lower levels and other times, the authors also adopted an indoor L_{max} of 50 dB as the maximum single-event level permissible in classrooms. Note that this limit was set based on students with normal hearing and no special needs; at-risk students may be adversely affected at lower sound levels.

Bradley recommends SEL as a better indicator of indoor estimated speech interference in the presence of aircraft overflights (Bradley 1985). For acceptable speech communication using normal vocal efforts, Bradley suggests that the indoor SEL be no greater than 64 dB. He assumes a 26 dB outdoor-to-indoor noise reduction that equates to 90 dB SEL outdoors. Aircraft events producing outdoor SEL values greater than 90 dB would result in disruption to indoor speech communication. Bradley's work indicates that, for speakers talking with a casual vocal effort, 95 percent intelligibility would be achieved when indoor SEL values did not exceed 60 dB, which translates approximately to an L_{max} of 50 dB.

In the presence of intermittent noise events, ANSI states that the criteria for allowable background noise level can be relaxed since speech is impaired only for the short time when the aircraft noise is close to its maximum value. Consequently, they recommend when the background noise level of the noisiest hour is dominated by aircraft noise, the indoor criteria (35 dB L_{eq} for continuous background noise) can be increased by 5 dB to an Leq of 40 dB, as long as the noise level does not exceed 40 dB for more than 10 percent of the noisiest hour. (ANSI 2002).

The WHO does not recommend a specific indoor Lmax criterion for single-event noise, but does place a guideline value at L_{eq} of 35 dB for overall background noise in the classroom. However, WHO does report that "for communication distances beyond a few meters, speech interference starts at sound pressure levels below 50 dB for octave bands centered on the main speech frequencies at 500 Hz, 1kHz, and 2 kHz." (WHO 2000). One can infer this can be approximated by an L_{max} value of 50 dB.

The United Kingdom Department for Education and Skills (UKDFES) established in its classroom acoustics guide a 30-minute time-averaged metric [$L_{eq(30min)}$] for background levels and $L_{A1,30}$ min for intermittent noises, at thresholds of 30-35 dB and 55 dB, respectively. $L_{A1,30}$ min represents the A-weighted sound level that is exceeded one percent of the time (in this case, during a 30 minute teaching session) and is generally equivalent to the L_{max} metric (UKDFES 2003).

Summary

As the previous section demonstrates, research indicates that it is not only important to consider the continuous background levels using time-averaged metrics, but also the intermittent events, using single-event metrics such as L_{max}. Table C-2 provides a summary of the noise level criteria recommended in the scientific literature.

Table C-2. Indoor Noise Level Criteria Based on Speech Intelligibility

Source	Metric/Level (dB)	Effects and Notes
U.S. FAA (1985)	L_{eq}(during school hours) = 45 dB	Federal assistance criteria for school sound insulation; supplemental single-event criteria may be used
Lind et al. (1998), Sharp and Plotkin (1984), Wesler (1986)	L_{max} = 50 dB / SIL 45	Single event level permissible in the classroom
WHO (1999)	L_{eq} = 35 dB L_{max} = 50 dB	Assumes average speech level of 50 dB and recommends signal to noise ratio of 15 dB
U.S. ANSI (2002)	L_{eq} = 40 dB, Based on Room Volume	Acceptable background level for continuous noise/ relaxed criteria for intermittent noise in the classroom
U.K. DFES (2003)	$L_{eq(30min)}$ = 30-35 dB L_{max} = 55 dB	Minimum acceptable in classroom and most other learning environs

When considering intermittent noise caused by aircraft overflights, a review of the relevant scientific literature and international guidelines indicates that an appropriate criteria is a limit on indoor background noise levels of 35 to 40 dB L_{eq} and a limit on single events of 50 dB L_{max}.

C.3.3 Sleep Disturbance

The disturbance of sleep is a major concern for communities exposed to nighttime aircraft noise. There have been numerous research studies that have attempted to quantify the complex effects of noise on sleep. This section provides an overview of the major noise-induced sleep disturbance studies that have been conducted, with particular emphasis placed on those studies that have influenced U.S. federal noise policy. The studies have been separated into two groups:

1. Initial studies performed in the 1960s and 1970s, where the research was focused on laboratory sleep observations.
2. Later studies performed in the 1990s up to the present, where the research was focused on field observations, and correlations to laboratory research were sought.

Initial Studies

The relationship between noise levels and sleep disturbance is complex and not fully understood. The disturbance depends not only on the depth of sleep, but also on the previous exposure to aircraft noise, familiarity with the surroundings, the physiological and psychological condition of the recipient, and a host of other situational factors. The most readily measurable effect of noise on sleep is the number of arousals or awakenings, and so the body of scientific literature has focused on predicting the percentage of the population that will be awakened at various noise levels. Fundamentally, regardless of the tools used to measure the degree of sleep disturbance (awakenings, arousals, etc.), these studies have grouped the data points into bins to predict the percentage of the population likely to be disturbed at various sound level thresholds.

FICON produced a guidance document that provided an overview of the most pertinent sleep disturbance research that had been conducted throughout the 1970s (FICON 1992). Literature reviews and meta-analysis conducted between 1978 and 1989 made use of the existing datasets that indicated the effects of nighttime noise on various sleep-state changes and awakenings (Lukas 1978; Griefahn 1978; Peasons et. al. 1989). FICON noted that various indoor A-weighted sound levels – ranging from

25 to 50 dB were observed to be thresholds below which significant sleep effects were not expected. Due to the large variability in the data, FICON did not endorse the reliability of the results.

However, FICON did recommend the use of an interim dose-response curve—awaiting future research—which predicted the percent of the exposed population expected to be awakened as a function of the exposure to single event noise levels expressed in terms of SEL. This curve was based on the research conducted for the U.S. Air Force (Finegold 1994). The dataset included most of the research performed up to that point, and predicted that ten percent of the population would be awakened when exposed to an interior SEL of approximately 58 dB. The data utilized to derive this relationship were primarily the results of controlled laboratory studies.

Recent Sleep Disturbance Research – Field and Laboratory Studies

It was noted in the early sleep disturbance research that the controlled laboratory studies did not account for many factors that are important to sleep behavior, such as habituation to the environment and previous exposure to noise and awakenings from sources other than aircraft noise. In the early 1990s, field studies were conducted to validate the earlier laboratory work. The most significant finding from these studies was that an estimated 80 to 90 percent of sleep disturbances were not related to individual outdoor noise events, but were instead the result of indoor noise sources and other non-noise-related factors . The results showed that there was less of an effect of noise on sleep in real-life conditions than had been previously reported from laboratory studies .

FICAN

The interim FICON dose-response curve that was recommended for use in 1992 was based on the most pertinent sleep disturbance research that was conducted through the 1970s, primarily in laboratory settings. After that time, considerable field research was conducted to evaluate the sleep effects in peoples' normal, home environment. Laboratory sleep studies tend to show higher values of sleep disturbance than field studies because people who sleep in their own homes are habituated to their environment and, therefore, do not wake up as easily (FICAN 1997).

Based on the new information, FICAN updated its recommended dose-response curve in 1997, depicted as the lower curve in Figure C-6. This figure is based on the results of three field studies (Ollerhead 1992; Fidell et. al. 1994; Fidell et al. 1995a and 1995b), along with the datasets from six previous field studies.

The new relationship represents the higher end, or upper envelope, of the latest field data. It should be interpreted as predicting the "maximum percent of the exposed population expected to be behaviorally awakened" or the "maximum percent awakened" for a given residential population. According to this relationship, a maximum of 3 percent of people would be awakened at an indoor SEL of 58 dB, compared to 10 percent using the 1992 curve. An indoor SEL of 58 dB is equivalent to outdoor SEL's of 73 and 83 dB respectively assuming 15 and 25 dB noise level reduction from outdoor to indoor with windows open and closed, respectively.

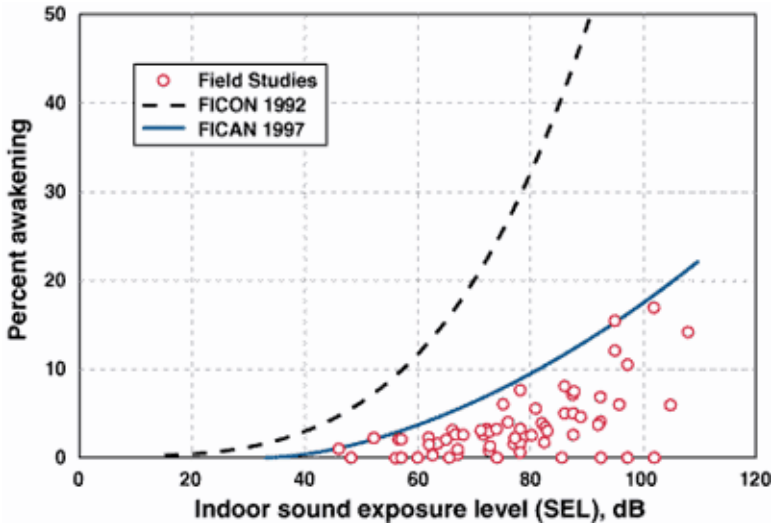


Figure C-6. FICAN's 1997 Recommended Sleep Disturbance Dose-Response Relationship

The FICAN 1997 curve is represented by the following equation:

$$\text{Percent Awakenings} = 0.0087 \times [\text{SEL} - 30]^{1.79}$$

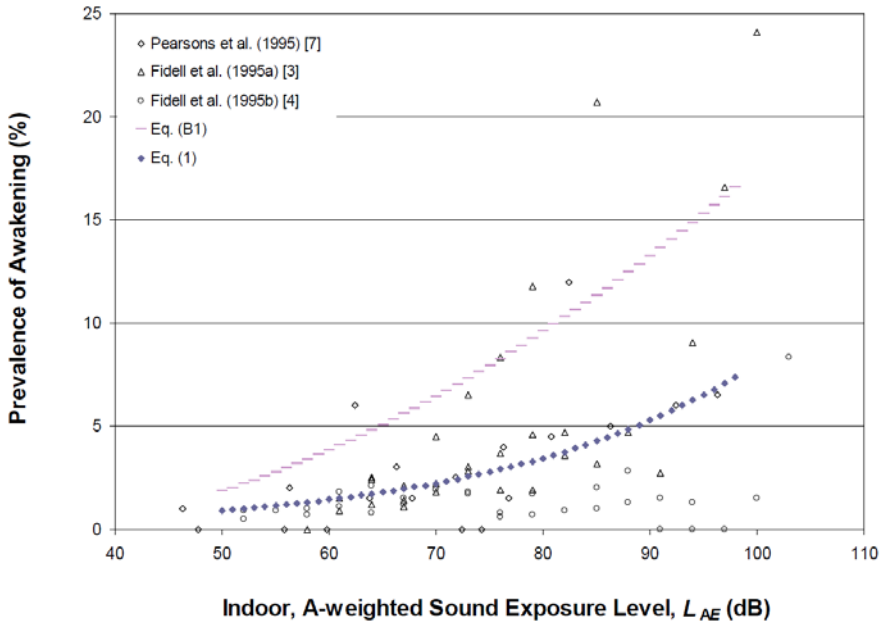
Note the relatively low percentage of awakenings to fairly high noise levels. People think they are awakened by a noise event, but usually the reason for awakening is otherwise. For example, the 1992 UK CAA study found the average person was awakened about 18 times per night for reasons other than exposure to an aircraft noise – some of these awakenings are due to the biological rhythms of sleep and some to other reasons that were not correlated with specific aircraft events.

Number of Events and Awakenings

In recent years, there have been studies and one proposal that attempted to determine the effect of multiple aircraft events on the number of awakenings. The German Aerospace Center (DLR) conducted an extensive study focused on the effects of nighttime aircraft noise on sleep and other related human performance factors (Basner 2004). The DLR study was one of the largest studies to examine the link between aircraft noise and sleep disturbance and involved both laboratory and in-home field research phases. The DLR investigators developed a dose-effect curve that predicts the number of aircraft events at various values of L_{max} expected to produce one additional awakening over the course of a night. The dose-effect curve was based on the relationships found in the field studies.

In July 2008 ANSI and the Acoustical Society of America (ASA) published a method to estimate the percent of the exposed population that might be awakened by multiple aircraft noise events based on statistical assumptions about the probability of awakening (or not awakening) (ANSI 2008). This method relies on probability theory rather than direct field research/experimental data to account for multiple events.

Figure C-7 depicts the awakenings data that form the basis and equations of ANSI S12.9-2008. The curve labeled 'Eq. (B1)' is the relationship between noise and awakening endorsed by FICAN in 1997. The ANSI recommended curve labeled 'Eq. (1)' quantifies the probability of awakening for a population of sleepers who are exposed to an outdoor noise event as a function of the associated indoor SEL in the bedroom. This curve was derived from studies of behavioral awakenings associated with noise events in "steady state" situations where the population has been exposed to the noise long enough to be habituated. The data points in Figure C-7 come from these studies. Unlike the FICAN curve, the ANSI 2008 curve represents the average of the field research data points.



Source: ANSI 2008

Figure C-7. Plot of Sleep Awakening Data versus Indoor SEL

In December 2008, FICAN recommended the use of this new estimation procedure for future analyses of behavioral awakenings from aircraft noise. In that statement, FICAN also recognized that additional sleep disturbance research is underway by various research organizations, and results of that work may result in additional changes to FICAN's position. Until that time, FICAN recommends the use of ANSI S12.9-2008.

C.3.4 Noise-Induced Hearing Impairment

Residents in surrounding communities express concerns regarding the effects of aircraft noise on hearing. This section provides a brief overview of hearing loss caused by noise exposure. The goal is to provide a sense of perspective as to how aircraft noise (as experienced on the ground) compares to other activities that are often linked with hearing loss.

Hearing Threshold Shifts

Hearing loss is generally interpreted as a decrease in the ear's sensitivity or acuity to perceive sound; i.e. a shift in the hearing threshold to a higher level. This change can either be a Temporary Threshold Shift (TTS), or a Permanent Threshold Shift (PTS) (Berger 1995) .

TTS can result from exposure to loud noise over a given amount of time, yet the hearing loss is not necessarily permanent. An example of TTS might be a person attending a loud music concert. After the concert is over, the person may experience a threshold shift that may last several hours, depending upon the level and duration of exposure. While experiencing TTS, the person becomes less sensitive to low-level sounds, particularly at certain frequencies in the speech range (typically near 4,000 Hz) . Normal hearing ability eventually returns, as long as the person has enough time to recover within a relatively quiet environment.

PTS usually results from repeated exposure to high noise levels, where the ears are not given adequate time to recover from the strain and fatigue of exposure. A common example of PTS is the result of working in a loud environment such as a factory. It is important to note that a temporary shift (TTS) can eventually become permanent (PTS) over time with continuous exposure to high noise levels. Thus, even if the ear is given time to recover from TTS, repeated occurrence of TTS may eventually lead to permanent hearing loss. The point at which a Temporary Threshold Shift results in a Permanent Threshold Shift is difficult to identify and varies with a person's sensitivity.

Criteria for Permanent Hearing Loss

Considerable data on hearing loss have been collected and analyzed by the scientific/medical community. It has been well established that continuous exposure to high noise levels will damage human hearing (EPA 1978). The Occupational Safety and Health Administration (OSHA) regulation of 1971 standardizes the limits on workplace noise exposure for protection from hearing loss as an average level of 90 dB over an 8-hour work period or 85 dB over a 16-hour period (the average level is based on a 5 dB decrease per doubling of exposure time) (US Department of Labor 1970). Even the most protective criterion (no measurable hearing loss for the most sensitive portion of the population at the ear's most sensitive frequency, 4,000 Hz, after a 40-year exposure) is an average sound level of 70 dB over a 24-hour period.

The US EPA established 75 dB for an 8-hour exposure and 70 dB for a 24-hour exposure as the average noise level standard requisite to protect 96 percent of the population from greater than a 5 dB PTS (EPA 1978). The National Academy of Sciences Committee on Hearing, Bioacoustics, and Biomechanics identified 75 dB as the minimum level at which hearing loss may occur (CHABA 1977). Finally, the WHO has concluded that environmental and leisure-time noise below an L_{eq24} value of 70 dB "will not cause hearing loss in the large majority of the population, even after a lifetime of exposure" (WHO 2000).

Hearing Loss and Aircraft Noise

The 1982 EPA Guidelines report specifically addresses the criteria and procedures for assessing the noise-induced hearing loss in terms of the Noise-Induced Permanent Threshold Shift (NIPTS), a quantity that defines the permanent change in hearing level, or threshold, caused by exposure to noise (EPA 1982). Numerically, the NIPTS is the change in threshold averaged over the frequencies 0.5, 1, 2, and 4 kHz that can be expected from daily exposure to noise over a normal working lifetime of 40 years, with the exposure beginning at an age of 20 years. A grand average of the NIPTS over time (40 years) and hearing sensitivity (10 to 90 percentiles of the exposed population) is termed the Average

NIPTS, or Ave NIPTS for short. The Average Noise Induced Permanent Threshold Shift (Ave. NIPTS) that can be expected for noise exposure as measured by the DNL metric is given in Table C-3.

Table C-3. Ave. NIPTS and 10th Percentile NIPTS as a Function of DNL

DNL	Ave. NIPTS dB*	10th Percentile NIPTS dB*
75-76	1.0	4.0
76-77	1.0	4.5
77-78	1.6	5.0
78-79	2.0	5.5
79-80	2.5	6.0
80-81	3.0	7.0
81-82	3.5	8.0
82-83	4.0	9.0
83-84	4.5	10.0
84-85	5.5	11.0

* Rounded to the nearest 0.5 dB

For example, for a noise exposure of 80 dB DNL, the expected lifetime avereage value of NIPTS is 2.5 dB, or 6.0 dB for the 10^{th} percentile. Characterizing the noise exposure in terms of DNL will usually overestimate the assessment of hearing loss risk as DNL includes a 10 dB weighting factor for aircraft operations occuring between 10 p.m. and 7 a.m. If, however, flight operations between the hours of 10 p.m. and 7 a.m. account for 5 percent or less of the total 24-hour operations, the overestimation is on the order of 1.5 dB.

From a civilian airport perspective, the scientific community has concluded that there is little likelihood that the resulting noise exposure from aircraft noise could result in either a temporary or permanent hearing loss. Studies on community hearing loss from exposure to aircraft flyovers near airports showed that there is no danger, under normal circumstances, of hearing loss due to aircraft noise (Newman and Beattie 1985). The EPA criterion (L_{eq24} = 70 dBA) can be exceeded in some areas located near airports, but that is only the case outdoors. Inside a building, where people are more likely to spend most of their time, the average noise level will be much less than 70 dBA (Eldred and von Gierke 1993). Eldred and von Gierke also report that "several studies in the U.S., Japan, and the U.K. have confirmed the predictions that the possibility for permanent hearing loss in communities, even under the most intense commercial take-off and landing patterns, is remote."

With regard to military airbases, as individual aircraft noise levels are increasing with the introduction of new aircraft, a 2009 DoD policy directive requires that hearing loss risk be estimated for the at risk population, defined as the population exposed to DNL greater than or equal to 80 dB and higher (DoD 2009). Specifically, DoD components are directed to "*use the 80 Day-Night A-Weighted (DNL) noise contour to identify populations at the most risk of potential hearing loss*". This does not preclude populations outside the 80 DNL contour, i.e. at lower exposure levels, from being at some degree of risk of hearing loss. However, the analysis should be restricted to populations within this contour area, including residents of on-base housing. The exposure of workers inside the base boundary area should be considered occupational and evaluated using the appropriate DoD component regulations for occupational noise exposure.

With regard to military airspace activity, studies have shown conflicting results. A 1995 laboratory study measured changes in human hearing from noise representative of low-flying aircraft on MTRs (Nixon, et al. 1993). The potential effects of aircraft flying along MTRs is of particular concern because of maximum overflight noise levels can exceed 115 dB, with rapid increases in noise levels exceeding 30 dB per second. In this study, participants were first subjected to four overflight noise exposures at A-weighted levels of 115 dB to 130 dB. Fifty percent of the subjects showed no change in hearing levels, 25 percent had a temporary 5 dB *increase* in sensitivity (the people could hear a 5 dB wider range of sound than before exposure), and 25 percent had a temporary 5 dB decrease in sensitivity (the people could hear a 5 dB narrower range of sound than before exposure). In the next phase, participants were subjected to a single overflight at a maximum level of 130 dB for eight successive exposures, separated by 90 seconds or until a temporary shift in hearing was observed. The temporary hearing threshold shifts showed an *increase* in sensitivity of up to 10 dB.

In another study of 115 test subjects between 18 and 50 years old in 1999, temporary threshold shifts were measured after laboratory exposure to military low-altitude flight noise (Ising, et al. 1999). According to the authors, the results indicate that repeated exposure to military low-altitude flight noise with L_{max} greater than 114 dB, especially if the noise level increases rapidly, may have the potential to cause noise induced hearing loss in humans.

Summary

Aviation and typical community noise levels near airports are not comparable to the occupational or recreational noise exposures associated with hearing loss. Studies of aircraft noise levels associated with civilian airport activity have not definitively correlated permanent hearing impairment with aircraft activity. It is unlikely that airport neighbors will remain outside their homes 24 hours per day, so there is little likelihood of hearing loss below an average sound level of 75 dB DNL. Near military airbases, average noise levels above 75 dB may occur, and while new DoD policy dictates that NIPTS be evaluated, no research results to date have definitively related permanent hearing impairment to aviation noise.

C.3.5 Nonauditory Health Effects

Studies have been conducted to determine whether correlations exist between noise exposure and cardiovascular problems, birth weight, and mortality rates. The nonauditory effect of noise on humans is not as easily substantiated as the effect on hearing. The results of studies conducted in the United States, primarily concentrating on cardiovascular response to noise, have been contradictory (Cantrell 1974). Cantrell concluded that the results of human and animal experiments show that average or intrusive noise can act as a stress-provoking stimulus. Prolonged stress is known to be a contributor to a number of health disorders. Kryter and Poza (1980) state, "It is more likely that noise-related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior, than it is from the noise eliciting, because of its intensity, reflexive response in the autonomic or other physiological systems of the body." Psychological stresses may cause a physiological stress reaction that could result in impaired health.

The National Institute for Occupational Safety and Health and EPA commissioned CHABA in 1981 to study whether established noise standards are adequate to protect against health disorders other than hearing defects. CHABA's conclusion was that:

Evidence from available research reports is suggestive, but it does not provide definitive answers to the question of health effects, other than to the auditory system, of long-term exposure to noise. It

seems prudent, therefore, in the absence of adequate knowledge as to whether or not noise can produce effects upon health other than damage to auditory system, either directly or mediated through stress, that insofar as feasible, an attempt should be made to obtain more critical evidence.

Since the CHABA report, there have been more recent studies that suggest that noise exposure may cause hypertension and other stress-related effects in adults. Near an airport in Stockholm, Sweden, the prevalence of hypertension was reportedly greater among nearby residents who were exposed to energy averaged noise levels exceeding 55 dB and maximum noise levels exceeding 72 dB, particularly older subjects and those not reporting impaired hearing ability (Rosenlund, et al. 2001). A study of elderly volunteers who were exposed to simulated military low-altitude flight noise reported that blood pressure was raised by L_{max} of 112 dB and high speed level increase (Michalak, et al. 1990). Yet another study of subjects exposed to varying levels of military aircraft or road noise found no significant relationship between noise level and blood pressure (Pulles, et al. 1990).

The U.S. Department of the Navy prepared a programmatic Environmental Assessment (EA) for the continued use of non-explosive ordnance on the Vieques Inner Range. Following the preparation of the EA, it was learned that research conducted by the University of Puerto Rico, Ponce School of Medicine, suggested that Vieques fishermen and their families were experiencing symptoms associated with vibroacoustic disease (VAD) (U.S. Department of the Navy 2002). The study alleged that exposure to noise and sound waves of large pressure amplitudes within lower frequency bands, associated with Navy training activities—specifically, air-to-ground bombing or naval fire support—was related to a larger prevalence of heart anomalies within the Vieques fishermen and their families. The Ponce School of Medicine study compared the Vieques group with a group from Ponce Playa. A 1999 study conducted on Portuguese aircraft-manufacturing workers from a single factory reported effects of jet aircraft noise exposure that involved a wide range of symptoms and disorders, including the cardiac issues on which the Ponce School of Medicine study focused. The 1999 study identified these effects as VAD.

Johns Hopkins University (JHU) conducted an independent review of the Ponce School of Medicine study, as well as the Portuguese aircraft workers study and other relevant scientific literature. Their findings concluded that VAD should not be accepted as a syndrome, given that exhaustive research across a number of populations has not yet been conducted. JHU also pointed out that the evidence supporting the existence of VAD comes largely from one group of investigators and that similar results would have to be replicated by other investigators. In short, JHU concluded that it had not been established that noise was the causal agent for the symptoms reported and no inference can be made as to the role of noise from naval gunfire in producing echocardiographic abnormalities (U.S. Department of the Navy 2002).

Most studies of nonauditory health effects of long-term noise exposure have found that noise exposure levels established for hearing protection will also protect against any potential nonauditory health effects, at least in workplace conditions. One of the best scientific summaries of these findings is contained in the lead paper at the National Institutes of Health Conference on Noise and Hearing Loss, held on 22 to 24 January 1990 in Washington, D.C.:

> "The nonauditory effects of chronic noise exposure, when noise is suspected to act as one of the risk factors in the development of hypertension, cardiovascular disease, and other nervous disorders, have never been proven to occur as chronic manifestations at levels below these criteria (an average of 75 dBA for complete protection against hearing loss for an 8-hour day). At the recent (1988) International Congress on Noise as a Public Health Problem, most studies attempting to clarify such health effects did not find them at levels below the criteria protective of noise-induced hearing loss, and even above these criteria, results regarding such health effects were ambiguous. Consequently, one comes to the conclusion that establishing and enforcing exposure levels protecting against noise-induced hearing loss would not only solve the noise-induced hearing loss problem, but also any potential nonauditory health effects in the work place" (von Gierke 1990).

Although these findings were specifically directed at noise effects in the workplace, they are equally applicable to aircraft noise effects in the community environment. Research studies regarding the nonauditory health effects of aircraft noise are ambiguous, at best, and often contradictory. Yet, even those studies that purport to find such health effects use time-average noise levels of 75 dB and higher for their research.

For example, two UCLA researchers apparently found a relationship between aircraft noise levels under the approach path to Los Angeles International Airport (LAX) and increased mortality rates among the exposed residents by using an average noise exposure level greater than 75 dB for the "noise-exposed" population (Meacham and Shaw 1979). Nevertheless, three other UCLA professors analyzed those same data and found no relationship between noise exposure and mortality rates (Frerichs, et al. 1980).

As a second example, two other UCLA researchers used this same population near LAX to show a higher rate of birth defects for 1970 to 1972 when compared with a control group residing away from the airport (Jones and Tauscher 1978). Based on this report, a separate group at the Center for Disease Control performed a more thorough study of populations near Atlanta's Hartsfield International Airport (ATL) for 1970 to 1972 and found no relationship in their study of 17 identified categories of birth defects to aircraft noise levels above 65 dB (Edmonds, et al. 1979).

In summary, there is no scientific basis for a claim that potential health effects exist for aircraft time-average sound levels below 75 dB.

The potential for noise to affect physiological health, such as the cardiovascular system, has been speculated; however, no unequivocal evidence exists to support such claims (Harris 1997). Conclusions drawn from a review of health effect studies involving military low-altitude flight noise with its unusually high maximum levels and rapid rise in sound level have shown no increase in cardiovascular disease (Schwartze and Thompson 1993). Additional claims that are unsupported include flyover noise producing increased mortality rates and increases in cardiovascular death, aggravation of post-traumatic stress syndrome, increased stress, increase in admissions to mental hospitals, and adverse affects on pregnant women and the unborn fetus (Harris 1997).

C.3.6 Performance Effects

The effect of noise on the performance of activities or tasks has been the subject of many studies. Some of these studies have established links between continuous high noise levels and performance loss. Noise-induced performance losses are most frequently reported in studies employing noise levels in excess of 85 dB. Little change has been found in low-noise cases. It has been cited that moderate noise levels appear to act as a stressor for more sensitive individuals performing a difficult psychomotor task.

While the results of research on the general effect of periodic aircraft noise on performance have yet to yield definitive criteria, several general trends have been noted including:

- A periodic intermittent noise is more likely to disrupt performance than a steady-state continuous noise of the same level. Flyover noise, due to its intermittent nature, might be more likely to disrupt performance than a steady-state noise of equal level.
- Noise is more inclined to affect the quality than the quantity of work.
- Noise is more likely to impair the performance of tasks that place extreme demands on theworker.

C.3.7 Noise Effects on Children

In response to noise-specific and other environmental studies, Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks (1997), requires federal agencies to ensure that policies, programs, and activities address environmental health and safety risks to identify any disproportionate risks to children.

A review of the scientific literature indicates that there has not been a tremendous amount of research in the area of aircraft noise effects on children. The research reviewed does suggest that environments with sustained high background noise can have variable effects, including noise effects on learning and cognitive abilities, and reports of various noise-related physiological changes.

Effects on Learning and Cognitive Abilities

In 2002 ANSI refers to studies that suggest that loud and frequent background noise can affect the learning patterns of young children (ANSI 2002). ANSI provides discussion on the relationships between noise and learning, and stipulates design requirements and acoustical performance criteria for outdoor-to-indoor noise isolation. School design is directed to be cognizant of, and responsive to surrounding land uses and the shielding of outdoor noise from the indoor environment. The ANSI acoustical performance criteria for schools include the requirement that the one-hour-average background noise level shall not exceed 35 dBA in core learning spaces smaller than 20,000 cubic-feet and 40 dBA in core learning spaces with enclosed volumes exceeding 20,000 cubic-feet. This would require schools be constructed such that, in quiet neighborhoods indoor noise levels are lowered by 15 to 20 dBA relative to outdoor levels. In schools near airports, indoor noise levels would have to be lowered by 35 to 45 dBA relative to outdoor levels (ANSI 2002).

The studies referenced by ANSI to support the new standard are not specific to jet aircraft noise and the potential effects on children. However, there are references to studies that have shown that children in noisier classrooms scored lower on a variety of tests. Excessive background noise or reverberation within schools causes interferences of communication and can therefore create an acoustical barrier to learning (ANSI 2002). Studies have been performed that contribute to the body of evidence emphasizing the importance of communication by way of the spoken language to the development of cognitive skills. The ability to read, write, comprehend, and maintain attentiveness, are, in part, based upon whether teacher communication is consistently intelligible (ANSI 2002).

Numerous studies have shown varying degrees of effects of noise on the reading comprehension, attentiveness, puzzle-solving, and memory/recall ability of children. It is generally accepted that young children are more susceptible than adults to the effects of background noise. Because of the developmental status of young children (linguistic, cognitive, and proficiency), barriers to hearing can cause interferences or disruptions in developmental evolution.

Research on the impacts of aircraft noise, and noise in general, on the cognitive abilities of school-aged children has received more attention in recent years. Several studies suggest that aircraft noise can affect the academic performance of schoolchildren. Although many factors could contribute to learning deficits in school-aged children (e.g., socioeconomic level, home environment, diet, sleep patterns), evidence exists that suggests that chronic exposure to high aircraft noise levels can impair learning.

Specifically, elementary school children attending schools near New York City's two airports demonstrated lower reading scores than children living farther away from the flight paths (Green, et al. 1982). Researchers have found that tasks involving central processing and language comprehension (such as reading, attention, problem solving, and memory) appear to be the most affected by noise (Evans and Lepore 1993; Hygge 1994; and Evans, et al. 1998). It has been demonstrated that chronic exposure of first- and second-grade children to aircraft noise can result in reading deficits and impaired speech perception (i.e., the ability to hear common, low-frequency [vowel] sounds but not high frequencies [consonants] in speech) (Evans and Maxwell 1997).

The Evans and Maxwell (1997) study found that chronic exposure to aircraft noise resulted in reading deficits and impaired speech perception for first- and second-grade children. Other studies found that children residing near the Los Angeles International Airport had more difficulty solving cognitive problems and did not perform as well as children from quieter schools in puzzle-solving and attentiveness (Bronzaft 1997; Cohen, et al. 1980). Children attending elementary schools in high aircraft noise areas near London's Heathrow Airport demonstrated poorer reading comprehension and selective cognitive impairments (Haines, et al. 2001a, and 2001b). Similarly, a 1994 study found that students exposed to aircraft noise of approximately 76 dBA scored 20% lower on recall ability tests than students exposed to ambient noise of 42-44 dBA (Hygge 1994). Similar studies involving the testing of attention, memory, and reading comprehension of school children located near airports showed that their tests exhibited reduced performance results compared to those of similar groups of children who were located in quieter environments (Evans, et al. 1998; Haines, et al. 1998). The Haines and Stansfeld study indicated that there may be some long-term effects associated with exposure, as one-year follow-up testing still demonstrated lowered scores for children in higher noise schools (Haines, et al. 2001a, and 2001b). In contrast, a 2002 study found that although children living near the old Munich airport scored lower in standardized reading and long-term memory tests than a control group, their performance on the same tests was equal to that of the control group once the airport was closed. (Hygge, et al. 2002).

Finally, although it is recognized that there are many factors that could contribute to learning deficits in school-aged children, there is increasing awareness that chronic exposure to high aircraft noise levels may impair learning. This awareness has led the World Health Organization and a North Atlantic Treaty Organization working group to conclude that daycare centers and schools should not be located near major sources of noise, such as highways, airports, and industrial sites (World Health Organization 2000; North Atlantic Treaty Organization 2000).

Health Effects

Physiological effects in children exposed to aircraft noise and the potential for health effects have also been the focus of limited investigation. Studies in the literature include examination of blood pressure levels, hormonal secretions, and hearing loss.

As a measure of stress response to aircraft noise, authors have looked at blood pressure readings to monitor children's health. Children who were chronically exposed to aircraft noise from a new airport near Munich, Germany, had modest (although significant) increases in blood pressure, significant increases in stress hormones, and a decline in quality of life (Evans, et al. 1998). Children attending noisy schools had statistically significant average systolic and diastolic blood pressure ($p<0.03$). Systolic blood pressure means were 89.68 mm for children attending schools located in noisier environments compared to 86.77 mm for a control group. Similarly, diastolic blood pressure means for the noisier environment group were 47.84 mm and 45.16 for the control group (Cohen, et al. 1980).

Although the literature appears limited, studies focused on the wide range of potential effects of aircraft noise on school children have also investigated hormonal levels between groups of children exposed to aircraft noise compared to those in a control group. Specifically, two studies analyzed cortisol and urinary catecholamine levels in school children as measurements of stress response to aircraft noise (Haines, et al. 2001b and 2001c). In both instances, there were no differences between the aircraft-noise-exposed children and the control groups.

Other studies have reported hearing losses from exposure to aircraft noise. Noise-induced hearing loss was reportedly higher in children who attended a school located under a flight path near a Taiwan airport, as compared to children at another school far away (Chen, et al. 1997). Another study reported that hearing ability was reduced significantly in individuals who lived near an airport and were frequently exposed to aircraft noise (Chen and Chen 1993). In that study, noise exposure near the airport was reportedly uniform, with DNL greater than 75 dB and maximum noise levels of about 87 dB during overflights. Conversely, several other studies that were reviewed reported no difference in hearing ability between children exposed to high levels of airport noise and children located in quieter areas (Fisch 1977; Andrus, et al. 1975; Wu, et al. 1995).

C.3.8 Effects on Domestic Animals and Wildlife

Hearing is critical to an animal's ability to react, compete, reproduce, hunt, forage, and survive in its environment. While the existing literature does include studies on possible effects of jet aircraft noise and sonic booms on wildlife, there appears to have been little concerted effort in developing quantitative comparisons of aircraft noise effects on normal auditory characteristics. Behavioral effects have been relatively well described, but the larger ecological context issues, and the potential for drawing conclusions regarding effects on populations, has not been well developed.

The relationships between potential auditory/physiological effects and species interactions with their environments are not well understood. Manci, et al. (1988), assert that the consequences that physiological effects may have on behavioral patterns is vital to understanding the long-term effects of noise on wildlife. Questions regarding the effects (if any) on predator-prey interactions, reproductive success, and intra-inter specific behavior patterns remain.

The following discussion provides an overview of the existing literature on noise effects (particularly jet aircraft noise) on animal species. The literature reviewed here involves those studies that have focused on the observations of the behavioral effects that jet aircraft and sonic booms have on animals.

A great deal of research was conducted in the 1960's and 1970's on the effects of aircraft noise on the public and the potential for adverse ecological impacts. These studies were largely completed in response to the increase in air travel and as a result of the introduction of supersonic jet aircraft. According to Manci, et al. (1988), the foundation of information created from that focus does not necessarily correlate or provide information specific to the impacts to wildlife in areas overflown by aircraft at supersonic speed or at low altitudes.

The abilities to hear sounds and noise and to communicate assist wildlife in maintaining group cohesiveness and survivorship. Social species communicate by transmitting calls of warning, introduction, and other types that are subsequently related to an individual's or group's responsiveness.

Animal species differ greatly in their responses to noise. Noise effects on domestic animals and wildlife are classified as primary, secondary, and tertiary. Primary effects are direct, physiological changes to the auditory system, and most likely include the masking of auditory signals. Masking is defined as the inability of an individual to hear important environmental signals that may arise from mates, predators, or prey. There is some potential that noise could disrupt a species' ability to communicate or could interfere with behavioral patterns (Manci, et al. 1988). Although the effects are likely temporal, aircraft noise may cause masking of auditory signals within exposed faunal communities. Animals rely on hearing to avoid predators, obtain food, and communicate with, and attract, other members of their species. Aircraft noise may mask or interfere with these functions. Other primary effects, such as ear drum rupture or temporary and permanent hearing threshold shifts, are not as likely given the subsonic noise levels produced by aircraft overflights. Secondary effects may include non-auditory effects such as stress and hypertension; behavioral modifications; interference with mating or reproduction; and impaired ability to obtain adequate food, cover, or water. Tertiary effects are the direct result of primary and secondary effects, and include population decline and habitat loss. Most of the effects of noise are mild enough that they may never be detectable as variables of change in population size or population growth against the background of normal variation (Bowles 1995). Other environmental variables (e.g., predators, weather, changing prey base, ground-based disturbance) also influence secondary and tertiary effects, and confound the ability to identify the ultimate factor in limiting productivity of a certain nest, area, or region (Smith, et al. 1988). Overall, the literature suggests that species differ in their response to various types, durations, and sources of noise (Manci, et al. 1988).

Many scientific studies have investigated the effects of aircraft noise on wildlife, and some have focused on wildlife "flight" due to noise. Apparently, animal responses to aircraft are influenced by many variables, including size, speed, proximity (both height above the ground and lateral distance), engine noise, color, flight profile, and radiated noise. The type of aircraft (e.g., fixed wing versus rotor-wing [helicopter]) and type of flight mission may also produce different levels of disturbance,

with varying animal responses (Smith, et al. 1988). Consequently, it is difficult to generalize animal responses to noise disturbances across species.

One result of the 1988 Manci, et al., literature review was the conclusion that, while behavioral observation studies were relatively limited, a general behavioral reaction in animals from exposure to aircraft noise is the startle response. The intensity and duration of the startle response appears to be dependent on which species is exposed, whether there is a group or an individual, and whether there have been some previous exposures. Responses range from flight, trampling, stampeding, jumping, or running, to movement of the head in the apparent direction of the noise source. Manci, et al. (1988), reported that the literature indicated that avian species may be more sensitive to aircraft noise than mammals.

Domestic Animals

Although some studies report that the effects of aircraft noise on domestic animals is inconclusive, a majority of the literature reviewed indicates that domestic animals exhibit some behavioral responses to military overflights but generally seem to habituate to the disturbances over a period of time. Mammals in particular appear to react to noise at sound levels higher than 90 dB, with responses including the startle response, freezing (i.e., becoming temporarily stationary), and fleeing from the sound source. Many studies on domestic animals suggest that some species appear to acclimate to some forms of sound disturbance (Manci, et al. 1988). Some studies have reported such primary and secondary effects as reduced milk production and rate of milk release, increased glucose concentrations, decreased levels of hemoglobin, increased heart rate, and a reduction in thyroid activity. These latter effects appear to represent a small percentage of the findings occurring in the existing literature.

Some reviewers have indicated that earlier studies, and claims by farmers linking adverse effects of aircraft noise on livestock, did not necessarily provide clear-cut evidence of cause and effect (Cottereau 1978). In contrast, many studies conclude that there is no evidence that aircraft overflights affect feed intake, growth, or production rates in domestic animals.

Cattle

In response to concerns about overflight effects on pregnant cattle, milk production, and cattle safety, the U.S. Air Force prepared a handbook for environmental protection that summarizes the literature on the impacts of low-altitude flights on livestock (and poultry) and includes specific case studies conducted in numerous airspaces across the country. Adverse effects have been found in a few studies but have not been reproduced in other similar studies. One such study, conducted in 1983, suggested that 2 of 10 cows in late pregnancy aborted after showing rising estrogen and falling progesterone levels. These increased hormonal levels were reported as being linked to 59 aircraft overflights. The remaining eight cows showed no changes in their blood concentrations and calved normally (U.S. Air Force 1994b). A similar study reported abortions occurred in three out of five pregnant cattle after exposing them to flyovers by six different aircraft (U.S.Air Force 1994b). Another study suggested that feedlot cattle could stampede and injure themselves when exposed to low-level overflights (U.S. Air Force 1994b).

A majority of the studies reviewed suggests that there is little or no effect of aircraft noise on cattle. Studies presenting adverse effects to domestic animals have been limited. A number of studies (Parker and Bayley 1960; Casady and Lehmann 1967; Kovalcik and Sottnik 1971) investigated the effects of jet aircraft noise and sonic booms on the milk production of dairy cows. Through the

compilation and examination of milk production data from areas exposed to jet aircraft noise and sonic boom events, it was determined that milk yields were not affected. This was particularly evident in those cows that had been previously exposed to jet aircraft noise.

A study examined the causes of 1,763 abortions in Wisconsin dairy cattle over a one-year time period and none were associated with aircraft disturbances (U.S.Air Force 1993). In 1987, Anderson contacted seven livestock operators for production data, and no effects of low-altitude and supersonic flights were noted. Three out of 43 cattle previously exposed to low-altitude flights showed a startle response to an F/A-18 aircraft flying overhead at 500 feet above ground level and 400 knots by running less than 10 meters. They resumed normal activity within one minute (U.S.Air Force 1994b). Beyer (1983) found that helicopters caused more reaction than other low-aircraft overflights, and that the helicopters at 30 to 60 feet overhead did not affect milk production and pregnancies of 44 cows and heifers in a 1964 study (U.S. Air Force 1994b).

Additionally, Beyer reported that five pregnant dairy cows in a pasture did not exhibit fright-flight tendencies or disturb their pregnancies after being overflown by 79 low-altitude helicopter flights and 4 low-altitude, subsonic jet aircraft flights (U.S. Air Force 1994b). A 1956 study found that the reactions of dairy and beef cattle to noise from low-altitude, subsonic aircraft were similar to those caused by paper blowing about, strange persons, or other moving objects (U.S. Air Force 1994b).

In a report to Congress, the U. S. Forest Service concluded that "evidence both from field studies of wild ungulates and laboratory studies of domestic stock indicate that the risks of damage are small (from aircraft approaches of 50 to 100 meters), as animals take care not to damage themselves (U.S. Forest Service 1992). If animals are overflown by aircraft at altitudes of 50 to 100 meters, there is no evidence that mothers and young are separated, that animals collide with obstructions (unless confined) or that they traverse dangerous ground at too high a rate." These varied study results suggest that, although the confining of cattle could magnify animal response to aircraft overflight, there is no proven cause-and-effect link between startling cattle from aircraft overflights and abortion rates or lower milk production.

Horses

Horses have also been observed to react to overflights of jet aircraft. Several of the studies reviewed reported a varied response of horses to low-altitude aircraft overflights. Observations made in 1966 and 1968 noted that horses galloped in response to jet flyovers (U.S. Air Force 1993). Bowles (1995) cites Kruger and Erath as observing horses exhibiting intensive flight reactions, random movements, and biting/kicking behavior. However, no injuries or abortions occurred, and there was evidence that the mares adapted somewhat to the flyovers over the course of a month (U.S. Air Force 1994b). Although horses were observed noticing the overflights, it did not appear to affect either survivability or reproductive success. There was also some indication that habituation to these types of disturbances was occurring.

LeBlanc, et al. (1991), studied the effects of F-14 jet aircraft noise on pregnant mares. They specifically focused on any changes in pregnancy success, behavior, cardiac function, hormonal production, and rate of habituation. Their findings reported observations of "flight-fright" reactions, which caused increases in heart rates and serum cortisol concentrations. The mares, however, did habituate to the noise. Levels of anxiety and mass body movements were the highest after initial exposure, with intensities of responses decreasing thereafter. There were no differences in pregnancy success when compared to a control group.

Swine

Generally, the literature findings for swine appear to be similar to those reported for cows and horses. While there are some effects from aircraft noise reported in the literature, these effects are minor. Studies of continuous noise exposure (i.e., 6 hours, 72 hours of constant exposure) reported influences on short-term hormonal production and release. Additional constant exposure studies indicated the observation of stress reactions, hypertension, and electrolyte imbalances (Dufour 1980). A study by Bond, et al. (1963), demonstrated no adverse effects on the feeding efficiency, weight gain, ear physiology, or thyroid and adrenal gland condition of pigs subjected to observed aircraft noise. Observations of heart rate increase were recorded, noting that cessation of the noise resulted in the return to normal heart rates. Conception rates and offspring survivorship did not appear to be influenced by exposure to aircraft noise.

Similarly, simulated aircraft noise at levels of 100 dB to 135 dB had only minor effects on the rate of feed utilization, weight gain, food intake, or reproduction rates of boars and sows exposed, and there were no injuries or inner ear changes observed (Manci, et al. 1988; Gladwin, et al. 1988).

Domestic Fowl

According to a 1994 position paper by the U.S. Air Force on effects of low-altitude overflights (below 1,000 ft) on domestic fowl, overflight activity has negligible effects (U.S. Air Force 1994a). The paper did recognize that given certain circumstances, adverse effects can be serious. Some of the effects can be panic reactions, reduced productivity, and effects on marketability (e.g., bruising of the meat caused during "pile-up" situations).

The typical reaction of domestic fowl after exposure to sudden, intense noise is a short-term startle response. The reaction ceases as soon as the stimulus is ended, and within a few minutes all activity returns to normal. More severe responses are possible depending on the number of birds, the frequency of exposure, and environmental conditions. Large crowds of birds, and birds not previously exposed, are more likely to pile up in response to a noise stimulus (U.S. Air Force 1994a). According to studies and interviews with growers, it is typically the previously unexposed birds that incite panic crowding, and the tendency to do so is markedly reduced within five exposures to the stimulus (U.S. Air Force 1994a). This suggests that the birds habituate relatively quickly. Egg productivity was not adversely affected by infrequent noise bursts, even at exposure levels as high as 120 to 130 dBA.

Between 1956 and 1988, there were 100 recorded claims against the Navy for alleged damage to domestic fowl. The number of claims averaged three per year, with peak numbers of claims following publications of studies on the topic in the early 1960s (U.S. Air Force 1994a). Many of the claims were disproved or did not have sufficient supporting evidence. The claims were filed for the following alleged damages: 55% for panic reactions, 31% for decreased production, 6% for reduced hatchability, 6% for weight loss, and less than 1% for reduced fertility (U.S. Air Force 1994a).

Turkeys

The review of the existing literature suggests that there has not been a concerted or widespread effort to study the effects of aircraft noise on commercial turkeys. One study involving turkeys examined the differences between simulated versus actual overflight aircraft noise, turkey responses to the noise, weight gain, and evidence of habituation (Bowles, et al. 1990a). Findings from the study suggested that turkeys habituated to jet aircraft noise quickly, that there were no growth rate

differences between the experimental and control groups, and that there were some behavioral differences that increased the difficulty in handling individuals within the experimental group.

Low-altitude overflights were shown to cause turkey flocks that were kept inside turkey houses to occasionally pile up and experience high mortality rates due to the aircraft noise and a variety of disturbances unrelated to aircraft (U.S. Air Force 1994a).

Wildlife

Studies on the effects of overflights and sonic booms on wildlife have been focused mostly on avian species and ungulates such as caribou and bighorn sheep. Few studies have been conducted on marine mammals, small terrestrial mammals, reptiles, amphibians, and carnivorous mammals. Generally, species that live entirely below the surface of the water have also been ignored due to the fact they do not experience the same level of sound as terrestrial species (National Park Service 1994). Wild ungulates appear to be much more sensitive to noise disturbance than domestic livestock (Manci, et al. 1988). This may be due to previous exposure to disturbances. One common factor appears to be that low-altitude flyovers seem to be more disruptive in terrain where there is little cover (Manci, et al. 1988).

Mammals

Terrestrial Mammals. Studies of terrestrial mammals have shown that noise levels of 120 dBA can damage mammals' ears, and levels at 95 dBA can cause temporary loss of hearing acuity. Noise from aircraft has affected other large carnivores by causing changes in home ranges, foraging patterns, and breeding behavior. One study recommended that aircraft not be allowed to fly at altitudes below 2,000 feet above ground level over important grizzly and polar bear habitat (Dufour 1980). Wolves have been frightened by low-altitude flights that were 25 to 1,000 feet off the ground. However, wolves have been found to adapt to aircraft overflights and noise as long as they were not being hunted from aircraft (Dufour 1980).

Wild ungulates (American bison, caribou, bighorn sheep) appear to be much more sensitive to noise disturbance than domestic livestock (Weisenberger, et al. 1996). Behavioral reactions may be related to the past history of disturbances by such things as humans and aircraft. Common reactions of reindeer kept in an enclosure exposed to aircraft noise disturbance were a slight startle response, raising of the head, pricking ears, and scenting of the air. Panic reactions and extensive changes in behavior of individual animals were not observed. Observations of caribou in Alaska exposed to fixed-wing aircraft and helicopters showed running and panic reactions occurred when overflights were at an altitude of 200 feet or less. The reactions decreased with increased altitude of overflights, and, with more than 500 feet in altitude, the panic reactions stopped. Also, smaller groups reacted less strongly than larger groups. One negative effect of the running and avoidance behavior is increased expenditure of energy. For a 90-kg animal, the calculated expenditure due to aircraft harassment is 64 kilocalories per minute when running and 20 kilocalories per minute when walking. When conditions are favorable, this expenditure can be counteracted with increased feeding; however, during harsh winter conditions, this may not be possible. Incidental observations of wolves and bears exposed to fixed-wing aircraft and helicopters in the northern regions suggested that wolves are less disturbed than wild ungulates, while grizzly bears showed the greatest response of any animal species observed.

It has been proven that low-altitude overflights do induce stress in animals. Increased heart rates, an indicator of excitement or stress, have been found in pronghorn antelope, elk, and bighorn sheep. As

such reactions occur naturally as a response to predation, infrequent overflights may not, in and of themselves, be detrimental. However, flights at high frequencies over a long period of time may cause harmful effects. The consequences of this disturbance, while cumulative, is not additive. It may be that aircraft disturbance may not cause obvious and serious health effects, but coupled with a harsh winter, it may have an adverse impact. Research has shown that stress induced by other types of disturbances produces long-term decreases in metabolism and hormone balances in wild ungulates.

Behavioral responses can range from mild to severe. Mild responses include head raising, body shifting, or turning to orient toward the aircraft. Moderate disturbance may be nervous behaviors, such as trotting a short distance. Escape is the typical severe response.

Marine Mammals. The physiological composition of the ear in aquatic and marine mammals exhibits adaptation to the aqueous environment. These differences (relative to terrestrial species) manifest themselves in the auricle and middle ear (Manci, et al. 1988). Some mammals use echolocation to perceive objects in their surroundings and to determine the directions and locations of sound sources (Simmons 1983 in Manci, et al. 1988).

In 1980, the Acoustical Society of America held a workshop to assess the potential hazard of manmade noise associated with proposed Alaska Arctic (North Slope-Outer Continental Shelf) petroleum operations on marine wildlife and to prepare a research plan to secure the knowledge necessary for proper assessment of noise impacts (Acoustical Society of America 1980). Since 1980 it appears that research on responses of aquatic mammals to aircraft noise and sonic booms has been limited. Research conducted on northern fur seals, sea lions, and ringed seals indicated that there are some differences in how various animal groups receive frequencies of sound. It was observed that these species exhibited varying intensities of a startle response to airborne noise, which was habituated over time. The rates of habituation appeared to vary with species, populations, and demographics (age, sex). Time of day of exposure was also a factor (Muyberg 1978 in Manci, et al. 1988).

Studies accomplished near the Channel Islands were conducted near the area where the space shuttle launches occur. It was found that there were some response differences between species relative to the loudness of sonic booms. Those booms that were between 80 and 89 dBA caused a greater intensity of startle reactions than lower-intensity booms at 72 to 79 dBA. However, the duration of the startle responses to louder sonic booms was shorter (Jehl and Cooper 1980 in Manci, et al. 1988).

Jehl and Cooper (1980) indicated that low-flying helicopters, loud boat noises, and humans were the most disturbing to pinnipeds. According to the research, while the space launch and associated operational activity noises have not had a measurable effect on the pinniped population, it also suggests that there was a greater "disturbance level" exhibited during launch activities. There was a recommendation to continue observations for behavioral effects and to perform long-term population monitoring (Jehl and Cooper 1980).

The continued presence of single or multiple noise sources could cause marine mammals to leave a preferred habitat. However, it does not appear likely that overflights could cause migration from suitable habitats as aircraft noise over water is mobile and would not persist over any particular area. Aircraft noise, including supersonic noise, currently occurs in the overwater airspace of Eglin, Tyndall, and Langley AFBs from sorties predominantly involving jet aircraft. Survey results reported in Davis, et al. (2000), indicate that cetaceans (i.e., dolphins) occur under all of the Eglin and Tyndall marine airspace. The continuing presence of dolphins indicates that aircraft noise does not discourage use of the area and apparently does not harm the locally occurring population.

In a summary by the National Parks Service (1994) on the effects of noise on marine mammals, it was determined that gray whales and harbor porpoises showed no outward behavioral response to aircraft noise or overflights. Bottlenose dolphins showed no obvious reaction in a study involving helicopter overflights at 1,200 to 1,800 feet above the water. Neither did they show any reaction to survey aircraft unless the shadow of the aircraft passed over them, at which point there was some observed tendency to dive (Richardson, et al. 1995). Other anthropogenic noises in the marine environment from ships and pleasure craft may have more of an effect on marine mammals than aircraft noise (U.S. Air Force 2000). The noise effects on cetaceans appear to be somewhat attenuated by the air/water interface. The cetacean fauna along the coast of California have been subjected to sonic booms from military aircraft for many years without apparent adverse effects (Tetra Tech, Inc. 1997).

Manatees appear relatively unresponsive to human-generated noise to the point that they are often suspected of being deaf to oncoming boats [although their hearing is actually similar to that of pinnipeds (Bullock, et al. 1980)]. Little is known about the importance of acoustic communication to manatees, although they are known to produce at least ten different types of sounds and are thought to have sensitive hearing (Richardson, et al. 1995). Manatees continue to occupy canals near Miami International Airport, which suggests that they have become habituated to human disturbance and noise (Metro-Dade County 1995). Since manatees spend most of their time below the surface and do not startle readily, no effect of aircraft overflights on manatees would be expected (Bowles, et al. 1991b).

Birds

Auditory research conducted on birds indicates that they fall between the reptiles and the mammals relative to hearing sensitivity. According to Dooling (1978), within the range of one to five kHz, birds show a level of hearing sensitivity similar to that of the more sensitive mammals. In contrast to mammals, bird sensitivity falls off at a greater rate to increasing and decreasing frequencies. Passive observations and studies examining aircraft bird strikes indicate that birds nest and forage near airports. Aircraft noise in the vicinity of commercial airports apparently does not inhibit bird presence and use.

High-noise events (like a low-altitude aircraft overflight) may cause birds to engage in escape or avoidance behaviors, such as flushing from perches or nests (Ellis, et al. 1991). These activities impose an energy cost on the birds that, over the long term, may affect survival or growth. In addition, the birds may spend less time engaged in necessary activities like feeding, preening, or caring for their young because they spend time in noise-avoidance activity. However, the long-term significance of noise-related impacts is less clear. Several studies on nesting raptors have indicated that birds become habituated to aircraft overflights and that long-term reproductive success is not affected (Grubb and King 1991; Ellis, et al. 1991). Threshold noise levels for significant responses range from 62 dB for Pacific black brant (Branta bernicla nigricans) (Ward and Stehn 1990) to 85 dB for crested tern (Sterna bergii) (Brown 1990).

Songbirds were observed to become silent prior to the onset of a sonic boom event (F-111 jets), followed by "raucous discordant cries." There was a return to normal singing within 10 seconds after the boom (Higgins 1974 in Manci, et al. 1988). Ravens responded by emitting protestation calls, flapping their wings, and soaring.

Manci, et al. (1988), reported a reduction in reproductive success in some small territorial passerines (i.e., perching birds or songbirds) after exposure to low-altitude overflights. However, it has been

observed that passerines are not driven any great distance from a favored food source by a nonspecific disturbance, such as aircraft overflights (U.S. Forest Service 1992). Further study may be warranted.

A recent study, conducted cooperatively between the DoD and the USFWS, assessed the response of the red-cockaded woodpecker to a range of military training noise events, including artillery, small arms, helicopter, and maneuver noise (Pater, et al. 1999). The project findings show that the red-cockaded woodpecker successfully acclimates to military noise events. Depending on the noise level that ranged from innocuous to very loud, the birds responded by flushing from their nest cavities. When the noise source was closer and the noise level was higher, the number of flushes increased proportionately. In all cases, however, the birds returned to their nests within a relatively short period of time (usually within 12 minutes). Additionally, the noise exposure did not result in any mortality or statistically detectable changes in reproductive success (Pater, et al. 1999). Red-cockaded woodpeckers did not flush when artillery simulators were more than 122 meters away and SEL noise levels were 70 dBA.

Lynch and Speake (1978) studied the effects of both real and simulated sonic booms on the nesting and brooding eastern wild turkey (Meleagris gallopavo silvestris) in Alabama. Hens at four nest sites were subjected to between 8 and 11 combined real and simulated sonic booms. All tests elicited similar responses, including quick lifting of the head and apparent alertness for between 10 and 20 seconds. No apparent nest failure occurred as a result of the sonic booms.

Twenty-one brood groups were also subjected to simulated sonic booms. Reactions varied slightly between groups, but the largest percentage of groups reacted by standing motionless after the initial blast. Upon the sound of the boom, the hens and poults fled until reaching the edge of the woods (approximately 4 to 8 meters). Afterward, the poults resumed feeding activities while the hens remained alert for a short period of time (approximately 15 to 20 seconds). In no instances were poults abandoned, nor did they scatter and become lost. Every observation group returned to normal activities within a maximum of 30 seconds after a blast.

Raptors. In a literature review of raptor responses to aircraft noise, Manci, et al. (1988), found that most raptors did not show a negative response to overflights. When negative responses were observed they were predominantly associated with rotor-winged aircraft or jet aircraft that were repeatedly passing within 0.5 mile of a nest.

Ellis, et al. (1991), performed a study to estimate the effects of low-level military jet aircraft and mid- to high-altitude sonic booms (both actual and simulated) on nesting peregrine falcons and seven other raptors (common black-hawk, Harris' hawk, zone-tailed hawk, red-tailed hawk, golden eagle, prairie falcon, bald eagle). They observed responses to test stimuli, determined nest success for the year of the testing, and evaluated site occupancy the following year. Both long- and short-term effects were noted in the study. The results reported the successful fledging of young in 34 of 38 nest sites (all eight species) subjected to low-level flight and/or simulated sonic booms. Twenty-two of the test sites were revisited in the following year, and observations of pairs or lone birds were made at all but one nest. Nesting attempts were underway at 19 of 20 sites that were observed long enough to be certain of breeding activity. Reoccupancy and productivity rates were within or above expected values for self-sustaining populations.

Short-term behavior responses were also noted. Overflights at a distance of 150 m or less produced few significant responses and no severe responses. Typical responses consisted of crouching or, very rarely, flushing from the perch site. Significant responses were most evident before egg laying and

after young were "well grown." Incubating or brooding adults never burst from the nest, thus preventing egg breaking or knocking chicks out of the nest. Jet passes and sonic booms often caused noticeable alarm; however, significant negative responses were rare and did not appear to limit productivity or reoccupancy. Due to the locations of some of the nests, some birds may have been habituated to aircraft noise. There were some test sites located at distances far from zones of frequent military aircraft usage, and the test stimuli were often closer, louder, and more frequent than would be likely for a normal training situation.

Manci, et al. (1988), noted that a female northern harrier was observed hunting on a bombing range in Mississippi during bombing exercises. The harrier was apparently unfazed by the exercises, even when a bomb exploded within 200 feet. In a similar case of habituation/non-disturbance, a study on the Florida snail-kite stated the greatest reaction to overflights (approximately 98 dBA) was "watching the aircraft fly by." No detrimental impacts to distribution, breeding success, or behavior were noted.

Bald Eagle. A study by Grubb and King (1991) on the reactions of the bald eagle to human disturbances showed that terrestrial disturbances elicited the greatest response, followed by aquatic (i.e., boats) and aerial disturbances. The disturbance regime of the area where the study occurred was predominantly characterized by aircraft noise. The study found that pedestrians consistently caused responses that were greater in both frequency and duration. Helicopters elicited the highest level of aircraft-related responses. Aircraft disturbances, although the most common form of disturbance, resulted in the lowest levels of response. This low response level may have been due to habituation; however, flights less than 170 meters away caused reactions similar to other disturbance types. Ellis, et al. (1991), showed that eagles typically respond to the proximity of a disturbance, such as a pedestrian or aircraft within 100 meters, rather than the noise level. Fleischner and Weisberg (1986) stated that reactions of bald eagles to commercial jet flights, although minor (e.g., looking), were twice as likely to occur when the jets passed at a distance of 0.5 mile or less. They also noted that helicopters were four times more likely to cause a reaction than a commercial jet and 20 times more likely to cause a reaction than a propeller plane.

The USFWS advised Cannon AFB that flights at or below 2,000 feet AGL from October 1 through March 1 could result in adverse impacts to wintering bald eagles (U.S. Fish and Wildlife Serice 1998). However, Fraser, et al. (1985), suggested that raptors habituate to overflights rapidly, sometimes tolerating aircraft approaches of 65 feet or less.

Osprey. A study by Trimper, et al. (1998), in Goose Bay, Labrador, Canada, focused on the reactions of nesting osprey to military overflights by CF-18 Hornets. Reactions varied from increased alertness and focused observation of planes to adjustments in incubation posture. No overt reactions (e.g., startle response, rapid nest departure) were observed as a result of an overflight. Young nestlings crouched as a result of any disturbance until they grew to 1 to 2 weeks prior to fledging. Helicopters, human presence, float planes, and other ospreys elicited the strongest reactions from nesting ospreys. These responses included flushing, agitation, and aggressive displays. Adult osprey showed high nest occupancy rates during incubation regardless of external influences.

The osprey observed occasionally stared in the direction of the flight before it was audible to the observers. The birds may have been habituated to the noise of the flights; however, overflights were strictly controlled during the experimental period. Strong reactions to float planes and helicopter may have been due to the slower flight and therefore longer duration of visual stimuli rather than noise-related stimuli.

Red-tailed Hawk. Anderson, et al. (1989), conducted a study that investigated the effects of low-level helicopter overflights on 35 red-tailed hawk nests. Some of the nests had not been flown over prior to the study. The hawks that were naïve (i.e., not previously exposed) to helicopter flights exhibited stronger avoidance behavior (nine of 17 birds flushed from their nests) than those that had experienced prior overflights. The overflights did not appear to affect nesting success in either study group. These findings were consistent with the belief that red-tailed hawks habituate to low-level air traffic, even during the nesting period.

Migratory Waterfowl. A study of caged American black ducks was conducted by Fleming, et al. in 1996. It was determined that noise had negligible energetic and physiologic effects on adult waterfowl. Measurements included body weight, behavior, heart rate, and enzymatic activity. Experiments also showed that adult ducks exposed to high noise events acclimated rapidly and showed no effects.

The study also investigated the reproductive success of captive ducks, which indicated that duckling growth and survival rates at Piney Island, North Carolina, were lower than those at a background location. In contrast, observations of several other reproductive indices (i.e., pair formation, nesting, egg production, and hatching success) showed no difference between Piney Island and the background location. Potential effects on wild duck populations may vary, as wild ducks at Piney Island have presumably acclimated to aircraft overflights. It was not demonstrated that noise was the cause of adverse impacts. A variety of other factors, such as weather conditions, drinking water and food availability and variability, disease, and natural variability in reproduction, could explain the observed effects. Fleming noted that drinking water conditions (particularly at Piney Island) deteriorated during the study, which could have affected the growth of young ducks. Further research would be necessary to determine the cause of any reproductive effects.

Another study by Conomy, et al. (1998) exposed previously unexposed ducks to 71 noise events per day that equaled or exceeded 80 dBA. It was determined that the proportion of time black ducks reacted to aircraft activity and noise decreased from 38 percent to 6 percent in 17 days and remained stable at 5.8 percent thereafter. In the same study, the wood duck did not appear to habituate to aircraft disturbance. This supports the notion that animal response to aircraft noise is species-specific. Because a startle response to aircraft noise can result in flushing from nests, migrants and animals living in areas with high concentrations of predators would be the most vulnerable to experiencing effects of lowered birth rates and recruitment over time. Species that are subjected to infrequent overflights do not appear to habituate to overflight disturbance as readily.

Black brant studied in the Alaska Peninsula were exposed to jets and propeller aircraft, helicopters, gunshots, people, boats, and various raptors. Jets accounted for 65% of all the disturbances. Humans, eagles, and boats caused a greater percentage of brant to take flight. There was markedly greater reaction to Bell-206-B helicopter flights than fixed wing, single-engine aircraft (Ward, et al. 1986).

The presence of humans and low-flying helicopters in the Mackenzie Valley North Slope area did not appear to affect the population density of Lapland longspurs, but the experimental group was shown to have reduced hatching and fledging success and higher nest abandonment. Human presence appeared to have a greater impact on the incubating behavior of the black brant, common eider, and Arctic tern than fixed-wing aircraft (Gunn and Livingston 1974).

Gunn and Livingston (1974) found that waterfowl and seabirds in the Mackenzie Valley and North Slope of Alaska and Canada became acclimated to float plane disturbance over the course of three days. Additionally, it was observed that potential predators (bald eagle) caused a number of birds to

leave their nests. Non-breeding birds were observed to be more reactive than breeding birds. Waterfowl were affected by helicopter flights, while snow geese were disturbed by Cessna 185 flights. The geese flushed when the planes were under 1,000 feet, compared to higher flight elevations. An overall reduction in flock sizes was observed. It was recommended that aircraft flights be reduced in the vicinity of premigratory staging areas.

Manci, et al. 1988 reported that waterfowl were particularly disturbed by aircraft noise. The most sensitive appeared to be snow geese. Canada geese and snow geese were thought to be more sensitive than other animals such as turkey vultures, coyotes, and raptors (Edwards, et al. 1979).

Wading And Shore Birds. Black, et al. (1984), studied the effects of low-altitude (less than 500 feet AGL) military training flights with sound levels from 55 to 100 dBA on wading bird colonies (i.e., great egret, snowy egret, tricolored heron, and little blue heron). The training flights involved three or four aircraft, which occurred once or twice per day. This study concluded that the reproductive activity--including nest success, nestling survival, and nestling chronology--was independent of F-16 overflights. Dependent variables were more strongly related to ecological factors, including location and physical characteristics of the colony and climatology. Another study on the effects of circling fixed-wing aircraft and helicopter overflights on wading bird colonies found that at altitudes of 195 to 390 feet, there was no reaction in nearly 75 percent of the 220 observations. Ninety percent displayed no reaction or merely looked toward the direction of the noise source. Another 6 percent stood up, 3 percent walked from the nest, and 2 percent flushed (but were without active nests) and returned within 5 minutes (Kushlan 1978). Apparently, non-nesting wading birds had a slightly higher incidence of reacting to overflights than nesting birds. Seagulls observed roosting near a colony of wading birds in another study remained at their roosts when subsonic aircraft flew overhead (Burger 1981). Colony distribution appeared to be most directly correlated to available wetland community types and was found to be distributed randomly with respect to military training routes. These results suggest that wading bird species presence was most closely linked to habitat availability and that they were not affected by low-level military overflights (U.S. Air Force 2000).

Burger (1986) studied the response of migrating shorebirds to human disturbance and found that shorebirds did not fly in response to aircraft overflights, but did flush in response to more localized intrusions (i.e., humans and dogs on the beach). Burger (1981) studied the effects of noise from JFK Airport in New York on herring gulls that nested less than 1 kilometer from the airport. Noise levels over the nesting colony were 85 to 100 dBA on approach and 94 to 105 dBA on takeoff. Generally, there did not appear to be any prominent adverse effects of subsonic aircraft on nesting, although some birds flushed when the concorde flew overhead and, when they returned, engaged in aggressive behavior. Groups of gulls tended to loaf in the area of the nesting colony, and these birds remained at the roost when the Concorde flew overhead. Up to 208 of the loafing gulls flew when supersonic aircraft flew overhead. These birds would circle around and immediately land in the loafing flock (U.S. Air Force 2000).

In 1970, sonic booms were potentially linked to a mass hatch failure of Sooty Terns on the Dry Tortugas (Austin, et al. 1970). The cause of the failure was not certain, but it was conjectured that sonic booms from military aircraft or an overgrowth of vegetation were factors. In the previous season, Sooties were observed to react to sonic booms by rising in a "panic flight," circling over the island, then usually settling down on their eggs again. Hatching that year was normal. Following the 1969 hatch failure, excess vegetation was cleared and measures were taken to reduce supersonic activity. The 1970 hatch appeared to proceed normally. A colony of Noddies on the same island hatched successfully in 1969, the year of the Sooty hatch failure.

Subsequent laboratory tests of exposure of eggs to sonic booms and other impulsive noises (Bowles, et al. 1991a; Bowles, et al. 1994; Cottereau 1972; Cogger and Zegarra 1980) failed to show adverse effects on hatching of eggs. A structural analysis (Ting, et al. 2002) showed that, even under extraordinary circumstances, sonic booms would not damage an avian egg.

Burger (1981) observed no effects of subsonic aircraft on herring gulls in the vicinity of JFK International Airport. The Concorde aircraft did cause more nesting gulls to leave their nests (especially in areas of higher density of nests), causing the breakage of eggs and the scavenging of eggs by intruder prey. Clutch sizes were observed to be smaller in areas of higher-density nesting (presumably due to the greater tendency for panic flight) than in areas where there were fewer nests.

Fish, Reptiles, and Amphibians

The effects of overflight noise on fish, reptiles, and amphibians have been poorly studied, but conclusions regarding their expected responses have involved speculation based upon known physiologies and behavioral traits of these taxa (Gladwin, et al. 1988). Although fish do startle in response to low-flying aircraft noise, and probably to the shadows of aircraft, they have been found to habituate to the sound and overflights. Reptiles and amphibians that respond to low frequencies and those that respond to ground vibration, such as spadefoots (genus Scaphiopus), may be affected by noise. Limited information is available on the effects of short-duration noise events on reptiles. Dufour (1980) and Manci, et al. (1988), summarized a few studies of reptile responses to noise. Some reptile species tested under laboratory conditions experienced at least temporary threshold shifts or hearing loss after exposure to 95 dB for several minutes. Crocodilians in general have the most highly developed hearing of all reptiles. Crocodile ears have lids that can be closed when the animal goes under water. These lids can reduce the noise intensity by 10 to 12 dB (Wever and Vernon 1957). On Homestead Air Reserve Station, Florida, two crocodilians (the American Alligator and the Spectacled Caiman) reside in wetlands and canals along the base runway suggesting that they can coexist with existing noise levels of an active runway including DNLs of 85 dB.

Summary

Some physiological/behavioral responses such as increased hormonal production, increased heart rate, and reduction in milk production have been described in a small percentage of studies. A majority of the studies focusing on these types of effects have reported short-term or no effects.

The relationships between physiological effects and how species interact with their environments have not been thoroughly studied. Therefore, the larger ecological context issues regarding physiological effects of jet aircraft noise (if any) and resulting behavioral pattern changes are not well understood.

Animal species exhibit a wide variety of responses to noise. It is therefore difficult to generalize animal responses to noise disturbances or to draw inferences across species, as reactions to jet aircraft noise appear to be species-specific. Consequently, some animal species may be more sensitive than other species and/or may exhibit different forms or intensities of behavioral responses. For instance, wood ducks appear to be more sensitive and more resistant to acclimation to jet aircraft noise than Canada geese in one study. Similarly, wild ungulates seem to be more easily disturbed than domestic animals.

The literature does suggest that common responses include the “startle” or “fright” response and, ultimately, habituation. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects.

The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms.

Animal responses to aircraft noise appear to be somewhat dependent on, or influenced by, the size, shape, speed, proximity (vertical and horizontal), engine noise, color, and flight profile of planes. Helicopters also appear to induce greater intensities and durations of disturbance behavior as compared to fixed-wing aircraft. Some studies showed that animals that had been previously exposed to jet aircraft noise exhibited greater degrees of alarm and disturbance to other objects creating noise, such as boats, people, and objects blowing across the landscape. Other factors influencing response to jet aircraft noise may include wind direction, speed, and local air turbulence; landscape structures (i.e., amount and type of vegetative cover); and, in the case of bird species, whether the animals are in the incubation/nesting phase.

C.3.9 Property Values

Property within a noise zone (or Accident Potential Zone) may be affected by the availability of federally guaranteed loans. According to U.S. Department of Housing and Urban Development (HUD), Federal Housing Administration (FHA), and Veterans Administration (VA) guidance, sites are acceptable for program assistance, subsidy, or insurance for housing in noise zones of less than 65 dB DNL, and sites are conditionally acceptable with special approvals and noise attenuation in the 65 to 75 dB DNL noise zone and the greater than 75 dB DNL noise zone. HUD's position is that noise is not the only determining factor for site acceptability, and properties should not be rejected only because of airport influences if there is evidence of acceptability within the market and if use of the dwelling is expected to continue. Similar to the Navy's and Air Force's Air Installation Compatible Use Zone Program, HUD, FHA, and VA recommend sound attenuation for housing in the higher noise zones and written disclosures to all prospective buyers or lessees of property within a noise zone (or Accident Potential Zone).

Newman and Beattie (1985) reviewed the literature to assess the effect of aircraft noise on property values. One paper by Nelson (1978), reviewed by Newman and Beattie, suggested a 1.8 to 2.3 percent decrease in property value per decibel at three separate airports, while at another period of time, they found only a 0.8 percent devaluation per decibel change in DNL. However, Nelson also noted a decline in noise depreciation over time which he theorized could be due to either noise sensitive people being replaced by less sensitive people or the increase in commerical value of the property near airports; both ideas were supported by Crowley (1978). Ultimately, Newman and Beattie summarized that while an effect of noise was observed, noise is only one of the many factors that is part of a decision to move close to, or away from, an airport, but which is sometimes considered an advantage due to increased opportunities for employment or ready access to the airport itself. With all the issues associated with determining property values, their reviews found that decreases in property values usually range from 0.5 to 2 percent per decibel increase of cumulative noise exposure.

More recently Fidell, et al. (1996) studied the influences of aircraft noise on actual sale prices of residential properties in the vicinity of two military facilities and found that equations developed for one area to predict residential sale prices in areas unaffected by aircraft noise worked equally well when applied to predicting sale prices of homes in areas with aircraft noise in excess of 65 dB DNL. Thus, the model worked equally well in predicting sale prices in areas with and without aircraft noise exposure. This indicates that aircraft noise had no meaningful effect on residential property values. In some cases, the average sale prices of noise exposed properties were somewhat higher than those

elsewhere in the same area. In the vicinity of Davis-Monthan AFB in Tucson, AZ, Fidell found the homes near the AFB were much older, smaller and in poorer condition than homes elsewhere. These factors caused the equations developed for predicting sale prices in areas further away from the base to be inapplicable with those nearer the AFB. However, again Fidell found that, similar to other researchers, differences in sale prices between homes with and without aircraft noise were frequently due to factors other than noise itself.

C.3.10 Noise Effects on Structures

Normally, the most sensitive components of a structure to airborne noise are the windows and, infrequently, the plastered walls and ceilings. An evaluation of the peak sound pressures impinging on the structure is normally used to determine the possibility of damage. In general, with peak sound levels above 130 dB, there is the possibility of the excitation of structural component resonances. While certain frequencies (such as 30 Hz for window breakage) may be of more concern than other frequencies, conservatively, only sounds lasting more than one second above a sound level of 130 dB are potentially damaging to structural components (Committee on Hearing, Bioacoustics, and Biomechanics 1977).

Noise-induced structural vibration may also cause annoyance to dwelling occupants because of induced secondary vibrations, or rattling of objects within the dwelling such as hanging pictures, dishes, plaques, and bric-a-brac. Window panes may also vibrate noticeably when exposed to high levels of airborne noise. In general, such noise-induced vibrations occur at peak sound levels of 110 dB or greater. Thus, assessments of noise exposure levels for compatible land use should also be protective of noise-induced secondary vibrations.

C.3.11 Noise Effects on Terrain

It has been suggested that noise levels associated with low-flying aircraft may affect the terrain under the flight path by disturbing fragile soil or snow, especially in mountainous areas, causing landslides or avalanches. There are no known instances of such effects, and it is considered improbable that such effects would result from routine, subsonic aircraft operations.

C.3.12 Noise Effects on Historical and Archaeological Sites

Because of the potential for increased fragility of structural components of historical buildings and other historical sites, aircraft noise may affect such sites more severely than newer, modern structures. Particularly in older structures, seemingly insignificant surface cracks initiated by vibrations from aircraft noise may lead to greater damage from natural forces (Hanson, et al. 1991). There are few scientific studies of such effects to provide guidance for their assessment.

One study involved the measurements of sound levels and structural vibration levels in a superbly restored plantation house, originally built in 1795, and now situated approximately 1,500 feet from the centerline at the departure end of Runway 19L at Washington Dulles International Airport. These measurements were made in connection with the proposed scheduled operation of the Concorde airplane at Dulles (Wesler 1977). There was special concern for the building's windows, since roughly half of the 324 panes were original. No instances of structural damage were found. Interestingly, despite the high levels of noise during Concorde takeoffs, the induced structural vibration levels were actually less than those induced by touring groups and vacuum cleaning.

As noted above for the noise effects of noise-induced vibrations of conventional structures, assessments of noise exposure levels for normally compatible land uses should also be protective of historic and archaeological sites.

C.4 References

Acoustical Society of America. 1980. *San Diego Workshop on the Interaction Between Manmade Noise and Vibration and Arctic Marine Wildlife*. Acoustical Society of Ameri., Am. Inst. Physics, New York. 84 pp.

American National Standards Institute. 1980. *Sound Level Descriptors for Determination of Compatible Land Use*. ANSI S3.23-1980.

American National Standards Institute. 1985. *Specification for Sound Level Meters.* ANSI S1.4A-1985 Amendment to ANSI S1.4-1983

American National Standards Institute. 1988. *Quantities and Procedures for Description and Measurement of Environmental Sound: Part 1*. ANSI S12.9-1988.

American National Standards Institute. 1996. *Quantities and Procedures for Description and Measurement of Environmental Sound: Part 4*. ANSI S12.9-1996.

American National Standards Institute (ANSI) 2002. *Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools*. ANSI S12.60-2002.

American National Standards Institute (ANSI) 2008. *Methods for Estimation of Awakenings with Outdoor Noise Events Heard in Homes*. ANSI S12.9-2008/Part6.

American Speech-Language-Hearing Association. 1995. *Guidelines for Acoustics in Educational Environments*, V.37, Suppl. 14, pgs. 15-19.

Anderson, D.E., O.J. Rongstad, and W.R. Mytton. 1989. *Responses of Nesting Red-tailed Hawks to Helicopter Overflights*. The Condor, Vol. 91, pp. 296-299.

Andrus, W.S., M.E. Kerrigan, and K.T. Bird. 1975. *Hearing in Para-Airport Children*. Aviation, Space, and Environmental Medicine, Vol. 46, pp. 740-742.

Austin, Jr., O.L., W.B. Robertson, Jr., and G.E. Wolfenden. 1970. *Mass Hatching Failure in Dry Tortugas Sooty Terns (Sterna fuscata)*. Proceedings of the XVth International Arnithological Congress, The Hague, The Netherlands. August 30 through September 5.

Basner, M., H., Buess, U. Miller, G. Platt, , A. Samuel. *Aircraft Noise Effects on Sleep: Final Results of DLR Laboratory and Field Studies of 2240 Polysomnographically Recorded Subject Nights*, August 2004.

Berger, E. H., W.D. Ward, J.C. Morrill, and L.H. Royster. 1995. *Noise And Hearing Conservation Manual, Fourth Edition*. American Industrial Hygiene Association, Fairfax, Virginia.

Berglund, B., and T. Lindvall, eds. 1995. *Community Noise*. Institute of Environmental Medicine.

Beyer, D. 1983. *Studies of the Effects of Low-Flying Aircraft on Endocrinological and Physiological Parameters in Pregnant Cows*. Veterinary College of Hannover, München, Germany.

Black, B., M. Collopy, H. Percivial, A. Tiller, and P. Bohall. 1984. *Effects of Low-Altitude Military Training Flights on Wading Bird Colonies in Florida*. Florida Cooperative Fish and Wildlife Research Unit, Technical Report No. 7.

Bond, J., C.F. Winchester, L.E. Campbell, and J.C. Webb. 1963. *The Effects of Loud Sounds on the Physiology and Behavior of Swine*. U.S. Department of Agriculture Agricultural Research Service Technical Bulletin 1280.

Bowles, A.E. 1995. *Responses of Wildlife to Noise*. In R.L. Knight and K.J. Gutzwiller, eds., "Wildlife and Recreationists: Coexistence through Management and Research," Island Press, Covelo, California, pp.109-156.

Bowles, A.E., F.T. Awbrey, and J.R. Jehl. 1991a. *The Effects of High-Amplitude Impulsive Noise On Hatching Success: A Reanalysis of the Sooty Tern Incident*. SD-TP-91-0006.

Bowles, A.E., B. Tabachnick, and S. Fidell. 1991b. *Review of the Effects of Aircraft Overflights on Wildlife*. Volume II of III, Technical Report, National Park Service, Denver, Colorado.

Bowles, A.E., C. Book, and F. Bradley. 1990a. *Effects of Low-Altitude Aircraft Overflights on Domestic Turkey Poults*. USAF, Wright-Patterson AFB. AL/OEBN Noise Effects Branch.

Bowles, A.E., M. Knobler, M.D. Sneddon, and B.A. Kugler. 1994. *Effects of Simulated Sonic Booms on the Hatchability of White Leghorn Chicken Eggs*. AL/OE-TR-1994-0179.

Bowles, A.E., P. K. Yochem, and F. T. Awbrey. 1990b. *The Effects of Aircraft Noise and Sonic Booms on Domestic Animals: A Preliminary Model and a Synthesis of the Literature and Claims (NSBIT Technical Operating Report Number 13)*. Noise and Sonic Boom Impact Technology, Advanced Development Program Office, Wright-Patterson AFB, Ohio.

Bradley J.S. 1985. *Uniform Derivation of Optimum Conditions for Speech in Rooms*, National Research Council, Building Research Note, BRN 239, Ottawa, Canada.

Bradley, J.S. 1993. *NRC-CNRC NEF Validation Study: Review of Aircraft Noise and its Effects*, National Research Council Canada and Transport Canada, Contract Report A-1505.5.

Bronzaft, A.L. 1997. *Beware: Noise is Hazardous to Our Children's Development*. Hearing Rehabilitation Quarterly, Vol. 22, No. 1.

Brown, A.L. 1990. *Measuring the Effect of Aircraft Noise on Sea Birds*. Environment International, Vol. 16, pp. 587-592.

Bullock, T.H., D.P. Donning, and C.R. Best. 1980. *Evoked Brain Potentials Demonstrate Hearing in a Manatee (Trichechus inunguis)*. Journal of Mammals, Vol. 61, No. 1, pp. 130-133.

Burger, J. 1981. *Behavioral Responses of Herring Gulls (Larus argentatus) to Aircraft Noise*. Environmental Pollution (Series A), Vol. 24, pp. 177-184.

Burger, J. 1986. *The Effect of Human Activity on Shorebirds in Two Coastal Bays in Northeastern United States*. Environmental Conservation, Vol. 13, No. 2, pp. 123-130.

Cantrell, R.W. 1974. *Prolonged Exposure to Intermittent Noise: Audiometric, Biochemical, Motor, Psychological, and Sleep Effects*. Laryngoscope, Supplement I, Vol. 84, No. 10, p. 2.

Casady, R.B., and R.P. Lehmann. 1967. *Response of Farm Animals to Sonic Booms*. Studies at Edwards Air Force Base, June 6-30, 1966. Interim Report, U.S. Department of Agriculture, Beltsville, Maryland, p. 8.

Chen, T., S. Chen, P. Hsieh, and H. Chiang. 1997. *Auditory Effects of Aircraft Noise on People Living Near an Airport*. Archives of Environmental Health, Vol. 52, No. 1, pp. 45-50.

Chen, T., and S. Chen. 1993. *Effects of Aircraft Noise on Hearing and Auditory Pathway Function of School-Age Children*. International Archives of Occupational and Environmental Health, Vol. 65, No. 2, pp. 107-111.

Cogger, E.A., and E.G. Zegarra. 1980. *Sonic Booms and Reproductive Performance of Marine Birds: Studies on Domestic Fowl as Analogues*. In Jehl, J.R., and C.F. Cogger, eds., "Potential Effects of Space Shuttle Sonic Booms on the Biota and Geology of the California Channel Islands: Research Reports," San Diego State University Center for Marine Studies Technical Report No. 80-1.

Cohen, S., G.W. Evans, D.S. Krantz, and D. Stokols. 1980. *Physiological, Motivational, and Cognitive Effects of Aircraft Noise on Children: Moving from Laboratory to Field*. American Psychologist, Vol. 35, pp. 231-243.

Committee on Hearing, Bioacoustics, and Biomechanics. 1977. *Guidelines for Preparing Environmental Impact Statements on Noise*. The National Research Council, National Academy of Sciences.

Conomy, J.T., J.A. Dubovsky, J.A. Collazo, and W. J. Fleming. 1998. *Do Black Ducks and Wood Ducks Habituate to Aircraft Disturbance?* Journal of Wildlife Management, Vol. 62, No. 3, pp. 1135-1142.

Cottereau, P. 1972. *Les Incidences Du 'Bang' Des Avions Supersoniques Sur Les Productions Et La Vie Animals*. Revue Medicine Veterinaire, Vol. 123, No. 11, pp. 1367-1409

Cottereau, P. 1978. *The Effect of Sonic Boom from Aircraft on Wildlife and Animal Husbandry*. In "Effects of Noise on Wildlife," Academic Press, New York, New York, pp. 63-79.

Crowley, R.W. 1978. *A Case Study of the Effects of an Airport on Land Values*. Journal of Transportation Economics and Policy, Vol. 7. May.

Davis, R.W., W.E. Evans, and B. Wursig, eds. 2000. *Cetaceans, Sea Turtles, and Seabirds in the Northern Gulf of Mexico: Distribution, Abundance, and Habitat Associations*. Volume II of Technical Report, prepared by Texas A&M University at Galveston and the National Marine Fisheries Service. U.S. Department of the Interior, Geological Survey, Biological Resources Division, USGS/BRD/CR-1999-0006 and Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, Louisiana, OCS Study MMS 2000-003.

Dooling, R.J. 1978. *Behavior and Psychophysics of Hearing in Birds*. J. Acoust. Soc. Am., Supplement 1, Vol. 65, p. S4.

Dufour, P.A. 1980. *Effects of Noise on Wildlife and Other Animals: Review of Research Since 1971*. U.S. Environmental Protection Agency.

Edmonds, L.D., P.M. Layde, and J.D. Erickson. 1979. *Airport Noise and Teratogenesis*. Archives of Environmental Health, Vol. 34, No. 4, pp. 243-247.

Edwards, R.G., A.B. Broderson, R.W. Harbour, D.F. McCoy, and C.W. Johnson. 1979. *Assessment of the Environmental Compatibility of Differing Helicopter Noise Certification Standards*. U.S. Dept. of Transportation, Washington, D.C. 58 pp.

Eldred, K, and H. von Gierke. 1993. *Effects of Noise on People*, Noise News International, 1(2), 67-89, June.

Ellis, D.H., C.H. Ellis, and D.P. Mindell. 1991. *Raptor Responses to Low-Level Jet Aircraft and Sonic Booms*. Environmental Pollution, Vol. 74, pp. 53-83.

Evans, G.W., and L. Maxwell. 1997. *Chronic Noise Exposure and Reading Deficits: The Mediating Effects of Language Acquisition*. Environment and Behavior, Vol. 29, No. 5, pp. 638-656.

Evans, G.W., and S.J. Lepore. 1993. *Nonauditory Effects of Noise on Children: A Critical Review*. Children's Environment, Vol. 10, pp. 31-51.

Evans, G.W., M. Bullinger, and S. Hygge. 1998. *Chronic Noise Exposure and Physiological Response: A Prospective Study of Children Living under Environmental Stress*. Psychological Science, Vol. 9, pp. 75-77.

Federal Aviation Administration (FAA). 1985. *Airport Improvement Program (AIP) Handbook*, Order No. 100.38.

Federal Interagency Committee On Noise (FICON). 1992. *Federal Agency Review of Selected Airport Noise Analysis Issues*. August 1992.

Federal Interagency Committee on Aviation Noise (FICAN). 1997. *Effects of Aviation Noise on Awakenings from Sleep*. June 1997.

Federal Interagency Committee on Urban Noise (FICUN). 1980. *Guidelines for Considering Noise in Land-Use Planning and Control*. U.S. Government Printing Office Report #1981-337-066/8071, Washington, D.C.

Fidell, S., D.S. Barber, and T.J. Schultz. 1991. *Updating a Dosage-Effect Relationship for the Prevalence of Annoyance Due to General Transportation Noise*. Journal of the Acoustical Society of America, Vol. 89, No. 1, pp. 221-233. January.

Fidell, S., K. Pearsons, R. Howe, B. Tabachnick, L. Silvati, and D.S. Barber. 1994. *Noise-Induced Sleep Disturbance in Residential Settings*. USAF, Wright-Patterson AFB, Ohio: AL/OE-TR-1994-0131.

Fidell, S., K. Pearsons, B. Tabachnick, R. Howe, L. Silvati, and D.S. Barber. 1995a. "*Field Study of Noise-Induced Sleep Disturbance*," Journal of the Acoustical Society of America Vol. 98, No. 2, pp. 1025-1033.

Fidell, S., R. Howe, B. Tabachnick, K. Pearsons, and M. Sneddon. 1995b. *Noise-induced Sleep Disturbance in Residences near Two Civil Airports* (Contract NAS1-20101) NASA Langley Research Center.

Fidell, S., B. Tabachnick, and L. Silvati. 1996. *Effects of Military Aircraft Noise on Residential Property Values*. BBN Systems and Technologies, BBN Report No. 8102.

Finegold, L.S., C.S. Harris, and H.E. von Gierke. 1994. *Community Annoyance and Sleep Disturbance: Updated Criteria for Assessing the Impact of General Transportation Noise on People*. Noise Control Engineering Journal, Vol. 42, No. 1, pp. 25-30.

Fisch, L. 1977. *Research Into Effects of Aircraft Noise on Hearing of Children in Exposed Residential Areas Around an Airport*. Acoustics Letters, Vol. 1, pp. 42-43.

Fleischner, T.L., and S. Weisberg. 1986. *Effects of Jet Aircraft Activity on Bald Eagles in the Vicinity of Bellingham International Airport*. Unpublished Report, DEVCO Aviation Consultants, Bellingham, WA.

Fleming, W.J., J. Dubovsky, and J. Collazo. 1996. *An Assessment of the Effects of Aircraft Activities on Waterfowl at Piney Island, North Carolina*. Final Report by the North Carolina Cooperative Fish and Wildlife Research Unit, North Carolina State University, prepared for the Marine Corps Air Station, Cherry Point.

Fraser, J.D., L.D. Franzel, and J.G. Mathiesen. 1985. *The Impact of Human Activities on Breeding Bald Eagles in North-Central Minnesota*. Journal of Wildlife Management, Vol. 49, pp. 585-592.

Frerichs, R.R., B.L. Beeman, and A.H. Coulson. 1980. *Los Angeles Airport Noise and Mortality: Faulty Analysis and Public Policy*. Am. J. Public Health, Vol. 70, No. 4, pp. 357-362. April.

Gladwin, D.N., K.M. Manci, and R. Villella. 1988. *Effects of Aircraft Noise and Sonic Booms on Domestic Animals and Wildlife*. Bibliographic Abstracts. NERC-88/32. U.S. Fish and Wildlife Service National Ecology Research Center, Ft. Collins, Colorado.

Green, K.B., B.S. Pasternack, and R.E. Shore. 1982. *Effects of Aircraft Noise on Reading Ability of School-Age Children*. Archives of Environmental Health, Vol. 37, No. 1, pp. 24-31.

Griefahn, B. 1978. Research on Noise Disturbed Sleep Since 1973, *Proceedings of Third Int. Cong. On Noise as a Public Health Problem*, pp. 377-390 (as appears in NRC-CNRC NEF Validation Study: (2) *Review of Aircraft Noise and Its Effects*, A-1505.1, p. 31).

Grubb, T.G., and R.M. King. 1991. *Assessing Human Disturbance of Breeding Bald Eagles with Classification Tree Models*. Journal of Wildlife Management, Vol. 55, No. 3, pp. 500-511.

Gunn, W.W.H., and J.A. Livingston. 1974. *Disturbance to Birds by Gas Compressor Noise Simulators, Aircraft, and Human Activity in the MacKenzie Valley and the North Slope*. Chapters VI-VIII, Arctic Gas Biological Report, Series Vol. 14.

Haines, M.M., S.A. Stansfeld, R.F. Job, and B. Berglund. 1998. *Chronic Aircraft Noise Exposure and Child Cognitive Performance and Stress*. In Carter, N.L., and R.F. Job, eds., Proceedings of Noise as a Public Health Problem, Vol. 1, Sydney, Australia University of Sydney, pp. 329-335.

Haines, M.M., S.A. Stansfeld, R.F. Job, B. Berglund, and J. Head. 2001a. *A Follow-up Study of Effects of Chronic Aircraft Noise Exposure on Child Stress Responses and Cognition*. International Journal of Epidemiology, Vol. 30, pp. 839-845.

Haines, M.M., S.A. Stansfeld, R.F. Job, B. Berglund, and J. Head. 2001b. *Chronic Aircraft Noise Exposure, Stress Responses, Mental Health and Cognitive Performance in School Children*. Psychological Medicine, Vol. 31, pp.265-277. February.

Haines, M.M., S.A. Stansfeld, S. Brentnall, J. Head, B. Berry, M. Jiggins, and S. Hygge. 2001c. *The West London Schools Study: the Effects of Chronic Aircraft Noise Exposure on Child Health*. Psychological Medicine, Vol. 31, pp. 1385-1396. November.

Hanson, C.E., K.W. King, M.E. Eagan, and R.D. Horonjeff. 1991. *Aircraft Noise Effects on Cultural Resources: Review of Technical Literature*. Report No. HMMH-290940.04-1, available as PB93-205300, sponsored by National Park Service, Denver CO.

Harris, C.M. 1979. *Handbook of Noise Control*. McGraw-Hill Book Co.

Harris, C.S. 1997. *The Effects of Noise on Health*. USAF, Wright-Patterson AFB, Ohio, AL/OE-TR-1997-0077.

Hygge, S. 1994. *Classroom Experiments on the Effects of Aircraft, Road Traffic, Train and Verbal Noise Presented at 66 dBA L_{eq}, and of Aircraft and Road Traffic Presented at 55 dBA L_{eq}, on Long Term Recall and Recognition in Children Aged 12-14 Years*. In Vallet, M., ed., Proceedings of the 6th International Congress on Noise as a Public Health Problem, Vol. 2, Arcueil, France: INRETS, pp. 531-538.

Hygge, S., G.W. Evans, and M. Bullinger. 2002. *A Prospective Study of Some Effects of Aircraft Noise on Cognitive Performance in School Children*. Psychological Science Vol. 13, pp. 469-474.

Ising, H., Z. Joachims, W. Babisch, and E. Rebentisch. 1999. *Effects of Military Low-Altitude Flight Noise I Temporary Threshold Shift in Humans*. Zeitschrift fur Audiologie (Germany), Vol. 38, No. 4, pp. 118-127.

Jehl, J.R., and C.F. Cooper, eds. 1980. *Potential Effects of Space Shuttle Sonic Booms on the Biota and Geology of the California Channel Islands*. Research Reports, Center for Marine Studies, San Diego State University, San Diego, CA, Technical Report No. 80-1. 246 pp.

Jones, F.N., and J. Tauscher. 1978. *Residence Under an Airport Landing Pattern as a Factor in Teratism*. Archives of Environmental Health, pp. 10-12. January/ February.

Kovalcik, K., and J. Sottnik. 1971. *Vplyv Hluku Na Mliekovú Úzitkovost Krív* [*The Effect of Noise on the Milk Efficiency of Cows*]. Zivocisná Vyroba, Vol. 16, Nos. 10-11, pp. 795-804.

Kryter, K.D. 1984. *Physiological, Psychological, and Social Effects of Noise*. NASA Reference Publication 1115. July.

Kryter, K.D., and F. Poza. 1980. *Effects of Noise on Some Autonomic System Activities*. J. Acoust. Soc. Am., Vol. 67, No. 6, pp. 2036-2044.

Kushlan, J.A. 1978. *Effects of Helicopter Censuses on Wading Bird Colonies*. Journal of Wildlife Management, Vol. 43, No. 3, pp. 756-760.

Lazarus H. 1990. *New Methods for Describing and Assessing Direct Speech Communication Under Disturbing Conditions*, Environment International, 16: 373-392.

LeBlanc, M.M., C. Lombard, S. Lieb, E. Klapstein, and R. Massey. 1991. *Physiological Responses of Horses to Simulated Aircraft Noise*. U.S. Air Force, NSBIT Program for University of Florida.

Lind S.J., Pearsons K., and Fidell S. 1998. *Sound Insulation Requirements for Mitigation of Aircraft Noise Impact on Highline School District Facilities*, Volume I, BBN Systems and Technologies, BBN Report No. 8240.

Lukas, J.S. 1978. *Noise and Sleep: A Literature Review and a Proposed Criterion for Assessing Effect*. In Darly N. May, ed., "Handbook of Noise Assessment," Van Nostrand Reinhold Company: New York, pp. 313-334.

Lynch, T.E., and D.W. Speake. 1978. *Eastern Wild Turkey Behavioral Responses Induced by Sonic Boom*. In "Effects of Noise on Wildlife," Academic Press, New York, New York, pp. 47-61.

Manci, K.M., D.N. Gladwin, R. Villella, and M.G Cavendish. 1988. *Effects of Aircraft Noise and Sonic Booms on Domestic Animals and Wildlife: A Literature Synthesis*. U.S. Fish and Wildlife Service National Ecology Research Center, Ft. Collins, CO, NERC-88/29. 88 pp.

Meecham, W.C., and N. Shaw. 1979. *Effects of Jet Noise on Mortality Rates*. British Journal of Audiology, Vol. 13, pp. 77-80. August.

Metro-Dade County. 1995. *Dade County Manatee Protection Plan*. DERM Technical Report 95-5. Department of Environmental Resources Management, Miami, Florida.

Miedema HM, Vos H. *Exposure-response relationships for transportation noise*. J Acoust Soc Am. 1998 Dec;104(6):3432–3445

Michalak, R., H. Ising, and E. Rebentisch. 1990. *Acute Circulatory Effects of Military Low-Altitude Flight Noise.* International Archives of Occupational and Environmental Health, Vol. 62, No. 5, pp. 365-372.

Miller, J.D. 1974. *Effects of Noise on People*, J. Acoust. Soc. Am., Volume 56, No. 3, pp. 729-764.

National Park Service. 1994. *Report to Congress: Report on Effects of Aircraft Overflights on the National Park System*. Prepared Pursuant to Public Law 100-91, The National Parks Overflights Act of 1987. 12 September.

Nelson, J.P. 1978. *Economic Analysis of Transportation Noise Abatement*. Ballenger Publishing Company, Cambridge, MA.

Newman, J.S., and K.R. Beattie. 1985. *Aviation Noise Effects*. U.S. Department of Transportation, Federal Aviation Administration Report No. FAA-EE-85-2.

Nixon, C.W., D.W. West, and N.K. Allen. 1993. *Human Auditory Responses to Aircraft Flyover Noise*. In Vallets, M., ed., Proceedings of the 6th International Congress on Noise as a Public Problem, Vol. 2, Arcueil, France: INRETS.

North Atlantic Treaty Organization. 2000. *The Effects of Noise from Weapons and Sonic Booms, and the Impact on Humans, Wildlife, Domestic Animals and Structures*. Final Report of the Working Group Study Follow-up Program to the Pilot Study on Aircraft Noise, Report No. 241. June.

Ollerhead, J.B., C.J. Jones, R.E. Cadoux, A. Woodley, B.J. Atkinson, J.A. Horne, F. Pankhurst, L. Reyner, K.I. Hume, F. Van, A. Watson, I.D. Diamond, P. Egger, D. Holmes, and J. McKean. December 1992. *Report of a Field Study of Aircraft Noise and Sleep Disturbance*. Commissioned by the UK Department of Transport for the 36 UK Department of Safety, Environment and Engineering, London, England: Civil Aviation Authority.

Parker, J.B., and N.D. Bayley. 1960. *Investigations on Effects of Aircraft Sound on Milk Production of Dairy Cattle, 1957-58*. U.S. Agricultural Research Services, U.S. Department of Agriculture, Technical Report Number ARS 44-60.

Pater, L.D., D.K. Delaney, T.J. Hayden, B. Lohr, and R. Dooling. 1999. *Assessment of Training Noise Impacts on the Red-cockaded Woodpecker: Preliminary Results – Final Report*. Technical Report. U.S. Army, Corps of Engineers, CERL, Champaign, IL, Report Number 99/51, ADA Number 367234.

Pearsons, K.S., D.S. Barber, and B.G. Tabachick. 1989. Analyses of the Predictability of Noise-Induced Sleep Disturbance. USAF Report HSD-TR-89-029, October.

Pearsons, K.S., D.S. Barber, B.G. Tabachnick, and S. Fidell. 1995. *Predicting Noise-Induced Sleep Disturbance*. J. Acoust. Soc. Am., Vol. 97, No. 1, pp. 331-338. January.

Pearsons, K.S., D.S. Barber, and B.G. Tabachnick. 1989. *Analyses of the Predictability of Noise-Induced Sleep Disturbance*. USAF Report HSD-TR-89-029. October.

Pulles, M.P.J., W. Biesiot, and R. Stewart. 1990. *Adverse Effects of Environmental Noise on Health : An Interdisciplinary Approach*. Environment International, Vol. 16, pp. 437-445.

Richardson, W.J., C.R. Greene, Jr., C.I. Malme, and D.H. Thomson. 1995. *Marine Mammals and Noise*. Academic Press, San Diego, CA.

Reyner L.A, Horne J.A. 1995. *Gender and Age-Related Differences in Sleep Determined by Home-Recorded Sleep Logs and Actimetry from 400 Adults*, Sleep, 18: 127-134.

Rosenlund, M., N. Berglind, G. Bluhm, L. Jarup, and G. Pershagen. 2001. *Increased Prevalence of Hypertension in a Population Exposed to Aircraft Noise*. Occupational and Environmental Medicine, Vol. 58, No. 12, pp. 769-773. December.

Schultz, T.J. 1978. *Synthesis of Social Surveys on Noise Annoyance*. J. Acoust. Soc. Am., Vol. 64, No. 2, pp. 377-405. August.

Schwarze, S., and S.J. Thompson. 1993. *Research on Non-Auditory Physiological Effects of Noise Since 1988: Review and Perspectives*. In Vallets, M., ed., Proceedings of the 6th International Congress on Noise as a Public Problem, Vol. 3, Arcueil, France: INRETS.

Sharp, B.H., and Plotkin, K.J. 1984. *Selection of Noise Criteria for School Classrooms*, Wyle Research Technical Note TN 84-2 for the Port Authority of New York and New Jersey, October.

Smith, D.G., D.H. Ellis, and T.H. Johnston. 1988. *Raptors and Aircraft*. In R.L Glinski, B. Gron-Pendelton, M.B. Moss, M.N. LeFranc, Jr., B.A. Millsap, and S.W. Hoffman, eds., Proceedings of the Southwest Raptor Management Symposium. National Wildlife Federation, Washington, D.C., pp. 360-367.

State of California. 1990. Administrative Code Title 21.

Stusnick, E., D.A. Bradley, J.A. Molino, and G. DeMiranda. 1992. *The Effect of Onset Rate on Aircraft Noise Annoyance, Volume 2: Rented Home Experiment.* Wyle Laboratories Research Report WR 92-3. March.

Tetra Tech, Inc. 1997. *Final Environmental Assessment Issuance of a Letter of Authorization for the Incidental Take of Marine Mammals for Programmatic Operations at Vandenberg Air Force Base, California*. July.

Ting, C., J. Garrelick, and A. Bowles. 2002. *An Analysis of the Response of Sooty Tern eggs to Sonic Boom Overpressures*. J. Acoust. Soc. Am., Vol. 111, No. 1, Pt. 2, pp. 562-568.

Trimper, P.G., N.M. Standen, L.M. Lye, D. Lemon, T.E. Chubbs, and G.W. Humphries. 1998. *Effects of Low-level Jet Aircraft Noise On the Behavior of Nesting Osprey*. Journal of Applied Ecology, Vol. 35, pp. 122-130.

United Kingdom Department for Education and Skills (UKDfES). 2003. *Building Bulletin 93, Acoustic Design of Schools - A Design Guide*, London: The Stationary Office.

U.S. Air Force. 1993. *The Impact of Low Altitude Flights on Livestock and Poultry*. Air Force Handbook. Volume 8, Environmental Protection. 28 January.

U.S. Air Force. 1994a. *Air Force Position Paper on the Effects of Aircraft Overflights on Domestic Fowl*. Approved by HQ USAF/CEVP. 3 October.

U.S. Air Force. 1994b. *Air Force Position Paper on the Effects of Aircraft Overflights on Large Domestic Stock*. Approved by HQ USAF/CEVP. 3 October.

U.S. Air Force. 2000. *Preliminary Final Supplemental Environmental Impact Statement for Homestead Air Force Base Closure and Reuse*. Prepared by SAIC. 20 July.

U.S. Department of Defense. 2009. Memorandum from the Under Secretary of Defense, Ashton B. Carter, re: "Methodology for assessing Hearing Loss Risk and Impacts in DoD Environmental Impact Analysis," 16 June.

U.S. Department of Labor, Occupational Safety & Health Administration, Occupational Noise Exposure, Standard No. 1910.95, 1971

U.S. Department of the Navy. 2002. *Supplement to Programmatic Environmental Assessment for Continued Use with Non-Explosive Ordnance of the Vieques Inner Range, to Include Training Operations Typical of Large Scale Exercises, Multiple Unit Level Training, and/or a Combination of Large Scale Exercises and Multiple Unit Level Training*. March.

U.S. Environmental Protection Agency. 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety*. U.S. Environmental Protection Agency Report 550/9-74-004. March.

U.S. Environmental Protection Agency. 1978. *Protective Noise Levels*. Office of Noise Abatement and Control, Washington, D.C. U.S. Environmental Protection Agency Report 550/9-79-100. November.

U.S. Environmental Protection Agency. 1982. *Guidelines for Noise Impact Analysis*. U.S. Environmental Protection Agency Report 550/9-82-105. April.

U.S. Fish and Wildlife Service. 1998. Consultation Letter #2-22-98-I-224 Explaining Restrictions on Endangered Species Required for the Proposed Force Structure and Foreign Military Sales Actions at Cannon AFB, NM. To Alton Chavis HQ ACC/CEVP at Langley AFB from Jennifer Fowler-Propst, USFWS Field Supervisor, Albuquerque, NM. 14 December.

U.S. Forest Service. 1992. *Report to Congress: Potential Impacts of Aircraft Overflights of National Forest System Wilderness*. U.S. Government Printing Office 1992-0-685-234/61004, Washington, D.C.

von Gierke, H.E. 1990. *The Noise-Induced Hearing Loss Problem*. NIH Consensus Development Conference on Noise and Hearing Loss, Washington, D.C. 22–24 January.

Ward, D.H., E.J. Taylor, M.A. Wotawa, R.A. Stehn, D.V. Derksen, and C.J. Lensink. 1986. *Behavior of Pacific Black Brant and Other Geese in Response to Aircraft Overflights and Other Disturbances at Izembek Lagoon, Alaska*. 1986 Annual Report, p. 68.

Ward, D.H., and R.A. Stehn. 1990. *Response of Brant and Other Geese to Aircraft Disturbances at Izembek Lagoon, Alaska*. Final Technical Report, Number MMS900046. Performing Org.: Alaska Fish and Wildlife Research Center, Anchorage, AK. Sponsoring Org.: Minerals Management Service, Anchorage, AK, Alaska Outer Continental Shelf Office.

Weisenberger, M.E., P.R. Krausman, M.C. Wallace, D.W. De Young, and O.E. Maughan. 1996. *Effects of Simulated Jet Aircraft Noise on Heart Rate and Behavior of Desert Ungulates*. Journal of Wildlife Management, Vol. 60, No. 1, pp. 52-61.

Wesler, J.E. 1977. *Concorde Operations At Dulles International Airport*. NOISEXPO '77, Chicago, IL. March.

Wesler, J.E. 1986. *Priority Selection of Schools for Soundproofing*, Wyle Research Technical Note TN 96-8 for the Port Authority of New York and New Jersey, October.

Wever, E.G., and J.A. Vernon. 1957. *Auditory Responses in the Spectacled Caiman*. Journal of Cellular and Comparative Physiology, Vol. 50, pp. 333-339.

Wilson, C.E. 1994. *Noise Control: Measurement, Analysis, and Control of Sound and Vibration*". Kreiger Publishing Company.

World Health Organization. 2000. *Guidelines for Community Noise*. Berglund, B., T. Lindvall, and D. Schwela, eds.

Wu, Trong-Neng, J.S. Lai, C.Y. Shen, T.S Yu, and P.Y. Chang. 1995. *Aircraft Noise, Hearing Ability, and Annoyance*. Archives of Environmental Health, Vol. 50, No. 6, pp. 452-456. November-December.

APPENDIX D

Landing Zone Figures

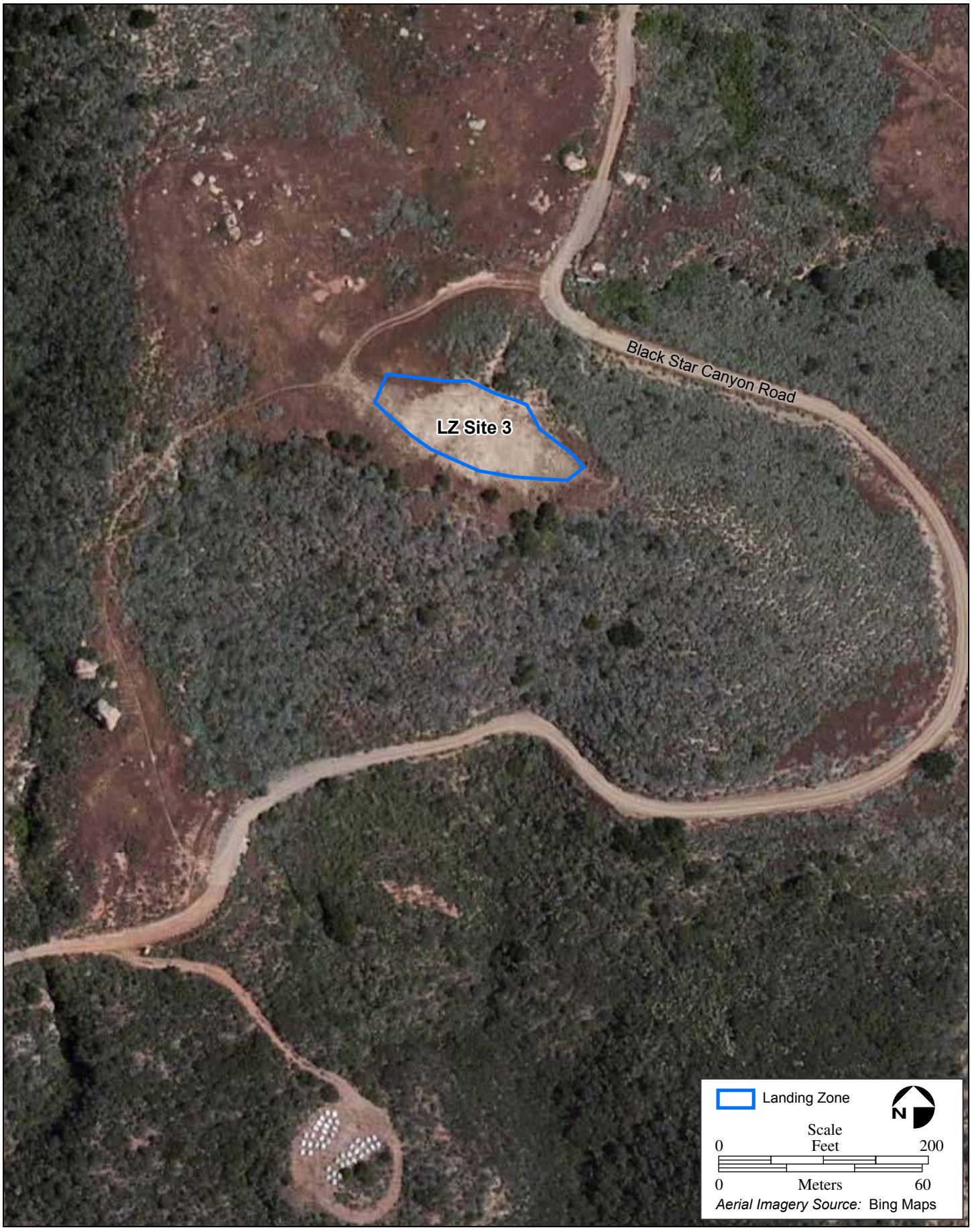


Figure D-1. Aerial View of LZ Site 3, Cleveland National Forest

Figure D-2. Aerial View of LZ Site 5, Cleveland National Forest

Figure D-3. Aerial View of LZ Site 6, Cleveland National Forest

Figure D-4. Aerial View of LZ Site 6 Alt, Cleveland National Forest

Figure D-5. Aerial View of LZ Site 7, Cleveland National Forest

Figure D-6. Aerial View of LZ Site 8, Cleveland National Forest

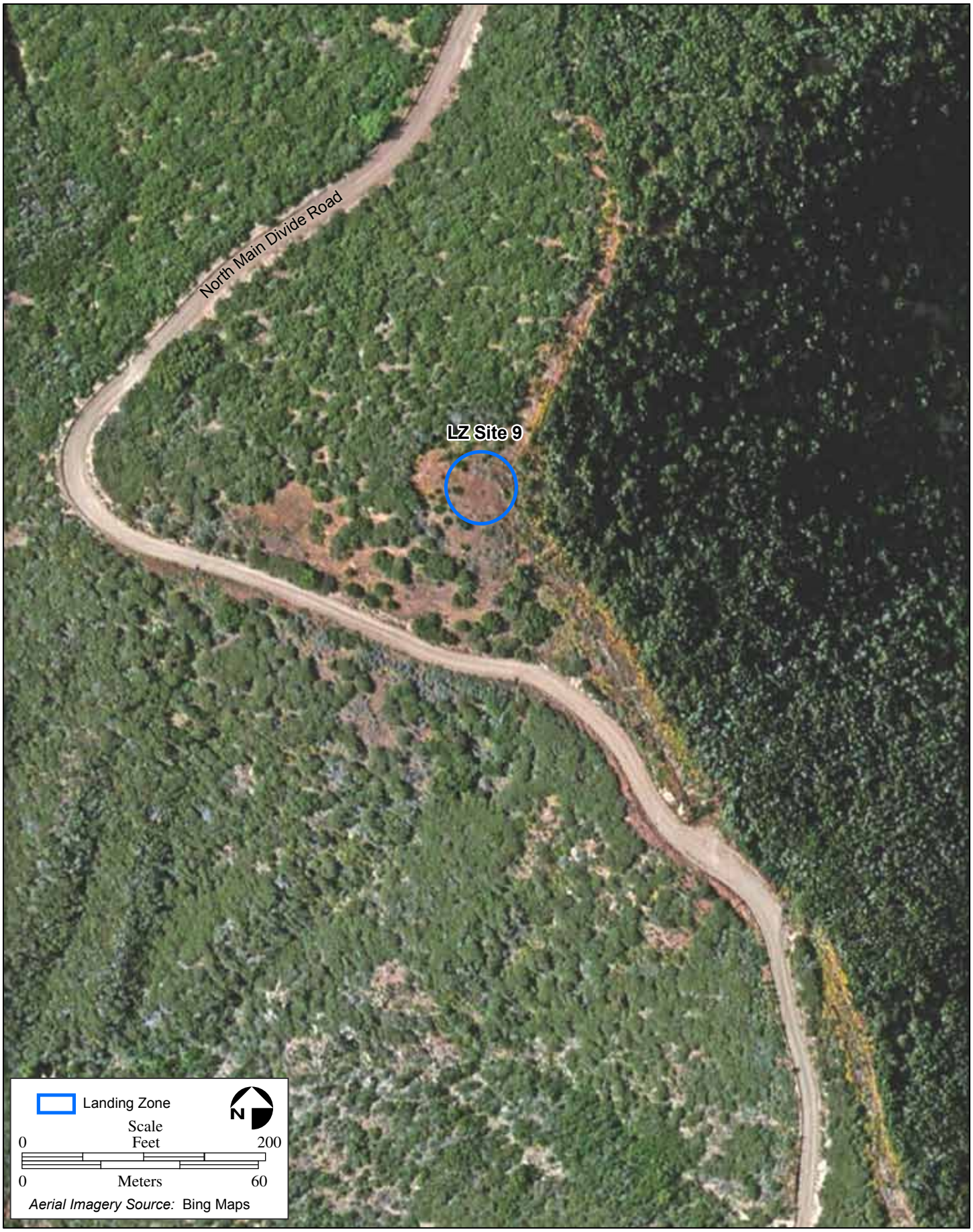


Figure D-7. Aerial View of LZ Site 9, Cleveland National Forest

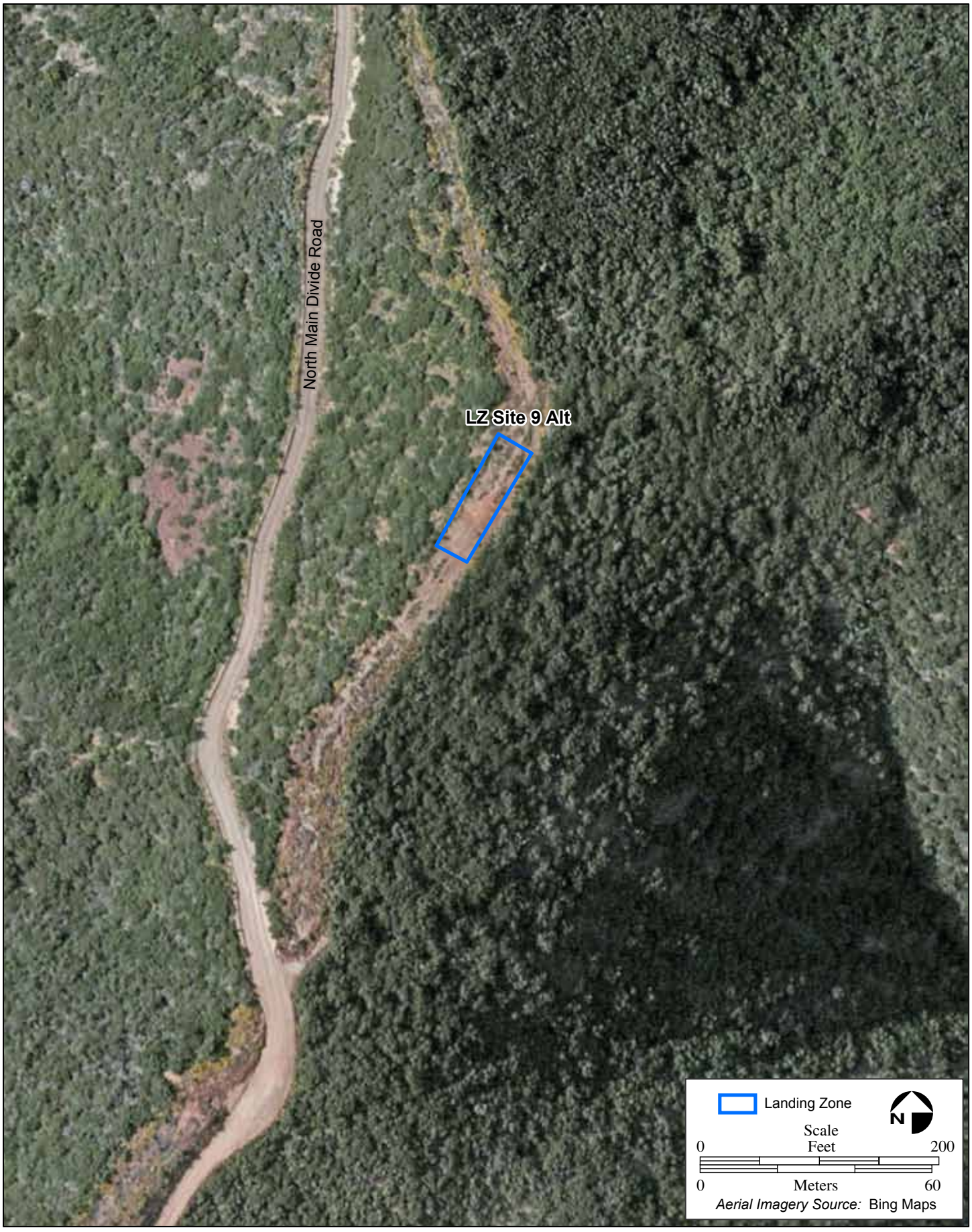


Figure D-8. Aerial View of LZ Site 9 Alt, Cleveland National Forest

Figure D-9. Aerial View of LZ Site 10, Cleveland National Forest

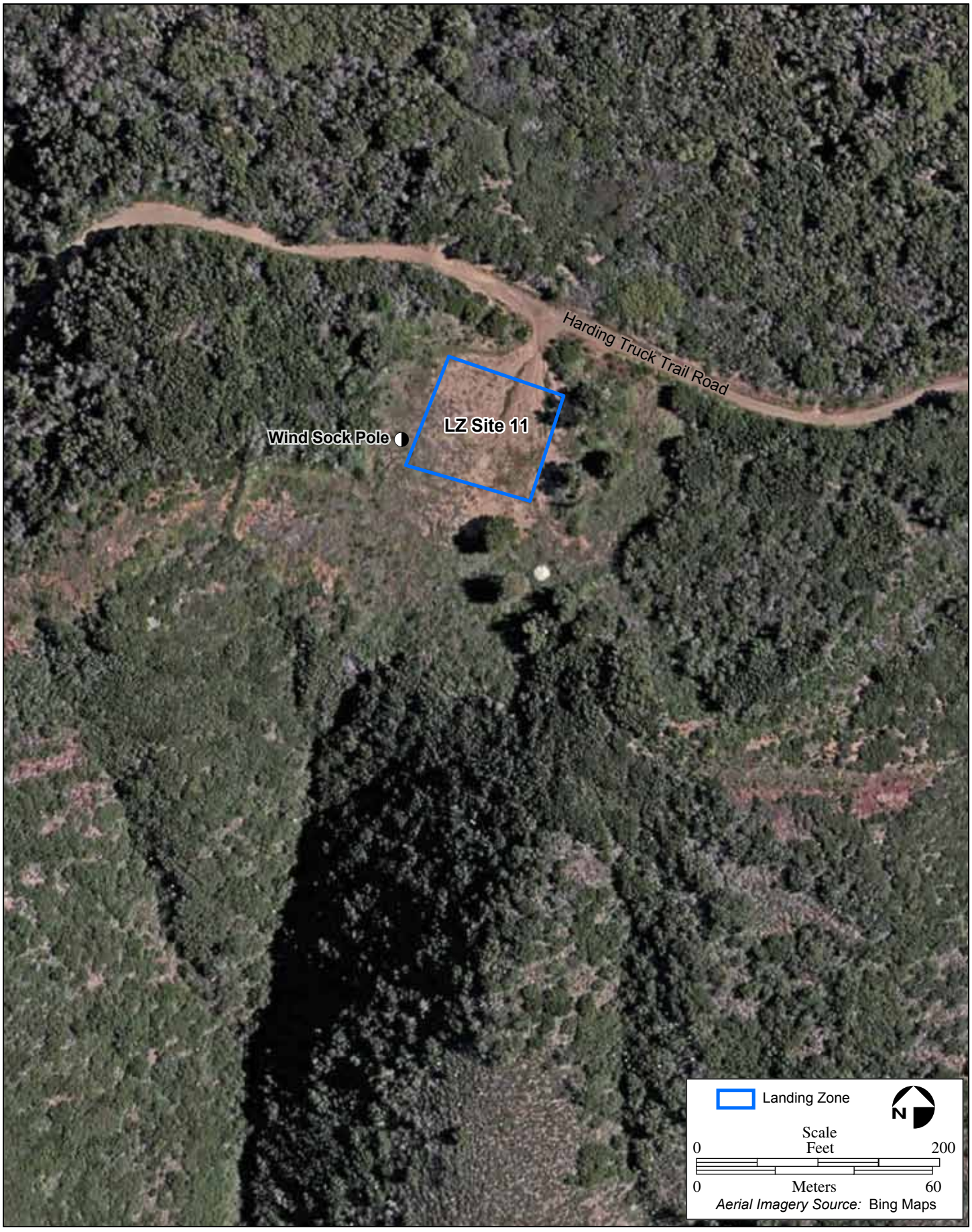


Figure D-10. Aerial View of LZ Site 11, Cleveland National Forest

Figure D-11. Aerial View of LZ Bull, BLM El Centro

Figure D-12. Aerial View of LZ C1, BLM El Centro

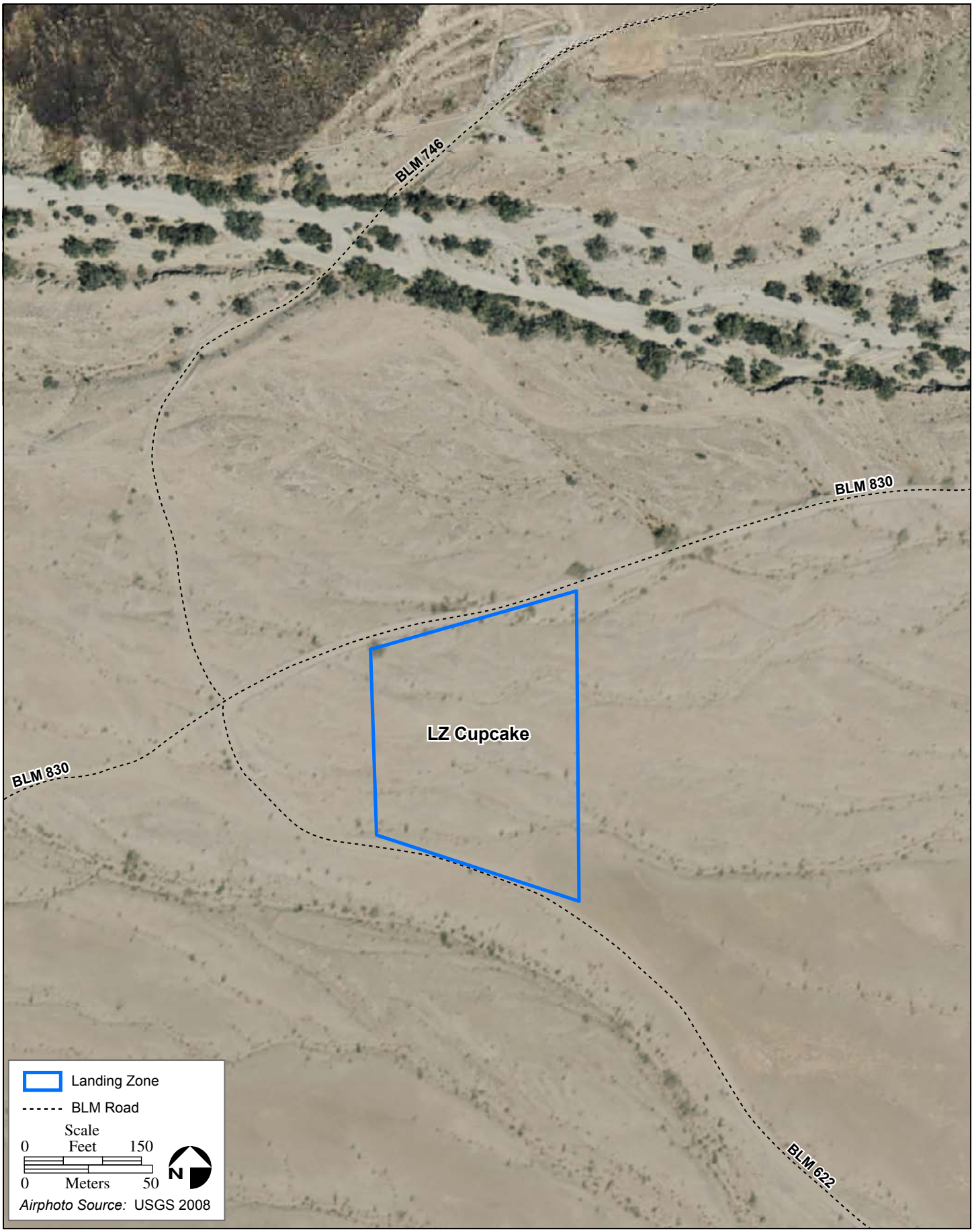


Figure D-13. Aerial View of LZ Cupcake, BLM El Centro

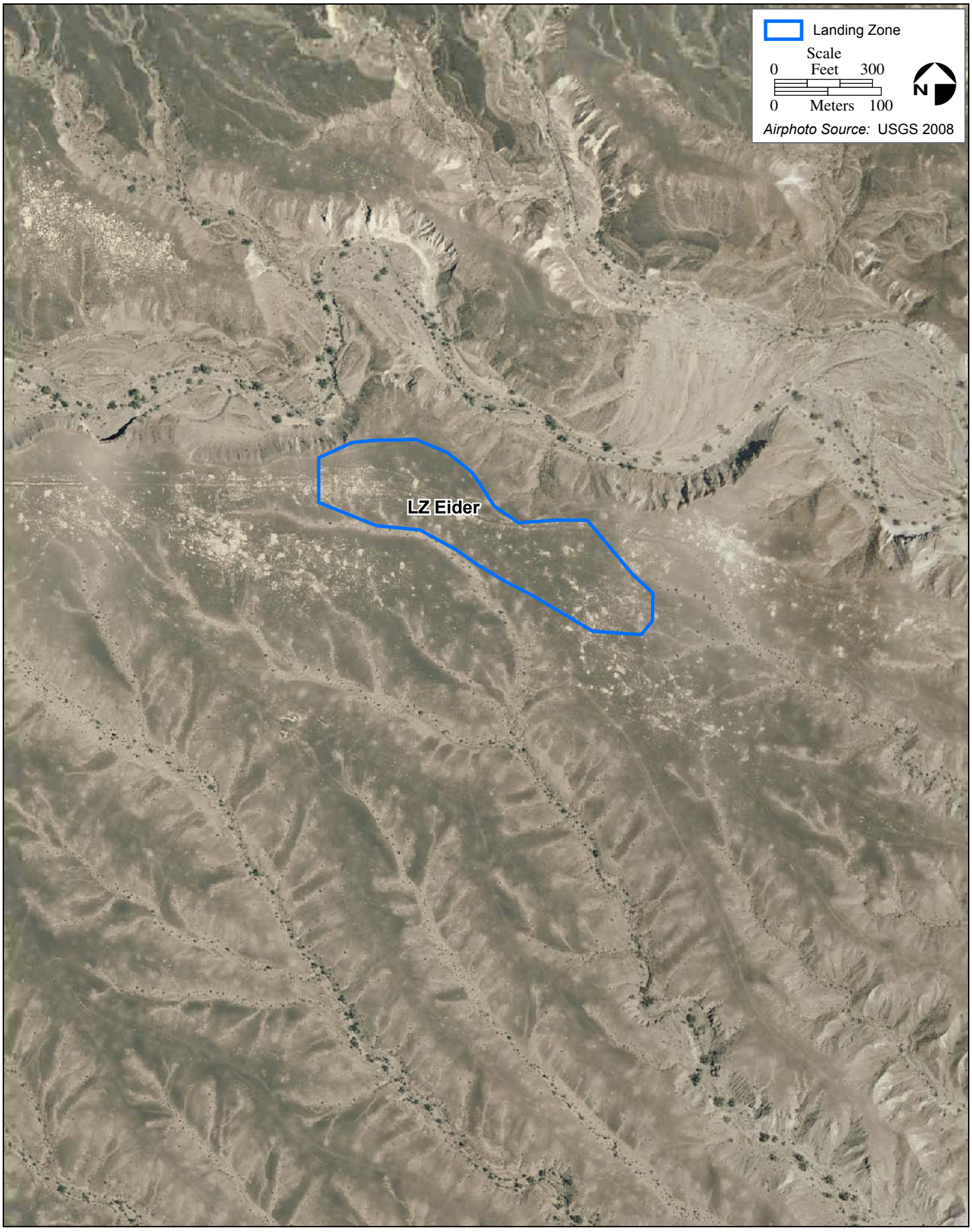


Figure D-14. Aerial View of LZ Eider, BLM El Centro

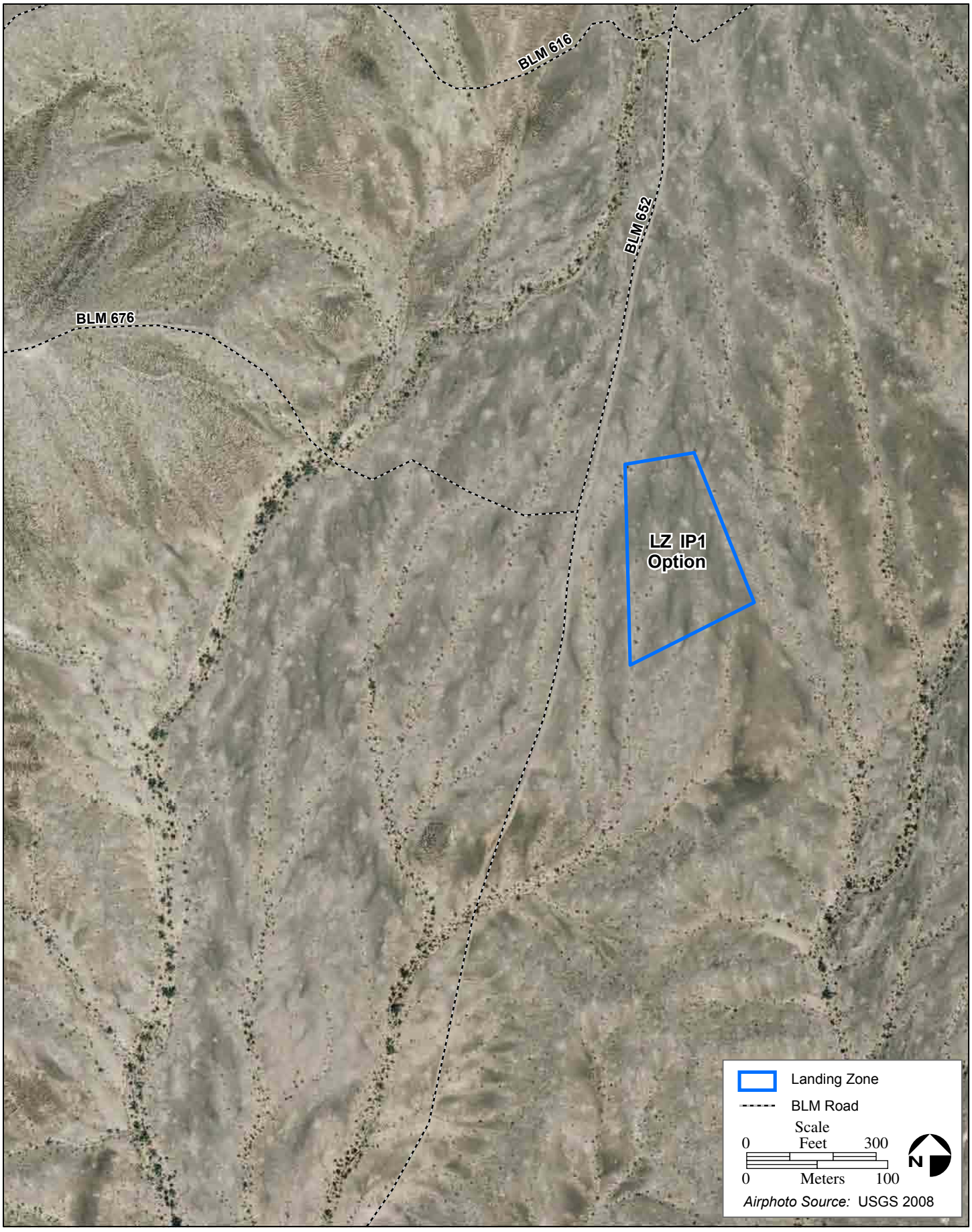


Figure D-15. Aerial View of LZ IP1 Option, BLM El Centro

Figure D-16. Aerial View of LZ Mallard, BLM El Centro

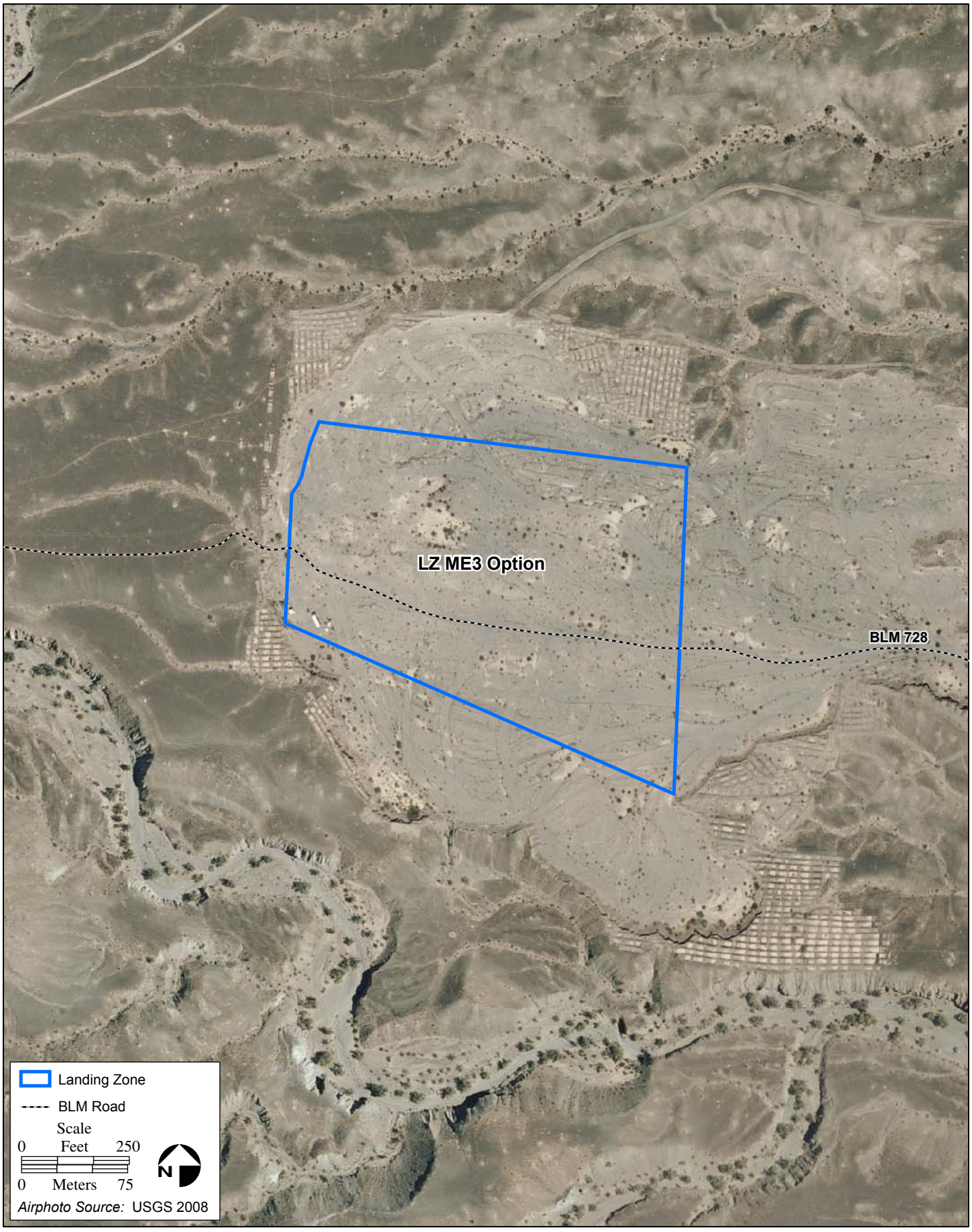


Figure D-17. Aerial View of LZ ME3 Option, BLM El Centro

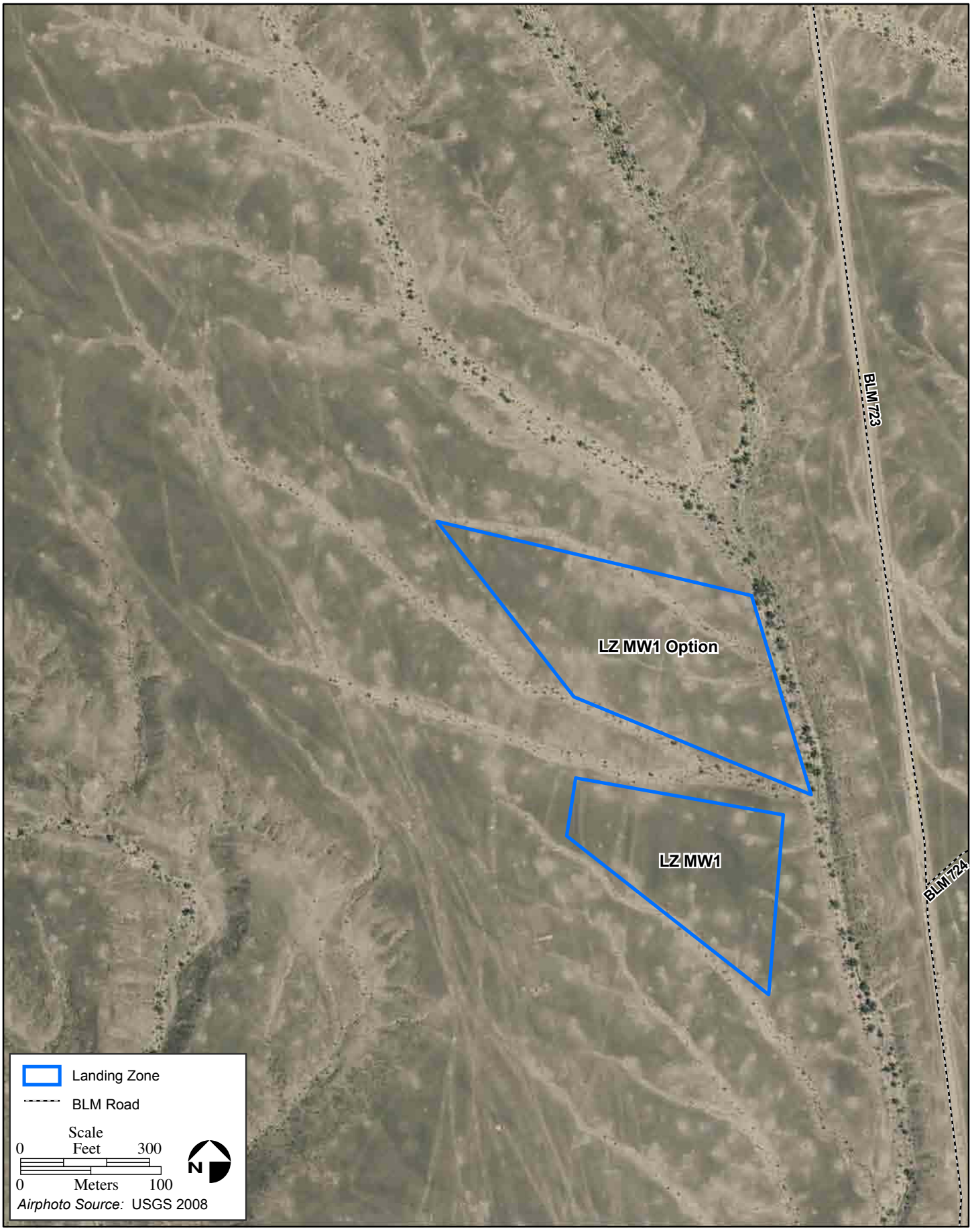


Figure D-18. Aerial View of LZ MW1 and LZ MW1 Option, BLM El Centro

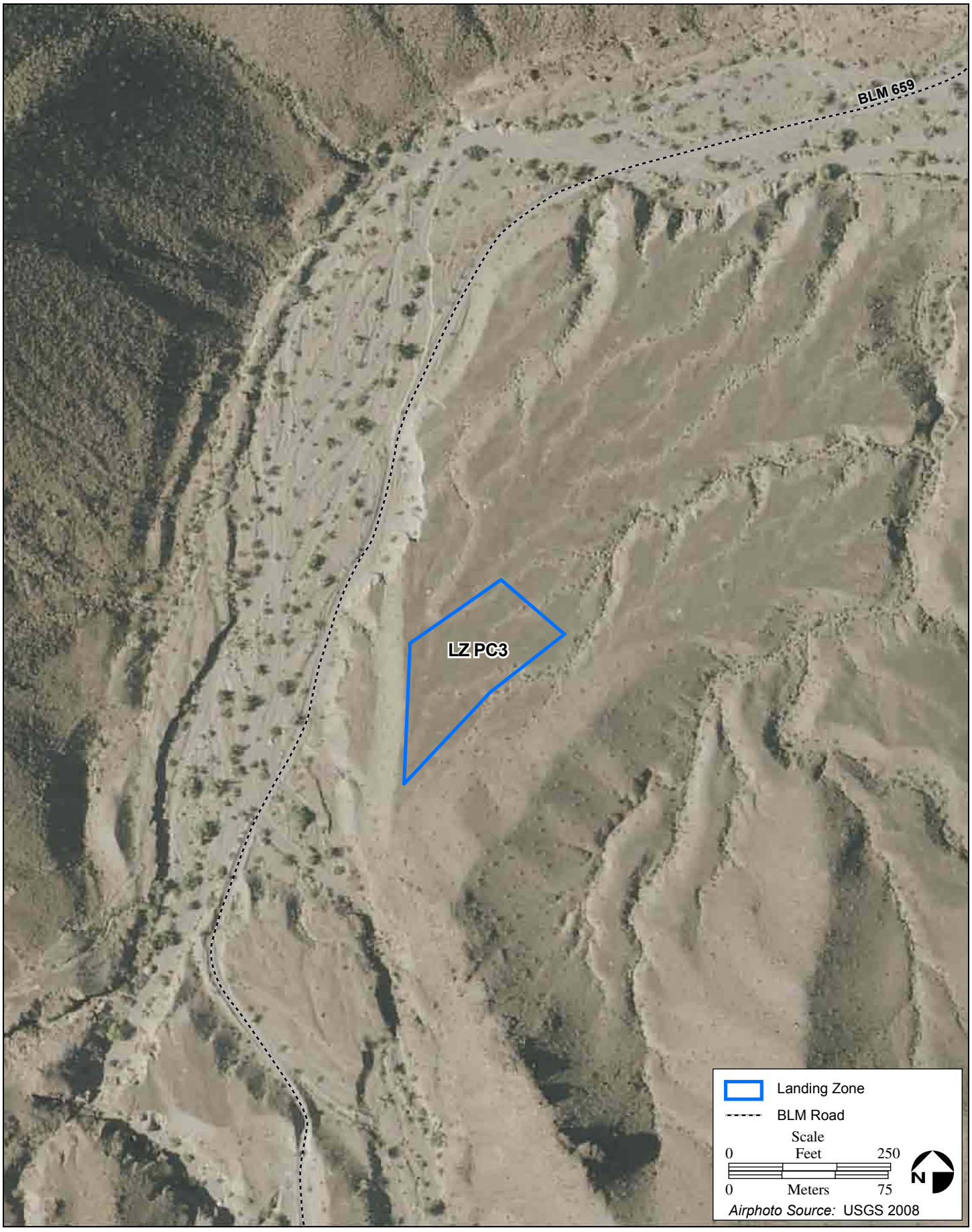


Figure D-19. Aerial View of LZ PC3, BLM El Centro

Figure D-20. Aerial View of LZ Pelican, BLM El Centro

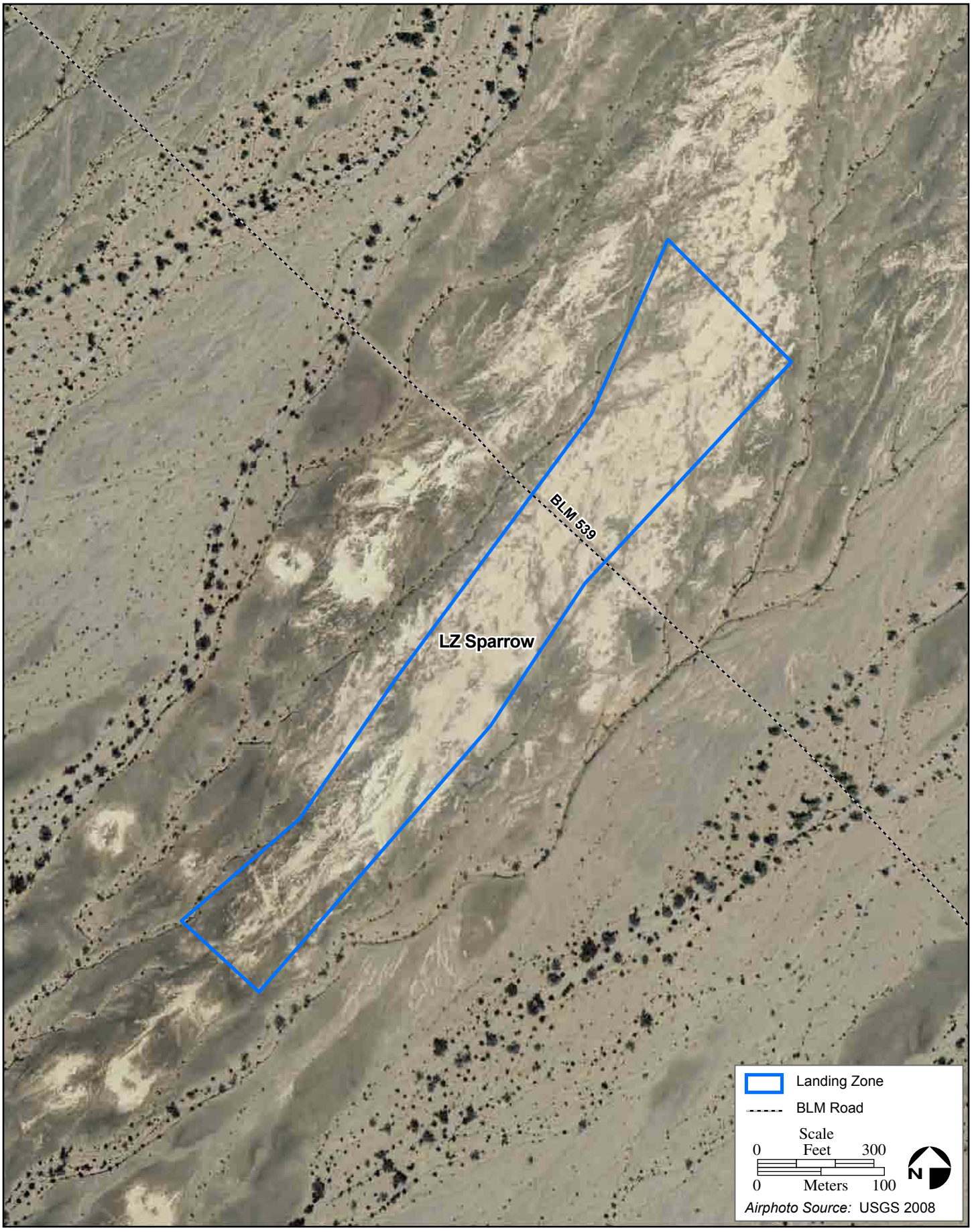


Figure D-21. Aerial View of LZ Sparrow, BLM El Centro

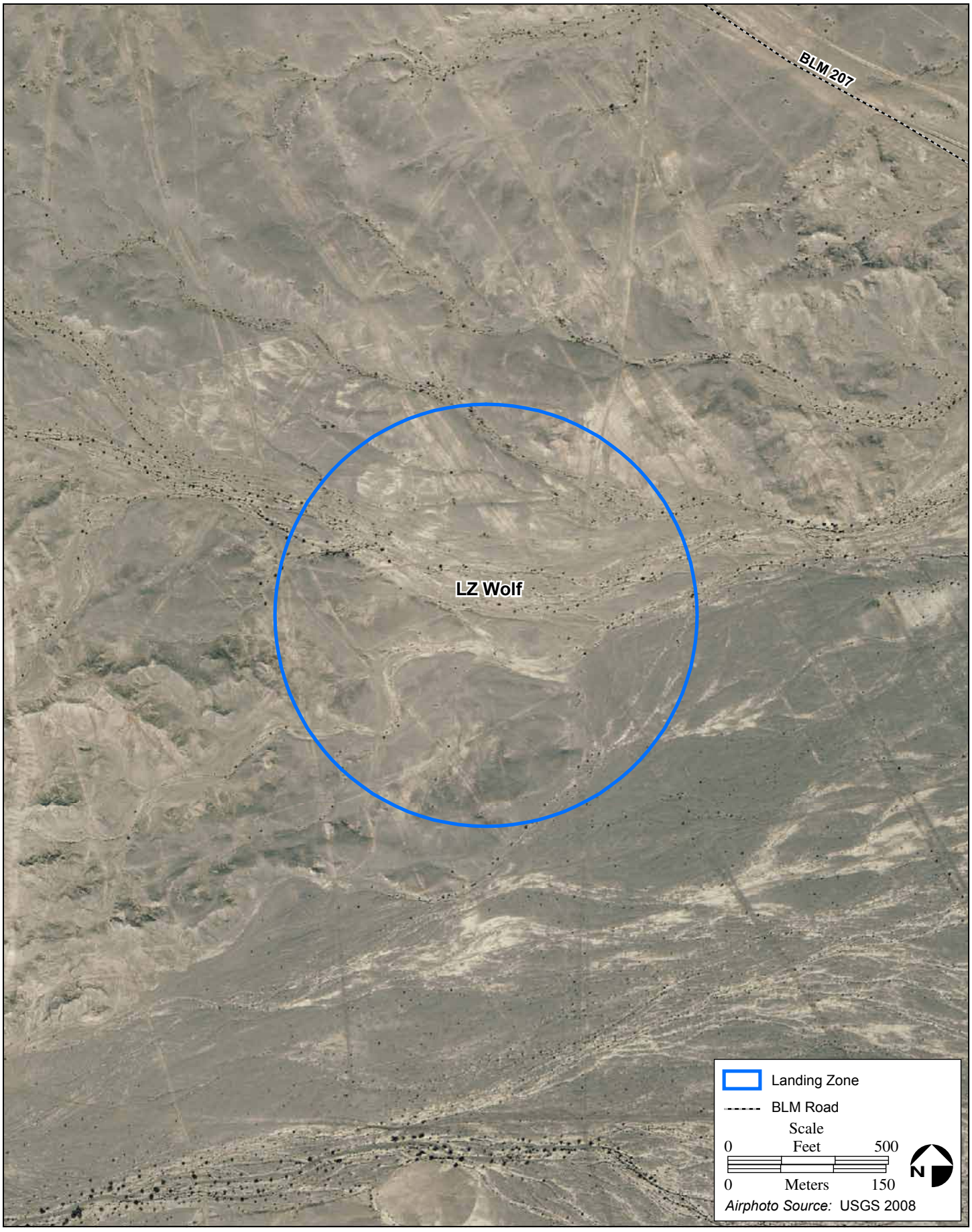


Figure D-22. Aerial View of LZ Wolf, BLM El Centro

APPENDIX E

Risk of Fire from V-22 Exhaust Memo

DEPARTMENT OF THE NAVY
PROGRAM EXECUTIVE OFFICER
AIR ASW ASSAULT AND SPECIAL MISSION PROGRAMS
47123 BUSE ROAD, BLDG 2272, Suite 149
PATUXENT RIVER, MD 20670-1547

IN REPLY REFER TO

Ser PMA-275/V22/357

JUL 21 2008

From: PMA-275 Program Manager
To: Headquarters, Marine Corps,
Department of Aviation, Aviation Logistics Support Branch
3000 Marine Corps, Pentagon Rm 5E518
Washington DC 20350-3000

Subj: RISK OF FIRE FROM V-22 EXHAUST

Ref: (a) Bell Boeing Test Report 901-993-356, Appendix E
(b) NAVAIR Safety Action Record (SAR) 22-02, Grass Fire Due to hot Exhaust

Encl: (1) Excerpt from A1-V22AB-NFM-000 MV-22B NATOPS Flight Manual
(2) U.S. Air Force JOPREP JIFFY report DTG 302000Z MAY 2007
(3) Excerpt from NSWCCD-65-TR-2006/12 March 2006, Structural Evaluation of an LHD-Class Amphibious Ship Flight Deck
Subjected to Exhaust Gas Heat from a MV-22 Osprey Aircraft
(4) Excerpt from National Institute for Standards and Technology (NIST) Technical Note 1481, Ignition of Cellulosic Fuels by Heated and Radiative Surfaces, March 2007

1. To support the transition of the MV-22B Osprey aircraft to the west coast, the program office has been requested to provide information concerning the risk of a grass fire due to the exhaust temperature of the V-22. This letter summarizes the V-22 program office's assessment of that risk.

2. The tiltrotor configuration of the V-22 necessitates that the engine exhaust be directed down with the nacelles in the vertical position. This places the engine exhaust exit 4ft 4in above the ground. To reduce heating of the ground and aircraft components, the V-22 incorporates an exhaust deflector system which directs the exhaust gasses outward, away from the aircraft and the ground. The exhaust deflector system is activated at low power settings with Weight on Wheels, but can be de-selected by the pilot. A temperature profile of V-22 exhaust with the coanda system off is illustrated in enclosure (1). With exhaust deflectors off, the V-22 exhaust temperature at the exit plane is 515 deg F above the ambient temperature decreasing to 150 deg F above ambient temperature at a distance of 4ft 4in below the bottom of the nacelle IR suppressor.

3. To date, there has been one documented grass fire attributed to V-22 exhaust. The fire occurred approximately 10 miles southwest of Troy, Alabama. Enclosure (2) contains the U.S. Air Force JOPREP JIFFY report, similar to a U.S. Marine Corps flash report, detailing the incident. The probable cause of the fire was attributed to an interruption of the exhaust deflector operation. With the exhaust deflector inoperative, the exhaust was directed straight down, increasing the temperature directly below the nacelle to a temperature high enough to support combustion of grass.

4. Testing to measure the effectiveness of the coanda exhaust deflection was performed in 1997. The maximum ground temperature achieved during this testing was 422 deg F (reference a). To quantify the flight deck heating characteristics of V-22 exhaust, with the exhaust defection system operating, testing was conducted aboard USS Wasp in 2005. An instrumented flight deck was constructed to measure deck temperatures for a V-22 with exhaust deflectors operating, at varied engine power settings. A graph of flight deck temperature (in deg F) versus time is presented in enclosure (3). These results show that the flight deck temperature reached 300 deg F approximately 10 minutes after engine start, attained a maximum temperature of 380 deg F 30 minutes after engine start, and remained at 380 deg F for as long as 90 minutes after engine start.

5. Information concerning the combustion temperatures of various plant based materials may be found in NIST Technical Note 1481, Ignition of Cellulosic Fuels by Heated and Radiative Surfaces. This testing was conducted to characterize the ignition behavior of typical outdoor fuels by heated mufflers and catalytic converters found on outdoor power equipment. The fuels tested included shredded newsprint, tall fescue, cheat grass, fine Florida grass, and pine needles. A summary of the test results is presented in enclosure (4), showing time to glowing ignition (in seconds) versus temperature (in deg C) for both no wind and high wind conditions. The figures show glowing ignition is reached at temperatures as low as 572 deg F (300 deg C). This is 150 to 192 deg F above the maximum ground temperatures achieved with exhaust deflectors operating during the 1997 coanda and the 2005 USS Wasp flight deck heating tests.

6. The Naval Air Systems Command (NAVAIR) system safety has also conducted a safety assessment of the risk of a grass fire caused by hot exhaust (reference b). This safety assessment took into account all the information presented above as well as extenuating circumstances such as rigid vegetation extending higher into the exhaust stream and leaking fuel or hydraulic fluid after an extended period with the engines shut down. After taking all of the data and possible circumstances into account, NAVAIR system safety assessed the risk of a grass fire as a remote frequency (> 1 event per million flight hours).

7. The available data indicates, under normal operations, with exhaust deflectors operating, the exhaust of the V-22 should not heat ground to a temperature high enough to support combustion of plant based materials. This conclusion is also consistent with V-22 operational experience. After 44,000 V-22 flight hours and operations to numerous unprepared landing zones at bases and ranges including sites in Alabama, Arizona, California, Florida, Maryland, Nevada, New Mexico, North Carolina, and Virginia, there has been one documented fire with exhaust deflectors inoperative and no documented fires with exhaust deflectors operating.

8. Based on the information available, it is the assessment of PMA-275, that operations to unprepared surfaces can be safely accomplished provided exhaust deflectors are operable. Additional operational mitigations such as avoiding placing rigid vegetation such as bushes and brush directly beneath the nacelle and limiting time the aircraft is on deck in unprepared landing zones will further mitigate this already remote risk.

M.D. MULHERN
COL USMC

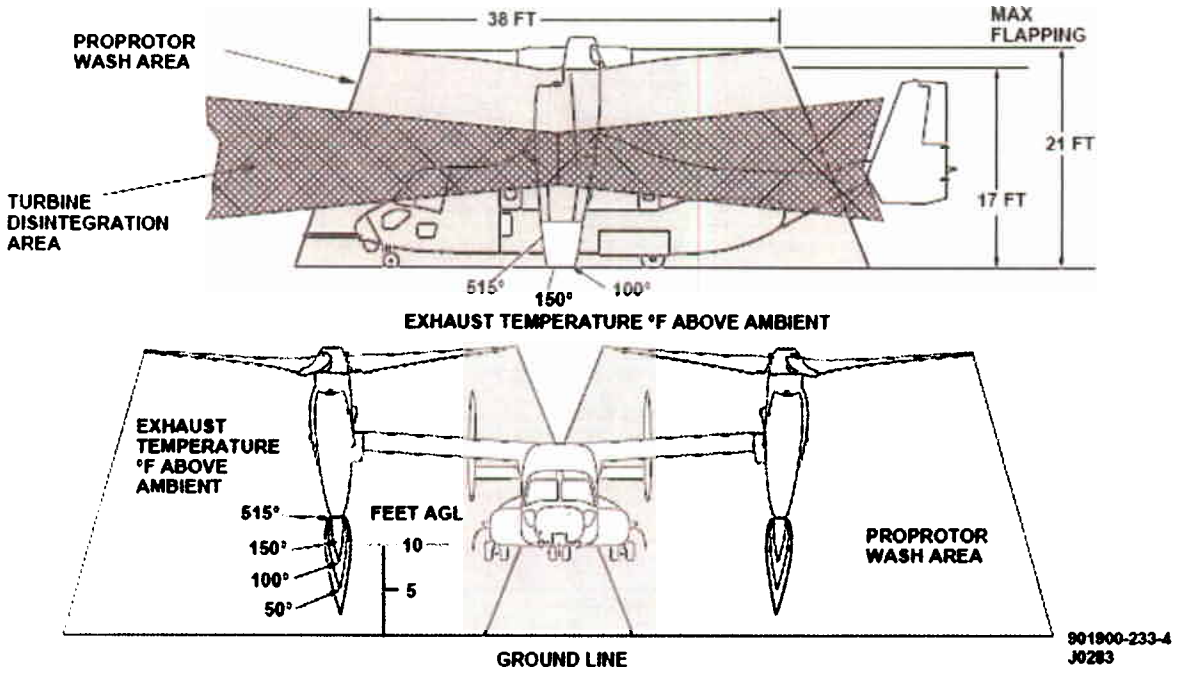


Figure 3-13. Danger Areas
A1-V22AB-NFM-000
NATOPS Flight Manual Navy Model MV-22B Tiltrotor, 1 October 2006

UNCLAS

DTG: 302000Z MAY 2007

FM 1 SOW HURLBURT FIELD FL//CP//

UNCLAS JOPREP JIFFY

MSGID/OPREP-3H/1 SOW/052/MAY//
REF/A/DESC: INITIAL VOICE OPREP-3H REPORT/1 SOW/301951ZMAY2007/052//
FLAGWORD/HOMELINE/-// TIMELOC/300305ZMAY2007/TROY, AL/FINAL//
GENTEXT/INCIDENT IDENTIFICATION AND DETAILS/THE COMMAND POST WAS NOTIFIED AT 300646Z MAY 2007 AND THE COMMANDER APPROVED THE VOICE REPORT AT 301932Z MAY 2007. THE INFORMATION WAS VERIFIED BY THE 8TH SPECIAL OPERATIONS SQUADRON AT 300646Z MAY 2007. A CV-22B, CALL SIGN RAVEN 47, TAIL NUMBER 04-0029 WAS ON A TRAINING MISSION AT A LANDING ZONE (RT392, N31.49.584/W086.10.996) 10NM SOUTHWEST OF TROY, ALABAMA. AT 300305Z MAY 2007, A GRASS FIRE ERRUPTED UNDER THE RIGHT ENGINE EXHAUST SUPRESSOR; THE PROBABLE CAUSE OF THE FIRE WAS DUE TO A MISSION COMPUTER FAILURE INTERRUPTING THE ENGINE EXHAUST DEFLECTOR SYSTEM. THE AIRCREW IMMEDIATELY TOOK OFF AND DETERMINED THAT THE FIRE WAS ONLY ON THE GROUND. RAVEN 47 COORDINATED A WITH LOCAL AIRSPACE CONTROLLING AGENCY FOR A FIRE RESPONSE CREW. ONCE THE FIREFIGHTERS WERE ON SCENE, THE AIRCRAFT RETURNED TO HOME STATION AT 300435Z MAY 2007. RULE 8.8 APPLIES. NO FURTHER INFORMATION AVAILABLE. THIS IS A COMMAND POST FINAL REPORT.//

UNCLAS

Encl (2)

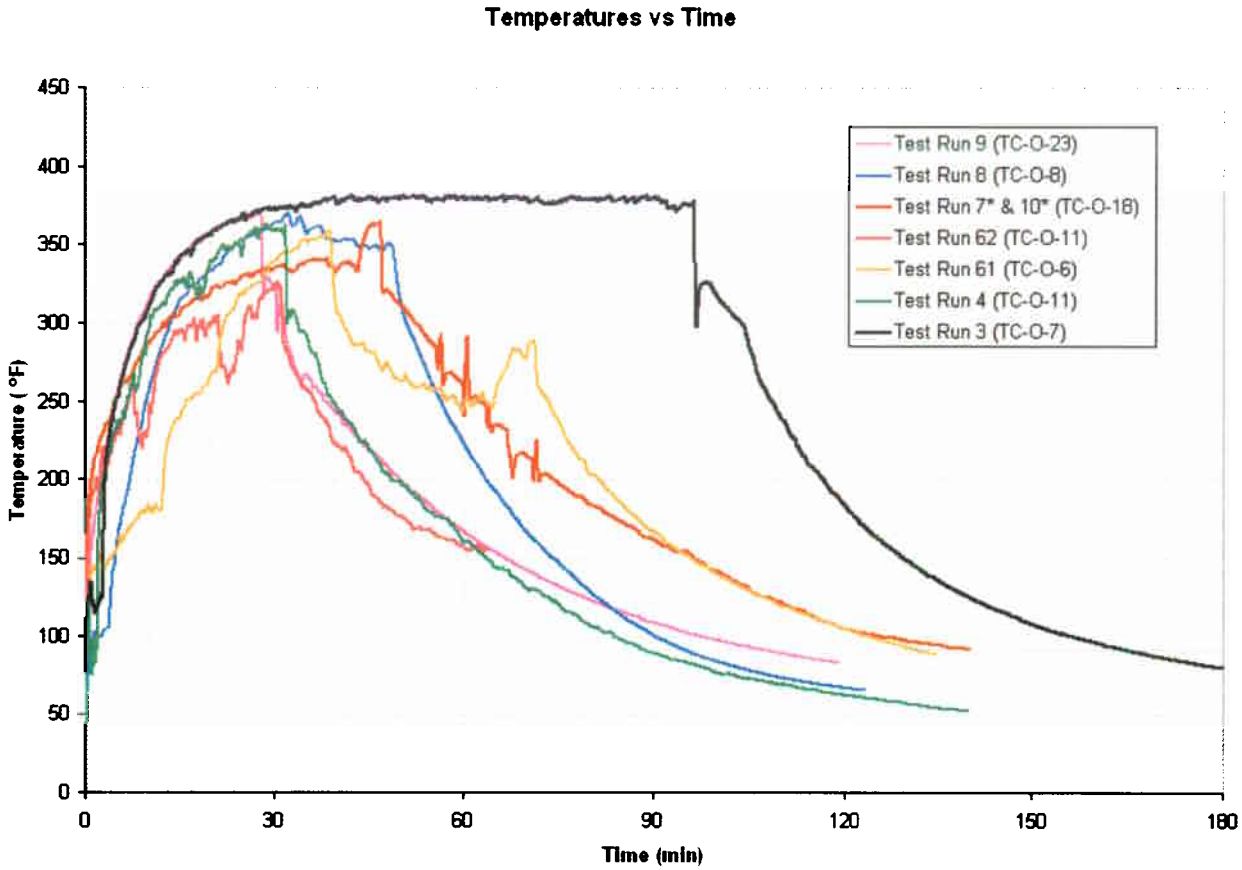


Figure 11. Measured Maximum Temperatures vs. Time (All Tests)

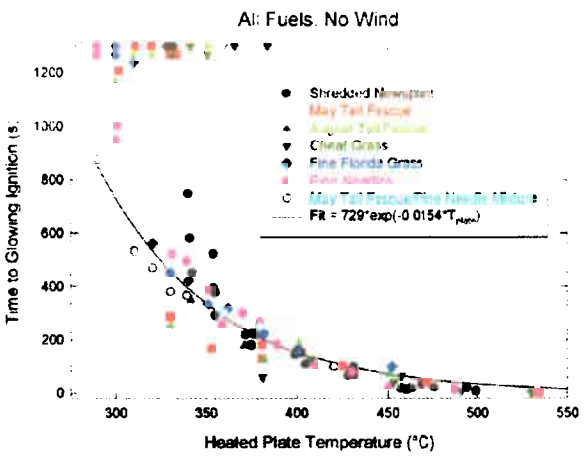


Figure 73. Data for time to glowing ignition with no applied wind are plotted as a function of heated plate temperature for seven fuels. Data near the upper temperature axis represent experiments for which ignition did not take place. The solid curve is the result of a least squares fit assuming an exponential dependence on heated plate temperature for all data where ignition was observed.

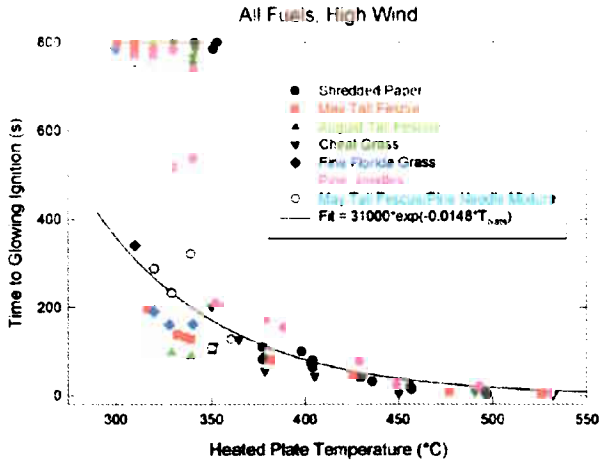


Figure 75. Data for time to glowing ignition with a high applied wind are plotted as a function of heated plate temperature for seven fuels. Data near the upper temperature axis represent experiments for which ignition did not take place. The solid curve is the result of a least squares fit assuming an exponential dependence on heated plate temperature for all data where ignition was observed.

APPENDIX F

Public Draft EA Comments and Public Outreach

APPENDIX F-1

Public Draft EA Comments and Responses

DEPARTMENT OF TRANSPORTATION
DISTRICT 8
PLANNING (MS 725)
464 WEST 4th STREET, 7th FLOOR
SAN BERNARDINO, CA 92401-1400
PHONE (909) 383-4557

Flex your power!
Be energy efficient!

July 12, 2012

Kelley Finn,
NEPA Project Manager
1220 Pacific Highway, Building 1, Central IPT
San Diego, CA 92132

Dear Ms. Finn:

Notice of Availability of Draft Environmental Assessment for U.S. Marine Corps Rotary Wing and Tilt-Rotor Training Operations on Public Lands in Southeastern California | A-1

We have received the Draft Environmental Assessment for the above referenced project, located proposed landing zones within the U.S. Forest Service of Trabuco Ranger District of the Cleveland National Forest and land managed by the Bureau of Land Management El Centro Field Office west of Interstate-15 (I-15) .

Your project does not appear to have impacts to the State Highway System. However, the California Department of Transportation reserves the right to comment on any future revisions to this project.

Should this proposal be later modified please forward copies of revised plans as necessary so that we may reevaluate all proposed changes for potential impact to Interstate-15.

Sincerely,

DANIEL KOPULSKY
Office Chief
Community Planning, IGR/CEQA Review

Department of Toxic Substances Control

Matthew Rodriquez
Secretary for
Environmental Protection

Deborah O. Raphael, Director
5796 Corporate Avenue
Cypress, California 90630

Edmund G. Brown Jr.
Governor

July 17, 2012

Ms. Kelly Finn
Naval Facilities Engineering Command, Southwest
1220 Pacific Highway, Building 1, Central IPT
San Diego, California 92132

NOTICE OF AVAILABILITY OF DRAFT ENVIRONMENTAL ASSESSMENT FOR U.S. MARINE CORPS ROTARY WING AND TILTROTOR TRAINING OPERATIONS ON PUBLIC LANDS IN SOUTHERN CALIFORNIA

Dear Ms. Finn:

The Department of Toxic Substances Control (DTSC) has received your submitted Notice of Preparation of the Environmental Impact Report for the above-mentioned project. The following project description is stated in your document: "The U.S. Marine Corps (Marine Corps), in cooperation with the U.S. Forest Service (USFS), has prepared a Draft Environmental Assessment (EA) to evaluate potential environmental impacts from continued Marine Corps aviation training operations on public lands managed by the USFS Trabuco Ranger District of the Cleveland National Forest and the Bureau of Land Management (BLM) El Centro Field Office. The Marine Corps currently conducts rotary wing (helicopter) operations on these public lands. Proposed operations evaluated in the Draft EA consist of conducting landings and takeoffs in designated areas known as landing zones. Proposed operations would be conducted by the current rotary wing inventory (CH-46E Sea Knight, CH-53E Super Stallion, AH-1W Super Cobra, AH-1Z Viper, UH-1N Huey and UH-1Y Venom), as well as the newly acquired MV-22B Osprey tilt-rotor aircraft. The use of landing zones by Marine Corps rotary wing and tilt -rotor squadrons is needed to develop and sustain critical pilot and crew skills to achieve and maintain required operational training that meet Marine Corps standards for certifications, safety, and combat effectiveness and survivability".

Based on the review of the submitted document DTSC has the following comments:

1) The EIR should evaluate whether conditions within the project area may pose a threat to human health or the environment. Following are the databases of some of the regulatory agencies: B-1

Printed on Recycled Paper

B-1

- National Priorities List (NPL): A list maintained by the United States Environmental Protection Agency (U.S.EPA).
- Envirostor (formerly CalSites): A Database primarily used by the California Department of Toxic Substances Control, accessible through DTSC's website (see below).
- Resource Conservation and Recovery Information System (RCRIS): A database of RCRA facilities that is maintained by U.S. EPA.
- Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS): A database of CERCLA sites that is maintained by U.S.EPA.
- Solid Waste Information System (SWIS): A database provided by the California Integrated Waste Management Board which consists of both open as well as closed and inactive solid waste disposal facilities and transfer stations.
- GeoTracker: A List that is maintained by Regional Water Quality Control Boards.
- Local Counties and Cities maintain lists for hazardous substances cleanup sites and leaking underground storage tanks.
- The United States Army Corps of Engineers, 911 Wilshire Boulevard, Los Angeles, California, 90017, (213) 452-3908, maintains a list of Formerly Used Defense Sites (FUDS).

B-2 2) The EIR should identify the mechanism to initiate any required investigation and/or remediation for any site that may be contaminated, and the government agency to provide appropriate regulatory oversight. If necessary, DTSC would require an oversight agreement in order to review such documents.

B-3 3) Any environmental investigations, sampling and/or remediation for a site should be conducted under a Workplan approved and overseen by a regulatory agency that has jurisdiction to oversee hazardous substance cleanup. The findings of any investigations, including any Phase I or II Environmental Site Assessment Investigations should be summarized in the document. All sampling results in which hazardous substances were found above regulatory standards should be clearly summarized in a table. All closure, certification or remediation approval reports by regulatory agencies should be included in the EIR.

4) If buildings, other structures, asphalt or concrete-paved surface areas are being planned to be demolished, an investigation should also be conducted for the presence of other hazardous chemicals, mercury, and asbestos containing materials (ACMs). If other hazardous chemicals, lead-based paints (LPB) or products, mercury or ACMs are identified, proper precautions should be taken during demolition activities. Additionally, the contaminants should be remediated in compliance with California environmental regulations and policies. B-4

5) Future project construction may require soil excavation or filling in certain areas. Sampling may be required. If soil is contaminated, it must be properly disposed and not simply placed in another location onsite. Land Disposal Restrictions (LDRs) may be applicable to such soils. Also, if the project proposes to import soil to backfill the areas excavated, sampling should be conducted to ensure that the imported soil is free of contamination. B-5

6) Human health and the environment of sensitive receptors should be protected during any construction or demolition activities. If necessary, a health risk assessment overseen and approved by the appropriate government agency should be conducted by a qualified health risk assessor to determine if there are, have been, or will be, any releases of hazardous materials that may pose a risk to human health or the environment. B-6

7) If it is determined that hazardous wastes are, or will be, generated by the proposed operations, the wastes must be managed in accordance with the California Hazardous Waste Control Law (California Health and Safety Code, Division 20, Chapter 6.5) and the Hazardous Waste Control Regulations (California Code of Regulations, Title 22, Division 4.5). If it is determined that hazardous wastes will be generated, the facility should also obtain a United States Environmental Protection Agency Identification Number by contacting (800) 618-6942. Certain hazardous waste treatment processes or hazardous materials, handling, storage or uses may require authorization from the local Certified Unified Program Agency (CUPA). Information about the requirement for authorization can be obtained by contacting your local CUPA. B-7

8) Hazardous substances would be present on the Project site during construction (e.g., fuels and lubricants, wastes from demolition and remediation, paints and solvents). If released, these substances could pose risks to human health and the environment. For example, demolition wastes containing volatile or fluid hazardous wastes, such as PCB-containing oils or residual fuels from abandoned storage tanks, should be contained and packaged in accordance with regulatory requirements and regularly transported to appropriate disposal facilities. B-8

9) DTSC can provide cleanup oversight through an Environmental Oversight Agreement (EOA) for government agencies that are not responsible parties, or a Voluntary Cleanup Agreement (VCA) for private parties. For additional B-9

B-9 information on the EOA or VCA, please see www.dtsc.ca.gov/SiteCleanup/Brownfields, or contact Ms. Maryam Tasnif-Abbasi, DTSC's Voluntary Cleanup Coordinator, at (714) 484-5489.

If you have any questions regarding this letter, please contact me at ashami@dtsc.ca.gov, or by phone at (714) 484-5472.

Sincerely,

Al Shami
Project Manager
Brownfields and Environmental Restoration Program

cc: Governor's Office of Planning and Research
State Clearinghouse
P.O. Box 3044
Sacramento, California 95812-3044
state.clearinghouse@opr.ca.gov

CEQA Tracking Center
Department of Toxic Substances Control
Office of Environmental Planning and Analysis
P.O. Box 806
Sacramento, California 95812
nritter@dtsc.ca.gov

CEQA # 3606

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-6251
Fax (916) 657-5390
Web Site www.nahc.ca.gov
e-mail: ds_nahc@pacbell.net

July 3, 2012

Ms. Kelly Finn, NEPA Project Manager
UNITED STATES NAVY
Department of Defense
1220 Pacific Highway, Building 1, Central IPT
San Diego, CA 92132

Sent by U.S. Mail
No. of Pages: 4

Re: Request of Sacred Lands File & Native American Contacts List, pursuant to 36 CFR Part 800, Protection of Historic Properties (NHPA Section 106; 16 U.S.C. 470 *et* seq) for the **"Draft Environmental Assessment (EA) for the U.S. Marine Corps Rotary Wing and Tilt-Rotor Training Operations on Public Lands in Southern California Project;"** located in the Cleveland National Forest; San Diego and Orange Counties, California.

Dear Ms. Finn:

The Native American Heritage Commission (NAHC) is the California State 'Trustee Agency' pursuant to Public Resources Code §21070 for the protection of California's Native American Cultural Resources. The NAHC is also a 'reviewing agency' for environmental documents prepared under the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 *et seq*), 36 CFR Part 800.3, .5 and are subject to the Tribal and interested Native American consultation as required by the National Historic Preservation Act, as amended (Section 106) (16 U.S.C. 470; Section 106, [4f] 110 [f] [k], 304). The provisions of the Native American Graves Protection and Repatriation Act (NAGPRA) (25 U.S.C. 3001-3013) and its implementation (43 CFR Part 10.2), and California Government Code §27491 may apply to this project if Native American human remains are inadvertently discovered. C-1

The NAHC is of the opinion that the federal standards, pursuant to the above-referenced Acts and the Council on Environmental Quality (CSQ; 42 U.S.C. 4371 *et seq*) are similar to and in many cases more stringent with regard to the 'significance' of historic, including Native American items, and archaeological, including Native American items at least equal to the California Environmental Quality Act (CEQA.). In most cases, federal environmental policy require that any project that causes a substantial adverse change in the significance of an historical resource, that includes archaeological resources, is a 'significant effect' requiring the preparation of an Environmental Impact Statement (EIS).

The NAHC did conduct a Sacred Lands File (SLF) search of its Inventory and Native American cultural resources were not identified in the area you specified (but not at the Point of Entry, but near Pilot Knob further north). Early and quality consultation with the Native American representatives on the attached list may provide detailed information of sites with which they are aware. Also note that the absence of archaeological resources does not preclude their existence, particularly at the subsurface level. C-2

The NAHC Sacred Lands File Inventory of the Native American Heritage Commission is

C-2 established by the California Legislature pursuant to California Public Resources Code §§5097.94(a) and 5097.96. The NAHC Sacred Lands Inventory is populated by submission to the data by Native American tribes and Native American elders. In this way it differs from the California and National Register of Historic Places under the jurisdiction of the U.S. Secretary of the Interior.

C-3 The NAHC, pursuant to Appendix B of the Guidelines to the California Environmental Quality Act (CEQA) is designated as the agency with expertise in the areas of issues of cultural significance to California Native American communities. Also, in the 1985 California Appellate Court decision (170 Cal App 3rd 604), the court held that the NAHC has jurisdiction and special expertise, as a state agency, over affected Native American resources, impacted by proposed projects including archaeological, places of religious significance to Native Americans and burial sites

C-4 Culturally affiliated tribes are to be consulted to determine possible project impacts pursuant to the National Historic Preservation Act, as amended. Early consultation with Native American tribes in your area is the best way to avoid unanticipated discoveries once a project is underway. The NAHC recommends as part of 'due diligence', that you also contact the nearest Information Center of the California Historical Resources Information System (CHRIS) of the State Historic Preservation Office (SHPO) for other possible recorded sites in or near the APE (contact the Office of Historic Preservation at 916-445-7000).

Attached is a list of Native American contacts is attached to assist you pursuanat to Section 800.2(c)(1)(i) and Section 800.2(c)(2); they may have knowledge of cultural resources in the project area. It is advisable to contact the persons listed and seek to establish a 'trust' relationship with them; if they cannot supply you with specific information about the impact on cultural resources, they may be able to refer you to another tribe or person knowledgeable of the cultural resources in or near the affected project area.

C-5 Lead agencies should consider avoidance, in the case of cultural resources that are discovered. A tribe or Native American individual may be the only source of information about a cultural resource; this is consistent with the NHPA (16 U.S.C. 470 *et seq* Sections. 106, 110, and 304) Section 106 Guidelines amended in 2009. Also, federal Executive Orders Nos. 11593 (preservation of cultural environment), 13175 (coordination & consultation) and 13007 (Sacred Sites) are helpful

C-6 NEPA regulations provide for provisions for accidentally discovered archeological resources during construction and mandate the processes to be followed in the event of an accidental discovery of any human remains in a project location other than a 'dedicated cemetery. Even though a discovery may be in federal property, California Government Code §27460 should be followed in the event of an accidental discovery of human remains during any groundbreaking activity; in such cases California Government Code §27491 and California Health & Safety Code §7050.5 will apply and construction cease in the affected area.

If you have any questions about this response to your request, please do not hesitate to contact me at (916) 653-6251.

Sincerely,

Dave Singleton

Cc: State Clearinghouse

Native American Contacts
Imperial, Orange and San Diego Counties
July 3, 2012

La Posta Band of Mission Indians
Gwendolyn Parada, Chairperson
PO Box 1120 Diegueno/Kumeyaay
Boulevard , CA 91905
gparada@lapostacasino.
(619) 478-2113
619-478-2125

Kwaaymii Laguna Band of Mission Indians
Carmen Lucas
P.O. Box 775 Diegueno -
Pine Valley , CA 91962
(619) 709-4207

Manzanita Band of Kumeyaay Nation
Leroy J. Elliott, Chairperson
PO Box 1302 Kumeyaay
Boulevard , CA 91905
ljbirdsinger@aol.com
(619) 766-4930
(619) 766-4957 Fax

Fort Yuma Quechan Indian Nation
Keeny Escalanti, Sr., President
PO Box 1899 Quechan
Yuma , AZ 85366
qitpres@quechantribe.com
(760) 572-0213
(760) 572-2102 FAX

Campo Band of Mission Indians
Ralph Goff, Chairperson
36190 Church Road, Suite 1 Diegueno/Kumeyaay
Campo , CA 91906
chairgoff@aol.com
(619) 478-9046
(619) 478-5818 Fax

Augustine Band of Cahuilla Mission Indians
Mary Ann Green, Chairperson
P.O. Box 849 Cahuilla
Coachella , CA 92236
(760) 398-4722
760-369-7161 - FAX

Torres-Martinez Desert Cahuilla Indians
Mary Resvaloso, Chairperson
PO Box 1160 Cahuilla
Thermal , CA 92274
mresvaloso@torresmartinez.
(760) 397-0300
(760) 397-8146 Fax

Torres-Martinez Desert Cahuilla Indians
Diana L. Chihuahua, Vice Chairperson, Cultural
P.O. Boxt 1160 Cahuilla
Thermal , CA 92274
760) 397-0300, Ext. 1209
(760) 272-9039 - cell (Lisa)
(760) 397-8146 Fax

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable for contacting local Native Americans with regard to cultural resources for the proposed Draft Environmental Assessment (EA) for the U.S. Marine Corps Rotary Wing and Tilt-Rotor Training Operations on Public Lands in Southern California; located in Imperial, Orange and San Diego Counties, California.

Native American Contacts
Imperial, Orange and San Diego Counties
July 3, 2012

Ewiiaapaayp Tribal Office
Will Micklin, Executive Director
4054 Willows Road — Diegueno/Kumeyaay
Alpine , CA 91901
wmicklin@leaningrock.net
(619) 445-6315 - voice
(619) 445-9126 - fax

Ewiiaapaayp Tribal Office
Michael Garcia, Vice Chairperson
4054 Willows Road — Diegueno/Kumeyaay
Alpine , CA 91901
michaelg@leaningrock.net
(619) 445-6315 - voice
(619) 445-9126 - fax

Cocopah Museum/Cultural Resources Dept.
H. Jill McCormick, Tribal Archaeologist
County 15th & Ave. G — Cocopah
Sommerton , AZ 85350
culturalres@cocopah.com
(928) 530-2291 - cell
(928) 627-2280 - fax

Augustine Band of Cahuilla Mission Indians
Karen Kupcha
P.O. Box 849 — Cahuilla
Coachella , CA 92236
(760) 398-4722
916-369-7161 - FAX

Manzanita Band of the Kumeyaay Nation
Nick Elliott, Cultural Resources Coordinator
P.O. Box 1302 — Kumeyaay
Boulevard , CA 91905
nickmepa@yahoo.com
(619) 766-4930
(619) 925-0952 - cell
(919) 766-4957 - FAX

Quenchan Indian Nation
John P. Bathke, THPO
P.O. Box 1899 — Quechan
Yuma , AZ 85366
b.nash@quechantribe.com
(928) 920-6068 - CELL
(760) 572-2423
(760) 572-0515 - FAX

Ah-Mut-Pipa Foundation
Preston J. Arrow-weed
P.O. Box 160 — Quechan
Bard , CA 92222 — Kumeyaay
ahmut@earthlink.net
(928) 388-9456

Inter-Tribal Cultural Resource Protection Council
Frank Brown, Coordinator
240 Brown Road — Diegueno/Kumeyaay
Alpine , CA 91901
frankbrown6928@gmail.com
(619) 884-6437

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable for contacting local Native Americans with regard to cultural resources for the proposed Draft Environmental Assessment (EA) for the U.S. Marine Corps Rotary Wing and Tilt-Rotor Training Operations on Public Lands in Southern California; located in Imperial, Orange and San Diego Counties, California.

Kumeyaay Cultural Repatriation Committee
Bernice Paipa, Vice Spokesperson
1095 Barona Road Diegueno/Kumeyaay
Lakeside , CA 92040
(619) 478-2113
(KCRC is a Colation of 12
Kumeyaay Governments

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable for contacting local Native Americans with regard to cultural resources for the proposed Draft Environmental Assessment (EA) for the U.S. Marine Corps Rotary Wing and Tilt-Rotor Training Operations on Public Lands in Southern California; located in Imperial, Orange and San Diego Counties, California.

Native American Contacts
Imperial, Orange and San Diego Counties
July 3, 2012

Ti'At Society/Inter-Tribal Council of Pimu
Cindi M. Alvitre, Chairwoman-Manisar
3094 Mace Avenue, Apt. B Gabrielino
Costa Mesa, , CA 92626
calvitre@yahoo.com
(714) 504-2468 Cell

Juaneno Band of Mission Indians Acjachemen Nation
Anthony Rivera, Chairman
31411-A La Matanza Street Juaneno
San Juan Capistrano CA 92675-2674
arivera@juaneno.com
(949) 488-3484
(949) 488-3294 - FAX
(530) 354-5876 - cell

Juaneno Band of Mission Indians Acjachemen Nation
David Belardes, Chairperson
32161 Avenida Los Amigos Juaneno
San Juan Capistrano CA 92675 m
chiefdavidbelardes@yahoo.
(949) 493-4933 - home
(949) 293-8522

Juaneno Band of Mission Indians
Alfred Cruz, Cultural Resources Coordinator
P.O. Box 25628 Juaneno
Santa Ana , CA 92799
alfredgcruz@sbcglobal.net
714-998-0721
714-998-0721 - FAX
714-321-1944 - cell

Gabrieleno/Tongva San Gabriel Band of Mission
Anthony Morales, Chairperson
PO Box 693 Gabrielino Tongva
San Gabriel , CA 91778
GTTribalcouncil@aol.com
(626) 286-1632
(626) 286-1758 - Home
(626) 286-1262 -FAX

Juaneno Band of Mission Indians
Adolph 'Bud' Sepulveda, Vice Chairperson
P.O. Box 25828 Juaneno
Santa Ana , CA 92799
bssepul@yahoo.net
714-838-3270
714-914-1812 - CELL
bsepul@yahoo.net

Gabrielino Tongva Nation
Sam Dunlap, Chairperson
P.O. Box 86908 Gabrielino Tongva
Los Angeles , CA 90086
samdunlap@earthlink.net

(909) 262-9351 - cell

United Coalition to Protect Panhe (UCPP)
Rebecca Robles
119 Avenida San Fernando Juaneno
San Clemente CA 92672
rebrobles1@gmail.com
(949) 573-3138

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable for contacting local Native Americans with regard to cultural resources for the proposed Draft Environmental Assessment (EA) for the U.S. Marine Corps Rotary Wing and Tilt-Rotor Training Operations on Public Lands in Southern California; located in Imperial, Orange and San Diego Counties, California.

Juaneno Band of Mission Indians Acjachemen Nation
Joyce Perry, Representing Tribal Chairperson
4955 Paseo Segovia Juaneno
Irvine , CA 92612
949-293-8522

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable for contacting local Native Americans with regard to cultural resources for the proposed Draft Environmental Assessment (EA) for the U.S. Marine Corps Rotary Wing and Tilt-Rotor Training Operations on Public Lands in Southern California; located in Imperial, Orange and San Diego Counties, California.

SOBOBA BAND OF LUISEÑO INDIANS
EST. JUNE 19, 1883

July 26, 2012

Attn: Kelly Finn, NEPA Project Manager
Navel Facilities Engineering Command, Southwest
1220 Pacific Coast Highway
San Diego, CA 92132

Re: Draft Environmental Assessment for U.S. Marine Corps Rotary Wing and Tilt-Rotor Training Operations on Public Lands in Southern California

The Soboba Band of Luiseño Indians appreciates your observance of Tribal Cultural Resources and their preservation in your project. The information provided to us on said project(s) has been assessed through our Cultural Resource Department, where it was concluded that although it is outside the existing reservation, the project area does fall within the bounds of our Tribal Traditional Use Areas. At this time the Soboba Band does not have any immediate concerns with the proposed project. The tribe requests notification of any inadvertent cultural resources discoveries that may be encounter during these operations. D-1

[SPECIAL NOTE (for projects other than cell towers): *If* this project is associated with a city or county specific plan or general plan action it is subject to the provisions of SB18-Tradtional Tribal Cultural Places (law became effective January 1, 2005) and will require the city or county to participate in **formal, government-to-government** consultation with the Tribe. If the city or county are your client, you may wish to make them aware of this requirement. By law, they are required to contact the Tribe.

Sincerely,

Joseph Ontiveros
Soboba Cultural Resource Department
P.O. Box 487
San Jacinto, CA 92581
Phone (951) 654-5544 ext. 4137
Cell (951) 663-5279
jontiveros@soboba-nsn.gov

PALA TRIBAL HISTORIC PRESERVATION OFFICE

PMB 50, 35008 Pala Temecula Road
Pala, CA 92059
760-891-3510 Office | 760-742-3189 Fax

PALA THPO

July 31, 2012

Naval Facilities Engineering Command, Southwest
Attention: Ms. Kelly Finn, NEPA Project Manager
1220 Pacific Highway, Building 1, Central IPT
San Diego, CA 92882

Re: Draft ERA for U.S. Marine Corps Rotary Wing and Tilt-rotor Training Operations

Dear Ms. Finn:

The Pala Band of Mission Indians Tribal Historic Preservation Office has received your notification of the project referenced above. This letter constitutes our response on behalf of Robert Smith, Tribal Chairman. E-1

We have consulted our maps and determined that the project as described is not within the boundaries of the recognized Pala Indian Reservation. It is, however, within the boundaries of the territory that the tribe considers its Traditional Use Area (TUA). Therefore, we request to be kept in the information loop as the project progresses and would appreciate being maintained on the receiving list for project updates, reports of investigations, and/or any documentation that might be generated regarding previously reported or newly discovered sites. Further, we concur with the measures you have suggested for protecting and monitoring known cultural resources within the project APE. If the project boundaries are modified to extend beyond the currently proposed limits, we request updated information and the opportunity to respond to your changes.

We appreciate involvement with your initiative and look forward to working with you on future efforts. If you have questions or need additional information, please do not hesitate to contact me by telephone at 760-891-3515 or by e-mail at sgaughen@palatribe.com.

Sincerely,

Shasta C. Gaughen, PhD
Tribal Historic Preservation Officer
Pala Band of Mission Indians

ATTENTION: THE PALA TRIBAL HISTORIC PRESERVATION OFFICE IS RESPONSIBLE FOR ALL REQUESTS FOR CONSULTATION. PLEASE ADDRESS CORRESPONDENCE TO **SHASTA C. GAUGHEN** AT THE ABOVE ADDRESS. IT IS NOT NECESSARY TO ALSO SEND NOTICES TO PALA TRIBAL CHAIRMAN ROBERT SMITH.

Pendleton

RINCON BAND OF LUISEÑO INDIANS

Culture Committee

Post Office Box 68 · Valley Center, CA 92082 ·
(760) 297-2635 or (760) 297-2622 & Fax:(760) 749-2639

July 31, 2012

Naval Facilities Engineering Command, Southwest
Attn: Ms. Kelly Finn, NEPA Project Manager
1220 Pacific Highway
Building 1, Central IPT
San Diego, CA 92132

Re: Notice of Availability of Draft Environmental Assessment for U.S. Marine Corps Rotary Wing and Tilt-Rotor Training Operations on Public Lands in Southern California

Dear Ms. Kelly Finn,

This letter is written on behalf of the Rincon Band of Luiseño Indians. Thank you for inviting us to submit comments on the above named project. The Rincon Band has concerns for impacts, disturbances, and destruction to historic properties, cultural resources, and findings of significant value that are considered culturally important to the Luiseño people. This is to inform you that some of the identified landing zone locations are situated within the Aboriginal Territory of the Luiseño people, especially those indicated as being within the Trabuco Ranger District. There are numerous known and yet to be discovered cultural sites within our Traditional Use Area, also referred to previously as the Luiseno Aboriginal Territory. F-1

We support the training of U.S. troops, and we are also concerned for the protection of cultural resources, especially any inadvertent archaeological discoveries that could be made or uncovered at the various aircraft landing sites. We do recommend avoidance as a strategy to minimize impacts to known cultural sites close to landing zones. Thus, if a landing zone was found to coincide with a cultural site, we would recommend moving the landing zone locale away to a non-impacting distance so as to avoid damaging the cultural location. We also suggest that you contact the Native American Heritage Commission regarding information on other Tribes in the various project areas. Additionally, we request that you would provide us with updates regarding the project. F-2

If you have any questions, please contact (760) 297-2635. Thank you for this opportunity to protect and preserve our cultural assets.

Sincerely,

Rose Duro
Rincon Culture Committee Chair

Bo Mazzetti, Tribal Chairman · Stephanie Spencer, Vice Chairwoman · Charlie Kolb, Council Member · Steve Stallings, Council Member · Laurie E. Gonzalez, Council Member

ORANGE COUNTY
OC Community Resources
Our Community. Our Commitment.

STEVE FRANKS
DIRECTOR
OC COMMUNITY RESOURCES

RYAN DRABEK
DIRECTOR
OC ANIMAL CARE

KAREN ROPER
DIRECTOR
OC COMMUNITY SERVICES

MARK DENNY
DIRECTOR
OC PARKS

HELEN FRIED
COUNTY LIBRARIAN
OC PUBLIC LIBRARIES

July 17, 2012

Ms. Kelly Finn,
NEPA Project Manager
Naval Facilities Engineering Command, Southwest
1220 Pacific Highway
Building 1, Central IPT
San Diego, CA 92132

Re: Notice of Availability of Draft Environmental Assessment for
U.S. Marine Corps Rotary Wing and Tilt-Rotor Training Operations
Public Lands in Southern California

Dear Ms. Finn:

We appreciate the opportunity to review and comment on the Draft Environmental Assessment regarding the United States Marine Corps' use of rotor and tilt wing aircraft landing zones in the Trabuco Ranger District of the Cleveland National Forest. Orange County Parks (OC Parks) is the primary land owner of the historic Irvine Ranch Open Space (approximately 20,000 acres) in north Orange County, which lie directly adjacent to the northwest end of the Trabuco Ranger District. These lands have been designated by the Interior Department of the United States and by the State of California as a Natural Landmark. The Irvine Ranch Open Space provides the public passive recreational use through scheduled programs in a manner protective of the natural habitat and wildlife. G-1

We realize that the proposed training operations noted in your assessment do not indicate landing areas within the Irvine Ranch Open Space. However, historically the United States Marine Corps, during the operational period of Tustin Marine Corps Air Station and in more recent times from Camp Pendleton and the Miramar Air Station, have utilized several landing zones for training practice in the Fremont and Black Star Canyons of the Irvine Ranch Open Space. These former landing zones and surrounding areas contain many sensitive and threatened plant and animal species that are protected under state and federal law. In addition, the quiet enjoyment of the land provided by the passive recreation would be significantly impacted by aircraft training operations. Due in part to the stated concerns, the historic landing zones within the Irvine Ranch Open Space have been closed to both military and private operations. OC Parks respectfully requests that the training operations plan for the Trabuco Ranger District include information noting that these landing zones within the Irvine Ranch Open Space (and in particular the landing zones in Fremont and Black Star Canyons), are closed and not available for use.

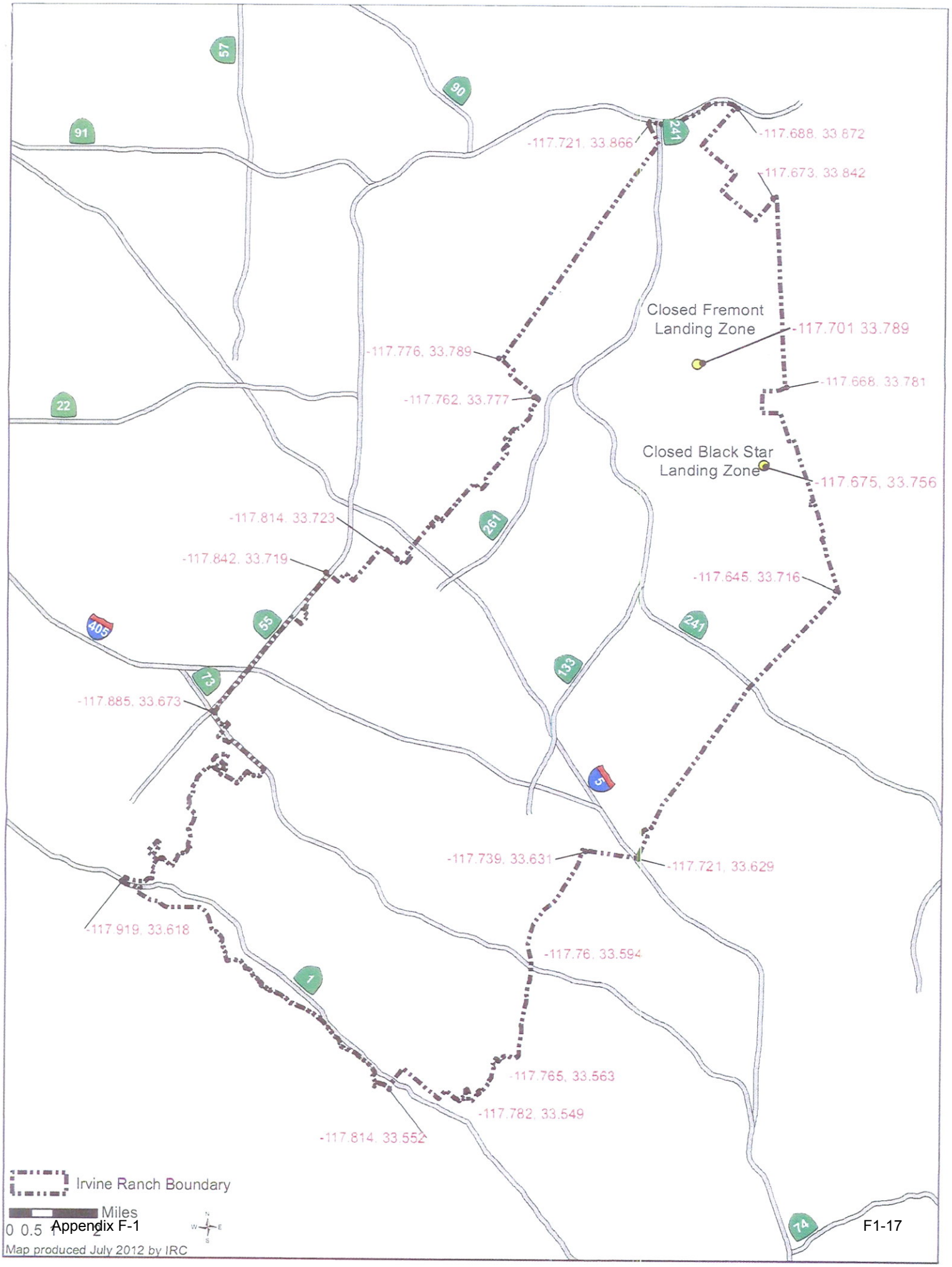
Please see the attached map of the Irvine Ranch Open Space Park. If you have any questions please feel free to contact me.

Sincerely,

Ron Slimm
Supervising Park Ranger
Irvine Ranch Open Space
Orange County Parks
Ron.slimm@ocparks.com
714/920-0177

CC: Barbara Norton, Division Manager
John Gannaway, Division Manager
Irvine Ranch Conservancy

13042 OLD MYFORD ROAD
IRVINE, CA 92602
PHONE: 866.OCPARKS
FAX: 714-667-6511


57
90
91
241
-117.721, 33.866
-117.688, 33.672
-117.673, 33.842
Closed Fremont
Landing Zone
-117.701 33.789
-117.776, 33.789
-117.762, 33.777
-117.668, 33.781
22
Closed Black Star
Landing Zone
-117.675, 33.756
-117.814, 33.723
261
-117.842, 33.719
-117.645, 33.716
405
55
241
73
133
-117.885, 33.673
5
-117.739, 33.631
-117.721, 33.629
-117.919, 33.618
-117.76, 33.594
1
-117.765, 33.563
-117.782, 33.549
-117.814, 33.552
Irvine Ranch Boundary
Miles
0 0.5 1 2
74
Map produced July 2012 by IRC

West Coast Rotary Wing and Tilt-Rotor Training

Home Comment Form

Comments Received

Name	Address	Comment	
Rose Duro	Rincon Band of Luiseno Indians Culture Committee PO BOX 68 Valley Center, CA 92082	July 31, 2012 Naval Facilities Engineering Command, Southwest Attn: Ms. Kelly Finn, NEPA Project Manager 1220 Pacific Highway Building 1, Central IPT San Diego, CA 92132 Re: Notice of Availability of Draft Environmental Assessment for U.S. Marine Corps Rotary Wing and Tilt-Rotor Training Operations on Public Lands in Southern California Dear Ms. Kelly Finn, This letter is written on behalf of the Rincon Band of Luiseño Indians. Thank you for inviting us to submit comments on the above named project. The Rincon Band has concerns for impacts, disturbances, and destruction to historic properties, cultural resources, and findings of significant value that are considered culturally important to the Luiseño people. This is to inform you that some of the identified landing zone locations are situated within the Aboriginal Territory of the Luiseño people, especially those indicated as being within the Trabuco Ranger District. There are numerous known and yet to be discovered cultural sites within our Traditional Use Area, also referred to previously as the Luiseno Aboriginal Territory. We support the training of U.S. troops, and we are also concerned for the protection of cultural resources, especially any inadvertent archaeological discoveries that could be made or uncovered at the various aircraft landing sites. We do recommend avoidance as a strategy to minimize impacts to known cultural sites close to landing zones. Thus, if a landing zone was found to coincide with a cultural site, we would recommend moving the landing zone locale away to a non-impacting distance so as to avoid damaging the cultural location. We also suggest that you contact the Native American Heritage Commission regarding information on other Tribes in the various project areas. Additionally, we request that you would provide us with updates regarding the project. If you have any questions, please contact (760) 297-2635. Thank you for this opportunity to protect and preserve our cultural assets. Sincerely, Rose Duro Rincon Culture Committee Chair	H-1
Kenneth Domer	2127 E. Adams Avenue Orange, California 92867	I have read and reviewed the draft EA for the proposed training operations and am in full support of the proposed training operaitons and designated sites for the landing zones. As a frequent hiker within the Cleveland National Forest, I greatly appreciated the USMC consideration of environmental factors and believe they have developed a more than adequate program in which to protect environmental assets while conducting much needed and critical to our national protection training.	I-1
Gunny Champagne	225 Wake Ave #211 El Centro, CA 92243	Two comments: Off-roaders will, much of the time, be without communications and need prior information of training sites that should be avoided. (2) Coordination with Off-Road-Race committees might be advisable. Semper Fi	J-1

DRAFT ENVIRONMENTAL ASSESSMENT FOR

U.S. MARINE CORPS ROTARY WING AND

TILT-ROTOR TRAINING OPERATIONS

PUBLIC HEARING

WEDNESDAY, JULY 25, 2012

4:30 P.M. TO 8:00 P.M.

REPORTER'S TRANSCRIPT OF PROCEEDINGS

REPORTED BY: MARIE T. MELLGREN, CSR No. 9442

JULY 25, 2012, CORONA, CALIFORNIA

4:30 P.M. TO 8:00 P.M.

MS. RIDENOUR: I would like to commend Karen Foster for answering my questions and Kelly Finn for providing the information that I needed and going out of their way to provide -- I don't know what you call this -- a map, I guess. K-1

Mike Hamilton was very influential with the environmental and archeological information. And I don't know what to call those guys. The Marine pilots were very influential.

And I feel comfortable that this will turn out to be a good project. K-2

How does that sound?

(Proceedings concluded at 8:00 p.m.)

REPORTER'S CERTIFICATE

I, Marie T. Mellgren, a Certified Shorthand Reporter for the State of California, do hereby certify:

That said proceedings was taken before me at the time and place set forth herein and was taken by me in shorthand and thereafter transcribed into typewriting using computer-aided transcription, and I hereby certify that the said deposition is a full, true and correct transcript of my shorthand notes so taken.

I further certify that I am neither counsel for nor related to any party to said action nor in any way interested in the outcome thereof.

IN WITNESS WHEREOF, I have subscribed my name this day of August, 2012.

_____

Marie T. Mellgren
CSR No. 9442

Response to Comments

Letter A - State of California Department of Transportation

Response to Comment A-1. Thank you for your review of the Public Draft Environmental Assessment (EA). If there is a change in the proposed action that may affect the State Highway System, the United States Marine Corps (USMC) will forward copies of the revised action as requested.

Letter B - Department of Toxic Substances Control

Response to Comment B-1. As described in Section 2.3 (*Resource Areas Eliminated from Detailed Consideration*) in the Public Draft EA, the proposed aircraft flight activity would not include new construction or improvements within the Cleveland National Forest or on Bureau of Land Management (BLM) lands; therefore, there would be no storage or removal of hazardous materials and waste. In addition, aircraft would not be maintained or fueled at any landing zone (LZ). Ongoing fueling and maintenance operations would be conducted on Department of Defense-controlled lands (not addressed in this EA); therefore, operational impacts would not occur with respect to hazardous materials in association with proposed aircraft flight activity. Based on these components of the proposed action, impacts due to hazardous materials and waste were considered negligible or non-existent and not analyzed in-depth in the Public Draft EA.

Response to Comment B-2. Environmental investigations, sampling, and/or remediation are not required for the proposed action. Please see response to Comment B-1.

Response to Comment B-3. Environmental investigations, sampling, and/or remediation are not required for the proposed action. Please see response to Comment B-1.

Response to Comment B-4. There are no planned demolitions of buidlings, other structures, asphalt, or concrete-paved surface areas; therefore, no investigations are required.

Response to Comment B-5. The proposed action does not include new construction or demolition activities. Therefore, no soil excavation or imports of fill soil are required.

Response to Comment B-6. This comment is not relevant because the proposed action does not include construction or demolition activities.

Response to Comment B-7. The proposed action would not generate hazardous wastes. Please see response to Comment B-1.

Response to Comment B-8. The proposed action does not include new construction or demolition activities.

Response to Comment B-9. No cleanup activities are anticipated for the proposed action.

Letter C – Native American Heritage Commission

Response to Comment C-1. As described in Section 3.8 (*Cultural Resources*) of the Final EA, the proposed action would have no adverse effect on a historic property or tribal cultural resource, and no significant impacts would occur under the National Environmental Policy Act (NEPA). Therefore, preparation of an Environmental Impact Statement (EIS) is not required.

Response to Comment C-2. Archaeological surveys were conducted for the entire Area of Potential Effects (APE) for both the Cleveland National Forest and BLM lands (SAIC 2011, 2012c). As part of the archaeological survey effort, a request for a Sacred Lands File Search was submitted on 1 June 2011 to the Native American Heritage Commission. A response was received on 16 June 2011, and the results were incorporated into the archaeological survey report. In addition, the USMC, in cooperation with BLM and Untied States Forest Service (USFS), consulted with federally recognized and non-federally recognized Indian tribes affiliated with lands involved in this action (see Section 2.6, *Agency Consultation and Approvals*, and Section 3.8, *Cultural Resources,* of the Final EA). The USMC coordinated with interested groups to determine if any other sensitive cultural sites, besides the archaeological sites located during surveys, are within the APE. No other resources were identified during this consultation effort.

Response to Comment C-3. As a federal undertaking on federal lands, the proposed action is not subject to the California Environmental Quality Act. However, the USMC understands that the Native American Heritage Commission has special expertise on issues concerning California Native American communities.

Response to Comment C-4. As described in Section 2.6 (*Agency Consultation and Approvals)* and Section 3.8 (*Cultural Resources)* of the Final EA, the USMC, in cooperation with BLM and USFS, consulted with federally recognized and non-federally recognized Indian tribes affiliated with lands involved in this action. Seventy-two letters were sent in April 2012 to initiate the consultation process. Responses were received from the Agua Caliente Band of Cahuilla Indians, Augustine Band of Cahuilla Indians, Cabazon Band of Mission Indians, Cocopah Indian Tribe, Pala Band of Mission Indians, Quechan Indian Tribe, Rincon Band of Luiseño Indians, and Soboba Band of Luiseño Indians. The USMC, in cooperation with BLM and USFS, conducted follow-on coordination with interested groups via phone calls, emails, and face-to-face meetings.

Additionally, records and literature searches of the California Historical Resources Information System (CHRIS) were conducted at the South Coastal Information Center, South Central Coastal Information Center, and Eastern Information Center as part of the archaeological investigations associated with the proposed action. A summary of the records searches was provided in the Public Draft EA (Section 3.8, *Cultural Resources)*.

Response to Comment C-5. During consultations with culturally-affiliated tribes, the USMC took into consideration concerns made by groups on potential effects on archaeological resources, and dropped some LZs from further consideration and redesigned two others to minimize impacts on nearby archaeological sites. For example, LZ Canary and LZ PC3 Option, which were addressed in the Public

Draft EA, were subsequently dropped from further consideration at the request of the Quechan Indian Tribe.

The USMC, in cooperation with the USFS and BLM, also consulted with the California State Historic Preservation Office (SHPO) in accordance with 36 Code of Federal Regulations 800, regulations implementing Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended (16 United States Code 70-470x-6). The California SHPO reviewed the proposed undertaking (File No. USMC 120802A) and concurred that the proposed undertaking would have no adverse effect on the identified historic properties.

Response to Comment C-6. The proposed action does not include new construction or demolition activities. The USMC will follow all applicable regulations regarding inadvertent discoveries of human remains.

Letter D – Soboba Band of Luiseño Indians

Response to Comment D-1. Thank you for your review of the Public Draft EA. Per your request, the USMC will notify you of any inadvertent cultural resources discoveries.

Letter E – Pala Tribal Historic Preservation Office

Response to Comment E-1. Thank you for your review of the Public Draft EA. The USMC will keep you on their on-going tribal consultation list, and will notify you of any changes to the proposed action that would extend the project boundaries beyond what is currently proposed.

Letter F – Rincon Band of Luiseño Indians

Response to Comment F-1. Thank you for your review of the Public Draft EA and your support of the U.S. troops. The USMC acknowledges your concerns about the preservation of resources that are culturally-sensitive to the Luiseño people.

Response to Comment F-2. The USMC, in support of this EA, has conducted detailed archaeological surveys of the proposed LZs in the Cleveland National Forest and on BLM lands. This effort included contacting the Native American Heritage Commission in June 2011. The USMC, in cooperation with BLM and USFS, also consulted with federally recognized and non-federally recognized Indian tribes affiliated with lands involved in this action. During consultations with culturally-affiliated tribes, the USMC took into consideration concerns made by groups on potential effects on archaeological resources, and dropped some LZs from further consideration and redesigned two others to avoid adverse effects on nearby archaeological sites. For example, LZ Canary and LZ PC3 Option, which were addressed in the Public Draft EA, were subsequently dropped from further consideration at the request of the Quechan Indian Tribe. As a result, the proposed action would have no adverse effect on a historic property or tribal cultural resource (see Section 3.8, *Cultural Resources,* of the Final EA).

Letter G – Orange County Community Resources

Response to Comment G-1. As indicated in your letter, the proposed training operations are not located within the Irvine Ranch Open Space. The USMC has no plans to use the closed Fremont or Black Star Landing Zones and recognize that they are not available for use at this time.

Letter H – Rincon Band of Luiseño Indians (website comment)

Response to Comment H-1. Please see response to Comments F-1 and F-2.

Letter I – Kenneth Domer (website comment)

Response to Comment I-1. We appreciate your support of the project.

Letter J – Gunny Champagne (website comment)

Response to Comment J-1. Regarding off-road races on BLM lands, BLM would coordinate with the USMC prior to any permitted event that may conflict with USMC activities to ensure that any potential conflicts are avoided. For USFS lands, squadron scheduling personnel would notify Cleveland Emergency Services Dispatch (Cleveland Dispatch) and the Special Use Coordinator to schedule landing operations typically two weeks in advance, which should help deconflict activities. Pilots would also contact the Cleveland Dispatch when checking into and out of the area. Pilots would also perform clearance passes of each LZ before landing, and pilots would not land, or attempt to land, if civilians are present, consistent with standard avoidance measures used to minimize annoyance of persons on the ground. See Section 2.2.1.3 (*Flight Activity within the Cleveland National Forest*) and Section 2.2.1.4 (*Flight Activity within BLM El Centro Managed Lands*) for more information.

Letter K – Ms. Ridenour (oral comment)

Response to Comment K-1. Thank you for your feedback on our public outreach efforts.

Response to Comment K-2. We appreciate your support of the project.

APPENDIX F-2

Public Outreach Summary (August 2012)

U.S. Marine Corps Rotary Wing and Tilt-Rotor Training Operations on Public Lands in Southern California Environmental Assessment

Public Involvement Activities Summary Report August 2012

The U.S. Marine Corps (Marine Corps), in cooperation with the U.S. Forest Service (USFS), conducted public notification and involvement activities in support of the Rotary Wing and Tilt-Rotor Training Operations on Public Lands in Southern California Draft Environmental Assessment (EA). The purpose of these efforts was to actively inform the public, organizations, government agencies, federally recognized tribes and elected officials about the Marine Corps' proposed action and to receive public comments on the accuracy and adequacy of the analysis presented in the Draft EA. The Marine Corps held two open house public meetings in Southern California on 17 and 25 July 2012.

Efforts to notify interested stakeholders about the availability of the Draft EA and the open house public meetings were conducted in accordance with the National Environmental Policy Act (NEPA) and the Public Involvement Plan developed for the Rotary Wing and Tilt-Rotor Operations EA.

This summary report includes detailed information about public notification, involvement and outreach activities conducted by the Marine Corps, in cooperation with the USFS, during the public review and comment period from 02 July 2012 to 31 July 2012.

Summary of Public Scoping Activities

The USFS issued 204 public scoping letters for the proposed action in March 2012 for a 30-day scoping period that ended on 15 April 2012. No comments were received in response to the scoping letters.

Summary of Activities Conducted During Public Comment Period

A. Notification Activities

The following notifications were developed to inform the public of the availability of the Draft EA and open house public meetings.

Notification Letter

A notification letter (Exhibit A), signed by Patrick Christman, Assistant Chief of Staff G-7, was mailed to 369 federal, state and local elected officials, government agencies, tribal chairs and other interested stakeholders on 29 June 2012. The letter provided information about the proposed action, Study Area, project website, commenting channels, and the locations, dates and times of the open house public meetings.

Additionally, 72 letters were sent in April 2012 to initiate the consultation process with federally recognized tribes, and follow-up phone calls were made to each group. The Marine Corps is currently coordinating with interested groups to address their concerns.

Project Website

A project-specific public website was created to provide project-related information, such as fact sheets, posters and notification of the open house public meetings, to the public. It also includes links to electronic versions of the Draft EA and other related official announcements and information. The website was activated concurrently with the release of the Draft EA. The contractor, upon approval, added, and will continue to add, information about the Rotary Wing and Tilt-Rotor Operations EA to the project website, throughout the life of the project. The website address is www.rotarywingnepa.com.

Newspaper Display Advertisements

Display advertisements (Exhibit B) announcing the availability of the Draft EA were published in four local newspapers. The series of display advertisements ran for three consecutive days in *The Orange County Register*, *The Press Enterprise*, the *Imperial Valley Press* and the *Adelante Valle,* a Spanish language newspaper. The ad included information on the proposed action; purpose and need; how to submit comments; open house public meetings, including format, dates, times and locations; and information repository locations. Due to a misprint in the *Orange County Register*, the newspaper ran the advertisement a fourth time at no cost to the Marine Corps.

Table 1: Display Advertisement Run Dates

COVERAGE	NEWSPAPER	DATES OF ADVERTISEMENT
Orange County	*The Orange County Register*	29 June 2012 30 June 2012 1 July 2012 7 July 2012
Riverside and San Bernardino Counties	*The Press-Enterprise*	29 June 2012 30 June 2012 1 July 2012
Imperial County	*Imperial Valley Press*	29 June 2012 30 June 2012 1 July 2012
Imperial County	*Adelante Valle*	29 June 2012 6 July 2012 13 July 2012

News Release

A news release (Exhibit C) was distributed by the Commander, Marine Corps Installations West Public Affairs Office to media outlets, elected officials and other potentially interested parties

concurrently with the release of the Draft EA on 02 July 2012. The news release announced the availability of the Draft EA and included information about the proposed action, purpose and need, public meeting locations, dates and times, project website and comment submittal information.

Postcard Mailer

A postcard mailer (Exhibit D) announcing the availability of the Draft EA, describing the proposed action and purpose and need, and providing information on how to submit comments, the project website and the open house public meeting locations, dates and times was sent to 649 individuals.

Draft EA Distribution

The Draft EA was available for download on the project website, and hard copy (paper) and/or electronic (CD-ROM) format was available to regulatory agencies, elected officials, federally recognized tribes and other interested parties upon request. The Draft EA was also available at the information repositories.

B. Pre-Meeting Training and Public Meeting Dry Run

A 90-minute, pre-meeting training and dry run were held on 17 July 2012 at Southwest High School in El Centro, Calif., to prepare the project team for addressing stakeholder and media inquiries, and interfacing with the public and media at the open house public meetings. A staffing plan (Exhibit E) indicated which team members would be at each poster station. Topics included a review of key messages, rules of engagement, and an overview of the public meeting format and poster stations. The dry run gave staff the opportunity to review poster content and potential questions in preparation for the public meetings.

C. Open House Public Meetings

The two open house public meetings were held at the following locations, dates and times.

Table 2: Open House Public Meeting Information

MEETING LOCATION	VENUE	DATE	TIME
El Centro, Calif.	Central Union High School District Southwest High School Multipurpose Room 2001 Ocotillo Drive	17 July 2012	5 to 8 p.m.
Corona, Calif.	Corona Parks and Community Services Historic Community Room 815 W. Sixth St.	25 July 2012	5 to 8 p.m.

The public meetings were held in an informal open-house format (Figure 1) where members of the public could arrive at any time during the three-hour event. There were no formal presentations or oral comment sessions. Staff members at the welcome station greeted guests

and encouraged meeting attendees to sign in on a sign-in sheet (Exhibit F) to receive project information and future notifications. A bound fact sheet booklet (Exhibit G) and a comment form (Exhibit H) were distributed to attendees, along with verbal direction about the organization and flow of the poster stations around the room.

Fact sheet booklets were provided to all attendees and covered the following topics:

- Poster station overview
- Landing zone map
- Proposed action and alternatives
- Environmental resource areas
- NEPA process and community involvement

For both meetings, a separate two-page Spanish fact sheet (Exhibit I) provided a general overview of the Draft EA and proposed action.

Posters (Exhibit J) covered the following topics:

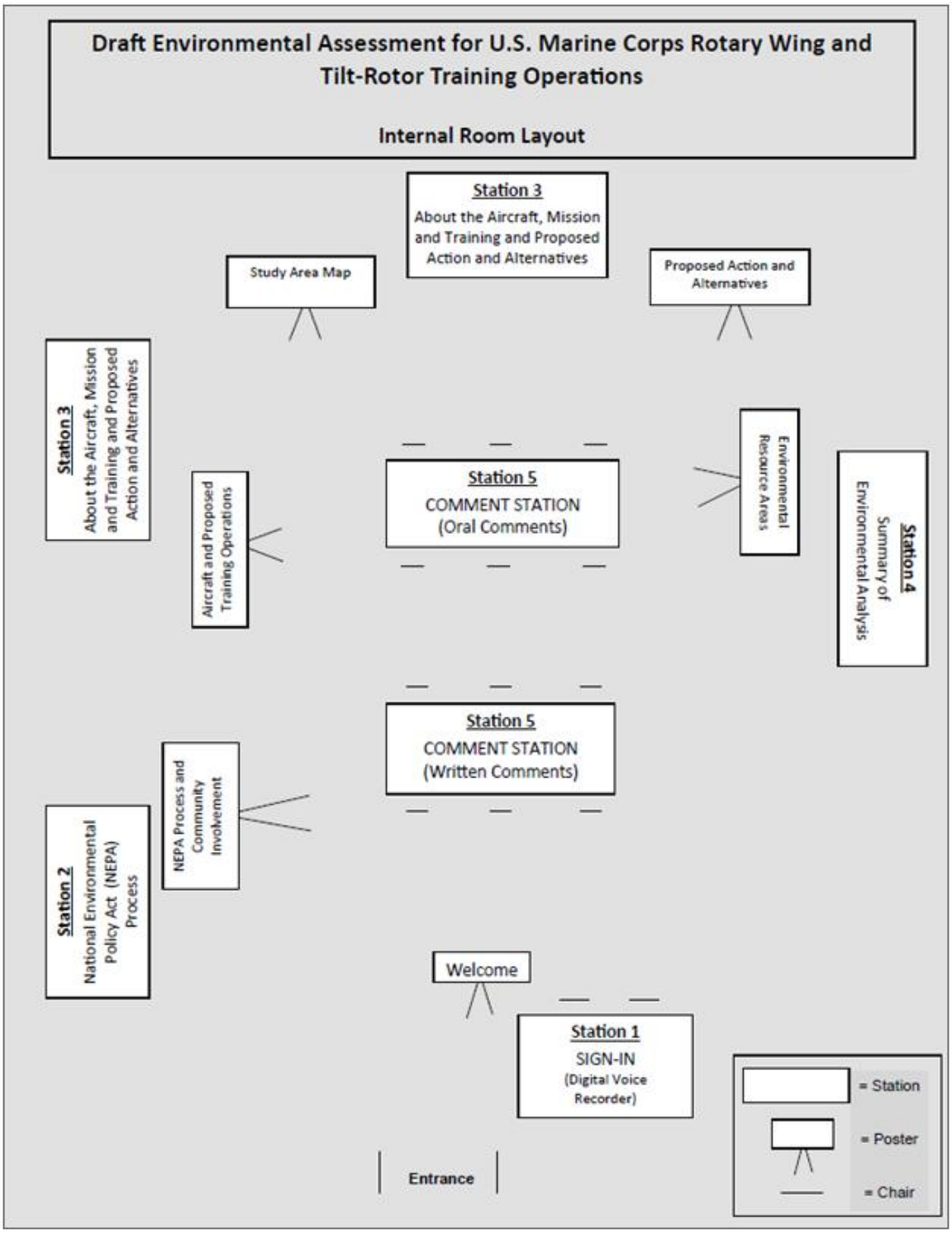
- Welcome
- NEPA process and community involvement
- Aircraft and proposed training operations
- Map of landing zones
- Proposed action and alternatives
- Environmental resource areas

Subject matter experts from the Marine Corps, USFS and contractors staffed each poster station to answer questions and provide project information. Each poster station included at least one poster, the fact sheet booklet and comment forms.

The open house public meetings also included a video demonstration that addressed noise comparisons. The video provided information about noise generated by rotary wing and tilt-rotor aircraft as well as comparisons of aircraft noise to that of daily activities. The video was set up at the environmental resource areas poster station.

A comment collection station, which included tables, chairs, pens, comment forms and a digital voice recorder for oral comments in languages other than English, was also set up to facilitate the submission of written and oral comments from interested members of the public. A court reporter was available to receive oral comments in English. Meeting attendees were encouraged to fill out public comment forms to ensure comments were submitted as part of the official record for the development of the Draft EA. Individuals could submit completed forms at the meetings or mail them to the address provided on the comment form. Attendees were also informed that they could submit comments online via the project website at www.rotarywingnepa.com.

Figure 1. Open House Public Meeting Internal Room Layout



Attendance

Meeting attendees were encouraged to sign in at the welcome table. The information below reflects the number in attendance. In total, eight (8) people attended the open house public meetings.

- El Centro, Calif.: Zero (0) people signed in; there were no media, elected officials, community representatives or interested members of the public in attendance.
- Corona, Calif.: Eight (8) people signed in; local government representation included the treasurer for the city of Corona; military representation included a member from the Los Alamitos Army Airfield.

D. Public Comment Period

The 30-day comment period was from 02 July 2012 to 31 July 2012. A total of ten (10) comments were received: three (3) website comments, one (1) oral comment received during the meetings and six (6) mailed in written comments. Below is a summary of the comments received during this comment period. Table 3 provides a breakdown of areas of public concern based on comments received during the public review and comment period. *The summary is not meant to capture all aspects of the comments or to serve as a legal record.*

Summary of Public Comments Received By Resource Area

Cultural Resources: Comments expressed concern for impacts, disturbances and destruction to historic properties, cultural resources and findings of significant value that are considered culturally important. Avoidance of known cultural sites and consultation with Native American tribes to identify current designated sites was recommended.

Environmental Resources: Comments expressed appreciation to the Marine Corps for consideration of environmental factors and protection of environmental assets.

Public Health and Safety: Comments expressed concern for the need to inform off-roaders beforehand of what training sites should be avoided.

Transportation: The California Department of Transportation provided a comment asking to be informed of any future updates to the EA that would affect Interstate 5.

NEPA Process: Comments expressed appreciation to the team for addressing public concerns and providing additional information when requested.

Table 3: Public Meeting Comment Summary

Issue	Number of times issue raised
Cultural Resources	5
Environmental Resources	1
Public Health and Safety	2
Transportation	1
NEPA Process	1

E. Media Coverage

There were no articles published regarding the Rotary Wing and Tilt-Rotor Operations EA or open house public meetings.

U.S. Marine Corps Rotary Wing and Tilt-Rotor Training Operations

on Public Lands in Southern California

Environmental Assessment

Public Involvement Activities Summary Report
Exhibits
August 2012

Exhibit A - Stakeholder Letter

UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS WEST-MCB CAMP PENDLETON
BOX 555200
CAMP PENDLETON, CALIFORNIA 92055-5200

MCIWEST G-7
3000
29 June 2012

Dear Interested Party:

SUBJECT: NOTICE OF AVAILABILITY OF DRAFT ENVIRONMENTAL ASSESSMENT FOR U.S. MARINE CORPS ROTARY WING AND TILT-ROTOR TRAINING OPERATIONS ON PUBLIC LANDS IN SOUTHERN CALIFORNIA

The U.S. Marine Corps (Marine Corps), in cooperation with the U.S. Forest Service (USFS), has prepared a Draft Environmental Assessment (EA) to evaluate potential environmental impacts from continued Marine Corps aviation training operations on public lands managed by the USFS Trabuco Ranger District of the Cleveland National Forest and the Bureau of Land Management (BLM) El Centro Field Office. The Marine Corps currently conducts rotary wing (helicopter) operations on these public lands. Proposed operations evaluated in the Draft EA consist of conducting landings and takeoffs in designated areas known as landing zones. Proposed operations would be conducted by the current rotary wing inventory (CH-46E Sea Knight, CH-53E Super Stallion, AH-1W Super Cobra, AH-1Z Viper, UH-1N Huey and UH-1Y Venom), as well as the newly acquired MV-22B Osprey tilt-rotor aircraft.

The use of landing zones by Marine Corps rotary wing and tilt-rotor squadrons is needed to develop and sustain critical pilot and crew skills to achieve and maintain required operational training that meet Marine Corps standards for certifications, safety, and combat effectiveness and survivability.

Current Department of Defense installations and ranges are able to fulfill most mission requirements, but they do not offer the full variability needed to simulate real-world conditions and often experience crowded airspace. Continued use of landing zones on USFS- and BLM-managed lands is critical to the quality, variety and quantity of training and the ability of Marine Corps aviation to maintain military readiness. The USFS is a cooperating agency on this action. The Marine Corps is seeking to obtain a special use authorization from the USFS for the use of the National Forest System lands for military activity. The Marine Corps is also coordinating with BLM, although no BLM authorization is needed for the proposed action.

Interested parties are encouraged to submit written comments on the Draft EA during the public comment period, from July 2, 2012, to July 31, 2012. To provide the public with the opportunity to learn more about the proposed action and the Draft EA, the Marine Corps and USFS will host two open house public meetings. There will be no formal presentation. The open house public meetings will be held from 5 to 8 p.m. on the following dates and locations:

Tuesday, July 17, 2012
Southwest High School
Multipurpose Room
2001 Ocotillo Drive
El Centro, CA 92243

Wednesday, July 25, 2012
Corona Parks and Community Services
Historic Community Room
815 W. Sixth St.
Corona, CA 92882

The Marine Corps requests and welcomes comments on the Draft EA. Comments may be submitted online at **www.rotarywingnepa.com** or mailed to:

Naval Facilities Engineering Command, Southwest
Attention: Ms. Kelly Finn, NEPA Project Manager
1220 Pacific Highway, Building 1, Central IPT
San Diego, CA 92132

All written comments must be postmarked or received online by July 31, 2012, for consideration in the Final EA.

To download a copy of the Draft EA, visit the project website at **www.rotarywingnepa.com**. A CD-ROM of the Draft EA can also be sent to you upon request. A copy of the Draft EA is also available at the following public libraries:

Corona Library
650 S. Main St.
Corona, CA 92882

El Centro Library
Community Center Branch
375 S. 1st St.
El Centro, CA 92243

San Juan Capistrano Library
31495 El Camino Real
San Juan Capistrano, CA 92675

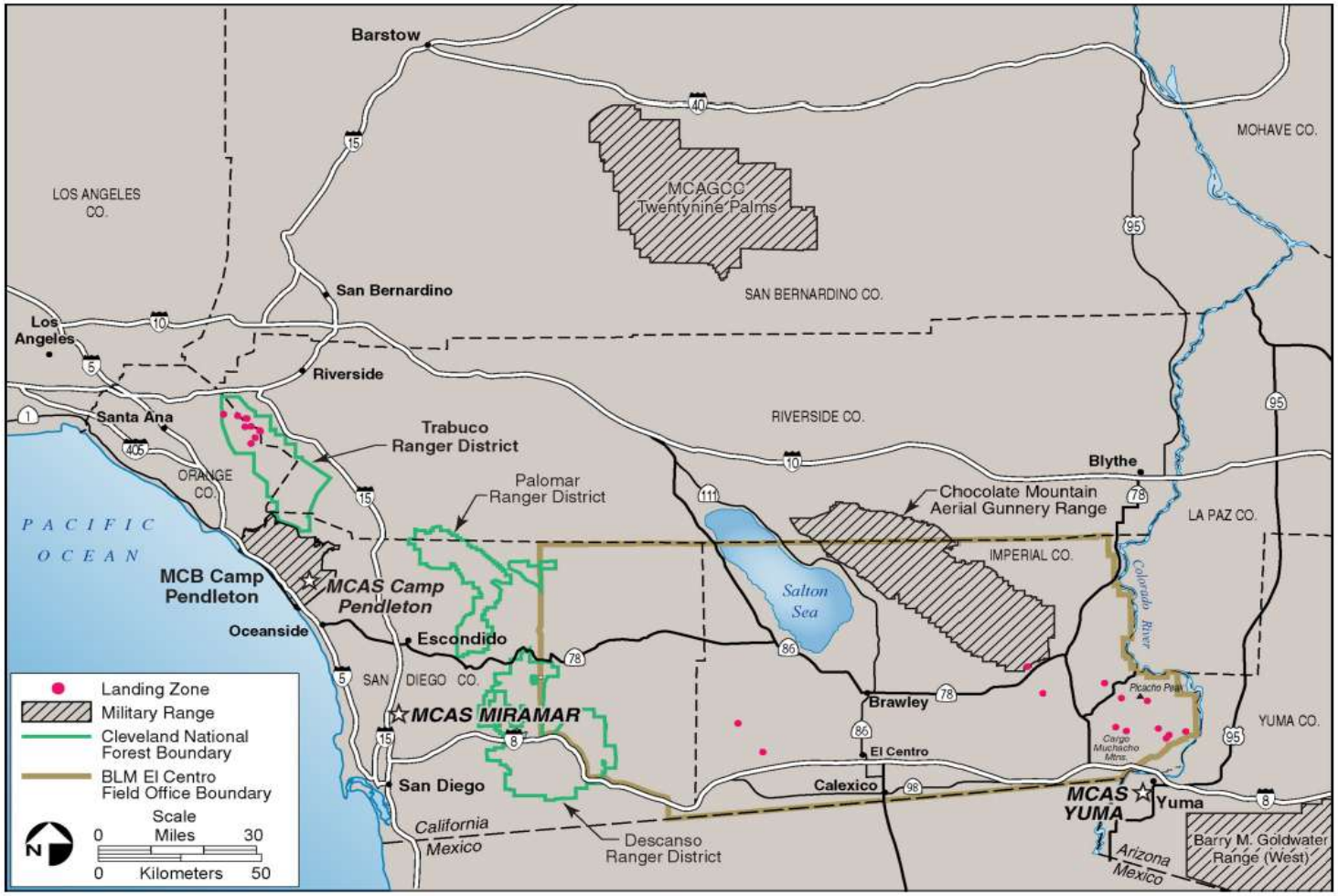
If you have any questions, please contact my project lead, Deputy Director Mike Hamilton at 760-725-2635, email charles.hamilton@usmc.mil.

Sincerely,

Patrick Christman
Assistant Chief of Staff, G-7
Marine Corps Installations West

Enclosure:
(1) Map of proposed landing zones within the USFS Trabuco Ranger District of the Cleveland National Forest and land managed by the BLM El Centro Field Office

3



Enclosure (1) Map of proposed landing zones within the U.S. Forest Service Trabuco Ranger District of the Cleveland National Forest and land managed by the Bureau of Land Management El Centro Field Office.

Exhibit B – Display Advertisement

The U.S. Marine Corps and U.S. Forest Service
PUBLIC NOTICE
Draft Environmental Assessment for Rotary Wing and Tilt-Rotor Training Operations on Public Lands within Southern California

The U.S. Marine Corps, in cooperation with the U.S. Forest Service (USFS), has prepared a Draft Environmental Assessment (EA) to assess potential environmental impacts from continued Marine Corps aviation training operations on public lands within Southern California. Public input is requested on the proposed action, alternatives, and accuracy and adequacy of the Draft EA.

PROPOSED ACTION: The Marine Corps currently conducts rotary wing (helicopter) operations on public lands managed by the USFS Trabuco Ranger District of the Cleveland National Forest and the Bureau of Land Management (BLM) El Centro Field Office. The Marine Corps evaluated the potential effects of continued flight activity on these lands by the current rotary wing inventory (CH-46E Sea Knight, CH-53E Super Stallion, AH-1W Super Cobra, AH-1Z Viper, UH-1N Huey and UH-1Y Venom), as well as the newly acquired MV-22B Osprey tilt-rotor aircraft. The use of these public lands by Marine Corps rotary wing and tilt-rotor squadrons is needed to develop and sustain critical pilot and crew skills to achieve and maintain required operational training that meet Marine Corps standards for certifications, safety and combat effectiveness and survivability. Proposed operations would consist of conducting landings and takeoffs within designated areas known as landing zones. The Marine Corps is seeking to obtain a special use authorization from the USFS for the use of the National Forest System lands for military activity. The Marine Corps is also coordinating with BLM, although no BLM authorization is needed for the proposed action.

The Marine Corps and USFS request your input!

How to Comment on the Draft EA:

- Attend one of the open house public meetings
- Submit comments online at **www.rotarywingnepa.com**
- Mail comments to:
  Naval Facilities Engineering Command, Southwest
  Attention: Ms. Kelly Finn, NEPA Project Manager
  1220 Pacific Highway, Building 1, Central IPT
  San Diego, CA 92132

The Draft EA is available for public review and comment from July 2, 2012 to July 31, 2012.

Comments must be postmarked or received online by July 31, 2012, for consideration in the Final EA.

For more information or to view a copy of the Draft EA, visit **www.rotarywingnepa.com** or the following public libraries: Corona, El Centro Community Center Branch and San Juan Capistrano.

OPEN HOUSE PUBLIC MEETINGS 5 – 8 p.m.

Tuesday, July 17, 2012
Southwest High School
Multipurpose Room
2001 Ocotillo Drive
El Centro, CA 92243

Wednesday, July 25, 2012
Corona Parks and Community Services Historic Community Room
815 W. Sixth St.
Corona, CA 92882

There will be no formal presentation. Project team members will be available at the open house public meetings to answer questions.

Exhibit C – News Release

<<Use MCI West PAO Header>>

NEWS RELEASE

Commander, Marine Corps Installations West
Public Affairs Office

Date:	For Immediate Release on <DATE>
Contact:	Public Affairs Office, Commander, Marine Corps Installations West
Telephone:	<XXX-XXX-XXXX>

U.S. Marine Corps and U.S. Forest Service Invite Public Comment on Draft Environmental Assessment for U.S. Marine Corps Rotary Wing and Tilt-Rotor Training Operations on Public Lands in Southern California

Open House Public Meetings to be Held

SAN DIEGO – The U.S. Marine Corps (Marine Corps), in cooperation with the U.S. Forest Service (USFS), has prepared a Draft Environmental Assessment (EA) to evaluate potential environmental impacts from continued Marine Corps aviation training operations on public lands managed by the USFS Trabuco Ranger District of the Cleveland National Forest and the Bureau of Land Management (BLM) El Centro Field Office. Proposed operations evaluated in the Draft EA consist of conducting landings and takeoffs in designated areas known as landing zones. Proposed operations would be conducted by the current rotary wing (helicopter) inventory (CH-46E Sea Knight, CH-53E Super Stallion, AH-1W Super Cobra, AH-1Z Viper, UH-1N Huey and UH-1Y Venom), as well as the newly acquired MV-22B Osprey tilt-rotor aircraft.

Interested parties may learn more about the Marine Corps and USFS proposed action and the Draft EA at two upcoming open house public meetings. The public may arrive at any time during the hours specified, and while formal presentations will not be made, project team members will be available to answer questions. Written comments from the public on the Draft EA will be accepted at these meetings, as well as by mail and online at **www.rotarywingnepa.com** during the public comment period, from July 2, 2012, to July 31, 2012.

Open House Public Meetings – 5 to 8 p.m.:

Date: **Tuesday, July 17, 2012**
Location: Southwest High School
Multipurpose Room
2001 Ocotillo Drive
El Centro, CA 92243

Date: **Wednesday, July 25, 2012**
Location: Corona Parks and Community Services
Historic Community Room
815 W. Sixth St.
Corona, CA 92882

- MORE -

How to Submit Comments:

Comments can be submitted at the open house public meetings. Interested parties who cannot attend a meeting may submit comments online at **www.rotarywingnepa.com** or mail written comments to:

Naval Facilities Engineering Command, Southwest
Attention: Ms. Kelly Finn, NEPA Project Manager
1220 Pacific Highway, Building 1, Central IPT
San Diego, CA 92132

All comments must be postmarked or received online by July 31, 2012, for consideration in the Final EA.

Proposed Action:

The Marine Corps evaluated the effects of continued flight activity on public lands managed by the USFS Trabuco Ranger District of the Cleveland National Forest and the BLM El Centro Field Office by the existing rotary wing inventory (CH-46E Sea Knight, CH-53E Super Stallion, AH-1W Super Cobra, AH-1Z Viper, UH-1N Huey and UH-1Y Venom), as well as by the newly acquired MV-22B Osprey tilt-rotor aircraft. The use of these public lands by Marine Corps rotary wing and tilt-rotor squadrons is needed to develop and sustain critical pilot and crew skills to achieve and maintain required operational training that meet Marine Corps standards for certifications, safety, and combat effectiveness and survivability.

Proposed operations would consist of conducting landings and takeoffs within designated areas known as landing zones. Continued use of landing zones on these USFS- and BLM-managed lands is critical to the quality, variety and quantity of training and the ability of Marine Corps aviation to maintain military readiness. The USFS is a cooperating agency on this action. The Marine Corps is seeking to obtain a special use authorization from the USFS for the use of the National Forest System lands for military activity. The Marine Corps is also coordinating with BLM, although no BLM authorization is needed for the proposed action.

For More Information:

For more information or to view a copy of the Draft EA, visit **www.rotarywingnepa.com** or one of the following public libraries:

Corona Library
650 S. Main St.
Corona, CA 92882

El Centro Library
Community Center Branch
375 S. 1st St.
El Centro, CA 92243

San Juan Capistrano Library
31495 El Camino Real
San Juan Capistrano, CA 92675

-END-

Exhibit D – Postcard Mailer

Draft Environmental Assessment for U.S. Marine Corps
Rotary Wing and Tilt-Rotor Training Operations
on Public Lands within Southern California

The U.S. Marine Corps and U.S. Forest Service (USFS) invite you to attend an open house public meeting for the Draft Environmental Assessment (EA).

The Marine Corps, in cooperation with the USFS, has prepared a Draft EA to evaluate potential environmental impacts from continued Marine Corps aviation training operations on public lands within Southern California. Public input is requested on the proposed action, alternatives, and accuracy and adequacy of the Draft EA.

Proposed Action

The Marine Corps currently conducts rotary wing (helicopter) operations on public lands managed by the USFS Trabuco Ranger District of the Cleveland National Forest and the Bureau of Land Management (BLM) El Centro Field Office. The Marine Corps evaluated the potential effects of continued flight activity on these lands by existing rotary wing inventory (CH-46E Sea Knight, CH-53E Super Stallion, AH-1W Super Cobra, AH-1Z Viper, UH-1N Huey and UH-1Y Venom), as well as the newly acquired MV-22B Osprey tilt-rotor aircraft.

Proposed operations would consist of conducting landings and takeoffs within designated areas known as landing zones. The continued use of landing zones is needed to develop and sustain critical skills for rotary wing and tilt-rotor aircraft pilots and crew.

The USFS is a cooperating agency on this action. The Marine Corps is seeking to obtain a special use authorization from the USFS for the use of the National Forest System lands for military activity. The Marine Corps is also coordinating with BLM, although no BLM authorization is needed for the proposed action.

All comments must be postmarked or received online by July 31, 2012, for consideration in the Final EA.

THE MARINE CORPS AND USFS REQUEST YOUR INPUT!

- **Attend** either of the two open house meetings to provide comments on the Draft EA. Project team members will be available to discuss the proposed action, alternatives and potential environmental impacts.
- **Visit www.rotarywingnepa.com** to learn more about the project, download a copy of the Draft EA or submit comments.
- **Mail** written comments to: Naval Facilities Engineering Command, Southwest Attention: Ms. Kelly Finn, NEPA Project Manager 1220 Pacific Highway, Building 1, Central IPT San Diego, CA 92132

Open House Public Meetings

5 – 8 p.m.

There will not be a formal presentation. The public is welcome to arrive at any time during the hours specified.

Tuesday, July 17, 2012
Southwest High School
Multipurpose Room
2001 Ocotillo Drive
El Centro, CA 92243

Wednesday, July 25, 2012
Corona Parks and Community Services
Historic Community Room
815 W. Sixth St.
Corona, CA 92882

Naval Facilities Engineering Command, Southwest
Attention: Ms. Kelly Finn,
NEPA Project Manager
1220 Pacific Highway,
Building 1, Central IPT
San Diego, CA 92132

The Draft EA is available for public review and comment from July 2, 2012 to July 31, 2012.
For more information or to view a copy of the Draft EA, visit **www.rotarywingnepa.com** or the following public libraries: Corona, El Centro Community Center Branch and San Juan Capistrano.

Exhibit E - Open House Staffing Plan

Environmental Assessment for
U.S. Marine Corps Rotary Wing and Tilt-Rotor Training Operations on Public Lands within Southern California

Open House Public Meeting Poster Stations and Collateral Materials Plan

Station	Posters	Fact Sheets/ Handouts	Other	Staffers
Station 1: **Welcome and Sign-in**	• 1. Welcome	• Fact Sheet Booklet • Spanish Translated Project Overview Fact Sheet • Poster Station Layout • Comment forms	• Sign-in sheets • (4) Clipboards • Pens • (8) Media kits • (1) Table • (2) Chairs • (1) Easel	**Sign-In Table** Breanna Flanagan (El Centro only) Sarah Rossetto (Corona only) Janessa Werhane (Corona only) **Rovers** Karen Foster **Media Interface** Mike Hamilton
Station 2: **National Environmental Policy Act Process**	• 2. NEPA Process and Community Involvement	• Fact Sheet Booklet • Spanish Translated Project Overview Fact Sheet • Comment forms	• Pens • (1) Table • (4) Chairs • (1) Easel	Kelly Finn [BLM staff] [USFS staff]
Station 3: **About the Aircraft, Mission and Training and Proposed Action and Alternatives**	• 3. Aircraft and Proposed Training Operations • 4. Map of Landing Zones • 5. Proposed Action and Alternatives	• Fact Sheet Booklet • Spanish Translated Project Overview Fact Sheet • Comment forms	• Pens • (2) Tables • (4) Chairs • (3) Easels	Zak Likins Karen Foster Mike Hamilton
Station 4: **Summary of Environmental Impacts**	• 6. Draft Environmental Assessment Findings	• Fact Sheet Booklet • Spanish Translated Project Overview Fact Sheet • Comment forms	• Pens • (1) Table • (2) Chairs • (1) Easel	Chris Crabtree Tara Schoenwetter Troy Schultz (El Centro only) Joe Czech (El Centro only) Patrick Kester (Corona only)

Environmental Assessment for
U.S. Marine Corps Rotary Wing and Tilt-Rotor Training Operations on Public Lands within Southern California

Open House Public Meeting Poster Stations and Collateral Materials Plan

Station	Posters	Fact Sheets/ Handouts	Other	Staffers
Station 5: **Comment Collection Station**	• Comment Table (small table sign)	• Comment forms	• (2) Tables • (6-8) Chairs • Pens • Digital voice recorder • Comment Collection envelope • Tabletop easel • Translated Spanish sign for digital voice recorder	Breanna Flanagan (El Centro only) Sarah Rossetto (Corona only) Janessa Werhane (Corona only) Karen Foster

Exhibit F – Sign-in Sheet

U.S. Marine Corps and U.S. Forest Service
Rotary Wing and Tilt-Rotor Training Operations
Draft Environmental Assessment

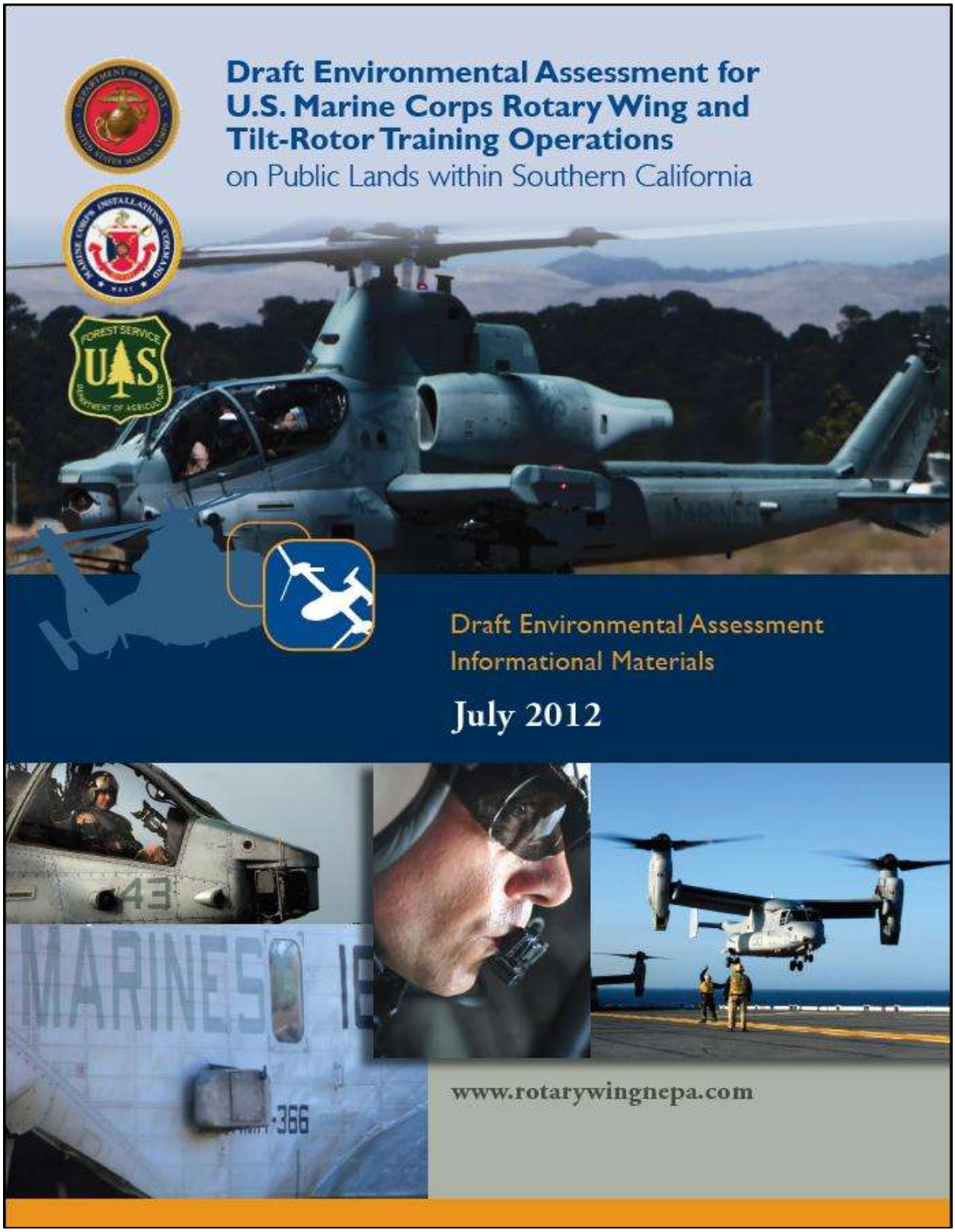
Open House Public Meeting Sign-In Sheet

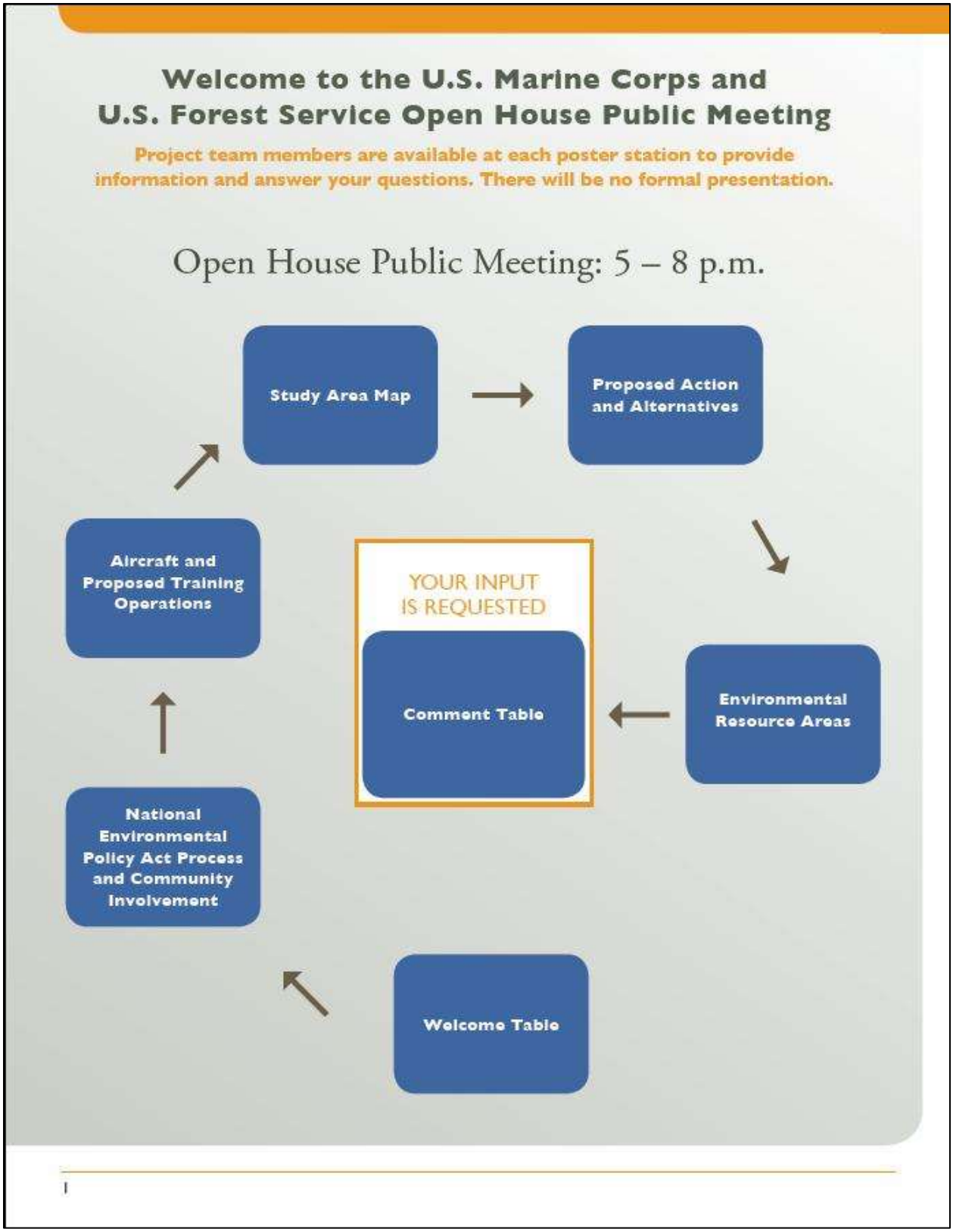
Location: _____ **Date:** _____

Name (please print)	Organization (if applicable)	Would you like to be added to the EA mailing list?	Mailing Address (including city, state and zip)
1.		☐ YES ☐ NO	
2.		☐ YES ☐ NO	
3.		☐ YES ☐ NO	
4.		☐ YES ☐ NO	
5.		☐ YES ☐ NO	
6.		☐ YES ☐ NO	
7.		☐ YES ☐ NO	
8.		☐ YES ☐ NO	
9.		☐ YES ☐ NO	
10.		☐ YES ☐ NO	

For Official Use Only - Privacy Sensitive: Any misuse or unauthorized disclosure may result in both civil or criminal penalties.

Exhibit G - Fact Sheet Booklet




Welcome to the U.S. Marine Corps and
U.S. Forest Service Open House Public Meeting
Project team members are available at each poster station to provide information and answer your questions. There will be no formal presentation.
Open House Public Meeting: 5 – 8 p.m.
Study Area Map
Proposed Action and Alternatives
Aircraft and Proposed Training Operations
YOUR INPUT IS REQUESTED
Comment Table
Environmental Resource Areas
National Environmental Policy Act Process and Community Involvement
Welcome Table

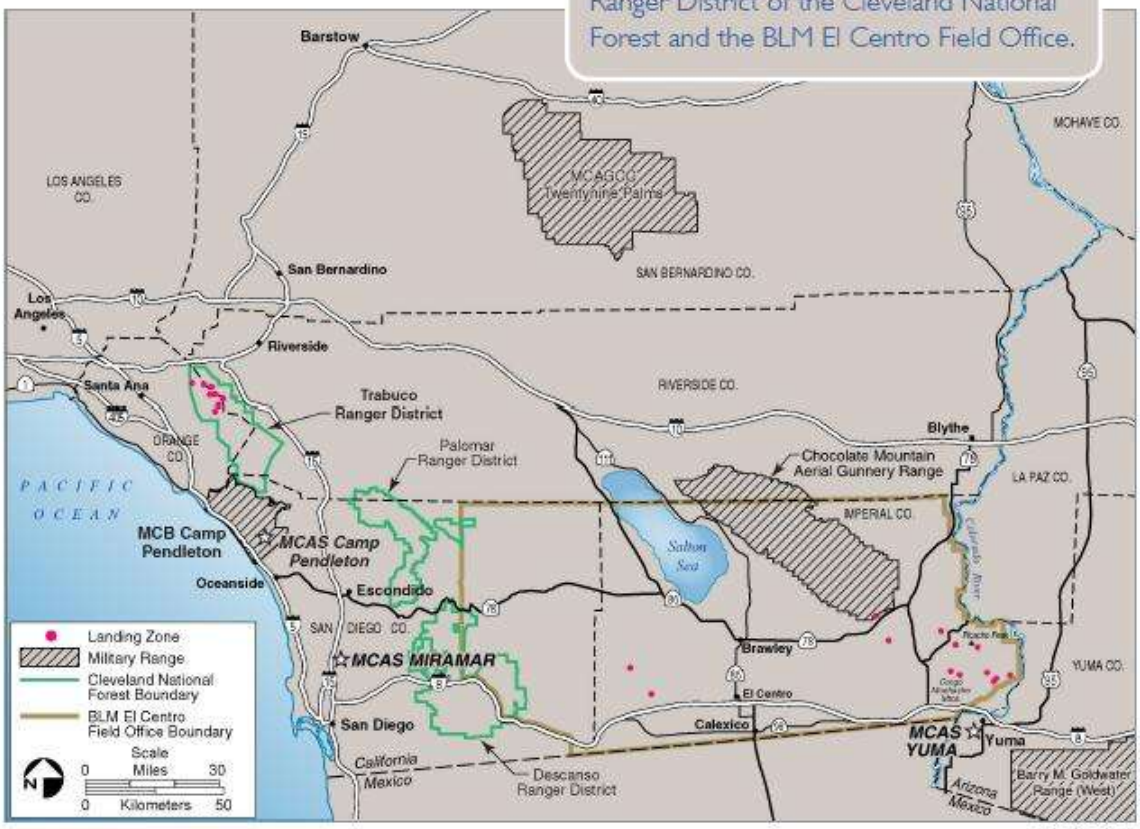
Introduction

The U.S. Marine Corps (Marine Corps), in cooperation with the U.S. Forest Service (USFS), has prepared a Draft Environmental Assessment (EA) to evaluate potential environmental impacts from continued Marine Corps aviation training operations on public lands managed by the USFS and the Bureau of Land Management (BLM).

The USFS is a cooperating agency on this action. A cooperating agency is any agency, other than the lead agency, which has jurisdiction by law or special expertise concerning the proposed action or an environmental impact involved in the proposal. The Marine Corps is seeking to obtain a special use authorization from the USFS for the use of National Forest System lands for continued military activity. The Marine Corps is also coordinating with BLM, although no BLM authorization is needed for the proposed action.

The Marine Corps has been conducting aviation training operations on public lands managed by the USFS and BLM for approximately 40 years. Continued use of the designated landing zones on these lands is critical for maintaining pilot skills and military readiness.

The Marine Corps proposes to conduct landings and takeoffs in designated areas known as "landing zones," using the current inventory of rotary wing aircraft and the newly acquired MV-22B Osprey tilt-rotor aircraft. The landing zones are located in remote areas of Southern California, on public lands managed by the USFS Trabuco Ranger District of the Cleveland National Forest and the BLM El Centro Field Office.



CH-46E Sea Knight

CH-53E Super Stallion

AH-1W Super Cobra

MV-22B Osprey

Rotary wing and tilt-rotor aircraft serve a variety of purposes for the Marine Corps, including:

- Combat and assault support
- Transportation of troops
- Transportation of weapons, equipment and supplies
- Search and rescue
- Offensive air support
- Utility support
- Armed escort and airborne support arms coordination
- Wildfire fighting to assist the USFS

Proposed Action and Alternatives

PROPOSED ACTION

The Marine Corps proposes to continue aviation training operations using designated landing zones located on specific public lands managed by the USFS Trabuco Ranger District of the Cleveland National Forest and the BLM El Centro Field Office.

Under the proposed action, aircraft would continue to originate from Marine Corps Air Station (MCAS) Miramar, MCAS Camp Pendleton or MCAS Yuma and would use existing flight routes to the designated landing zones. Proposed operations would include:

- Conducting landings and takeoffs at designated landing zones
- Practicing "hover-holds" (hovering above a landing zone)
- General navigation/tactical training
- Night vision goggle training

No deployment or recovery of personnel or equipment, and no use of training artillery is proposed.

Proposed training operations would primarily be conducted by the West Coast-based Marine Expeditionary Force, Third Marine Aircraft Wing squadrons based at MCAS Miramar and MCAS Camp Pendleton. Training operations may also originate out of MCAS Yuma, especially during large training exercises. Training would also be conducted by squadrons from other aircraft wings, such as visiting East Coast-based Second Marine Aircraft Wing squadrons or Fourth Marine Aircraft Wing reserve squadrons.

NEED FOR PROPOSED TRAINING OPERATIONS

Military installations and ranges are able to fulfill most mission requirements, but they do not offer the full variability needed to simulate real-world conditions and often experience crowded airspace. The use of landings zones by Marine Corps rotary wing and tilt-rotor squadrons is needed to develop and sustain critical pilot and crew skills to meet Marine Corps standards for certifications, safety, and combat effectiveness and survivability.

ALTERNATIVES

The National Environmental Policy Act (NEPA) process requires the identification and evaluation of a range of reasonable alternatives to the proposed action. After initial analyses of various alternatives, the Marine Corps carried forward one action alternative (Alternative 1) and the No Action Alternative for more in-depth analysis.

Marine Corps pilots and crew must operate in a variety of terrain, climatic conditions and altitudes to meet and maintain high standards of training.

Alternative 1

Alternative 1 would allow for continued military aviation training operations using 10 existing landing zones in the Cleveland National Forest and 15 existing landing zones on BLM El Centro-managed lands for landing and takeoff operations. Specific landing zones were selected based on the following criteria:

- Adequate airspace conditions to support flight operations (e.g., lack of air traffic congestion or airspace restrictions)
- Avoidance of congressionally designated or proposed wilderness areas or U.S. Fish and Wildlife Service-designated critical habitat
- Compatibility with land owner uses and management plans

The Marine Corps proposes to conduct 2,205 individual landings per year within the Cleveland National Forest, and 14,441 individual landings per year on BLM El Centro-managed lands.

No Action Alternative

Under the No Action Alternative, no Marine Corps rotary wing or tilt-rotor operations would occur on public lands managed by the USFS or BLM. Although the No Action Alternative would not meet the purpose of and need for the proposed action, its inclusion enables decision-makers to compare the environmental consequences of Alternative 1.

Environmental Resource Areas

SUMMARY OF ENVIRONMENTAL ANALYSIS

The Marine Corps, in cooperation with the USFS, has evaluated the potential effects that the proposed action may have on the following resource areas:

- Airspace
- Noise
- Land use and recreation
- Air quality
- Topography, geology and soils
- Water resources
- Biological resources
- Cultural resources
- Public health and safety
- Aesthetics

Alternative 1

The Marine Corps' proposed training operations under Alternative 1 are not anticipated to have significant impacts on environmental resources.

No Action Alternative

Under the No Action Alternative, Marine Corps aviation training activities would not take place. However, other agencies may still use the landing zones. Therefore, there may be impacts on resource areas within the vicinity of the landing zones, but impacts would likely be less than current conditions.

National Environmental Policy Act Process and Community Involvement

NEPA PROCESS

The purpose of an Environmental Assessment (EA) is to determine whether a proposed action or its alternatives would have potentially significant impacts on the human, natural or cultural environment. Community involvement is a critical part of the NEPA process, and the public is invited to participate by reviewing and providing comments on the proposed action, alternatives and the environmental analysis in the Draft EA to ensure all relevant issues are addressed.

After the close of the Draft EA public comment period, the Marine Corps will consider all comments and prepare a Final EA. The Marine Corps may respond to the public comments in different ways, such as correcting data, clarifying and modifying analytical approaches, or including additional data or analyses.

If the findings of the Final EA indicate environmental impacts would be significant, the Marine Corps would then prepare an Environmental Impact Statement and conduct additional analyses. If the findings of the Final EA indicate environmental impacts would not be significant, the Marine Corps would prepare a Finding of No Significant Impact (FONSI) documenting the decision made to implement the proposed action. The Final EA/FONSI would then be made available to the public.

For more information about the NEPA process, visit **http://ceq.hss.doe.gov.**

NEPA Process for Environmental Assessments

FOR MORE INFORMATION

For more information or to view a copy of the Draft EA, visit the project website at **www.rotarywingnepa.com** or one of the following public libraries:

- Corona Library
  650 S. Main St.
  Corona, CA 92882
- El Centro Library
  Community Center Branch
  375 S. 1st St.
  El Centro, CA 92243
- San Juan Capistrano Library
  31495 El Camino Real
  San Juan Capistrano, CA 92675

For more information about the Rotary Wing and Tilt-Rotor Training Operations Draft Environmental Assessment, visit www.rotarywingnepa.com.

The public is invited to provide comments on the Draft EA to ensure all relevant issues are addressed.

JULY 2012

Printed on recycled paper

Exhibit H – Comment Form

U.S. Marine Corps and U.S. Forest Service
Rotary Wing and Tilt-Rotor Training Operations
Draft Environmental Assessment

Open House Public Meeting Comment Form

Comments must be postmarked or received online by July 31, 2012, for consideration in the Final Environmental Assessment. Comments may be submitted at the open house public meetings, via the project website at **www.rotarywingnepa.com** or by U.S. Postal Service to the address below.

LOCATION: _____ DATE: _____

Please Print

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

1. NAME: _____
2. ORGANIZATION (if applicable): _____
3. ADDRESS: _____

_____

NOTE: *All comments received by the Marine Corps or Forest Service become part of the public record associated with this proposed project. Accordingly, your comments (including name and address) will be available for review by any person who wishes to review the public record. At your request, your name and address will be withheld to the extent allowed by the Freedom of Information Act or any other law. However, all submissions from organizations or businesses, and individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.*

Please give this completed form to one of the project team representatives or mail by **July 31, 2012**, to:

Naval Facilities Engineering Command, Southwest
ATTENTION: Ms. Kelly Finn, NEPA Project Manager
1220 Pacific Highway, Building 1, Central IPT
San Diego, CA 92132
Online at: www.rotarywingnepa.com

Exhibit I – Spanish Fact Sheet

Borrador de la Evaluación de impacto ambiental de las operaciones de adiestramiento en helicópteros y aeronaves de rotor basculante del Cuerpo de Marines de EE.UU.

en tierras públicas del sur de California

INTRODUCCIÓN

El Cuerpo de Marines de EE.UU. (Marine Corps) junto con el Servicio Forestal de EE.UU. (USFS, por sus siglas en inglés) han preparado un Borrador de evaluación de impacto ambiental (EA, por sus siglas en inglés) para evaluar el posible impacto en el ambiente de las operaciones de adiestramiento continuo de la aviación del Cuerpo de Marines en tierras públicas administradas por el USFS y el Bureau de administración de tierras (BLM, por sus siglas en inglés).

MEDIDAS PROPUESTAS

El Cuerpo de Marines propone continuar con las operaciones de adiestramiento en aviación utilizando zonas de aterrizaje designadas situadas en ciertas tierras administradas por el Distrito de guardaparques Trabucco del Parque Nacional de Cleveland del USFS y El Centro Field Office del BLM.

De conformidad con la medida propuesta, las aeronaves continuarán despegando de las Estaciones Aéreas del Cuerpo de Marines (MCAS, pos sus siglas en inglés) de Miramar, Camp Pendleton o Yuma y utilizarán las rutas aéreas existentes a las zonas de aterrizaje designadas. Las operaciones propuestas incluirán:

- Realizar aterrizajes y despegues en las zonas de aterrizaje designadas.
- Realizar "hover-holds" (sobrevolar a baja altura sobre una zona de aterrizaje)
- Adiestramiento en navegación y táctico en general
- Adiestramiento en el uso de gafas de visión nocturna

No se propone realizar despliegues ni recuperación de personal o equipos, así como tampoco se utilizará artillería de adiestramiento.

NECESIDAD DE LAS OPERACIONES DE ADIESTRAMIENTO PROPUESTAS

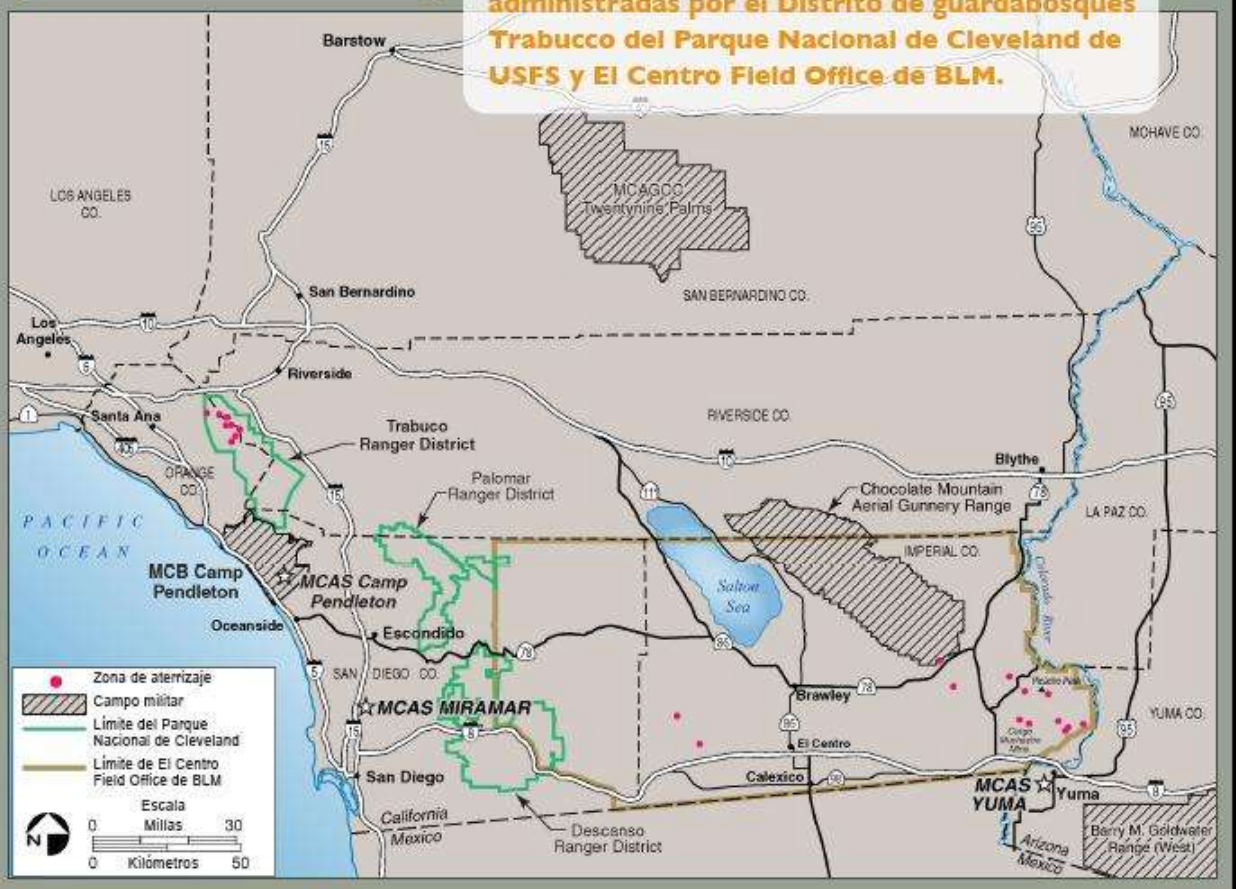
Las instalaciones y campos militares están en condiciones de cumplir la mayoría de los requisitos de la misión, pero no ofrecen la variabilidad completa necesaria para simular las condiciones del mundo real y suelen sufrir los inconvenientes de un espacio aéreo saturado. El uso de las zonas de aterrizaje por los escuadrones de helicópteros y aeronaves de rotor basculante del Cuerpo de Marines es necesario para el desarrollo y mantenimiento de las habilidades de piloto críticas para satisfacer las normas del Cuerpo de Marines respecto de certificaciones, seguridad, eficacia y supervivencia en combate.

ALTERNATIVAS

La Ley de política ambiental nacional exige la identificación y evaluación de una cantidad razonable de alternativas a la medida propuesta. Después de realizar el análisis inicial de varias alternativas, el Cuerpo de Marines presentó una medida alternativa (Alternativa 1) y una Alternativa que contempla no realizar la acción para un análisis más exhaustivo.

El Cuerpo de Marines propone realizar aterrizajes y despegues en las zonas designadas conocidas como "zonas de aterrizaje", utilizando el inventario actual de helicópteros y las recientemente adquiridas aeronaves de rotor basculante MV-22B Osprey. Las zonas de aterrizaje se encuentran en área remotas del sur de California, en tierras públicas administradas por el Distrito de guardabosques Trabucco del Parque Nacional de Cleveland de USFS y El Centro Field Office de BLM.

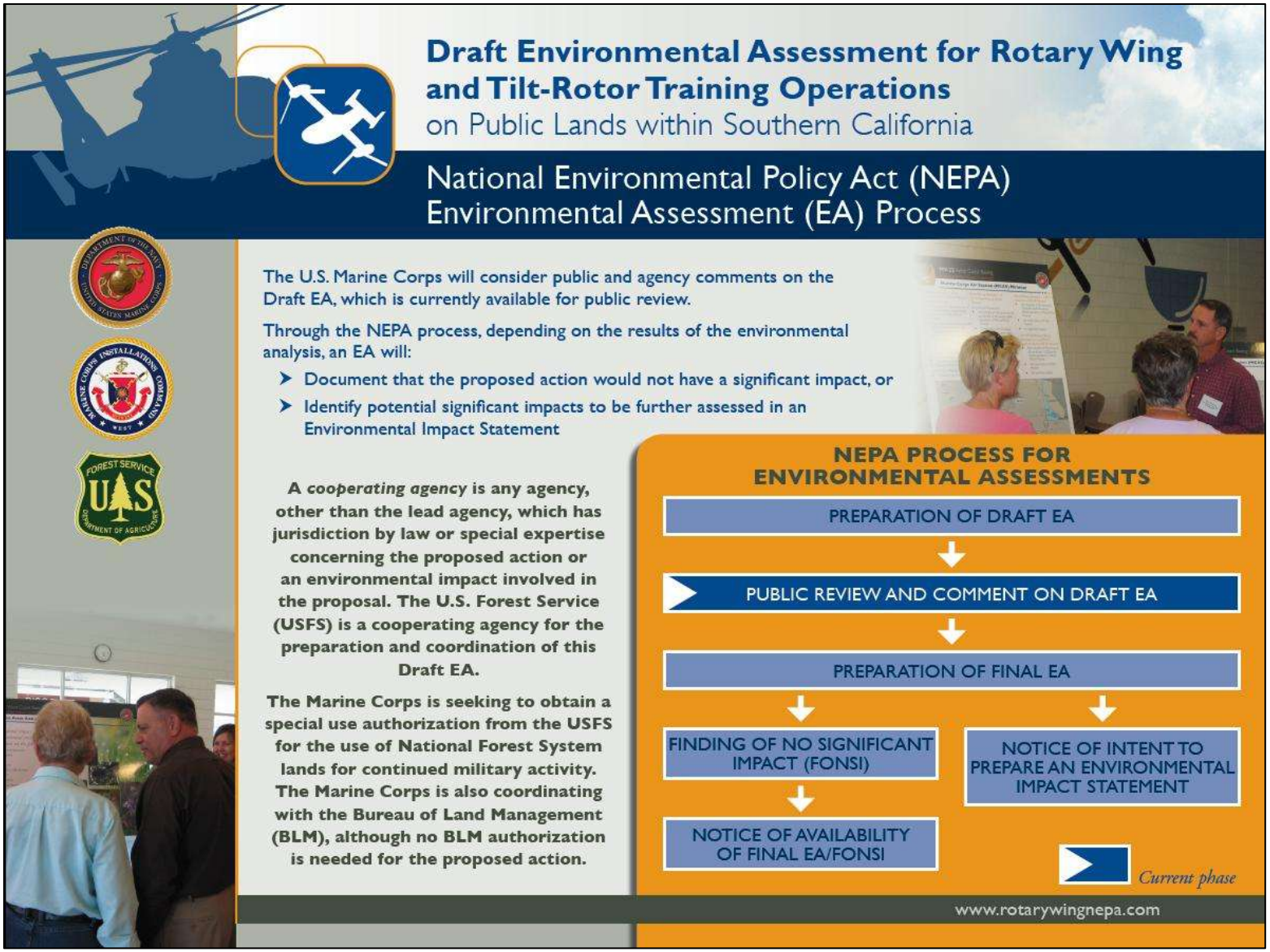
MAPA DEL ÁREA DE ESTUDIO

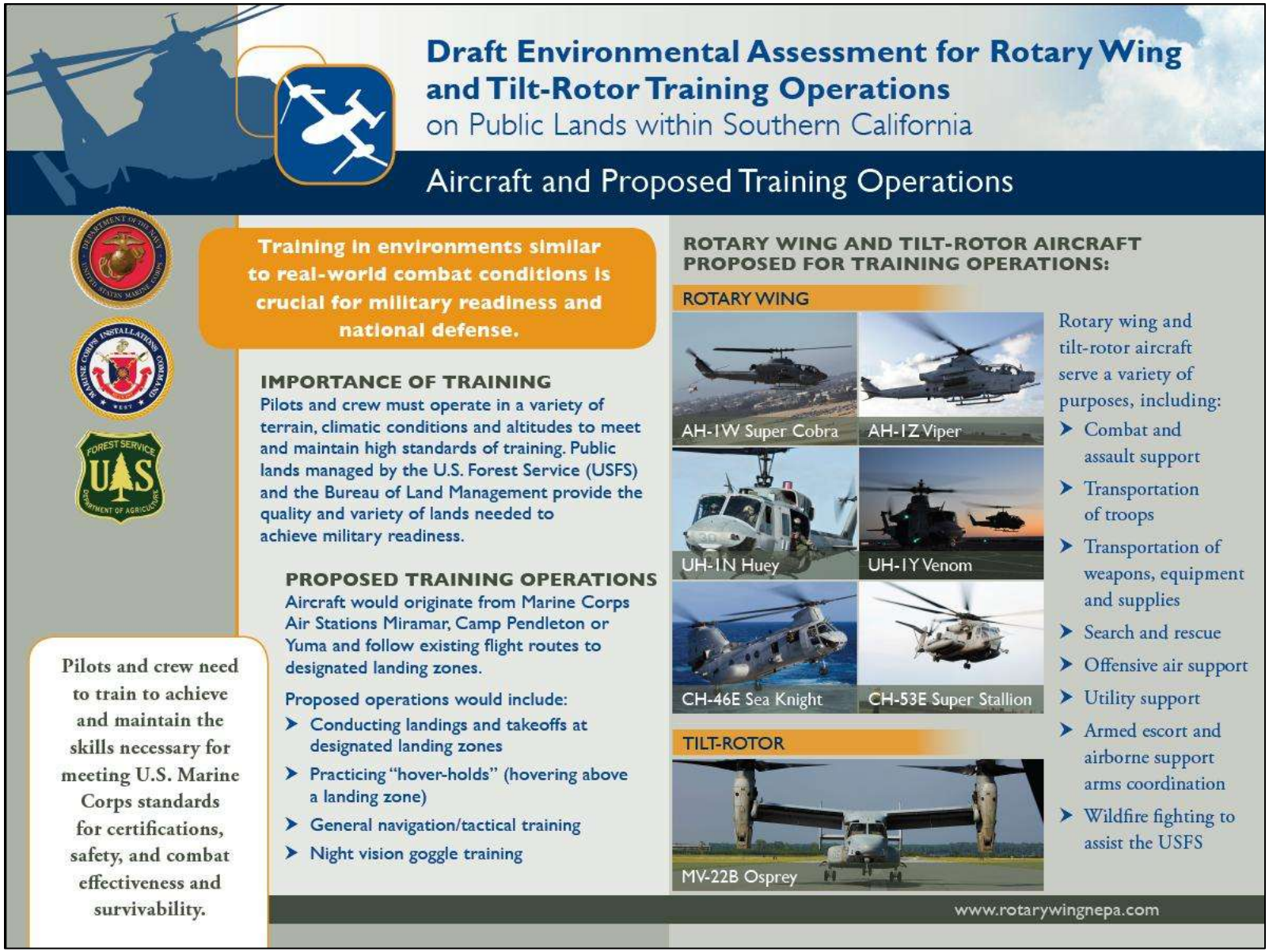


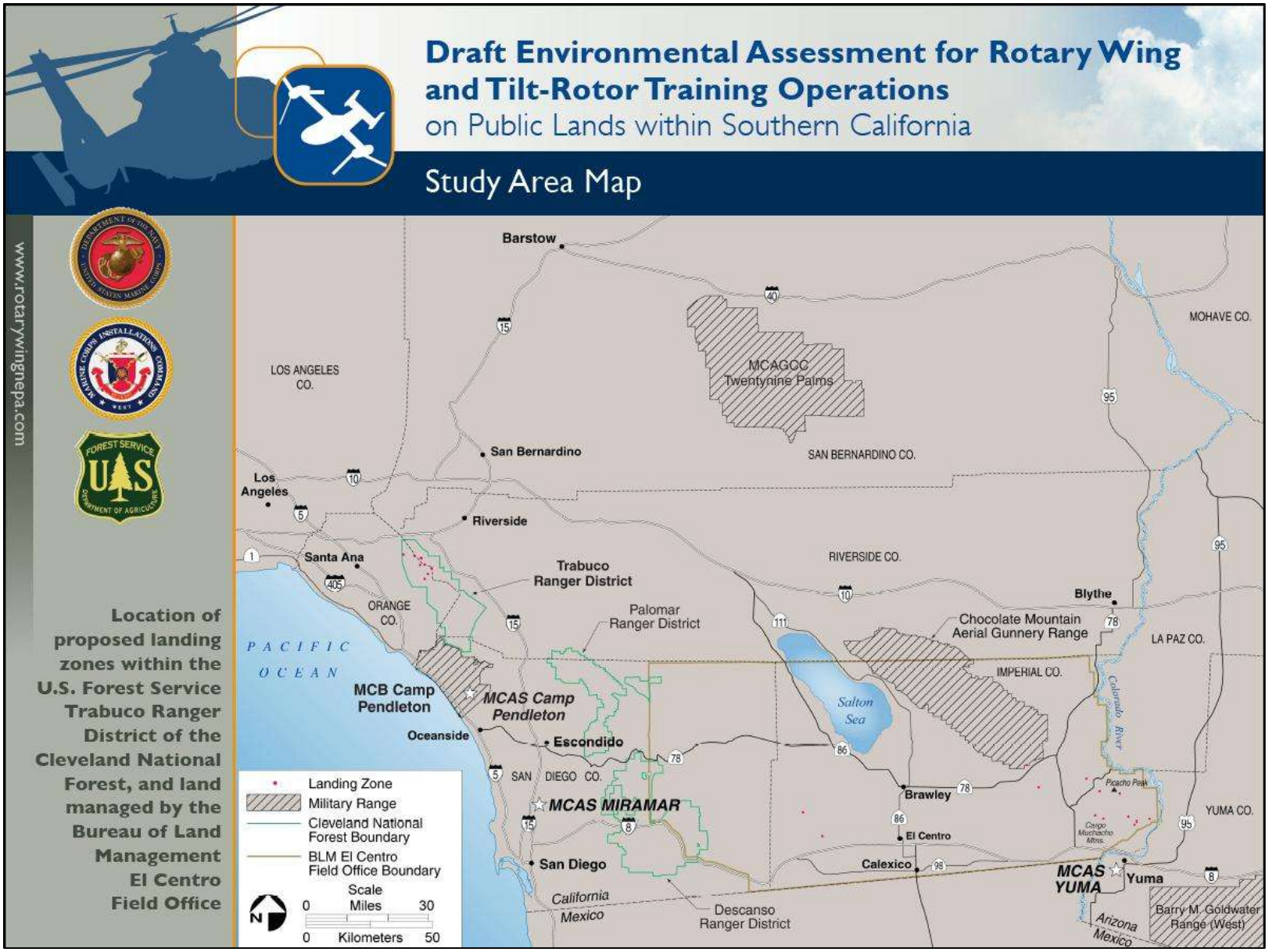
Impreso en papel reciclado
JULIO 2012

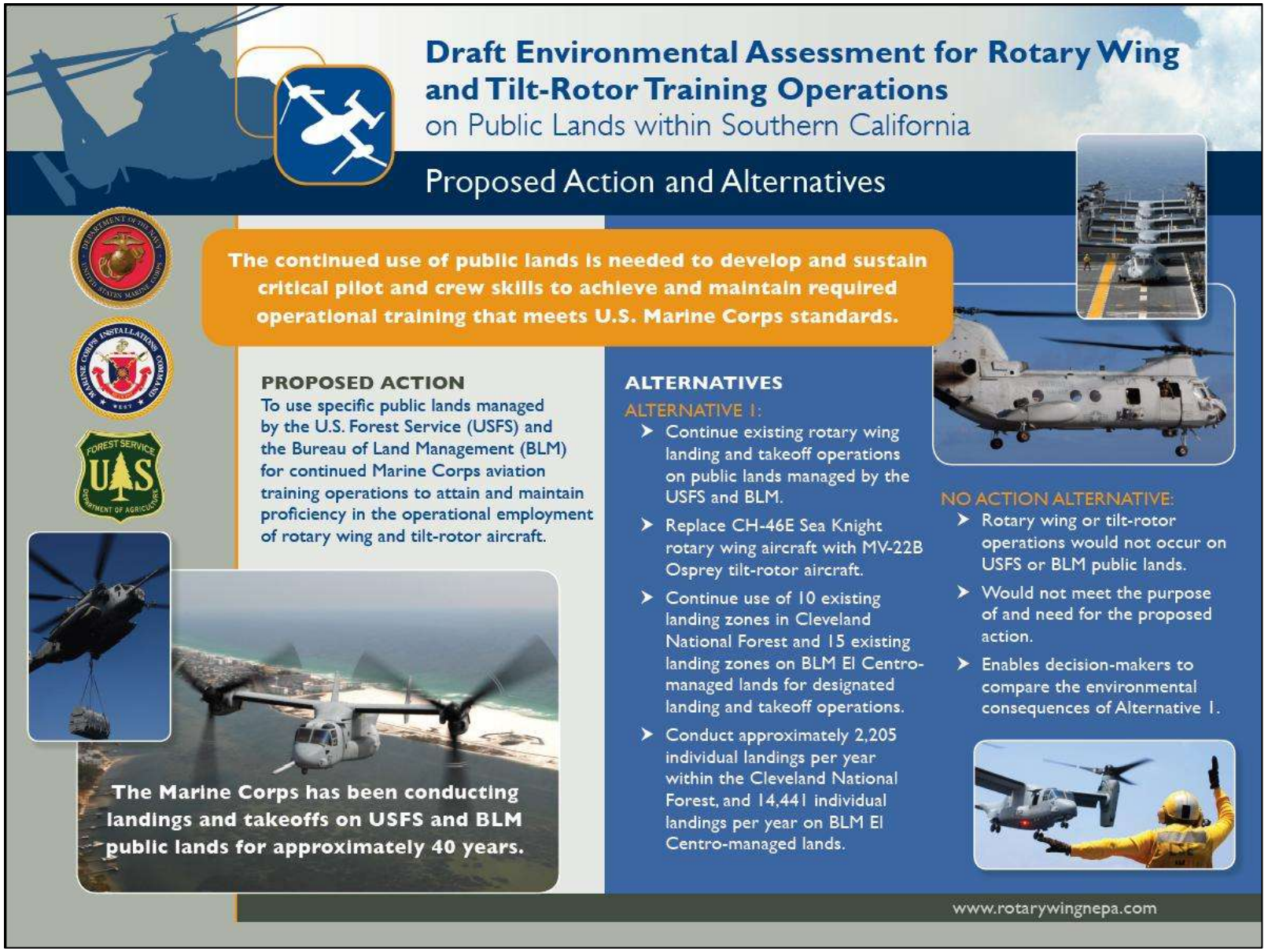
Para obtener más información sobre la Evaluación del impacto ambiental de las operaciones de adiestramiento en helicópteros y aeronaves de rotor basculante, visite www.rotarywingnepa.com.

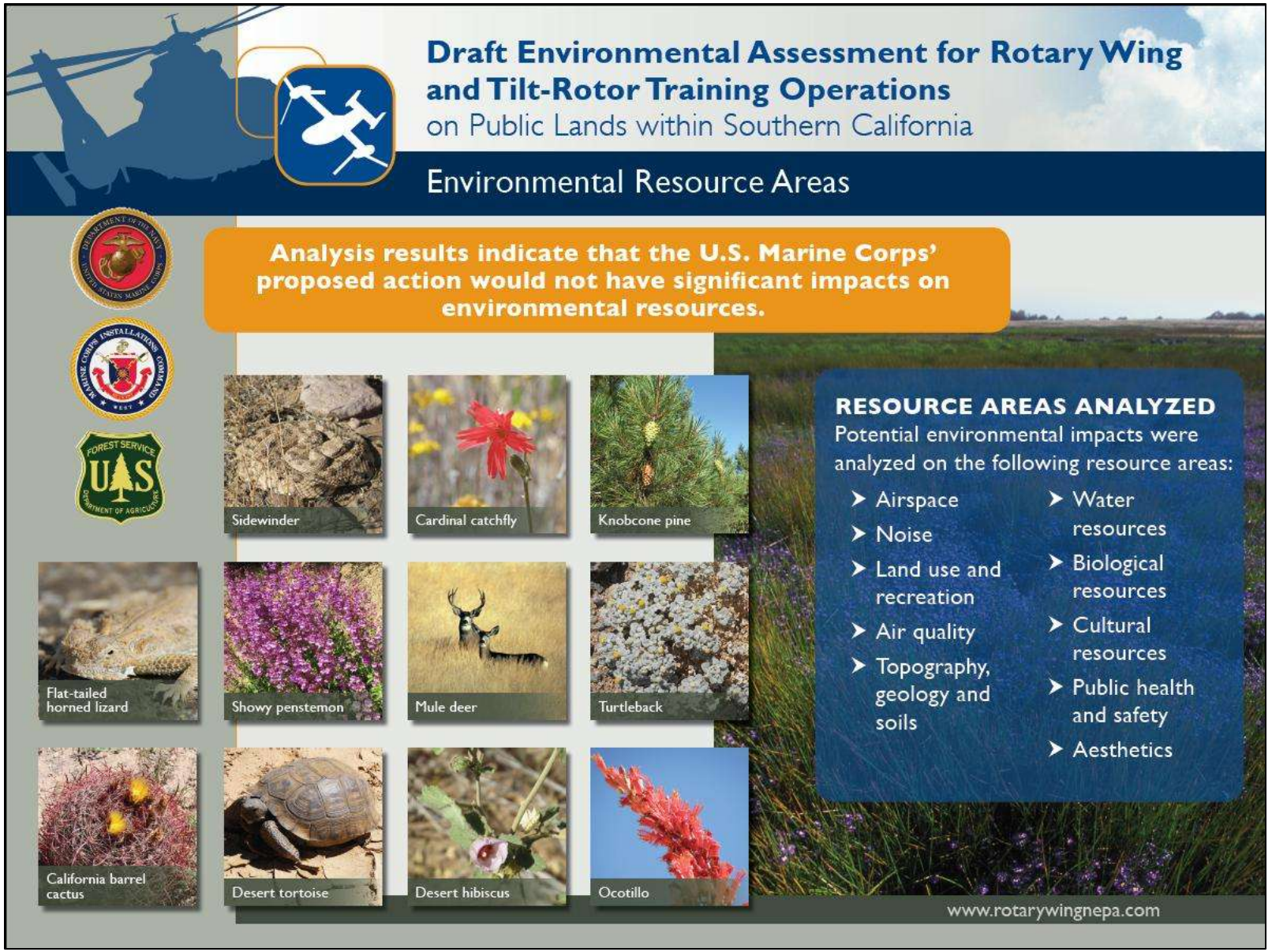
Exhibit J – Posters


Draft Environmental Assessment for Rotary Wing and Tilt-Rotor Training Operations
on Public Lands within Southern California
National Environmental Policy Act (NEPA)
Environmental Assessment (EA) Process
The U.S. Marine Corps will consider public and agency comments on the Draft EA, which is currently available for public review.
Through the NEPA process, depending on the results of the environmental analysis, an EA will:
Document that the proposed action would not have a significant impact, or
Identify potential significant impacts to be further assessed in an Environmental Impact Statement
A cooperating agency is any agency, other than the lead agency, which has jurisdiction by law or special expertise concerning the proposed action or an environmental impact involved in the proposal. The U.S. Forest Service (USFS) is a cooperating agency for the preparation and coordination of this Draft EA.
The Marine Corps is seeking to obtain a special use authorization from the USFS for the use of National Forest System lands for continued military activity. The Marine Corps is also coordinating with the Bureau of Land Management (BLM), although no BLM authorization is needed for the proposed action.
NEPA PROCESS FOR ENVIRONMENTAL ASSESSMENTS
PREPARATION OF DRAFT EA
PUBLIC REVIEW AND COMMENT ON DRAFT EA
PREPARATION OF FINAL EA
FINDING OF NO SIGNIFICANT IMPACT (FONSI)
NOTICE OF INTENT TO PREPARE AN ENVIRONMENTAL IMPACT STATEMENT
NOTICE OF AVAILABILITY OF FINAL EA/FONSI
Current phase
www.rotarywingnepa.com


Draft Environmental Assessment for Rotary Wing and Tilt-Rotor Training Operations
on Public Lands within Southern California
Aircraft and Proposed Training Operations
Training in environments similar to real-world combat conditions is crucial for military readiness and national defense.
IMPORTANCE OF TRAINING
Pilots and crew must operate in a variety of terrain, climatic conditions and altitudes to meet and maintain high standards of training. Public lands managed by the U.S. Forest Service (USFS) and the Bureau of Land Management provide the quality and variety of lands needed to achieve military readiness.
PROPOSED TRAINING OPERATIONS
Aircraft would originate from Marine Corps Air Stations Miramar, Camp Pendleton or Yuma and follow existing flight routes to designated landing zones.
Proposed operations would include:
Conducting landings and takeoffs at designated landing zones
Practicing "hover-holds" (hovering above a landing zone)
General navigation/tactical training
Night vision goggle training
Pilots and crew need to train to achieve and maintain the skills necessary for meeting U.S. Marine Corps standards for certifications, safety, and combat effectiveness and survivability.
ROTARY WING AND TILT-ROTOR AIRCRAFT PROPOSED FOR TRAINING OPERATIONS:
ROTARY WING
AH-1W Super Cobra
AH-1Z Viper
UH-1N Huey
UH-1Y Venom
CH-46E Sea Knight
CH-53E Super Stallion
TILT-ROTOR
MV-22B Osprey
Rotary wing and tilt-rotor aircraft serve a variety of purposes, including:
Combat and assault support
Transportation of troops
Transportation of weapons, equipment and supplies
Search and rescue
Offensive air support
Utility support
Armed escort and airborne support arms coordination
Wildfire fighting to assist the USFS
www.rotarywingnepa.com


Draft Environmental Assessment for Rotary Wing and Tilt-Rotor Training Operations
on Public Lands within Southern California
Study Area Map
www.rotarywingnepa.com
Location of proposed landing zones within the U.S. Forest Service Trabuco Ranger District of the Cleveland National Forest, and land managed by the Bureau of Land Management El Centro Field Office
Barstow
MOHAVE CO.
LOS ANGELES CO.
MCAGCC Twentynine Palms
San Bernardino
SAN BERNARDINO CO.
Los Angeles
Riverside
Santa Ana
Trabuco Ranger District
RIVERSIDE CO.
Blythe
ORANGE CO.
Palomar Ranger District
Chocolate Mountain Aerial Gunnery Range
LA PAZ CO.
PACIFIC OCEAN
IMPERIAL CO.
MCB Camp Pendleton
MCAS Camp Pendleton
Salton Sea
Oceanside
Escondido
SAN DIEGO CO.
MCAS MIRAMAR
Brawley
Picacho Peak
YUMA CO.
El Centro
San Diego
Calexico
MCAS YUMA
Yuma
California
Mexico
Descanso Ranger District
Arizona
Mexico
Barry M. Goldwater Range (West)
Landing Zone
Military Range
Cleveland National Forest Boundary
BLM El Centro Field Office Boundary
Scale
0 Miles 30
0 Kilometers 50


Draft Environmental Assessment for Rotary Wing and Tilt-Rotor Training Operations
on Public Lands within Southern California
Proposed Action and Alternatives
The continued use of public lands is needed to develop and sustain critical pilot and crew skills to achieve and maintain required operational training that meets U.S. Marine Corps standards.
PROPOSED ACTION
To use specific public lands managed by the U.S. Forest Service (USFS) and the Bureau of Land Management (BLM) for continued Marine Corps aviation training operations to attain and maintain proficiency in the operational employment of rotary wing and tilt-rotor aircraft.
ALTERNATIVES
ALTERNATIVE 1:
Continue existing rotary wing landing and takeoff operations on public lands managed by the USFS and BLM.
Replace CH-46E Sea Knight rotary wing aircraft with MV-22B Osprey tilt-rotor aircraft.
Continue use of 10 existing landing zones in Cleveland National Forest and 15 existing landing zones on BLM El Centro-managed lands for designated landing and takeoff operations.
Conduct approximately 2,205 individual landings per year within the Cleveland National Forest, and 14,441 individual landings per year on BLM El Centro-managed lands.
NO ACTION ALTERNATIVE:
Rotary wing or tilt-rotor operations would not occur on USFS or BLM public lands.
Would not meet the purpose of and need for the proposed action.
Enables decision-makers to compare the environmental consequences of Alternative 1.
The Marine Corps has been conducting landings and takeoffs on USFS and BLM public lands for approximately 40 years.
www.rotarywingnepa.com


Draft Environmental Assessment for Rotary Wing and Tilt-Rotor Training Operations
on Public Lands within Southern California
Environmental Resource Areas
Analysis results indicate that the U.S. Marine Corps' proposed action would not have significant impacts on environmental resources.
Sidewinder
Cardinal catchfly
Knobcone pine
Flat-tailed horned lizard
Showy penstemon
Mule deer
Turtleback
California barrel cactus
Desert tortoise
Desert hibiscus
Ocotillo
RESOURCE AREAS ANALYZED
Potential environmental impacts were analyzed on the following resource areas:
Airspace
Noise
Land use and recreation
Air quality
Topography, geology and soils
Water resources
Biological resources
Cultural resources
Public health and safety
Aesthetics
www.rotarywingnepa.com