WEST COAST BASING OF THE MV-22

Final
Environmental Impact Statement

Volume I
Chapters 1 through 5

October 2009

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE WEST COAST BASING OF THE MV-22

October 2009

Lead Agency for the EIS: Department of the Navy
Title of Proposed Action: West Coast Basing of the MV-22
Designation: Final EIS

ABSTRACT

This Environmental Impact Statement (EIS) has been prepared by the Department of the Navy in accordance with the National Environmental Policy Act of 1969, 42 United States Code §§ 4321-4370d, as implemented by the Council on Environmental Quality regulations, 40 Code of Federal Regulations Parts 1500-1508, the guidelines contained in the Chief of Naval Operations Environmental and Natural Resources Program Manual Instruction 5090.1B dated 4 June 2003, and Marine Corps Order P5090.2A, Change 2, dated 21 May 2009, Environmental Compliance and Protection Manual. The proposed action addressed in this EIS would include: 1) basing up to ten squadrons (120 aircraft) of the MV-22 on the West Coast; 2) construction and/or renovation of airfield facilities necessary to accommodate and maintain the MV-22 squadrons; and 3) conducting MV-22 readiness and training operations and special exercise operations to attain and maintain proficiency in the operational employment of the MV-22. The proposed action would also replace nine helicopter squadrons (114 aircraft) currently authorized for basing on the West Coast. This EIS addresses the following basing alternatives: 1) full basing at Marine Corps Air Station (MCAS) Miramar in San Diego County, California, 2) partial (i.e., "split") basing at MCAS Miramar and MCAS Camp Pendleton in San Diego County, California, 3) partial basing at MCAS Yuma (Yuma County, Arizona) and MCAS Camp Pendleton (San Diego County, California), and 4) partial basing at MCAS Miramar (San Diego County, California) and MCAS Yuma (Yuma County, Arizona). The EIS also evaluates proposed MV-22 operations at Marine Corps Base (MCB) Camp Pendleton (San Diego County, California), the Bob Stump Training Range Complex (Chocolate Mountain Aerial Bombing and Gunnery Range, Barry M. Goldwater Range [West], R-2510, and R-2512) (Yuma County, Arizona and Imperial and Riverside counties in California), Marine Corps Air Ground Combat Center (MCAGCC) (San Bernardino County, California), and various Military Training Routes (San Diego, San Bernardino, Riverside, Orange, and Imperial counties in California and Yuma County, Arizona). This EIS evaluates the potential environmental impacts to the following resource areas: airfields and airspace; land use; socioeconomics; community facilities and services; ground traffic and transportation; air quality; noise; infrastructure and utilities; cultural resources; hazardous materials management; topography, geology, and soils; water resources; biological resources; aesthetics and visual resources; safety and environmental health; and environmental justice. The publication of the Notice of Intent (NOI) in the Federal Register occurred on 6 October 2000.

Comments should be sent to:

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Executive Summary

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EXECUTIVE SUMMARY

The Department of the Navy (DoN) has prepared this Final Environmental Impact Statement (EIS) to assess the potential environmental impacts of basing the MV-22 Osprey tilt-rotor (MV-22) aircraft in the Western United States (U.S.). The proposed introduction of MV-22 aircraft to the Western U.S. is part of a U.S. Marine Corps (USMC)-wide process of replacing its aging fleet of medium lift helicopters with more advanced, operationally-capable aircraft. The replacement of CH-46E helicopters with MV-22 aircraft will modernize the USMC medium lift fleet and improve the operational capabilities of the Third and Fourth Marine Aircraft Wing (3D and 4th MAW) squadrons.

The proposed action (described in detail in Chapter 2.0 of this EIS) would include: 1) basing up to eight MV-22 squadrons for employment by the 3D MAW to provide medium lift capability to I Marine Expeditionary Force (I MEF); 2) basing of up to two 4th MAW MV-22 squadrons to provide a West Coast reserve component medium lift capability; 3) construction and/or renovation of airfield facilities necessary to accommodate and maintain the MV-22 squadrons; and 4) conducting MV-22 readiness and training operations and special exercise operations to attain and maintain proficiency in the operational employment of the MV-22.

This EIS addresses the following basing alternatives:

- **Partial (i.e., "split") basing at MCAS Miramar (eight squadrons) and MCAS Camp Pendleton (two squadrons) both in San Diego County, California (*Preferred Alternative*);**
- Full basing (ten squadrons) at Marine Corps Air Station (MCAS) Miramar in San Diego County, California;
- Partial basing at MCAS Miramar (eight squadrons) and MCAS Yuma (Yuma County, Arizona) (two squadrons);
- Partial basing at MCAS Miramar (two squadrons) and MCAS Yuma (eight squadrons);
- Partial basing at MCAS Yuma (eight squadrons) and MCAS Camp Pendleton (two squadrons); and
- No Action.

Regardless of which basing alternative is ultimately selected, the MV-22 would conduct training and readiness operations and special exercise operations within DoD-controlled airspace and DoN/USMC training ranges located on the West Coast. This includes operations at Marine Corps Base (MCB) Camp Pendleton in San Diego County, California; the Bob Stump Training Range Complex (Chocolate Mountain Aerial Bombing and Gunnery Range, Barry M. Goldwater Range [West], R-2510, and R-2512) in Yuma County, Arizona and Imperial and Riverside counties in California; Marine Corps Air Ground Combat Center (MCAGCC) in San Bernardino County, California; and various Military Training Routes (MTRs) in San Diego, San Bernardino, Riverside, Orange, and Imperial counties in California and Yuma County, Arizona. The locations of the basing alternatives and proposed training ranges are shown on Figure ES-1. No construction or improvements are proposed at any range facility at this time.

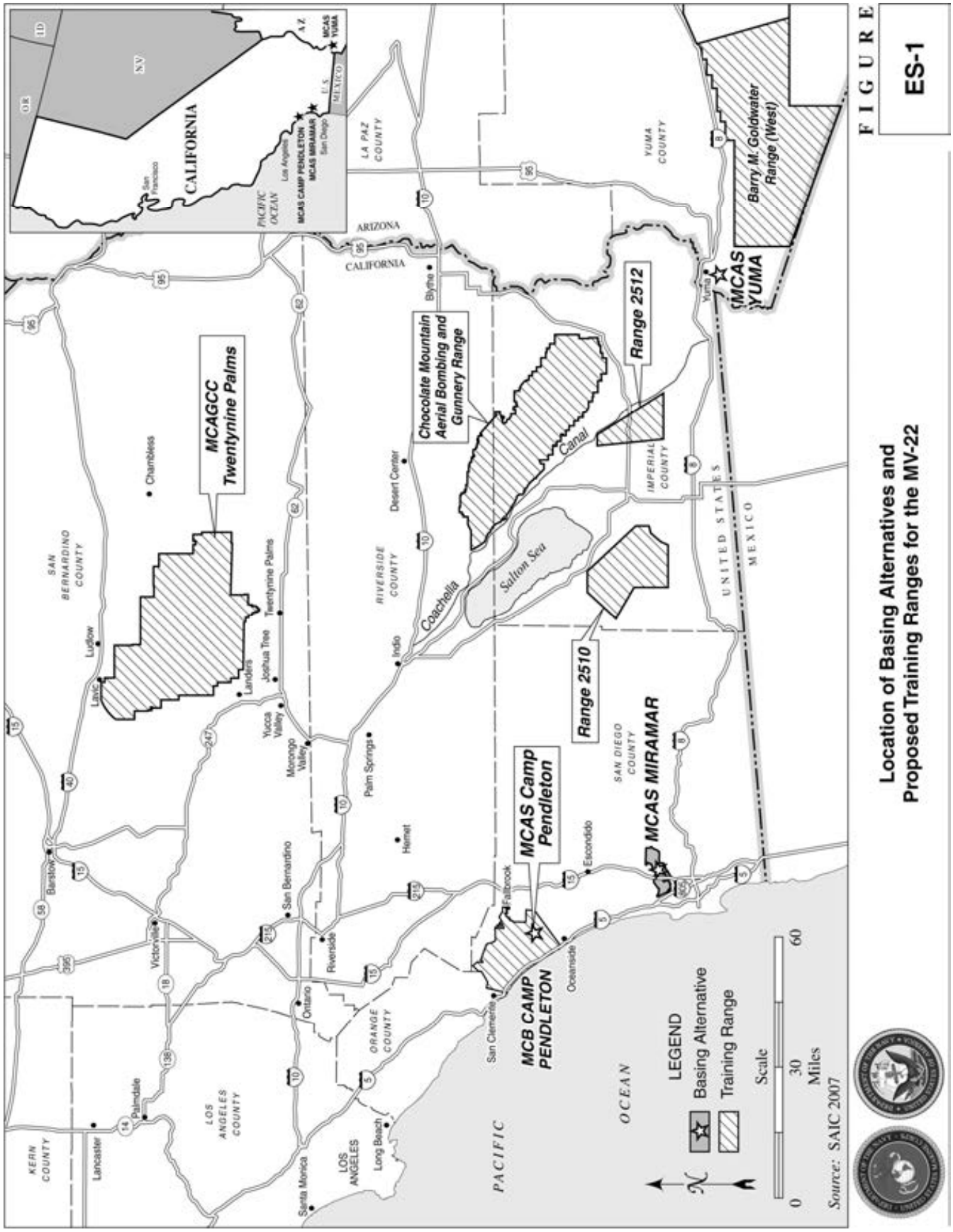


FIGURE
ES-1
Location of Basing Alternatives and Proposed Training Ranges for the MV-22
MCAGCC Twentynine Palms
Chocolate Mountain Aerial Bombing and Gunnery Range
Range 2512
Range 2510
MCAS YUMA
Barry M. Goldwater Range (West)
MCAS Camp Pendleton
MCAS MIRAMAR
MCB CAMP PENDLETON
CALIFORNIA
ARIZONA
MEXICO
UNITED STATES
PACIFIC OCEAN
Salton Sea
Coachella Canal
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
SAN DIEGO COUNTY
IMPERIAL COUNTY
YUMA COUNTY
LA PAZ COUNTY
KERN COUNTY
LOS ANGELES COUNTY
ORANGE COUNTY
LEGEND
Basing Alternative
Training Range
Scale
0
30
60
Miles
Source: SAIC 2007

The DoN has prepared this EIS in accordance with the National Environmental Policy Act of 1969 (NEPA), 42 U.S. Code (USC) §§4321-4370d, as implemented by the Council on Environmental Quality (CEQ) regulations, 40 Code of Federal Regulations (CFR) Parts 1500-1508, the guidelines contained in the Chief of Naval Operations Environmental and Natural Resources Program Manual Instruction (OPNAVINST) 5090.1B dated 4 June 2003, and Marine Corps Order (MCO) P5090.2A, change 2, dated 21 May 2009, Environmental Compliance and Protection Manual, which establish procedures for implementing the NEPA.

ES.1 PURPOSE AND NEED

The purpose of the proposed action is to determine the basing location(s) for MV-22 squadrons that would provide medium lift capability to support I MEF and meet West Coast requirements for reserve component medium lift capability, and provide for efficient training through ready access to ranges, training areas, and airspace. The MV-22 is the replacement for the current fleet of less-capable, 1960s-era CH-46 medium lift helicopters. The 3D MAW currently operates seven active duty squadrons of CH-46Es in support of the West Coast-based I MEF. The 4th MAW currently operates a reserve squadron of CH-46Es and, until recently, operated a reserve squadron of CH-53Es that was used in a medium lift capacity from Edwards Air Force Base (AFB) to meet West Coast reserve component medium lift requirements.

The need for the proposed action is to base the USMC's new medium lift aircraft where it can best support the I MEF and 4th MAW missions, while making use of existing facilities to the greatest extent practicable and preventing impacts to combat capability and mission readiness during the transition to meet current and future operational requirements of the USMC. In addition, increasing maintenance requirements limit the use of the aging aircraft (CH-46E) on the emerging battlefield. The MV-22 aircraft utilize tilt-rotor technology to provide the maneuverability and lift of a helicopter and, in fixed wing mode, have the ability to fly twice as fast, four times as far, and carry twice the combat load of the CH-46E (DoN 2008a). Thus, replacement of CH-46E helicopters with MV-22 aircraft will modernize the USMC medium lift fleet and improve the operational capabilities of the 3D and 4th MAW squadrons.

ES.2 PROPOSED ACTION AND ALTERNATIVES

The proposed action would base up to ten MV-22 squadrons (120 aircraft) on the West Coast and would replace nine helicopter squadrons (114 aircraft) currently authorized for basing on the West Coast. The new MV-22 would replace seven CH-46E active duty squadrons (90 aircraft), one reserve CH-46E squadron (13 aircraft), and one reserve CH-53E squadron (11 aircraft) operated by the 3D and 4th MAW. These aircraft are currently authorized for basing at MCAS Camp Pendleton, MCAS Miramar, and Edwards AFB. Although the existing aircraft to be replaced are based at three different installations, the proposed MV-22 squadrons would be co-located at a single installation or would be split between a maximum of two aviation facilities. The selection criteria used to determine possible basing alternative locations are discussed in section 2.2.

The following provides additional information regarding expected personnel change, schedule, and proposed MV-22 training operations. Section ES.2.4 also describes the various basing alternatives carried forward for detailed analysis.

ES.2.1 Personnel

The MV-22 provides expanded USMC capabilities without substantially changing the number of needed squadron personnel. Expected staffing for the ten MV-22 squadrons ranges from 2,411 to 2,727 personnel, depending on basing alternative selected (Table ES-1). This includes personnel assigned to each tactical squadron, the Marine Aviation Logistics Squadron (MALS), headquarters and headquarters support associated with the reserve squadrons, and other administrative or site support functions. As a comparison, the current staffing level associated with the nine helicopter squadrons to be replaced by the MV-22 is approximately 2,601 military personnel.

ES.2.2 Schedule

Transition from the helicopters to the MV-22 is scheduled to occur between fiscal year (FY) 2010 and FY 2020. It is anticipated that one or two squadrons would complete the MV-22 transition each year between 2011 and 2020. Construction activities are anticipated to occur primarily between FY 2010 and FY 2014. MV-22 training exercises and operations would begin with the arrival of the first MV-22 aircraft in FY 2010.

Table ES-1. Proposed MV-22 Squadrons and Associated Personnel

	Aircraft	Officers	Enlisted	Total Military Personnel
MV-22 – 10 squadrons	120	330	1,650	1,980
MALS	-	26	269	295
Headquarters (MAG-46)	-	25	90	115
Administrative or Site Support*	-	8	13	21
Total	**120**	**389**	**2,022**	**2,411**

Notes:

*For split base options, each base would need a full complement of MALS core personnel (295) and site support personnel (21). This would require an additional 316 military personnel over the full basing option shown above, which would result in the need for a total of 2,727 military personnel (2,411 + 316) for split base options.

MAG = Marine Aircraft Group

Source: USMC 2004a; Pharris 2004, personal communication.

ES.2.3 MV-22 Operations

This EIS covers MV-22 training and readiness operations within Department of Defense (DoD)-controlled airspace and DoN/USMC-controlled training ranges located on the West Coast. The MV-22 tilt-rotor is a new type of aircraft for the USMC, with new and different capabilities as compared to the CH-46 helicopter it replaces. As the USMC collectively gains experience with the MV-22, greater understanding of its capabilities and limitations will lead to development changes or different operations and training. This EIS incorporates the most up-to-date information regarding expected training operations based on the MV-22 Training and Readiness Manual (USMC 2008c). This provides the best information available to the public and agencies and allows environmental planning based on that information. The USMC expects to continue updating the MV-22 Training and Readiness Manual and training plans to reflect lessons learned from training evolutions and deployment experience. Due to the evolving nature of these MV-22 training requirements, additional training areas and air space,

on or off DoD-owned lands, likely will emerge as necessary or useful for applying the aircraft's capabilities to ever-changing missions. The environmental impacts associated with new training requirements will be evaluated under the NEPA, and will include consultations pursuant to the Endangered Species Act and/or National Historic Preservation Act where applicable. Toward that end, the DoN is seeking programmatic agreements with State Historic Preservation Officers to set forth procedures for evaluating future proposed landing zones.

Proposed MV-22 operations under consideration in this EIS would be conducted at military ranges, which are composed of Special Use Airspace and land areas, both of which are essential for conducting aviation training. Proposed operations would fall into three broad categories: initial or familiarization training designed to instruct new pilots or acquaint pilots of other aircraft with the operation of the MV-22; tactical training designed to teach MV-22 aircrew the tactical employment of the aircraft; and integrated training designed to teach aircrew how to combine MV-22 operations with other Marine or joint air and ground assets.

Airfield Operations

Proposed MV-22 operations at established airfields include the following actions: Departures, Arrivals (Straight-In/Full-Stop), Overhead Break Arrivals, Touch-and-Gos, Field Carrier Landing Practice, Ground-Controlled Approach Box (GCA), and Low Work. These operations are defined in section 2.1.3.

Training and Readiness Operations

Operations for new or transition pilots would include working through the MV-22 Training and Readiness Manual (USMC 2008c), and would involve the use of the aircraft's machine gun at existing targets. Course elements include the following: familiarization profiles (night and day); formations (night and day); nuclear, biological, and chemical equipment training (night and day); tactics; confined area landings; combined arms exercises; night vision goggle training; terrain-following exercises; and training in urban environment exercises.

Examples of proposed MV-22 integrated training include special exercises, such as the Weapons Tactics Instructors (WTI) course. WTI is staged from MCAS Yuma, Arizona, and occurs twice a year. 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. These types of training events are designed to expose participants to missions that would likely be implemented while deployed, with emphasis on integration, coordination, and tactical execution.

DoD-Controlled Airspace and DoN/USMC-Controlled Training Ranges

The proposed MV-22 operations under consideration in this EIS would be conducted at existing DoD-controlled airspace and DoN/USMC-controlled training ranges located on the West Coast. Regardless of which basing alternative discussed in section ES.2.4 is ultimately selected, the MV-22 would conduct training and readiness operations at MCB Camp Pendleton, the Bob Stump Training Range Complex (Chocolate Mountain Aerial Bombing and Gunnery Range, Barry M. Goldwater Range [West], R-2510 and R-2512), MCAGCC, and various MTRs. Current training requirements outlined in the MV-22 Training and Readiness Manual can be accommodated within these training ranges and MTRs.

Approximately 46,000 total MV-22 annual operations are expected to occur at the training ranges and MTRs under consideration in this EIS, and would include the types of flight activities discussed above. This would replace approximately 27,000 annual operations currently being conducted by the CH-46E aircraft that the MV-22 is replacing. Table ES-2 shows the proposed change in annual operations at the training ranges and MTRs under consideration in this EIS. The proposed change generally results in an increase in annual operations at any given training range, except for MCAGCC, where there would be a small reduction in annual operations.

Table ES-2. Proposed Change in Annual Airspace/Range Operations

Location	Addition of MV-22 Operations	Reduction of CH-46 Operations	Change in Operation over Existing Conditions
MCB Camp Pendleton	17,008	-15,113	+1,895
Barry M. Goldwater Range (West)	17,942	-5,879	+12,063
Chocolate Mountain Range	5,111	-862	+4,249
R-2510 and R-2512	148	-78	+70
MCAGCC	3,874	-5,563	-1,689
MTRs	2,085	-	+2,085
Total	**46,168**	**-27,495**	**+18,673**

Notes:
1. Includes operations at the Helicopter Outlying Landing Field (HOLF) at MCB Camp Pendleton, the outlying auxiliary airfield (AUX-2) at Barry M. Goldwater Range-West, and the Expeditionary Airfield (EAF) at MCAGCC.
2. For MTRs, each one-way trip represents an operation.

See Chapter 6 for details.

The proposed change in number of annual operations takes into account the fact that the MV-22 is a new type of aircraft so that every pilot will need to complete all training based on the MV-22 Training and Readiness Manual. This includes initial or familiarization training designed to instruct new pilots or acquaint pilots of other aircraft with the operation of the MV-22. As the pool of experienced MV-22 pilots increases over time, it is expected that the number of annual training operations will decrease. Chapter 6 describes each training range and the MTRs in more detail and provides an analysis of impacts related to operations at these locations.

Transit Routes

Typical routes for access to and from airfields, ranges, and MTRs throughout the southern California and Arizona regions would occur at over 3,000 feet (914 meters) above ground level. At that altitude, noise impacts are negligible, and emissions are above the U.S. Environmental Protection Agency's (USEPA) presumed mixing height for air pollutants (USEPA 1999b).

Therefore, these transit flights are not discussed further in this EIS. The only exceptions are major Ingress and Egress routes to and from airfields, ranges, and MTRs that fall within the restricted airspace adjacent to the proposed basing locations or training locations. Because the MV-22 may be transitioning from the ground level to 3,000 feet above ground level within these Ingress and Egress routes, potential impacts will be addressed in conjunction with the airspace operations discussed above.

ES.2.4 Basing Alternatives Carried Forward for Detailed Analysis

The alternatives carried forward as feasible alternatives in this EIS include full basing and partial basing scenarios as follows:

Full Basing Alternatives (10 Squadrons)

- MCAS Miramar

Partial Basing Alternatives

- MCAS Miramar – maximum eight squadrons/minimum two squadrons
- MCAS Camp Pendleton – two squadrons
- MCAS Yuma – maximum eight squadrons/minimum two squadrons

For basing alternatives with eight or more MV-22 squadrons, hangar and apron space planning accounts for the fact that one squadron would be deployed at all times. For example, under a full basing alternative, hangar and apron space would be needed for only 108 aircraft (versus 120 aircraft) because 12 aircraft would be deployed off-base for training or operations at all times.

Partial basing alternatives may include other combinations of MV-22 aircraft at MCAS Miramar and MCAS Yuma, besides the maximum and minimum squadron options noted above (e.g., a 4-squadron and 6-squadron combination); however, evaluations of the minimum and maximum squadron options will capture the environmental impacts related to any intermediary basing alternative. Two squadrons at MCAS Camp Pendleton are the only reasonable basing option possible at that air station (see *MCAS Camp Pendleton Basing Alternatives* below).

Regardless of the alternative chosen, the existing squadrons of CH-46E at MCAS Miramar and MCAS Camp Pendleton, as well as the CH-46E and CH-53E squadrons at Edwards AFB, would be removed. Therefore, the proposed action may result in a net decrease of aircraft and personnel at a given installation.

MCAS Miramar Basing Alternatives

MCAS Miramar lies in the northern suburbs of San Diego, California, and is one of the largest military installations in the area. The primary mission of MCAS Miramar is to maintain and operate facilities and to provide services and material to support operations of the 3D MAW, Marine Aircraft Group-46 and other Naval aviation units (DoN 2006). The station averages 250 aircraft aboard on any given day, with approximately 112,000 flight operations per year, including both jet and helicopter aviation assets.

The close proximity of MCAS Miramar to training areas at MCB Camp Pendleton represents a major efficiency advantage for basing the MV-22 squadrons at this station. The existing flightline and associated aviation support facilities are efficiently laid out. The MV-22 would replace four squadrons of active duty CH-46Es and thereby free up existing apron and hangar space that could be used by the MV-22 aircraft. Taking into account the fact that the MV-22 footprint is much larger than the CH-46E footprint, MCAS Miramar can accommodate both partial basing options and a full basing option if land is developed south of the existing runway.

Full Basing (10-Squadron) Alternative

Basing all ten squadrons of MV-22 aircraft at MCAS Miramar would require placing 60 aircraft north of the runway and 48 aircraft south of the runway (hangar and apron space planning accounts for the fact at least 12 aircraft are deployed at all times). Figures ES-2 and ES-3 and Table ES-3 provide the details regarding proposed new construction and necessary demolition of existing facilities.

Table ES-3. Summary of Proposed Construction and Demolition at MCAS Miramar

	10-Squadron Alternative (Full Basing)	8-Squadron Alternative (Maximum)	2-Squadron Alternative (Minimum)
CONSTRUCTION			
Building Facilities (square feet)	371,031	230,562	0
Airfield Facilities (square yards)	901,818	400,651	0
DEMOLITION			
Building Facilities (square feet)	18,637	43,633	0
Airfield Facilities (square yards)	128,621	144,061	0
Source: DoN 2008b			

North of the runway, up to 20 MV-22 aircraft would be housed in hangars, and the rest on the aircraft parking apron. New support facilities, including one new hangar module, parking apron, four new fuel pits, and one new wash rack, would be sited as shown on Figure ES-2. The existing fueling octagon and compass rose facilities use a large amount of parking apron leaving a limited amount of space to fit the MV-22 squadrons and the existing CH-53E squadrons. Both the fueling octagon and the compass rose facilities would have to be relocated to provide enough parking apron for both the MV-22s and the CH-53Es. The new fuel pits would be located south of the apron, as shown on Figure ES-2.

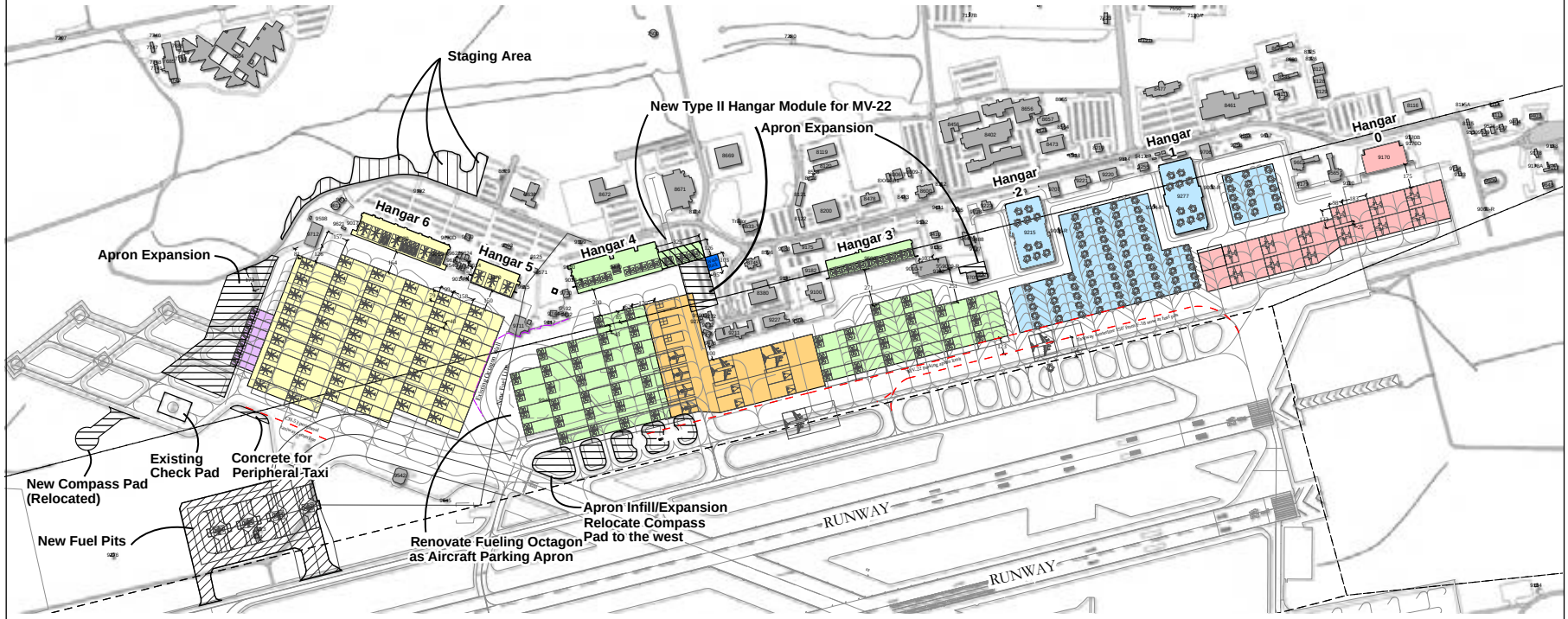
Housing aircraft south of the runway would entail extensive construction in a previously undeveloped area. The proposed site layout consists of up to 16 MV-22 aircraft housed in new hangars, and the rest on the new aircraft parking apron. New support facilities, including two hangars, aircraft parking apron, taxiways, wash racks, three new fuel pits and associated fuel lines, would be sited as shown on Figure ES-3. The existing transmitter and receiver antennas would be temporarily relocated near Clairmont Mesa Boulevard until they can be placed on top of the proposed hangars. A firefighter trainer facility would be relocated about 800 feet southeast of its current location. Johnson Road would be extended and improved to provide better access to the new facilities, a bridge would be constructed to avoid adding traffic adjacent to the Combat Aircraft Loading Area (CALA), utilities would be extended to support the hangars and other facilities, and a new parking area for personally-owned vehicles would be constructed.

The Full Basing Alternative would add approximately 1,000 military personnel to MCAS Miramar.

Maximum Partial Basing (8-Squadron) Alternative

Due to current space constraints north of the runway, eight squadrons of MV-22 aircraft would be the maximum number that could be accommodated north of the runway. Figure ES-4 and Table ES-3 provide the details regarding proposed new construction and necessary demolition of

MEU	CH-53 HMH	MV-22	Transient & HHS	VMFAT-101	VMFA	KC-130
3 UH-1N/Y 4 AH-1W/Z	4 HMH/CH-53 Squadrons 64 Total Aircraft 53 Aircraft on Apron 3 Hangar Modules (Hangars 5 & 6)	5 MV-22 Squadrons 60 Total Aircraft 50 Aircraft on Apron 5 Hangar Module (Hangars 3 & 4)	4 C-9 3 UC-35 4 F-14 (2 F-14 on Apron) 2 C-17 (1 C-17 on Apron)	36 VMFA Aircraft 36 Total Aircraft 34 Aircraft on Apron 3 Hangar Module (Hangar 2)	5 VMFA Squadrons 56 Total Aircraft 47 Aircraft on Apron 5 Hangar Modules (Hangars 1 & 2)	1 KC-130 Squadrons 12 Total Aircraft 12 Aircraft on Apron 1 Hangar Module (Hangar 0)



Squadrons
- CH-53
- KC-130
- MEU
- MV-22
- Transient
- VMFA

New Construction
- New Apron
- New Hangars
- New Washracks
- New Fuel Pits
- Staging Area

- Imaginary Surface
- P-80 Criteria Taxiway Centerlines
- Apron Wall

0 700
Feet

Source: DoN 2008b

Site Layout for North of the Runway Associated with the MCAS Miramar Full Basing Alternative

FIGURE

ES-2

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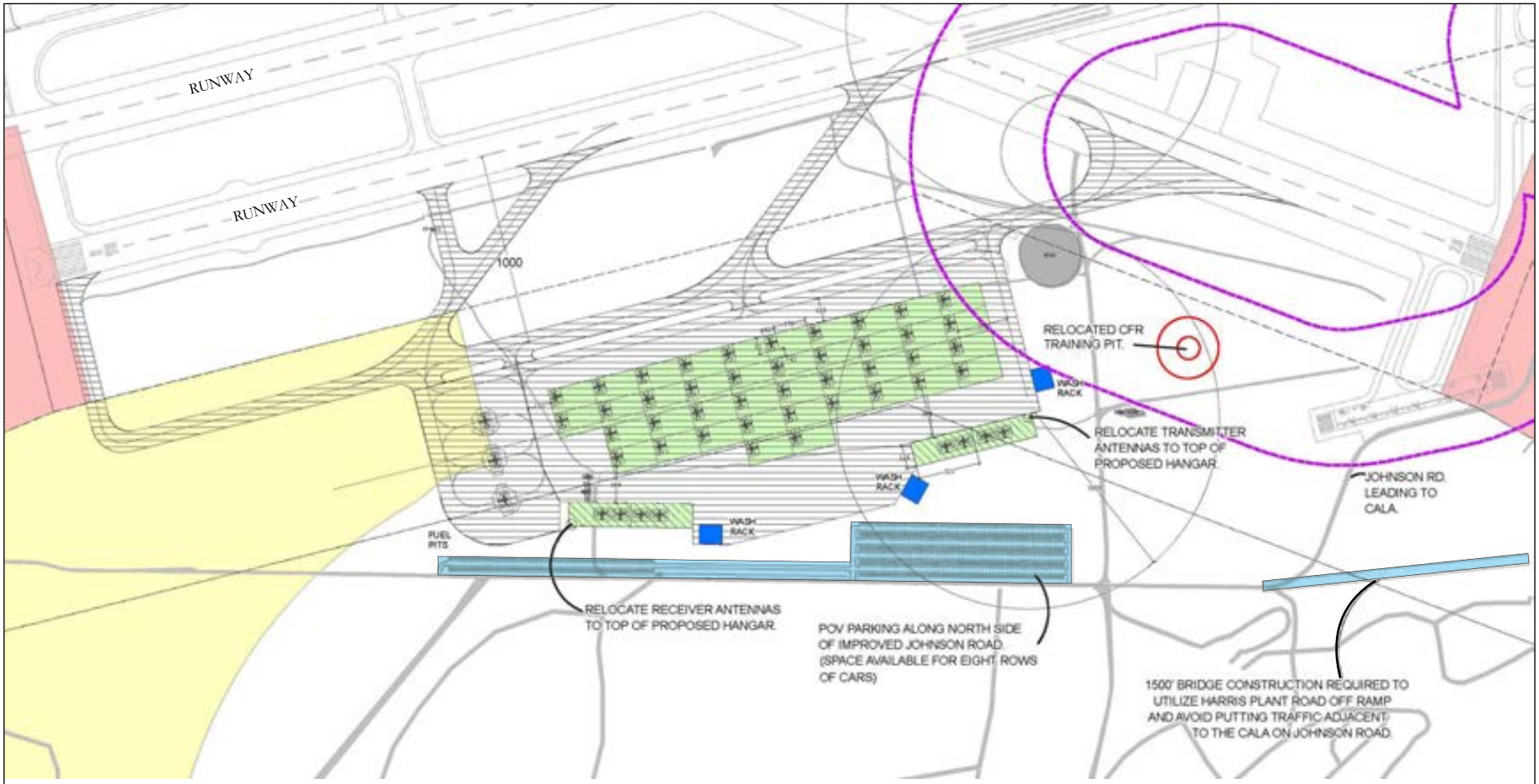

Imaginary Surface
ESQD Arcs

Accident Potential Zones
APZ I & II
Clear Zone

Squadrons
MV-22

New Construction
New Hangars
New Apron/Taxiway
New Washracks
New Road/Parking Upgrades

MV-22

4 MV-22 Squadrons
48 Total Aircraft
40 Aircraft on Apron
4 Hangar Modules
(4 New Hangars)

N

0 700
Feet

Source: DoN 2008b

Site Layout for South of the Runway Associated with the MCAS Miramar Full Basing Alternative

FIGURE

ES-3

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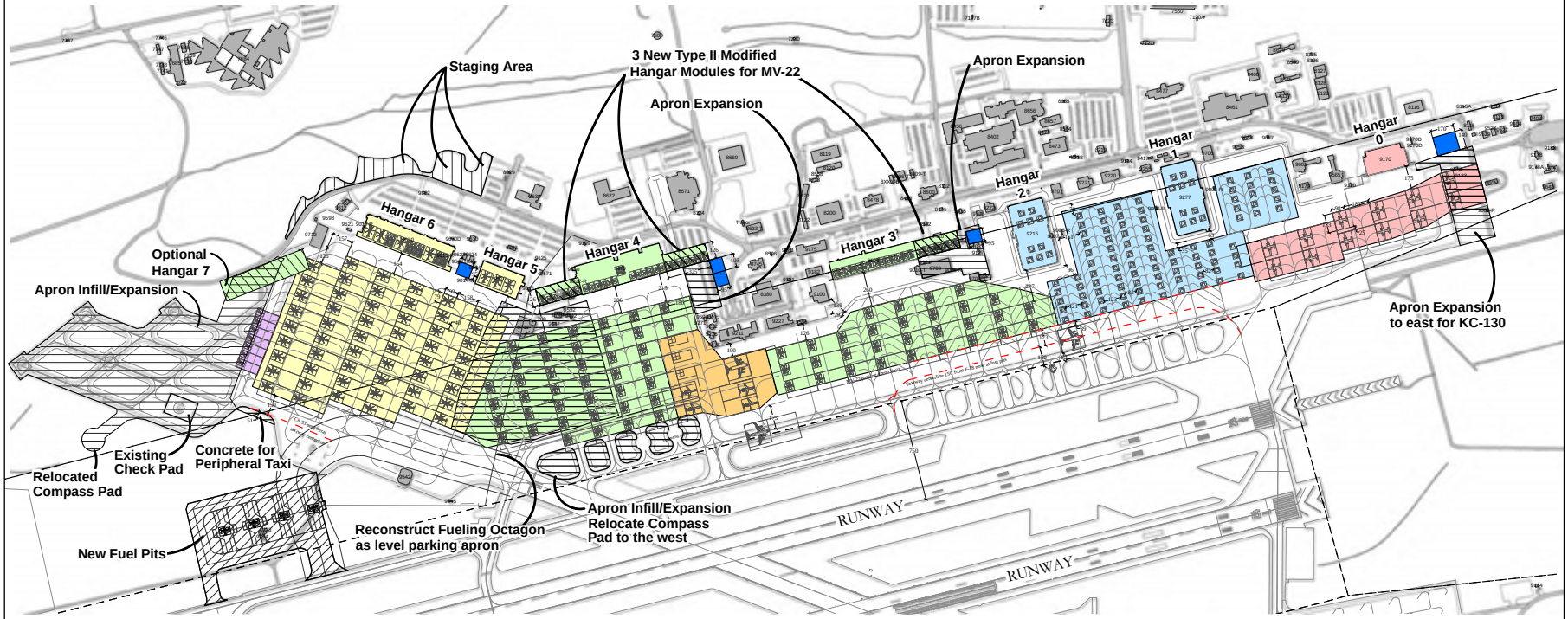
MEU	CH-53 HMH	MV-22	Transient & HHS	VMFAT-101	VMFA	KC-130
3 UH-1N/Y 4 AH-1W/Z	4 HMH/CH-53 Squadrons 64 Total Aircraft 53 Aircraft on Apron 4 Hangar Modules (Hangars 5 & 6)	7 MV-22 Squadrons (8 Total, 1 Deployed at all times) 84 Total Aircraft 70 Aircraft on Apron 7 Hangar Module (Hangars 3 & 4)	4 C-9 3 UC-35 4 F-14 (3 F-14 on Apron) 2 C-17 (1 C-17 on Apron)	36 VMFA Aircraft 36 Total Aircraft 32 Aircraft on Apron 3 Hangar Module (Hangar 2)	5 VMFA Squadrons 56 Total Aircraft 47 Aircraft on Apron 5 Hangar Modules (Hangars 1 & 2)	1 KC-130 Squadrons 12 Total Aircraft 12 Aircraft on Apron 1 Hangar Module (Hangar 0)



Squadrons
- CH-53
- VMFA
- KC-130
- MEU
- MV-22
- Transient

New Airfield Construction
- New Hangars
- New Apron
- New Washracks
- New Fuel Pits
- Staging Area

- Imaginary Surface
- P-80 Criteria Taxiway Centerlines

0 700
Feet

Source: DoN 2008b

Site Layout Associated with the MCAS Miramar Maximum Partial Basing (8-Squadron) Alternative

FIGURE

ES-4

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existing facilities Basing eight squadrons of MV-22 aircraft at MCAS Miramar would entail up to 28 MV-22 aircraft housed in hangars and the rest on the aircraft parking apron (hangar and apron space planning accounts for the fact at least 12 aircraft are deployed at all times). New support facilities would include three new hangar modules, parking apron, four new fuel pits, and five new wash racks. Figure ES-4 also shows an optional Hangar 7, which would be in lieu of the hangar module on the east side of Hangar 3 and the hangar module on the west side of Hangar 4. Although the optional Hangar 7 currently overlaps with some aircraft parking space, parking for the affected aircraft could be moved adjacent to the Marine Expeditionary Unit (MEU) parking shown in purple.

The apron expansion on the eastern side of the flightline would interfere with an existing flightline access road; flightline traffic would be re-routed to another existing road further east. Similar to the Full Basing Alternative, both the existing fueling octagon and the compass rose facilities would have to be relocated to provide enough parking apron for both the MV-22s and the existing CH-53Es. Compared to the Full Basing Alternative, this alternative has more construction north of the runway to accommodate 84 aircraft (versus 60 aircraft north of the runway under the Full Basing Alternative), but no construction would occur south of the runway.

The Maximum Partial Basing Alternative would add approximately 750 military personnel to MCAS Miramar.

Minimum Partial Basing (2-Squadron) Alternative

Two squadrons would be the minimum basing alternative at MCAS Miramar. Up to eight MV-22 aircraft would be housed in hangars, and the rest on the aircraft parking apron. No new construction or demolition at MCAS Miramar would occur as a result of this basing alternative, as shown on Figure ES-5. The existing fueling octagon and compass rose facility would remain in place.

There would be a reduction of about 500 military personnel at MCAS Miramar under the Minimum Partial Basing Alternative.

Airfield Use

Airfield use at MCAS Miramar would range between about 9,000 and 52,000 annual MV-22 operations, depending on basing alternative selected. The proposed MV-22 airfield operations would replace approximately 17,000 annual airfield operations at MCAS Miramar currently being conducted by CH-46E aircraft (see section 3.2 for more details). This accounts for airfield operations by the four CH-46E squadrons (48 aircraft) currently based at MCAS Miramar as well as use by other transient (visiting) CH-46E aircraft from other air stations.

MCAS Camp Pendleton Basing Alternatives

MCAS Camp Pendleton lies in the southern part of MCB Camp Pendleton, approximately 40 miles north of San Diego, California. The primary mission of MCAS Camp Pendleton is to provide services and support operations for Marine Aircraft Group-39, which is an element of the 3D MAW. The major occupants of MCAS Camp Pendleton are Marine Aircraft Group-39,

Marine Aircraft Group-46 Detachment A, MCB Camp Pendleton Range Control, and the Center for Naval Aviation Technical Training (CNATT). It currently supports both rotary and fixed wing aircraft, and supports approximately 128,000 flight operations annually.

Basing all ten MV-22 squadrons at MCAS Camp Pendleton would be advantageous for efficiency because it lies in close proximity to ground troops and training areas, and the air station met the three fundamental selection criteria. However, floodway and biological constraints (e.g., habitat for threatened and endangered species) to the north, the land-locked status of the flightline and support areas to the south, and the roadway and cultural resources to the east leave little room for reasonable expansion at this station. Even though the MV-22 would replace three squadrons of CH-46E helicopter, only two squadrons of MV-22 can be accommodated because the MV-22 footprint is much larger than the CH-46E footprint.

Partial Basing (2-Squadron) Alternative

Due to the limited amount of developable land along the flightline, the maximum number of MV-22 aircraft possible at MCAS Camp Pendleton is two squadrons. Up to eight MV-22 aircraft would be housed in hangars, and the rest on the aircraft parking apron. New support facilities, including a new hangar module, modifications to an existing hangar, new wash rack, and new parking apron, would be sited as shown on Figure ES-6 and Table ES-4. New facilities may require the demolition and relocation of an existing Explosive Ordnance Disposal (EOD) building, either as an addition to the proposed new hangar or as a standalone facility (the latter shown on Figure ES-6).

There would be a reduction of about 250 military personnel at MCAS Camp Pendleton under the Partial Basing Alternative.

Table ES-4. Summary of Proposed Construction and Demolition at MCAS Camp Pendleton

	2-Squadron Alternative
CONSTRUCTION	
Building Facilities (square feet)	80,106
Airfield Facilities (square yards)	76,171
DEMOLITION	
Building Facilities (square feet)	1,344
Airfield Facilities (square yards)	0
Source: DoN 2008b	

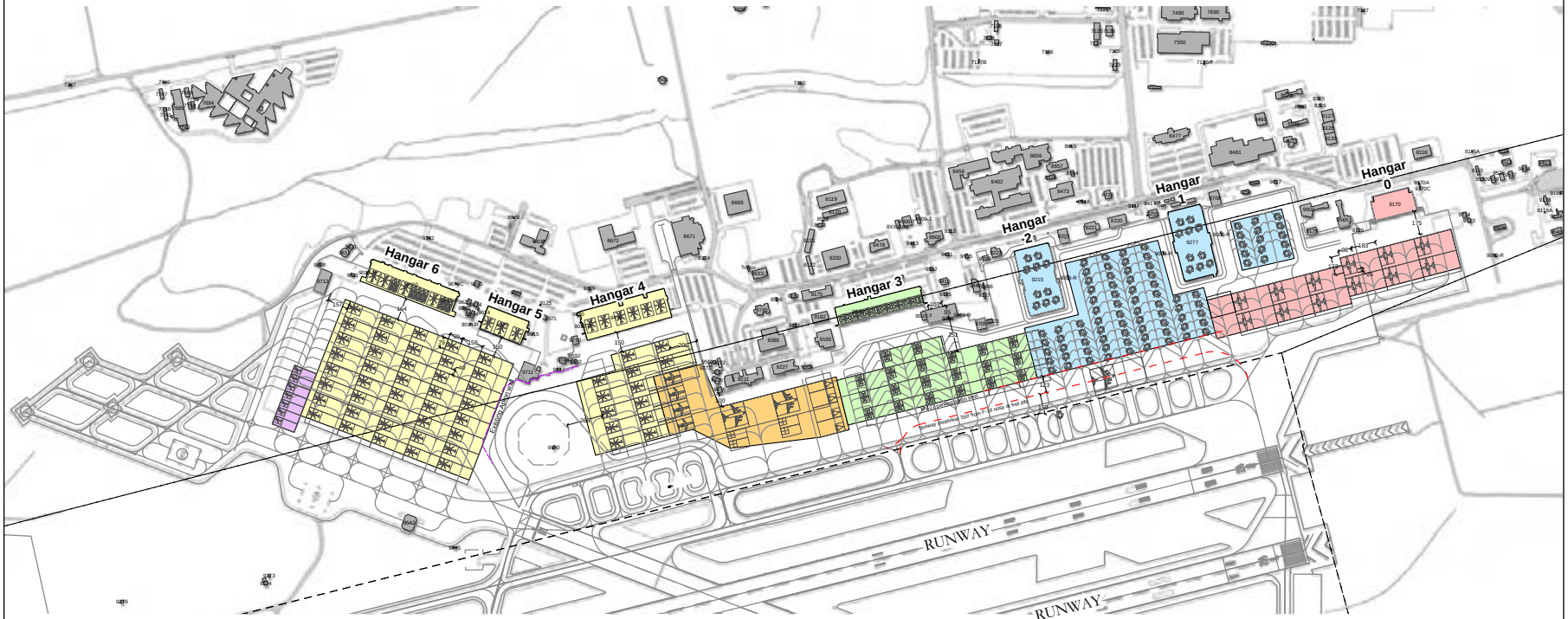
Airfield Use

The Partial Basing Alternative would add approximately 12,000 annual MV-22 operations to MCAS Camp Pendleton, and would replace approximately 18,000 annual airfield operations (see section 4.2 for more details). The 18,000 annual airfield operations accounts for airfield use by the three CH-46E squadrons (42 aircraft) currently based at MCAS Camp Pendleton as well as use by other transient (visiting) CH-46E aircraft from other air stations.

MCAS Yuma Basing Alternatives

MCAS Yuma lies in Yuma, Arizona, and is one of the USMC's main aviation training installations. Its primary mission is to provide aviation ranges, facilities, and services that support

MEU	CH-53 HMH	MV-22	Transient & HHS	VMFAT-101	VMFA	KC-130
3 UH-1N/Y 4 AH-1W/Z	4 HMH/CH-53 Squadrons 64 Total Aircraft 53 Aircraft on Apron 5 Hangar Modules (Hangars 4, 5 & 6)	2 MV-22 Squadrons 24 Total Aircraft 20 Aircraft on Apron 2 Hangar Modules (Hangar 3)	4 C-9 3 UC-35 4 F-14 (3 F-14 on Apron) 2 C-17 (1 C-17 on Apron)	36 VMFA Aircraft 36 Total Aircraft 32 Aircraft on Apron 3 Hangar Module (Hangar 2)	5 VMFA Squadrons 56 Total Aircraft 47 Aircraft on Apron 5 Hangar Modules (Hangars 1 & 2)	1 KC-130 Squadrons 12 Total Aircraft 12 Aircraft on Apron 1 Hangar Module (Hangar 0)



Squadrons
- CH-53
- KC-130
- MEU
- MV-22
- Transient
- VMFA

New Construction
No construction or modifications needed.

- Imaginary Surface
- P-80 Criteria Taxiway Centerline
- Apron Wall

0 700
Feet

Source: DoN 2008b

Site Layout Associated with the MCAS Miramar Minimum Partial Basing (2-Squadron) Alternative

FIGURE
ES-5

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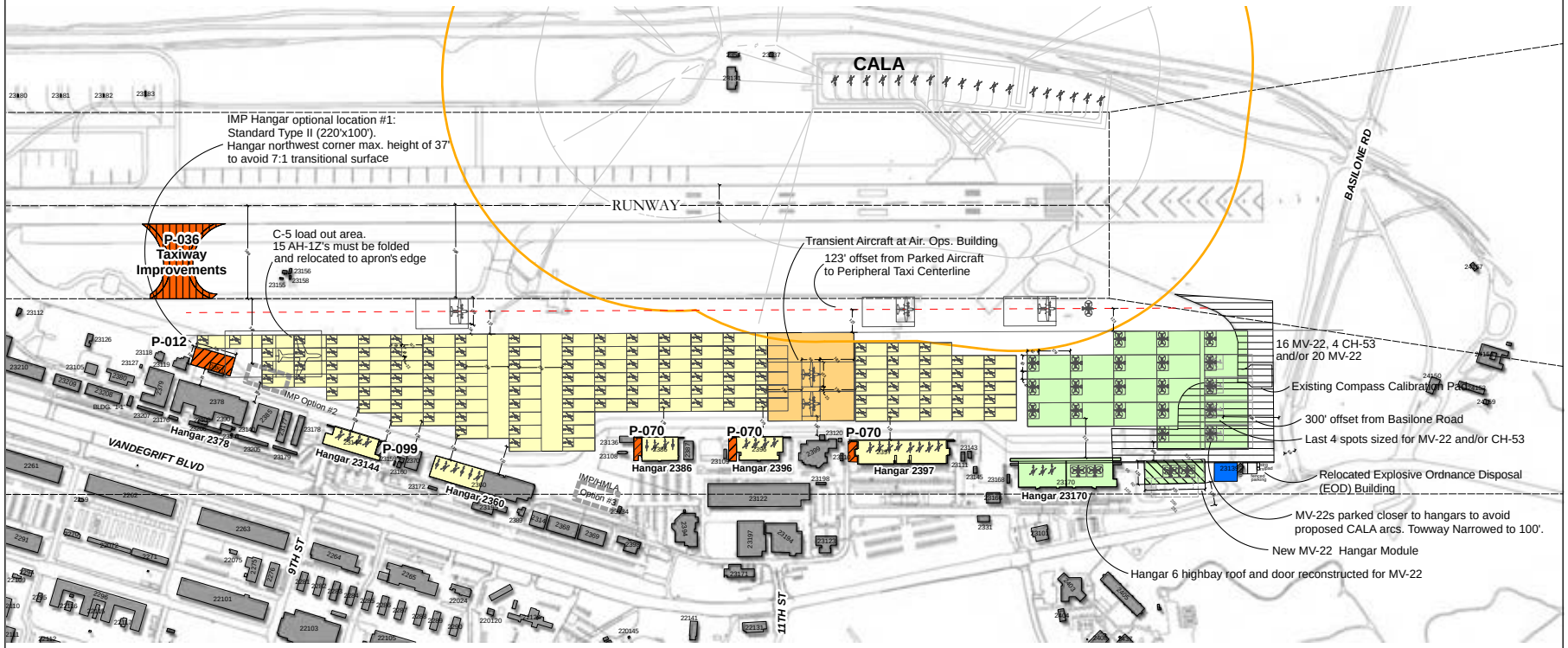
HMT-303	Transient & HHS	HMLA	MV-22
1 HMLA Squadron 48 Total Aircraft 35 Aircraft on Apron 2 Hangar Modules	3 KC-130 4 UC-35 (Not on Apron)	4 HMLA Squadrons 108 Total Aircraft 90 Aircraft on Apron 4 Hangar Modules	2 MV-22 Squadrons 24 Total Aircraft 20 MV-22 and/or 16 MV-22, 4 CH-53 on apron 3 Hangar Modules



Existing CALA ESQD

Imaginary Surface Edges

Squadrons

- AH-1
- MV-22
- Transient

Improvements

Programmed or Planned

(Not associated with the proposed MV-22 action)

- Hangar Construction (P-012 IMP, P-099 IMP, P-070 HMLA Hangar Admin Additions)
- Taxiway Improvements (P-036)

New Construction

- New Apron
- New Hangar
- New Washrack

0 500

Feet

Source: DoN 2008b

Site Layout Associated with the MCAS Camp Pendleton Partial Basing (2-Squadron) Alternative

FIGURE

ES-6

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operating forces, tenant commands and activities (MCAS Yuma 2007a). MCAS Yuma is home to a number of tenant units, including Marine Aviation Weapons and Tactics Squadron-1 (MAWTS-1), Marine Aircraft Group-13, Marine Wing Support Squadron-371, Marine Fighter Training Squadron-401, Marine Air Control Squadron-1 and Combat Logistics Company 16. The station also shares one side of the runway facilities with a commercial aviation airport. The airfield currently supports both fixed wing and rotary wing aviation assets, and has approximately 163,000 flight operations per year.

Land area at MCAS Yuma is substantially constrained, despite recently acquired land in its southern section, due to airfield safety criteria and ordnance storage safety requirements. MCAS Yuma has the ability to accommodate several partial basing options ranging from two to eight squadrons.

Maximum Partial Basing (8-Squadron) Alternative

Due to land constraints and lack of existing facilities that could be used by the MV-22, the maximum number of MV-22 squadrons possible at MCAS Yuma is eight. Figure ES-7 and Table ES-5 provide the details regarding proposed new construction and necessary demolition of existing facilities for the introduction of eight squadrons. Basing eight squadrons of MV-22 aircraft at MCAS Yuma would entail up to 28 MV-22 aircraft housed in hangars and the rest on the aircraft parking apron (hangar and apron space planning accounts for the fact at least 12 aircraft are deployed at all times). New support facilities would include seven new hangar modules, a new taxiway, parking apron, wash racks, a rinse facility, and other support facilities (e.g., headquarters, warehouse, van pads). The pavement associated with the old CALA and weapons complex (recently relocated) would provide room for the construction of new aircraft parking apron space. The Maximum Partial Basing Alternative would add approximately 2,000 military personnel to MCAS Yuma.

Table ES-5. Summary of Proposed Construction and Demolition at MCAS Yuma

	8-Squadron Alternative (Maximum)	**2-Squadron Alternative (Minimum)**
CONSTRUCTION		
Building Facilities (square feet)	583,493	179,539
Airfield Facilities (square yards)	390,023	88,989
DEMOLITION		
Building Facilities (square feet)	24,830	12,506
Airfield Facilities (square yards)	0	0
Source: DoN 2008b		

Minimum Partial Basing (2-Squadron) Alternative

The 2-squadron configuration is similar to the 8-squadron configuration, except only two new hangars and a smaller amount of new apron space would be constructed (see Figure ES-8 and Table ES-5). Construction activities would include a new rinse facility and wash racks and other support facilities, but the new taxiway would not be necessary.

The Minimum Partial Basing Alternative would add approximately 700 military personnel to MCAS Yuma.

Airfield Use

Airfield use at MCAS Yuma would range between about 9,000 and 43,000 annual MV-22 operations, depending on basing alternative selected. The proposed MV-22 airfield operations would replace approximately 2,800 annual airfield operations by transient (visiting) CH-46E aircraft from other air stations (see section 5.2 for more details).

ES.3 NO ACTION ALTERNATIVE

Analysis of the No Action Alternative provides a benchmark that enables decision-makers to evaluate the environmental consequences of the proposed basing alternatives. Section 1502.14(d) of the NEPA requires an EIS to analyze the No Action Alternative. No action means that an action would not take place, and the resulting environmental effects from taking no action would be compared with the effects of allowing the proposed basing activity to go forward.

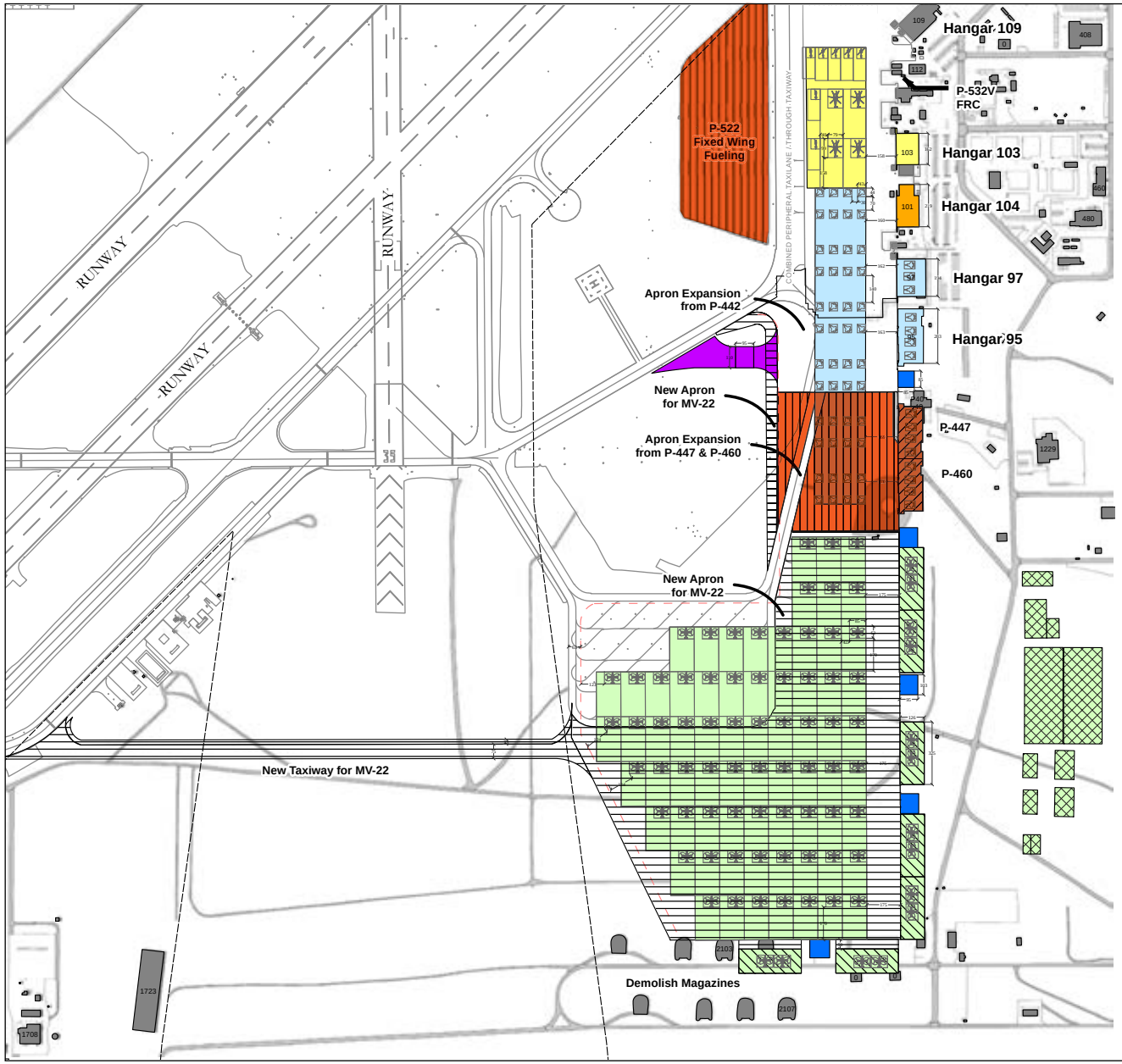
Under the No Action Alternative, no aircraft would be replaced, aircraft operations would continue at the current level, and no construction/demolition or personnel changes related to basing the MV-22 aircraft on the West Coast would occur. Some MV-22 training by East Coast squadrons currently occurs on the West Coast, and would continue to occur under the No Action Alternative. It is possible that future construction efforts may be needed (e.g., wash racks at MCAS Yuma) related to this training activity under the No Action Alternative. Future construction efforts would likely focus on MCAS Yuma because this air station supports special exercises like WTI, which currently includes participation by East Coast MV-22 squadrons.

The No Action Alternative would not meet mission requirements because the MV-22 would not be available for employment by 3D MAW and 4th MAW to provide medium lift capability to I MEF and other supported forces on the West Coast, despite congressional approval of the MV-22 as the replacement for outdated CH-46 helicopters that are quickly approaching the end of their service life. USMC readiness and essential support for Marines on the ground would be seriously compromised in the long term under the No Action Alternative as a result of the failure of the medium lift aviation mission.

ES.4 PREFERRED ALTERNATIVE

The DoN has selected the following basing option as the Preferred Alternative: 8 squadrons at MCAS Miramar (Maximum Partial Basing Alternative at MCAS Miramar) and 2 squadrons at MCAS Camp Pendleton (Partial Basing Alternative at MCAS Camp Pendleton). This basing option best reflects both the Fundamental Selection Criteria and the Preferential Selection Criteria (see Chapter 2), while minimizing adverse effects on biological resources, specifically those located south of the runway at MCAS Miramar.

The NEPA also requires that an environmentally preferable alternative be identified. The No Action Alternative would have no significant impacts, and for NEPA purposes it would be the environmentally preferable alternative. However, the No Action Alternative would not meet mission requirements because the MV-22 would not be available for employment by 3D MAW and 4th MAW to provide medium lift capability to I MEF and other supported forces on the West Coast, as described in section ES.3 (No Action Alternative).



VMA

4 AV-8 Squadrons
56 Total Aircraft
48 Aircraft on Apron
4 Hangar Modules

MV-22

7 MV-22 Squadrons
(8 Total, 1 Deployed at all times)
84 Total Aircraft
70 Aircraft on Apron
7 Hangar Modules

Transient

4 CH-53
3 AH-1
4 UH-1

Legend

Imaginary Surface Edges
Buildings

Squadrons

MALS
MV-22
Transient
VMA

Improvements

New Airfield Construction

New Hangars
New Taxiway and Apron
New Washracks
New Rinse Facility
Support Facilities

Programmed or Planned

(Not associated with the proposed MV-22 action)

Airfield Concrete (P-447 & P-460 Apron Additions, P-522 Fueling Facilities)

Hangar Construction (P-447 & P-460 two Type II Modules, P-532V FRC)

0 600
Feet

Source: DoN 2008b

Site Layout Associated with the MCAS Yuma Maximum Partial Basing (8-Squadron) Alternative

FIGURE

ES-7

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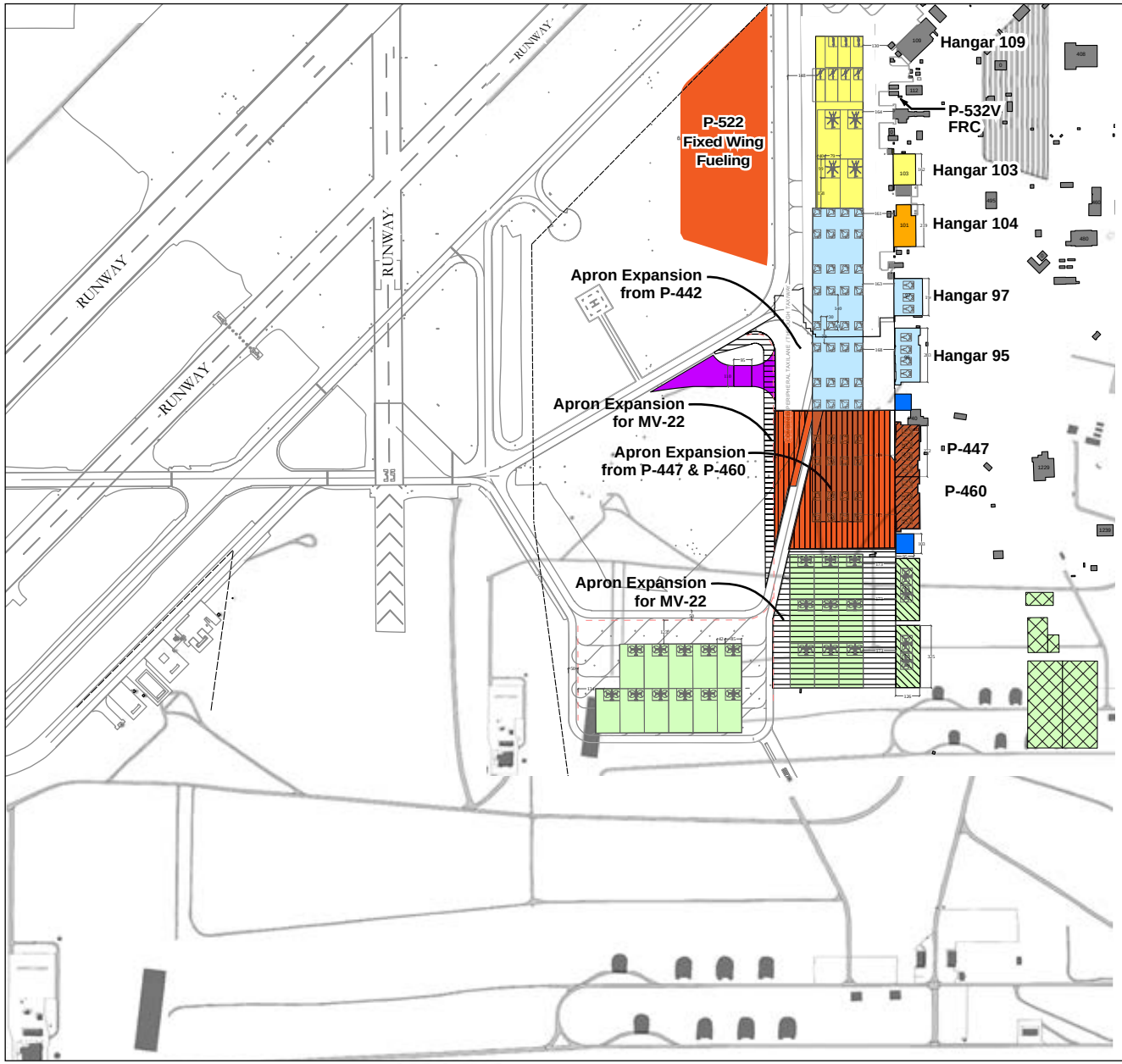

VMA

4 AV-8 Squadrons
56 Total Aircraft
48 Aircraft on Apron
4 Hangar Modules

MV-22

2 MV-22 Squadrons
24 Total Aircraft
20 Aircraft on Apron
2 Hangar Modules

Transient

4 CH-53
3 AH-1
4 UH-1

Legend

Imaginary Surface Edges
Buildings

Squadrons

MALS
MV-22
Transient
VMA

Improvements

New Airfield Construction

New Hangars
New Taxiway and Apron
New Washracks
New Rinse Facility
Support Facilities

Programmed or Planned
(Not associated with the proposed MV-22 action)

Airfield Concrete (P-447 & P-460 Apron Additions, P-522 Fueling Facilities)

Hangar Construction (P-447 & P-460 two Type II Modules, P-532V FRC)

0 600
Feet

Source: DoN 2008b

Site Layout Associated with the MCAS Yuma Minimum Partial Basing (2-Squadron) Alternative

FIGURE

ES-8

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Since the proposed action would affect several areas that are in nonattainment or maintenance of a national ambient air quality standard (NAAQS), the requirements of the General Conformity Rule under Section 176(c) of the Clean Air Act apply to the action within these areas. Appendices B.2 and B.3 of this EIS include the required conformity determination and conformity applicability analyses, respectively, for the proposed action. These analyses demonstrate that the proposed action would conform to the applicable State Implementation Plans within these areas.

ES.5 ENVIRONMENTAL CONSEQUENCES

This EIS addresses the impacts of basing up to ten squadrons of MV-22 on the West Coast. Evaluations were made of the maximum and minimum number of squadron options at each air station (e.g., maximum partial basing of eight squadrons and minimum partial basing of two squadrons). These include the following basing alternatives.

- **Partial basing at MCAS Miramar (eight squadrons) and MCAS Camp Pendleton (two squadrons) (*Preferred Alternative*);**
- Full basing (ten squadrons) at MCAS Miramar;
- Partial basing at MCAS Miramar (eight squadrons) and MCAS Yuma (two squadrons);
- Partial basing at MCAS Miramar (two squadrons) and MCAS Yuma (eight squadrons);
- Partial basing at MCAS Yuma (eight squadrons) and MCAS Camp Pendleton (two squadrons); and
- No Action.

Chapter 7 and the tables below (Tables ES-6 through ES-10) provide a summary of potential environmental impacts related to each proposed action alternative and the no action alternative.

MCAS Miramar 8-Squadron/MCAS Camp Pendleton 2-Squadron Alternative (Preferred Alternative). This alternative would result in significant and unmitigable ground traffic and transportation impacts in the vicinity of MCAS Miramar (Table ES-6). These impacts are considered unmitigable because the additional traffic volume does not meet eligibility criteria for the Defense Access Roads Program (23 U.S. Code § 210), and the DoN has no other legal authority for funding roadway improvements outside the installation. Additionally, significant but mitigable impacts to biological resources and cultural resources would occur in association with this alternative. A summary of impacts for all basing alternatives is provided in Chapter 7, along with proposed mitigation measures.

Full Basing Alternative at MCAS Miramar. This alternative would result in significant and unmitigable ground traffic and transportation impacts in the vicinity of MCAS Miramar as well as significant and unmitigable biological resources impacts on the air station (Table ES-7). The ground traffic and transportation impacts are considered unmitigable because the additional traffic volume does not meet eligibility criteria for the Defense Access Roads Program (23 U.S. Code § 210), and the DoN has no other legal authority for funding roadway improvements outside the installation. Direct impacts on vernal pools and associated species that are federally listed as threatened or endangered could be reduced through mitigation but not to a level of less than

significant. Additionally, significant but mitigable impacts to cultural resources were determined to occur in association with this alternative.

MCAS Miramar 8-Squadron/MCAS Yuma 2-Squadron Alternative. This alternative would result in significant and unmitigable ground traffic and transportation impacts in the vicinity of both MCAS Miramar and MCAS Yuma (Table ES-8). These impacts are considered unmitigable because the additional traffic volume does not meet eligibility criteria for the Defense Access Roads Program (23 U.S. Code § 210), and the DoN has no other legal authority for funding roadway improvements outside the installation. Additionally, significant but mitigable impacts to socioeconomics, biological resources, and cultural resources would occur in association with this alternative.

MCAS Yuma 8-Squadron/MCAS Miramar 2-Squadron Alternative. This alternative would result in significant and unmitigable ground traffic and transportation impacts in the vicinity of MCAS Yuma (Table ES-9). These impacts are considered unmitigable because because the additional traffic volume does not meet eligibility criteria for the Defense Access Roads Program (23 U.S. Code § 210), and the DoN has no other legal authority for funding roadway improvements outside the installation. Additionally, significant but mitigable impacts to socioeconomics and cultural resources would occur in association with this alternative.

MCAS Yuma 8-Squadron/MCAS Camp Pendleton 2-Squadron Alternative. This alternative would result in significant and unmitigable ground traffic and transportation impacts in the vicinity of MCAS Yuma (Table ES-10). These impacts are considered unmitigable because the additional traffic volume does not meet eligibility criteria for the Defense Access Roads Program (23 U.S. Code § 210), and the DoN has no other legal authority for funding roadway improvements outside the installation. Additionally, significant but mitigable impacts to socioeconomics, biological resources, and cultural resources would occur in association with this alternative.

No Action Alternative. The No Action Alternative would have no significant impact on existing environmental resources at MCAS Miramar, MCAS Camp Pendleton, MCAS Yuma, MCB Camp Pendleton, the Bob Stump Training Range Complex, MCAGCC, or the MTRs.

ES.6 ORGANIZATION OF THE EIS

Chapter 1 provides the purpose and need for the proposed action and discusses the public involvement and scoping process. Chapter 2 describes the proposed action and alternatives, including a detailed discussion of the alternatives development process. Environmental impacts of the proposed action (construction and operations) are assessed for each air station in Chapters 3 (MCAS Miramar), 4 (MCAS Camp Pendleton), and 5 (MCAS Yuma). Regardless of which basing alternative is ultimately selected, the MV-22 would conduct training and readiness operations and special exercise operations within DoD-controlled airspace and DoN/USMC training ranges located on the West Coast. This includes operations at MCB Camp Pendleton (section 6.1), the Bob Stump Training Range Complex (Chocolate Mountain Aerial Bombing and Gunnery Range, Barry M. Goldwater Range [West], R-2510 and R-2512) (section 6.2), MCAGCC (section 6.3), and various MTRs (section 6.4). Chapter 7 provides a summary of potential environmental impacts related to each proposed action alternative and the no action alternative, and includes a list of proposed mitigation measures. Chapter 8

provides an analysis of cumulative impacts, Chapter 9 covers other NEPA considerations, Chapter 10 is the list of preparers, and Chapters 11 and 12 provide a list of acronyms and references, respectively. Persons or agencies contacted during the course of preparing this EIS are cited as personal communications and listed in the reference section, while agency correspondence is provided in Appendix H.

ES.7 PUBLIC COMMENT ON THE EIS

The USEPA published a Notice of Availability (NOA) in the Federal Register for the Draft EIS for this proposed action on 17 February 2009. The Draft EIS was circulated for review and comment to government agencies, local organizations, Native American tribes, and interested private citizens for 45 days between 17 February 2009 and 3 April 2009. The Draft EIS was also available for general review in five public libraries and was available online at http://www.mv22eiswest.net/. Public meetings were conducted during the review period in two southern California communities (one near MCAS Camp Pendleton and one near MCAS Miramar) as well as in Yuma, Arizona (near MCAS Yuma). Public comments received were reviewed and reflected as appropriate in the Final EIS, with responses to all comments presented in the Appendix A of the Final EIS.

The Final EIS will be circulated for a 30-day review period, and an NOA will be published in the Federal Register. The Final EIS will be available for public comment between 16 October 2009 and 16 November 2009.

Additionally, a NOA for public review of the Draft Conformity Determination for the proposed action was advertised in the *San Diego Union Tribune* on 15 June 2009.

Table ES-6. Summary of Environmental Consequences for MCAS Miramar 8-Squadron / MCAS Camp Pendleton 2-Squadron Alternative (Preferred Alternative)

	MCAS Miramar (Eight Squadrons)	MCAS Camp Pendleton (Two Squadrons)	MCAS Yuma (No MV-22 Squadrons*)	MCB Camp Pendleton	Bob Stump Training Range Complex	MCAGCC	MTR
CHANGE IN CONDITIONS							
Net Change in Aircraft	+48	-18	-	-	-	-	-
Net Change in Military Personnel	+746	-257	-	-	-	-	-
Net Change in Annual Operations	+22,246	-5,898	-2,812	+1,895	+16,382	-1,689	+2,085
RESOURCE AREA IMPACT							
Airfields and Airspace	NS	NS	NI	NS	NS	NS	NS
Land Use	NS	NS	NS	NS	NS	NS	NS
Socioeconomics	NS	NS	NS	NI	NI	NI	NI
Community Facilities & Services	NS	NS	NI	NI	NI	NI	NS
Ground Traffic & Transportation	S-U	NS	NS	NI	NI	NI	NI
Air Quality	NS	NS/BI	NS	NS	NS	NS	NS
Noise	NS	NS	NS	NS	NS	NS	NS
Infrastructure & Utilities	NS	NS	NS	NI	NI	NI	NI
Aesthetics & Visual Resources	NS	NS	NS	NI	NI	NI	NS
Hazardous Materials Management	NS	NS	NS	NI	NI	NS	NI
Topography, Geology, & Soils	NS	NS	NS	NS	NS	NS	NI
Water Resources	NS	NS	NS	NS	NS	NS	NI
Biological Resources	S-M	S-M	NS	NS	NS	NS	NS
Cultural Resources	NS	S-M	NS	S-M	S-M	S-M	NI
Safety & Environmental Health	NS	NS	NS	NS	NS	NS	NI
Environmental Justice	NS	NS	NS	NS	NS	NS	NS

Notes:
Significant/Unmitigable Impacts = S-U; Significant/Mitigable = S-M; No Significant Impacts = NS; Beneficial Impacts = BI; No Impacts = NI
* There would be no change in personnel or aircraft at MCAS Yuma; this column is based on the No Action Alternative.

Table ES-7. Summary of Environmental Consequences for the Full Basing Alternative at MCAS Miramar

	MCAS Miramar (Ten MV-22 Squadrons)	MCAS Camp Pendleton (No MV-22 Squadrons*)	MCAS Yuma (No MV-22 Squadron+)	MCB Camp Pendleton	Bob Stump Training Range Complex	MCAGCC	MTR
CHANGE IN CONDITIONS							
Net Change in Aircraft	+72	-42	-	-	-	-	-
Net Change in Military Personnel	+1,142	-674	-	-	-	-	-
Net Change in Annual Operations	+34,421	-17,995	-2,812	+1,895	+16,382	-1,689	+2,085
RESOURCE AREA IMPACT							
Airfields and Airspace	NS	NS	NI	NS	NS	NS	NS
Land Use	NS	NS	NS	NS	NS	NS	NS
Socioeconomics	NS	NS	NS	NI	NI	NI	NI
Community Facilities & Services	NS	NS	NI	NI	NI	NI	NS
Ground Traffic & Transportation	S-U	NS	NS	NI	NI	NI	NI
Air Quality	NS	NS/BI	NS	NS	NS	NS	NS
Noise	NS	NS	NS	NS	NS	NS	NS
Infrastructure & Utilities	NS	NS	NS	NI	NI	NI	NI
Aesthetics & Visual Resources	NS	NI	NS	NI	NI	NI	NS
Hazardous Materials Management	NS	NI	NS	NI	NI	NS	NI
Topography, Geology, & Soils	NS	NI	NS	NS	NS	NS	NI
Water Resources	NS	NI	NS	NS	NS	NS	NI
Biological Resources	S-U	NI	NS	NS	NS	NS	NS
Cultural Resources	S-M	NI	NS	S-M	S-M	S-M	NI
Safety & Environmental Health	NS	NS	NS	NS	NS	NS	NI
Environmental Justice	NS	NS	NS	NS	NS	NS	NS

Notes:
Significant/Unmitigable Impacts = S-U; Significant/Mitigable = S-M; No Significant Impacts = NS; Beneficial Impacts = BI; No Impacts = NI
* MCAS Camp Pendleton would lose three CH-46 squadrons.
\+ There would be no change in personnel or aircraft at MCAS Yuma; this column is based on the No Action Alternative.

Table ES.8. Summary of Environmental Consequences for MCAS Miramar 8-Squadron / MCAS Yuma 2-Squadron Alternative

	MCAS Miramar (Eight Squadrons)	MCAS Yuma (Two Squadrons)	MCAS Camp Pendleton (No MV-22 Squadrons*)	MCB Camp Pendleton	Bob Stump Training Range Complex	MCAGCC	MTR
CHANGE IN CONDITIONS							
Net Change in Aircraft	+48	+24	-42	-	-	-	-
Net Change in Military Personnel	+746	+712	-674	-	-	-	-
Net Change in Annual Operations	+22,246	+6,320	-17,995	+1,895	+16,382	-1,689	+2,085
RESOURCE AREA IMPACT							
Airfields and Airspace	NS	NS	NS	NS	NS	NS	NS
Land Use	NS	NS	NS	NS	NS	NS	NS
Socioeconomics	NS	S-M	NS	NI	NI	NI	NI
Community Facilities & Services	NS	NS	NS	NI	NI	NI	NS
Ground Traffic & Transportation	S-U	S-U	NS	NI	NI	NI	NI
Air Quality	NS	NS/BI	NS/BI	NS	NS	NS	NS
Noise	NS	NS	NS	NS	NS	NS	NS
Infrastructure & Utilities	NS	NS	NS	NI	NI	NI	NI
Aesthetics & Visual Resources	NS	NS	NI	NI	NI	NI	NS
Hazardous Materials Management	NS	NS	NI	NI	NI	NS	NI
Topography, Geology, & Soils	NS	NS	NI	NS	NS	NS	NI
Water Resources	NS	NS	NI	NS	NS	NS	NI
Biological Resources	S-M	NS	NI	NS	NS	NS	NS
Cultural Resources	NS	NS	NI	S-M	S-M	S-M	NI
Safety & Environmental Health	NS	NS	NS	NS	NS	NS	NI
Environmental Justice	NS	NS	NS	NS	NS	NS	NS

Notes:
Significant/Unmitigable Impacts = S-U; Significant/Mitigable = S-M; No Significant Impacts = NS; Beneficial Impacts = BI; No Impacts = NI
* MCAS Camp Pendleton would lose three CH-46 squadrons.

Table ES-9. Summary of Environmental Consequences for MCAS Yuma 8-Squadron / MCAS Miramar 2-Squadron Alternative

	MCAS Yuma (Eight Squadrons)	MCAS Miramar (Two Squadrons)	MCAS Camp Pendleton (No MV-22 Squadrons*)	MCB Camp Pendleton	Bob Stump Training Range Complex	MCAGCC	MTR
CHANGE IN CONDITIONS							
Net Change in Aircraft	+96	-24	-42	-	-	-	-
Net Change in Military Personnel	+2,015	-557	-674	-	-	-	-
Net Change in Annual Operations	+39,799	-8,910	-17,995	+1,895	+16,382	-1,689	+2,085
RESOURCE AREA IMPACT							
Airfields and Airspace	NS	NS	NS	NS	NS	NS	NS
Land Use	NS	NS	NS	NS	NS	NS	NS
Socioeconomics	S-M	NS	NS	NI	NI	NI	NI
Community Facilities & Services	NS	NS	NS	NI	NI	NI	NS
Ground Traffic & Transportation	S-U	NS	NS	NI	NI	NI	NI
Air Quality	NS	NS/BI	NS/BI	NS	NS	NS	NS
Noise	NS	NS	NS	NS	NS	NS	NS
Infrastructure & Utilities	NS	NS	NS	NI	NI	NI	NI
Aesthetics & Visual Resources	NS	NI	NI	NI	NI	NI	NS
Hazardous Materials Management	NS	NS	NI	NI	NI	NS	NI
Topography, Geology, & Soils	NS	NS	NI	NS	NS	NS	NI
Water Resources	NS	NS	NI	NS	NS	NS	NI
Biological Resources	NS	NS	NI	NS	NS	NS	NS
Cultural Resources	S-M	NI	NI	S-M	S-M	S-M	NI
Safety & Environmental Health	NS	NS	NS	NS	NS	NS	NI
Environmental Justice	NS	NS	NS	NS	NS	NS	NS

Notes:
Significant/Unmitigable Impacts = S-U; Significant/Mitigable = S-M; No Significant Impacts = NS; Beneficial Impacts = BI; No Impacts = NI
* MCAS Camp Pendleton would lose three CH-46 squadrons.

Table ES-10. Summary of Environmental Consequences for MCAS Yuma 8-Squadron / MCAS Camp Pendleton 2-Squadron Alternative

	MCAS Yuma (Eight Squadrons)	MCAS Camp Pendleton (Two Squadrons)	MCAS Miramar (No MV-22 Squadrons*)	MCB Camp Pendleton	Bob Stump Training Range Complex	MCAGCC	MTR
CHANGE IN CONDITIONS							
Net Change in Aircraft	+96	-18	-48	-	-	-	-
Net Change in Military Personnel	+2,015	-257	-974	-	-	-	-
Net Change in Annual Operations	+39,799	-5,898	-17,322	+1,895	+16,382	-1,689	+2,085
RESOURCE AREA IMPACT							
Airfields and Airspace	NS	NS	NS	NS	NS	NS	NS
Land Use	NS	NS	NS	NS	NS	NS	NS
Socioeconomics	S-M	NS	NS	NI	NI	NI	NI
Community Facilities & Services	NS	NS	NS	NI	NI	NI	NS
Ground Traffic & Transportation	S-U	NS	NS	NI	NI	NI	NI
Air Quality	NS	NS/BI	NS/BI	NS	NS	NS	NS
Noise	NS	NS	NS	NS	NS	NS	NS
Infrastructure & Utilities	NS	NS	NS	NI	NI	NI	NI
Aesthetics & Visual Resources	NS	NS	NI	NI	NI	NI	NS
Hazardous Materials Management	NS	NS	NI	NI	NI	NS	NI
Topography, Geology, & Soils	NS	NS	NI	NS	NS	NS	NI
Water Resources	NS	NS	NI	NS	NS	NS	NI
Biological Resources	NS	S-M	NS	NS	NS	NS	NS
Cultural Resources	S-M	S-M	NI	S-M	S-M	S-M	NI
Safety & Environmental Health	NS	NS	NS	NS	NS	NS	NI
Environmental Justice	NS	NS	NS	NS	NS	NS	NS

Notes:
Significant/Unmitigable Impacts = S-U; Significant/Mitigable = S-M; No Significant Impacts = NS; Beneficial Impacts = BI; No Impacts = NI
* MCAS Miramar would lose four CH-46 squadrons.

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Chapter 1

Purpose and Need

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1.0 PURPOSE AND NEED

1.1 INTRODUCTION

The Department of the Navy (DoN) has prepared this Environmental Impact Statement (EIS) to assess the potential environmental impacts of basing the MV-22 Osprey tilt-rotor (MV-22) aircraft in the Western United States (U.S.). The proposed introduction of MV-22 aircraft to the Western U.S. is part of a U.S. Marine Corps (USMC)-wide process of replacing its aging fleet of medium lift helicopters with more advanced, operationally-capable aircraft.

The proposed action addressed in this EIS would include: 1) basing up to eight MV-22 squadrons for employment by the Third Marine Aircraft Wing (3D MAW) to provide medium lift capability to I Marine Expeditionary Force (I MEF); 2) basing of up to two Fourth Marine Aircraft Wing (4th MAW) MV-22 squadrons to provide a West Coast reserve component medium lift capability; 3) construction and/or renovation of airfield facilities necessary to accommodate and maintain the MV-22 squadrons; and 4) conducting MV-22 readiness and training operations and special exercise operations to attain and maintain proficiency in the operational employment of the MV-22.

Basing up to ten MV-22 squadrons (120 aircraft) on the West Coast would replace nine helicopter squadrons (114 aircraft) currently authorized for basing on the West Coast. The proposed MV-22 squadrons would be located at a single installation or would be split between a maximum of two aviation facilities, including the following: 1) full basing at Marine Corps Air Station (MCAS) Miramar; 2) partial (i.e., "split") basing at MCAS Miramar and MCAS Camp Pendleton; 3) partial basing at MCAS Yuma and MCAS Camp Pendleton; and 4) partial basing at MCAS Miramar and MCAS Yuma. The locations of these military installations are shown in Figure 1.1-1.

The MV-22 squadrons would also conduct operations within existing military lands and along existing USMC-controlled Military Training Routes (MTRs). The MV-22 tilt-rotor is a new type of aircraft for the USMC, with new and different capabilities as compared to the CH-46 helicopter it replaces. As the USMC collectively gains experience with the MV-22, greater understanding of its capabilities and limitations will lead to development changes or different operations and training. This EIS incorporates the most up-to-date information regarding expected training operations based on the MV-22 Training and Readiness Manual (USMC 2008c). This provides the best information available to the public and agencies and allows environmental planning based on that information. As the MV-22 program moves forward, the DoN will monitor the program, taking steps to identify and reduce potential environmental consequences, evaluate the results in light of new information, and inform the public of substantial changes.

The proposed action, basing alternatives, and the No Action Alternative are described in further detail in Chapter 2 of this EIS.

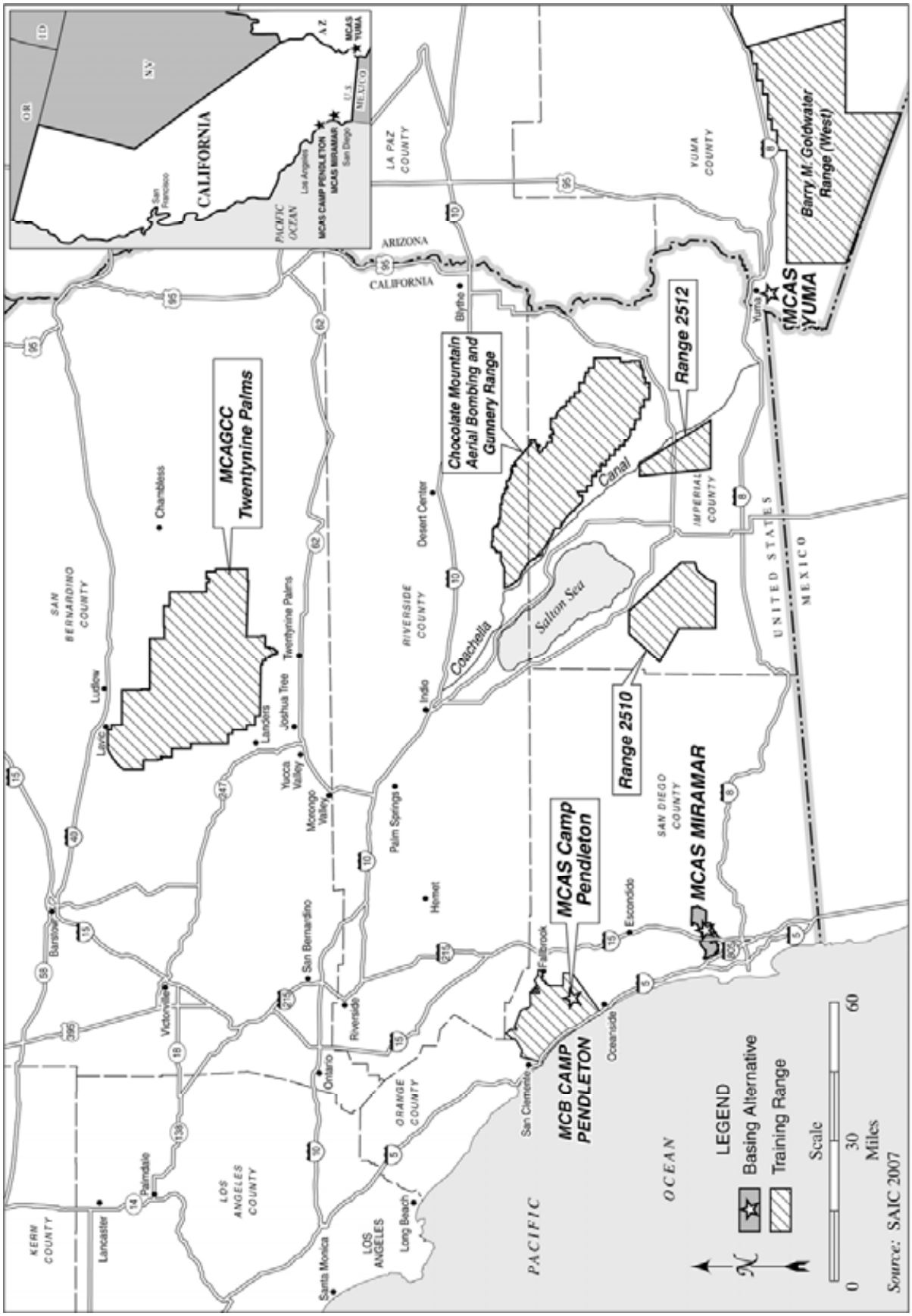

FIGURE 1.1-1

Location of Basing Alternatives and Proposed Training Ranges for the MV-22

This EIS has been prepared in compliance with:

- The National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S. Code [USC] § 4321 et seq.);
- Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (Title 40 Code of Federal Regulations [CFR] §§ 1500-1508);
- DoN Procedures for Implementing NEPA (32 CFR § 775), as described in Chief of Naval Operations Instruction (OPNAVINST) 5090.1B; and
- USMC Environmental Compliance and Protection Manual (Marine Corps Order [MCO] P5090.2A, change 2).

The NEPA requires consideration of potential impacts to the environment in the decision-making process for federal actions. CEQ regulations implement the "action forcing" provision of the NEPA to ensure that federal agencies comply with the letter and spirit of the NEPA. OPNAVINST 5090.1B and MCO P5090.2A provide specific guidance for the DoN and USMC in preparing environmental documentation for proposed actions subject to the NEPA.

1.2 PURPOSE AND NEED FOR PROPOSED ACTION

The purpose of the proposed action is to determine the basing location(s) for MV-22 squadrons that would provide medium lift capability to support I MEF and meet West Coast requirements for reserve component medium lift capability, and provide for efficient training through ready access to ranges, training areas and airspace. The MV-22 is the replacement for the current fleet of less-capable, 1960s-era CH-46 medium lift helicopters. The 3D MAW currently operates seven active duty squadrons of CH-46Es in support of the West Coast-based I MEF. The 4th MAW currently operates a reserve squadron of CH-46Es and, until recently, operated a reserve squadron of CH-53Es from Edwards Air Force Base (AFB) to meet West Coast reserve component medium lift requirements.

The need for the proposed action is to base the USMC's new medium lift aircraft where it can best support the I MEF and 4th MAW missions, while making use of existing facilities to the greatest extent practicable and preventing impacts to combat capability and mission readiness during the transition to meet current and future operational requirements of the USMC. In addition, increasing maintenance requirements limit the use of the aging aircraft (CH-46E) on the emerging battlefield. The MV-22 aircraft utilize tilt-rotor technology to provide the maneuverability and lift of a helicopter and, in fixed wing mode, have the ability to fly twice as fast, four times as far, and carry twice the combat load of the CH-46E (DoN 2008a). Thus, replacement of CH-46E helicopters with MV-22 aircraft will modernize the USMC medium lift fleet and improve the operational capabilities of the 3D and 4th MAW squadrons.

1.3 PUBLIC INVOLVEMENT AND SCOPING PROCESS

1.3.1 Scoping Process

The purpose of scoping is to identify potential environmental issues and concerns regarding the proposed action. The scoping process for this EIS included public notification via the Federal Register, newspaper advertisements, direct mail, and seven public scoping meetings. The

public scoping period officially began on 6 October 2000, with the publication of the Notice of Intent (NOI) in the Federal Register. The NOI conveyed to the public the intent of the DoN to prepare an EIS to evaluate the potential impacts of the proposed action. The NOI also announced the dates, times, and locations of the public scoping meetings. Foreign language translation was available upon request.

Public scoping meetings were held between 25 October and 9 November 2000, in six southern California communities (Lancaster, El Centro, Del Mar, San Clemente, Mira Mesa, and Fallbrook) and in Yuma, Arizona. The public scoping meetings were designed with an "open house" format to create a comfortable, more informative atmosphere. Using this format, public participants could speak individually to USMC personnel and other members of the project team. Attendees visiting the information stations were provided the opportunity to observe a video of the MV-22 and a continuous play PowerPoint presentation. The goals of these meetings were to introduce the communities to the EIS process, provide available project information, answer questions from community members, and solicit public input on important issues and concerns. Over 200 community members attended the meetings, presenting important and challenging questions to the project team. Details regarding the public participation program and the results of the public scoping meetings are included in Appendix A of this document. The DoN considered comments received during the scoping process in determining the range of issues to be evaluated in the EIS.

After the public scoping meetings held in 2000, the MV-22 program and associated EIS was delayed because technical issues arose during testing and evaluation of this new aircraft. These issues have been resolved, East Coast MV-22 squadrons have been deployed successfully for combat support in Iraq, and the MV-22 program is moving forward.

1.3.2 Public Comment on the EIS

The U.S. Environmental Protection Agency (USEPA) published a Notice of Availability (NOA) in the Federal Register for the Draft EIS for this proposed action on 17 February 2009. The Draft EIS was circulated for review and comment to government agencies, local organizations, Native American tribes, and interested private citizens for 45 days between 17 February 2009 and 3 April 2009. The Draft EIS was also available for general review in five public libraries and was available online at http://www.mv22eiswest.net/. Public meetings were conducted during the review period in two southern California communities (one near MCAS Camp Pendleton and one near MCAS Miramar) as well as in Yuma, Arizona (near MCAS Yuma). Public comments received were reviewed and reflected as appropriate in the Final EIS, with responses to all comments presented in the Appendix A of the Final EIS.

The Final EIS will be circulated for a 30-day review period, and a NOA will be published in the Federal Register. The Final EIS will be available for public comment between 16 October 2009 and 16 November 2009.

Additionally, a NOA for public review of the Draft Conformity Determination for the proposed action was advertised in the *San Diego Union Tribune* on 15 June 2009.

Chapter 2

Description of Proposed Action and Alternatives

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2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

The proposed action is the basing of MV-22 squadrons to provide medium lift capability to the West Coast-based I MEF as the replacement for outdated CH-46 helicopters that are quickly approaching the end of their service life and to meet West Coast requirements for reserve component medium lift capability. The proposed action would base up to ten MV-22 squadrons (120 aircraft) on the West Coast and would replace nine helicopter squadrons (114 aircraft) currently authorized for basing on the West Coast. The proposed action would require construction and/or renovation of airfield facilities to accommodate the basing decision. The proposed action would also encompass training and readiness operations within existing military lands and along existing USMC-controlled MTRs to attain and maintain proficiency in the operational employment of the MV-22.

2.1.1 Description of MV-22 Aircraft

The MV-22 is a multi-engine, dual-piloted, vertical take-off and landing tilt-rotor aircraft designed for combat, combat support, combat service support, and Special Operations missions worldwide. The MV-22 can carry up to 24 combat-loaded Marines, or 10,000 pounds (5 tons) of cargo, at a cruising speed in excess of 240 knots (276 miles per hour [mph]). It has a combat range of 430 nautical miles (nm) and a flight ceiling of more than 26,000 feet (7,925 meters). The unique tilt-rotor allows the MV-22 to operate as a helicopter or turboprop. This allows the MV-22 to combine the hovering advantages of a helicopter, with the high speed and high altitude cruise capability of a modern turboprop aircraft. The MV-22 is shipboard compatible (able to land and take-off from ships) with the world's first complete blade fold and storage system that allows aircraft to be easily accommodated aboard ship. It is able to operate off L-class amphibious ships, amphibious assault general purpose (LHA) and multi-purpose (LHD) class ships, and can also operate from, and be stowed on, nuclear aircraft carriers.

The MV-22 is powered by two Rolls-Royce AE1107C turbo shaft engines and is armed with one machine gun. The aft ramp is used for loading and unloading troops and cargo in the interior cargo compartment and the MV-22 can transport external cargo using a tandem hook suspension system for high speed transport of loads, such as vehicles and equipment. Information regarding heat exhaust and rotor wash can be found in Appendix G.

The MV-22's avionics include Global Positioning System; lightweight inertial navigation system; radar altimeter; and night vision with an integrated display system. These features enable aircrews to navigate globally, accurately refine aircraft position without the need for ground-based navigation aids, update mission information, and update target coordinates while in flight. Combat support is enhanced by the MV-22's ability to be operated 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 MV-22 is designed to meet USMC operational requirements well into the 21st Century.

2.1.2 Replacement of Aircraft and Personnel

Aircraft

The proposed action would base up to ten MV-22 squadrons consisting of eight active duty squadrons and two reserve squadrons with a combined total of 120 aircraft on the West Coast. The new MV-22 would replace seven CH-46E active duty squadrons (90 aircraft), one reserve CH-46E squadron (13 aircraft), and one reserve CH-53E squadron (11 aircraft) currently operated by the 3D and 4th MAW (Table 2.1-1 and Figure 2.1-1). Of the seven CH-46E active duty squadrons, three are associated with Marine Aircraft Group-39 at MCAS Camp Pendleton, and four are associated with Marine Aircraft Group-16 at MCAS Miramar. The two reserve squadrons are associated with Marine Aircraft Group-46 at Edwards AFB.

Although the existing aircraft to be replaced are based at three different installations, the proposed MV-22 squadrons would be co-located at a single installation or would be split between a maximum of two aviation facilities. The selection criteria used to determine possible basing alternative locations are discussed in section 2.2.

Table 2.1-1. Existing Aircraft and Personnel Associated with the Nine Squadrons to be Replaced by the MV-22

	Aircraft	Officers	Enlisted	Total Military Personnel
MCAS MIRAMAR (3D MAW—4 ACTIVE DUTY SQUADRONS)				
HMM-161, MAG-16 (The First)	12	33	164	197
HMM-163, MAG-16 (Evil Eyes)	12	33	164	197
HMM-165, MAG-16 (White Knights)	12	33	164	197
HMM-166, MAG-16 (Sea Elk)	12	33	164	197
MALS-16 (Forerunners)	-	26	269	295
Administrative or Site Support	-	8	13	21
HMH-769, MAG-46 (MALS augment)*	-	1	26	27
HMM-764, MAG-46 (MALS augment)*	-	-	23	23
Headquarters (MAG-46)*	-	25	90	115
Sub-total	48	192	1,077	1,269
MCAS CAMP PENDLETON (3D MAW—3 ACTIVE DUTY SQUADRONS)				
HMM(T)-164, MAG-39 (Knight Riders)	18	27	231	258
HMM-268, MAG-39 (Red Dragons)	12	33	164	197
HMM-364, MAG-39 (Purple Foxes)	12	33	164	197
MALS-39 (Magicians)	-	26	269	295
Administrative or Site Support	-	5	17	22
Sub-total	42	124	845	969
EDWARDS AFB (4TH MAW—2 RESERVE SQUADRONS)				
HMH-769, MAG-46 (Road Hogs)**	11	24	143	167
HMM-764, MAG-46 (Moonlighters)	13	33	163	196
Sub-total	24	57	306	363
Total	**114**	**373**	**2,228**	**2,601**

Notes:
* Associated with Edwards reserve squadrons.
** This squadron has already been deactivated.
HMH = Heavy lift helicopter HMM = Medium lift helicopter MAG = Marine Aircraft Group
MAW = Marine Aircraft Wing MALS = Marine Aviation Logistics Squadron
Source: USMC 2004a; Pharris, personal communication 2004.

Source: SAIC 2007

3D and 4th MAW Squadrons Affected by the Transition to the MV-22

FIGURE 2.1-1

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Personnel

The MV-22 provides expanded USMC capabilities without substantially changing the number of needed squadron personnel. The current staffing level associated with the nine helicopter squadrons to be replaced by the MV-22, including personnel assigned to each tactical squadron, the Marine Aviation Logistics Squadron (MALS), headquarters and headquarters support associated with the reserve squadrons, and other administrative or site support functions, is approximately 2,601 military personnel (Table 2.1-1). The total personnel associated with ten squadrons of MV-22 ranges from 2,411 military personnel, if the squadrons are co-located at a single installation, to 2,727 personnel if the squadrons are split between two facilities (Table 2.1-2). A break-down of current and expected staffing requirements is provided below. Details regarding potential changes in military personnel for each basing alternative carried forward for detailed analysis are described in section 2.3.

Table 2.1-2. Proposed MV-22 Squadrons and Associated Personnel

	Aircraft	Officers	Enlisted	Total Military Personnel
MV-22 – 10 squadrons	120	330	1,650	1,980
MALS	-	26	269	295
Headquarters (MAG-46)	-	25	90	115
Administrative or Site Support*	-	8	13	21
Total	**120**	**389**	**2,022**	**2,411**

Notes:
*For split base options, each base would need a full complement of MALS core personnel (295) and site support personnel (21). This would require an additional 316 military personnel over the full basing option shown above, which would result in the need for a total of 2,727 military personnel (2,411 + 316) for split base options.
MAG = Marine Aircraft Group
Source: USMC 2004a; Pharris 2004, personal communication.

Active Duty Squadrons. Present staffing for seven active duty helicopter squadrons to be replaced by the MV-22 is 1,440 military personnel[1]. Expected staffing for the eight active duty MV-22 squadrons is 1,584 military personnel (198 per squadron).

Reserve Squadrons. Present staffing for the two reserve helicopter squadrons to be replaced by the MV-22 is 363 military personnel (average of 182 per squadron). Expected staffing for the two reserve MV-22 squadrons is 396 military personnel (198 per squadron).

Marine Aviation Logistics Squadrons. The mission of the MALS is to provide all phases of aviation logistical support to the Marine Aircraft Groups, including intermediate level maintenance and aviation supply. MALS-16 at MCAS Miramar has a core team of 295 total military personnel that support the existing CH-46E tactical squadrons as well as four squadrons of CH-53Es currently based at MCAS Miramar (see Table 2.1-1). The reserve squadrons at Edwards AFB rely on MALS-16 for aviation logistical support and, in conjunction, have 50 military personnel stationed at MCAS Miramar to augment MALS-16. MALS-39 at MCAS Camp Pendleton also has a core team of 295 total military personnel that support the existing CH-46E tactical squadrons as well as four light attack helicopter (HMLA) squadrons of Hueys and Cobras currently based at MCAS Camp Pendleton.

[1] Six squadrons have 197 military personnel per squadron, and the training squadron (HMMT-164) has 258 military personnel, for a total of 1,440 personnel.

With the transition to the MV-22, a MALS would be co-located with the MV-22 tactical squadrons, similar to existing conditions. Staffing would include 295 military personnel (one MALS) if all ten squadrons were based at a single installation, or 590 military personnel (two MALS) if the tactical squadrons were split between two aviation facilities (see Table 2.1-2). The MV-22 squadrons would rely on an existing MALS, when possible, depending on the basing alternative chosen.

Headquarters, Administration, and Other Staffing. In addition, there are currently about 158 military positions associated with headquarters and headquarters support and other administrative or site support functions. With the transition to the MV-22, some of the existing positions may be reassigned to other bases, depending on which basing alternative was selected.

Basing alternatives may also affect civilian employment positions associated with base operating support, such as civilian food services, range support and aircraft scheduling, contract maintenance, etc. There are also likely to be civilian contractors on-site to assist with the operation and maintenance of the MV-22 because it is a new type of aircraft. Details regarding potential changes in civilian personnel for each basing alternative carried forward are provided in the relevant Socioeconomics impact sections (see sections 3.4, 4.4, and 5.4).

Schedule

Transition from the helicopters to the MV-22 is scheduled to occur between fiscal year (FY) 2010 and FY 2020, based on the Marine Aviation Plan (USMC 2008d). It is anticipated that one or two squadrons would complete the MV-22 transition per year between 2011 and 2020. Construction activities are anticipated to occur primarily between FY 2010 and FY 2014. MV-22 training exercises and operations would begin with the arrival of the first MV-22 aircraft in FY 2010.

2.1.3 Proposed MV-22 Operations

This EIS covers MV-22 training and readiness operations within Department of Defense (DoD)-controlled airspace and DoN/USMC-controlled training ranges located on the West Coast. As discussed in Chapter 1, the MV-22 tilt-rotor aircraft is a new type of aircraft for the USMC, with new and different capabilities as compared to the CH-46 helicopter it replaces. The USMC has made reasonable assumptions about the number and types of proposed MV-22 training and readiness operations, based on operations 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-22 would permit tactical training in ways not currently possible using conventional helicopters. The operations information provided below and elsewhere in the EIS is based on the MV-22 Training and Readiness Manual (USMC 2008c), which provides the best information available regarding proposed MV-22 operations.

The USMC expects to continue updating the MV-22 Training and Readiness Manual and training plans to reflect lessons learned from training evolutions and deployment experience. Due to the evolving nature of these MV-22 training requirements, additional training areas and air space, on or off DoD-owned lands, likely will emerge as necessary or useful for applying the aircraft's capabilities to ever-changing missions. The environmental impacts associated with new training requirements will be evaluated under NEPA, and will include consultations pursuant to the Endangered Species Act and/or National Historic Preservation Act where applicable. Toward that

end, the DoN is seeking programmatic agreements with State Historic Preservation Officers to set forth procedures for evaluating future proposed landing zones.

Additionally, the MV-22 is operated in accordance with the Naval Air Training and Operating Procedures Standardization (NATOPS) training manual. The manual 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.

Special Use Airspace, Range Facility, and Operations Definitions

The following provides basic definitions for relevant types of Special Use Airspace, range facilities, and airfield operations that are discussed in the EIS.

Special Use Airspace

Segments of airspace are designated Special Use Airspace for use by military aircraft. Consistent with the direction provided to the Federal Aviation Administration (FAA) in the Federal Aviation Act of 1958, the concept of Special Use Airspace was developed by the FAA and the DoD to identify areas where military activity or unusual flight conditions may occur, and its designation serves to alert a non-participating aircraft (civil or military) to the possible presence of these activities. The intent of this designation is to ensure the safety of all airspace users and balance the needs of the military with the needs of commercial and general aviation. Special Use Airspace has a defined vertical and lateral limit within which the flight of non-military aircraft is subject to restrictions. There are four primary types of Special Use Airspace discussed in this EIS:

Restricted Areas (R-). Airspace designated to support ground or flight activities that could be hazardous to non-participating aircraft. Entry into restricted areas without approval from the using or controlling agency is prohibited.

MTRs. A corridor of airspace used by the military, usually for the purpose of conducting low-altitude, high-speed training. MTRs are described by a centerline, with defined horizontal limits on either side of the centerline, and vertical limits expressed as minimum and maximum altitudes along the flight track.

Military Operating Areas (MOAs). Airspace established to separate or segregate certain non-hazardous military activities from Instrument Flight Rule (IFR) aircraft traffic and to identify Visual Flight Rule (VFR) aircraft traffic where these military activities are conducted. MOAs exist at altitudes up to, but not including, 18,000 feet mean sea level (MSL).

Air Traffic Control Assigned Airspace (ATCAA). Airspace controlled by the applicable FAA Air Route Traffic Control Center (ARTCC) that, if not required for other purposes, may be available for military use. ATCAAs are structured and used to extend the horizontal and/or vertical boundaries (maximum altitude) of other Special Use Airspace, such as MOAs or restricted areas. ATCAAs exist at or above 18,000 feet MSL.

Range Facilities

Various range facilities would be used during MV-22 operations, including the following types:

Outlying Airfield (OLFs). Airfields that are outside of a main base that reduce the need to use the runways on the air station to complete programmed training requirements.

Landing Zone (LZ). The actual point where aircraft land; these can either be developed (e.g., concrete pad) or unpaved.

Drop Zone (DZ). The area above and around a location used for parachute drops or "fast rope" (rappelling down ropes from the aircraft) maneuvers. Some sites can also be used for cargo drops.

Confined Area Landing (CAL) Site. A landing area designed for a precision, power-controlled approach used when the intended point of landing is surrounded by obstacles, such as buildings and high trees, preventing a normal approach glide slope.

Operations Definitions

Two specialized terms are often used to describe flight activities: sortie and operation. A *sortie* consists of a single military aircraft flight from take-off 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. An *operation* represents a single movement or individual flight in the base airfield or airspace environment, such as one take-off, 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. Types of airfield operations include the following actions:

Departure. An aircraft taking off to a local training area, a non-local training area, or as part of a training maneuver (i.e., touch-and-go).

Arrival (Straight-In/Full-Stop). An aircraft lines up six to ten nm from the field on the runway centerline. The aircraft descends gradually, lands, comes to a full stop, and then taxis off the runway.

Overhead Break Arrival. An expeditious arrival using visual flight rules. An aircraft approaches the runway 500 feet (150 meters) above the altitude of the landing pattern. Approximately halfway down the runway, the aircraft performs a 180-degree turn to enter the landing pattern. Once established in the pattern, the aircraft lowers landing gear and flaps and performs a 180-degree descending turn to land on the runway.

Touch-and-Go. An aircraft lands and takes off on a runway without coming to a full stop. After touching down, the pilot immediately goes to full power and takes off again. The touch-and-go is counted as two operations because the landing is counted as one operation and the take-off is counted as another.

Field Carrier Landing Practice (FCLP). An aircraft practices simulated carrier landing. FCLPs are required training for all pilots before landing on a carrier. The FCLP is counted as two operations because the landing is counted as one operation and the take-off is counted as another.

Ground-Controlled Approach (GCA) Box. A radar or "talk down" approach directed from the ground by Air Traffic Control personnel. Air Traffic Control personnel provide pilots with verbal course and glide slope information, allowing them to make an instrument approach during inclement

weather. The GCA is counted as two operations because the landing is counted as one operation and the take-off is counted as another.

Low Work. An approach where the pilot does not make contact with the runway. This is used during maintenance check flights, hover work, and any other training operations conducted at less than 50 feet (15 meters) above ground level and lasts, on average, seven minutes.

Training and Readiness Operations

Proposed MV-22 operations under consideration in this EIS would be conducted at military ranges, which are composed of Special Use Airspace and land areas, both of which are essential for conducting aviation training. Proposed operations would fall into three broad categories: initial or familiarization training designed to instruct new pilots or acquaint pilots of other aircraft with the operation of the MV-22; tactical training designed to teach MV-22 aircrew the tactical employment of the aircraft; and integrated training designed to teach aircrew how to combine MV-22 operations with other Marine or joint air and ground assets.

Operations for new or transition pilots would include working through the MV-22 Training and Readiness Manual (USMC 2008c), and would involve the use of the aircraft's machine gun at existing targets. Course elements include the following:

- Familiarization profiles (night and day);
- Formations (night and day);
- Nuclear, biological, and chemical equipment training (night and day);
- Tactics;
- Confined area landings;
- Combined arms exercises;
- Night vision goggle training;
- Terrain-following exercises; and
- Training in urban environment exercises.

Examples of proposed MV-22 integrated training include special exercises, such as the Weapons Tactics Instructors (WTI) course. WTI is staged from MCAS Yuma, Arizona, and occurs twice a year. 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. The exercise is focused on the six major functions of Marine Aviation: offensive air support, anti-air warfare, assault support, aerial reconnaissance, electronic warfare, and control of missiles and aircraft. 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.

DoD-Controlled Airspace and DoN/USMC Training Ranges

The proposed MV-22 operations under consideration in this EIS would be conducted at existing DoD-controlled airspace and DoN/USMC-controlled training ranges located on the West Coast.

Regardless of which basing alternative discussed in section 2.3 is ultimately selected, the MV-22 would conduct training and readiness operations at Marine Corps Base (MCB) Camp Pendleton, the Bob Stump Training Range Complex (Chocolate Mountain Aerial Bombing and Gunnery Range, Barry M. Goldwater Range [West], R-2510 and R-2512), Marine Corps Air Ground Combat Center (MCAGCC), and various MTRs. Current training requirements outlined in the MV-22 Training and Readiness Manual can be accommodated within these training ranges and MTRs.

As discussed earlier, the USMC expects to continue updating the MV-22 Training and Readiness Manual and training plans to reflect lessons learned from training evolutions and deployment experience. Due to the evolving nature of these MV-22 training requirements, additional training areas and air space, on or off DoD-owned lands, likely will emerge as necessary or useful for applying the aircraft's capabilities to ever-changing missions. The environmental impacts associated with new training requirements will be evaluated under NEPA, and will include consultations pursuant to the Endangered Species Act and/or National Historic Preservation Act where applicable. Toward that end, the DoN is seeking programmatic agreements with State Historic Preservation Officers to set forth procedures for evaluating future proposed landing zones.

Approximately 46,000 total MV-22 annual operations are expected to occur at the training ranges and MTRs under consideration in this EIS, and would include the types of flight activities discussed above. This would replace approximately 27,000 annual operations currently being conducted by the CH-46E aircraft that the MV-22 is replacing. Table 2.1-3 shows the proposed change in annual operations at the training ranges and MTRs under consideration in this EIS. The proposed change generally results in an increase in annual operations at any given training range, except for MCAGCC, where there would be a small reduction in annual operations.

The proposed change in number of annual operations takes into account the fact that the MV-22 is a new type of aircraft and that every pilot will need to complete all training based on the MV-22 Training and Readiness Manual. This includes initial or familiarization training designed to instruct new pilots or acquaint pilots of other aircraft with the operation of the MV-22. As the pool of experienced MV-22 pilots increases over time, it is expected that the number of annual training operations will decrease. Chapter 6 describes each training range and the MTRs in more detail and provides an analysis of impacts related to operations at these locations.

Table 2.1-3. Proposed Change in Annual Airspace/Range Operations

Location	Addition of MV-22 Operations	Reduction of CH-46 Operations	Change in Operation over Existing Conditions
MCB Camp Pendleton	17,008	-15,113	+1,895
Barry M. Goldwater Range (West)	17,942	-5,879	+12,063
Chocolate Mountain Range	5,111	-862	+4,249
R-2510 and R-2512	148	-78	+70
MCAGCC	3,874	-5,563	-1,689
MTRs	2,085	-	+2,085
Total	**46,168**	**-27,495**	**+18,673**

Notes:
1. Includes operations at the Helicopter Outlying Landing Field (HOLF) at MCB Camp Pendleton, the outlying auxiliary airfield (AUX-2) at Barry M. Goldwater Range-West, and the Expeditionary Airfield (EAF) at MCAGCC.
2. For MTRs, each one-way trip represents an operation. See Chapter 6 for details.

Transit Routes

Typical routes for access to and from airfields, ranges, and MTRs throughout the southern California and Arizona regions would occur at over 3,000 feet (914 meters) above ground level. At that altitude, noise impacts are negligible, and emissions are above the USEPA's presumed mixing height for air pollutants (USEPA 1999b). Therefore, these transit flights are not discussed further in this EIS. The only exceptions are major Ingress and Egress routes to and from airfields, ranges, and MTRs that fall within the restricted airspace adjacent to the proposed basing locations or training locations. Because the MV-22 may be transitioning from the ground level to 3,000 feet above ground level within these Ingress and Egress routes, potential impacts will be addressed in conjunction with the airspace operations discussed above.

2.2 ALTERNATIVES DEVELOPMENT PROCESS

A two-tiered screening process was applied to narrow and then focus the possible basing alternatives to feasible alternatives for this EIS. The fundamental selection criteria were first applied to ensure that the facilities met minimum operational requirements. The preferential selection criteria were then applied to focus on transitional needs and efficiencies associated with basing the MV-22 squadrons. The selection criteria are described below.

2.2.1 Fundamental Selection Criteria

The USMC and DoN established three fundamental selection criteria that must be satisfied as part of the MV-22 West Coast basing process. These criteria of distance, capacity, and compatibility, explained below, were used to identify and evaluate potential basing locations that best fulfill the purpose and need for the proposed action.

Distance. The selected MV-22 basing location(s) must lie within 200 nm of MCB Camp Pendleton. This 200 nm radius is based on the normal operating radius of the MV-22, as determined by IFR. MCB Camp Pendleton is used as the central anchor for West Coast operations because the MV-22 must be employed by 3D MAW to provide medium lift capability to I MEF, which is permanently based at MCB Camp Pendleton and surrounding installations.

Capacity. An existing DoD aviation facility capable of permanently basing MV-22 aircraft and associated command and support infrastructure must be present at the chosen basing location(s). This facility must have either sufficient existing capacity or land space available for construction of appropriate infrastructure. The MV-22 is a larger aircraft than the CH-46E that it is replacing and, therefore, requires more hangar and parking space per aircraft than the CH-46E.

Since not all installations within 200 nm of MCB Camp Pendleton are capable of supporting up to ten squadrons, the ten MV-22 squadrons may be split between a maximum of two aviation facilities. Split basing at more than two facilities would not meet USMC needs because of the impracticality of establishing an additional MALS at a third (or more) facility and dispersing command and control.

Compatibility. Existing use of the selected DoD aviation facility(ies) must be compatible with the mission of 3D and 4th MAW MV-22 squadrons, and the MV-22 squadrons must be compatible with the existing mission of the DoD aviation facility, as determined by the DoD component that operates the facility.

2.2.2 Preferential Selection Criteria

Five preferential selection criteria were applied to basing locations that met the fundamental selection criteria. Preferential criteria fall within two categories: operational efficiency and cost. The five preferential criteria are not fundamental to the transition to the new aircraft; however, these preferential criteria substantially affect the suitability of, or preference for, a specific basing alternative. These preferential selection criteria include the following:

- Proximity of the selected facility or facilities to the Ground Combat Elements (GCEs) of I MEF;
- Presence at the facility of a MALS. Since the MALS will deploy with the Marine Aircraft Group as part of an integrated warfighting unit, it is not reasonable to rely on another DoD maintenance and logistics provider to provide the needed support. To effectively split the MV-22 squadrons and maintain command and control as well as maintenance and supply, a MALS would need to be present at each basing location;
- Proximity of the facility to appropriate training areas and adequate Special Use Airspace within a reasonable distance of the home base;
- Available existing capacity at the selected facility in terms of ramp space, hangar space, support facilities, and buildings to accommodate the aircraft and personnel; and
- Costs, both in manpower and in military construction/renovation, associated with the implementation of the alternative.

2.2.3 Screening Process

Based on the distance limitation (fundamental selection criteria #1), 15 air installations were identified as possible basing alternatives: Vandenberg AFB; Naval Air Weapon Station (NAWS) China Lake; MCAGCC; Naval Air Station (NAS) North Island; NAS Point Mugu; Naval Outlying Landing Field (NOLF) Imperial Beach; Air Force Plant 42, Palmdale; Los Alamitos Army Air Field (AAF); March Air Reserve Base; Laguna AAF; Edwards AFB; Naval Air Facility (NAF) El Centro; MCAS Yuma; MCAS Miramar; and MCAS Camp Pendleton. These installations are identified on Figure 2.2-1.

The 15 air installations that met the distance criterion were screened against the second and third fundamental selection criteria. Three air installations were found to meet the three fundamental selection criteria and have been carried forward for further analysis in this EIS. These bases include MCAS Miramar, MCAS Camp Pendleton, and MCAS Yuma (shown on Figure 2.2-1). The 12 other air installations were eliminated from further consideration, as outlined below:

Vandenberg AFB: There is insufficient land space available for further expansion. Additionally, the U.S. Air Force has determined that MV-22 basing is not compatible with the primary mission at Vandenberg AFB, which is to support the U.S. Air Force Space Command.

NAWS China Lake: There is no IFR structure serving NAWS China Lake, and the high operational tempo and stringent DoN Research, Testing, Development and Evaluation (RTD&E) requirements at NAWS China Lake preclude the possibility of concurrent MV-22 fleet squadron operations.

FIGURE 2.2-1

Regional Location Map of Possible Siting Alternatives

MCAGCC: The primary mission of MCAGCC is to develop, conduct, and evaluate the USMC's Combined Arms Training Program (USMC 2003a). MCAGCC has an expeditionary air facility that is not considered capable of permanently basing military aircraft. Therefore, the mission of the expeditionary air facility is not considered to be compatible with permanently basing MV-22 squadrons at this location.

NAS North Island: NAS North Island is operating at capacity with no land available for expansion.

NAS Point Mugu: NAS Point Mugu is operating at capacity with no land available for expansion.

NOLF Imperial Beach: There is no land available at NOLF Imperial Beach for further expansion. Additionally, the mission of NOLF Imperial Beach is to provide NAS North Island with an outlying airfield for training. This mission is not considered to be compatible with that of the MV-22.

Air Force Plant 42, Palmdale: There is insufficient capacity in terms of land space available for expansion. Further, Air Force Plant 42 is an industrial complex that is utilized by aerospace contractors to build, develop, and test aircraft for the U.S. Air Force. This mission is not considered to be compatible with that of the MV-22.

Los Alamitos AAF: Los Alamitos AAF is operating at capacity, with insufficient land space available for further expansion.

March Air Reserve Base: March Air Reserve Base is operating at capacity, with insufficient land space available for further expansion.

Laguna AAF: The mission of Laguna AAF, which is to support RTD&E of current and future ground and airborne weapon systems, is not considered to be compatible with that of the MV-22.

Edwards AFB: Although Edwards AFB was initially carried forward for further analysis and scoping meetings were conducted in nearby Lancaster, the U.S. Air Force has determined that MV-22 basing is not compatible with the current and future Test and Evaluation mission at the Air Force Flight Test Center at Edwards AFB. Specifically, proposed MV-22 operations would compete for airspace, ranges and airfields needed to support the current and projected test and evaluation workload.

NAF El Centro: Although NAF El Centro was initially carried forward for further analysis and scoping meetings were conducted in El Centro, a more detailed review of facility requirements during development of a Concept Development Plan resulted in new information showing that there is insufficient land space available to meet the requirements of the MV-22. Additionally, the DoN has determined that the MV-22 basing is not compatible with the current and future mission of NAF El Centro as a Fleet Training Complex.

2.3 BASING ALTERNATIVES CARRIED FORWARD FOR DETAILED ANALYSIS

The alternatives carried forward as feasible alternatives in this EIS include full basing and partial basing scenarios as follows:

Full Basing Alternatives (10 Squadrons)

- MCAS Miramar

Partial Basing Alternatives

- MCAS Miramar – maximum eight squadrons/minimum two squadrons
- MCAS Camp Pendleton – two squadrons
- MCAS Yuma – maximum eight squadrons/minimum two squadrons

The number of MV-22 squadrons that can fit at each station is dependent upon the amount of available space for flightline and hangar requirements. The number and type of aircraft currently based at a station would remain with little or no modification, except for the CH-46E and CH-53E squadrons that are being replaced as part of the proposed action. For basing alternatives with eight or more MV-22 squadrons, hangar and apron space planning accounts for the fact that one squadron would be deployed at all times. For example, under a full basing alternative, hangar and apron space would be needed for only 108 aircraft (versus 120 aircraft) because 12 aircraft would be deployed off-base for training or operations at all times.

Regardless of the alternative chosen, the existing squadrons of CH-46E at MCAS Miramar and MCAS Camp Pendleton, as well as the CH-46E and CH-53E squadrons at Edwards AFB, would be removed. Therefore, the proposed action may result in a net decrease of aircraft and personnel at a given installation.

The alternatives discussed in this section consider the operational requirements of the MV-22 squadrons, such as proposed facility requirements and potential personnel changes. The descriptions of the facility requirements under each basing scenario are based on the *Concept Development Plan for the West Coast Introduction of the MV-22* (DoN 2008b). Facility requirements include necessary hangar space, aircraft apron parking, and other related facilities (e.g., aircraft wash racks and fuel storage).[2]

2.3.1 MCAS Miramar Basing Alternatives

MCAS Miramar lies in the northern suburbs of San Diego, California. The primary mission of MCAS Miramar is to maintain and operate facilities and to provide services and material to support operations of the 3D MAW, Marine Aircraft Group-46 and other Naval aviation units (DoN 2006). The station averages 250 aircraft aboard on any given day, with approximately 112,000 flight operations per year, including both jet and helicopter aviation assets.

The close proximity of MCAS Miramar to training areas at MCB Camp Pendleton represents a major efficiency advantage for basing the MV-22 squadrons at this station. The existing flightline and associated aviation support facilities are efficiently laid out. The MV-22 would replace four squadrons of active duty CH-46Es and thereby free up existing apron and hangar space that could

[2] The number of aircraft spots in the hangars is determined by the aircraft (AC) type where carrier and helicopters require spaces in the hangar for 33 percent of the AC assigned to the squadron (12 AC X .33 = 4 AC spots per squadron in the hangar). Thus four hangar spaces must be provided for each squadron. Parking apron spaces required = 12 - (4/2=2) = 10 parking apron spaces per squadron. As a result, if aircraft are shown in all possible parking spaces, the total quantity of aircraft shown on the layouts will be larger than the number of aircraft actually assigned to the squadron. These apparent 'extra' parking spots are necessary to allow for the movement of one aircraft out of the hangar and into an open parking spot, and then safely moving another aircraft from its spot on the parking apron and into the newly opened space in the hangar. Hangar dimensions are based on Bell Boeing MV-22 hangar space dimension requirements as needing to support aircraft configured with 3 AC in the spread configuration and 1 in the stowed configuration for a total hangar width of 325 feet.

be used by the MV-22 aircraft. Taking into account the fact that the MV-22 footprint is much larger than the CH-46E footprint, MCAS Miramar can accommodate both partial basing options and a full basing option if land is developed south of the existing runway.

Facility Requirements

Full Basing (10-Squadron) Alternative

Basing all ten squadrons of MV-22 aircraft at MCAS Miramar would require placing 60 aircraft north of the runway and 48 aircraft south of the runway (hangar and apron space planning accounts for the fact at least 12 aircraft are deployed at all times). Figures 2.3-1 and 2.3-2 and Table 2.3-1 provide the details regarding proposed new construction and necessary demolition of existing facilities.

North of the runway, up to 20 MV-22 aircraft would be housed in hangars, and the rest on the aircraft parking apron. New support facilities, including one new hangar module, parking apron, four new fuel pits, and one new wash rack, would be sited as shown on Figure 2.3-1. The existing fueling octagon and compass rose facilities use a large amount of parking apron leaving a limited amount of space to fit the MV-22 squadrons and the existing CH-53E squadrons. Both the fueling octagon and the compass rose facilities would have to be relocated to provide enough parking apron for both the MV-22s and the CH-53Es. The new fuel pits would be located south of the apron, as shown on Figure 2.3-1.

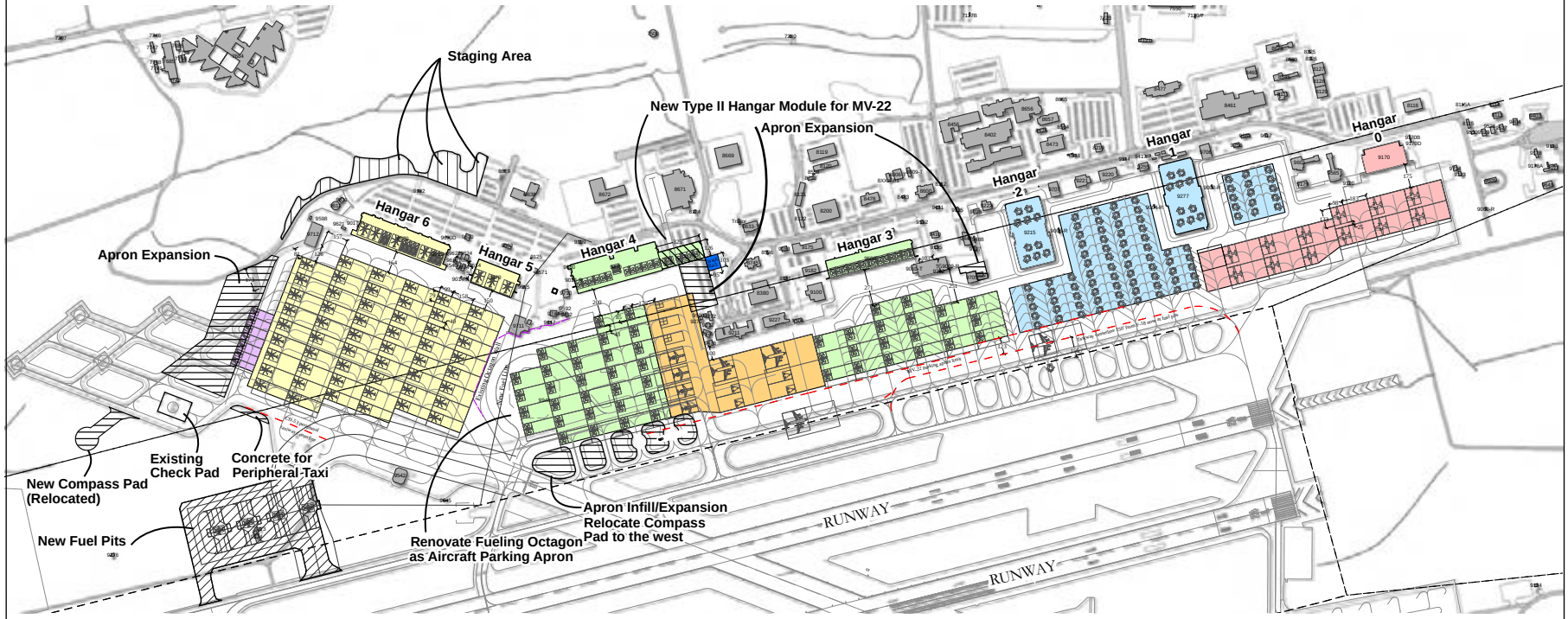
Table 2.3-1. Summary of Proposed Construction and Demolition at MCAS Miramar

	10-Squadron Alternative (Full Basing)	8-Squadron Alternative (Maximum)	2-Squadron Alternative (Minimum)
CONSTRUCTION			
Building Facilities (square feet)	371,031	230,562	0
Airfield Facilities (square yards)	901,818	400,651	0
DEMOLITION			
Building Facilities (square feet)	18,637	43,633	0
Airfield Facilities (square yards)	128,621	144,061	0
Source: DoN 2008b			

MCAS Miramar has a dedicated construction staging/lay-down area north of Hangar 6 that has been used in the past for construction-related equipment and materials; this area would be used for the same purpose under this alternative. The staging area would easily support hangar construction as well as other activities, and is located as close as practicable to the fuel pit site proposed under this alternative. The lay-down area (approximately 7.5 acres [3.0 hectares]) would be utilized for the duration of the proposed construction phase, which is currently scheduled between 2010 and 2014.

Housing aircraft south of the runway would entail extensive construction in a previously undeveloped area. The proposed site layout consists of up to 16 MV-22 aircraft housed in new hangars, and the rest on the new aircraft parking apron. New support facilities, including two hangars, aircraft parking apron, taxiways, wash racks, three new fuel pits and associated fuel lines, would be sited as shown on Figure 2.3-2. The existing transmitter and receiver antennas would be temporarily relocated near Clairmont Mesa Boulevard until they can be placed on top of

MEU	CH-53 HMH	MV-22	Transient & HHS	VMFAT-101	VMFA	KC-130
3 UH-1N/Y 4 AH-1W/Z	4 HMH/CH-53 Squadrons 64 Total Aircraft 53 Aircraft on Apron 3 Hangar Modules (Hangars 5 & 6)	5 MV-22 Squadrons 60 Total Aircraft 50 Aircraft on Apron 5 Hangar Module (Hangars 3 & 4)	4 C-9 3 UC-35 4 F-14 (2 F-14 on Apron) 2 C-17 (1 C-17 on Apron)	36 VMFA Aircraft 36 Total Aircraft 34 Aircraft on Apron 3 Hangar Module (Hangar 2)	5 VMFA Squadrons 56 Total Aircraft 47 Aircraft on Apron 5 Hangar Modules (Hangars 1 & 2)	1 KC-130 Squadrons 12 Total Aircraft 12 Aircraft on Apron 1 Hangar Module (Hangar 0)



Squadrons
- CH-53
- KC-130
- MEU
- MV-22
- Transient
- VMFA

New Construction
- New Apron
- New Hangars
- New Washracks
- New Fuel Pits
- Staging Area

- Imaginary Surface
- P-80 Criteria Taxiway Centerlines
- Apron Wall

0 700
Feet

Source: DoN 2008b

Site Layout for North of the Runway Associated with the MCAS Miramar Full Basing Alternative

FIGURE

2.3-1

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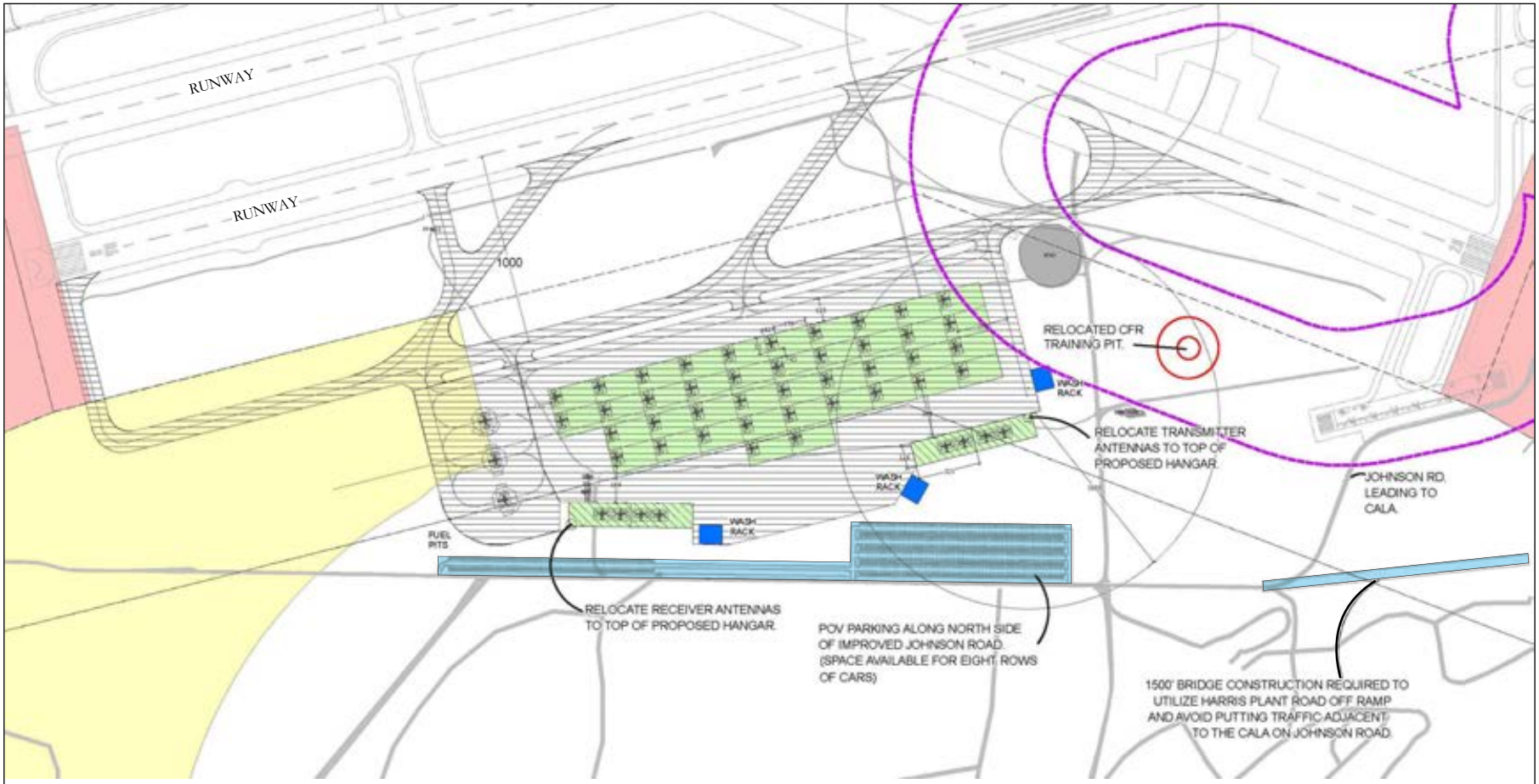

Imaginary Surface
ESQD Arcs

Accident Potential Zones
APZ I & II
Clear Zone

Squadrons
MV-22

New Construction
New Hangars
New Apron/Taxiway
New Washracks
New Road/Parking Upgrades

MV-22

4 MV-22 Squadrons
48 Total Aircraft
40 Aircraft on Apron
4 Hangar Modules
(4 New Hangars)

0 700
Feet

Source: DoN 2008b

Site Layout for South of the Runway Associated with the MCAS Miramar Full Basing Alternative

FIGURE

2.3-2

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the proposed hangars. A firefighter trainer facility would be relocated about 800 feet southeast of its current location. Johnson Road would be extended and improved to provide better access to the new facilities, a bridge[3] would be constructed to avoid adding traffic adjacent to the Combat Aircraft Loading Area (CALA), utilities would be extended to support the hangars and other facilities, and a new parking area for personally-owned vehicles would be constructed.

Construction staging/lay-down areas south of the runway would be within and adjacent to the proposed site layout shown on Figure 2.3-2.

Maximum Partial Basing (8-Squadron) Alternative

Due to current space constraints north of the runway, eight squadrons of MV-22 aircraft would be the maximum number that could be accommodated north of the runway. Figure 2.3-3 and Table 2.3-1 provide the details regarding proposed new construction and necessary demolition of existing facilities. Basing eight squadrons of MV-22 aircraft at MCAS Miramar would entail up to 28 MV-22 aircraft housed in hangars and the rest on the aircraft parking apron (hangar and apron space planning accounts for the fact at least 12 aircraft are deployed at all times). New support facilities would include three new hangar modules, parking apron, four new fuel pits, and five new wash racks. Figure 2.3-3 also shows an optional Hangar 7, which would be in lieu of the hangar module on the east side of Hangar 3 and the hangar module on the west side of Hangar 4. Although the Optional Hangar 7 currently overlaps with some aircraft parking space, parking for the affected aircraft could be moved adjacent to the Marine Expeditionary Unit (MEU) parking shown in purple. The apron expansion on the eastern side of the flightline would interfere with an existing flightline access road; flightline traffic would be re-routed to another existing road further east. Similar to the Full Basing Alternative, both the existing fueling octagon and the compass rose facilities would have to be relocated to provide enough parking apron for both the MV-22s and the existing CH-53Es. Compared to the Full Basing Alternative, this alternative has more construction north of the runway to accommodate 84 aircraft (versus 60 aircraft north of the runway under the Full Basing Alternative), but no construction would occur south of the runway.

The dedicated construction staging/lay-down area north of Hangar 6 discussed under the Full Basing Alternative would be used for the same purpose under this alternative.

Minimum Partial Basing (2-Squadron) Alternative

Two squadrons would be the minimum basing alternative at MCAS Miramar. Up to eight MV-22 aircraft would be housed in hangars, and the rest on the aircraft parking apron. No new construction or demolition at MCAS Miramar would occur as a result of this basing alternative, as shown on Figure 2.3-4. The existing fueling octagon and compass rose facility would remain in place.

Personnel Changes

The net change in military personnel for each of the basing alternatives at MCAS Miramar is provided in Table 2.3-2. MALS-16 would continue to support the four squadrons of CH-53Es currently based at MCAS Miramar in addition to supporting the proposed MV-22 squadrons.

[3] The bridge would connect to an existing paved road/parking lot of a nearby Trap and Skeet Range.

Table 2.3-2. Proposed Change in Aircraft and Personnel at MCAS Miramar

	Aircraft	Officers	Enlisted	Total Military Personnel
EXISTING AIRCRAFT/PERSONNEL TO BE REPLACED BY THE MV-22				
MCAS Miramar (four CH-46E active duty squadrons)*	48	192	1,077	1,269
PROPOSED MV-22 AIRCRAFT/PERSONNEL				
Full Basing (10-Squadron) Alternative	120	389	2,022	2,411
Maximum Partial Basing (8-Squadron) Alternative	96	323	1,692	2,015
Minimum Partial Basing (2-Squadron) Alternative	24	100	612	712
NET CHANGE IN AIRCRAFT/PERSONNEL				
Full Basing (10-Squadron) Alternative	+72	+197	+945	+1,142
Maximum Partial Basing (8-Squadron) Alternative	+48	+131	+615	+746
Minimum Partial Basing (2-Squadron) Alternative	-24	-92	-465	-557

Notes:
* See Table 2.1-1 for breakdown of existing aircraft and personnel.

Airfield Use

Airfield use at MCAS Miramar would be dependent upon the number of squadrons based at the station. Table 2.3-3 provides an approximate number of annual MV-22 airfield operations expected for each basing alternative at MCAS Miramar. An airfield flight operation is defined here as a single event that occurs at the air station, such as departure, arrival, or touch down. For example, one aircraft departing and returning would represent two airfield flight operations. The Maximum Partial Basing Alternative includes eight active duty squadrons in order to represent the maximum number of airfield operations under a partial basing scenario, while the Minimum Partial Basing Alternative includes two reserve squadrons to represent the minimum number of airfield operations under a partial basing scenario.

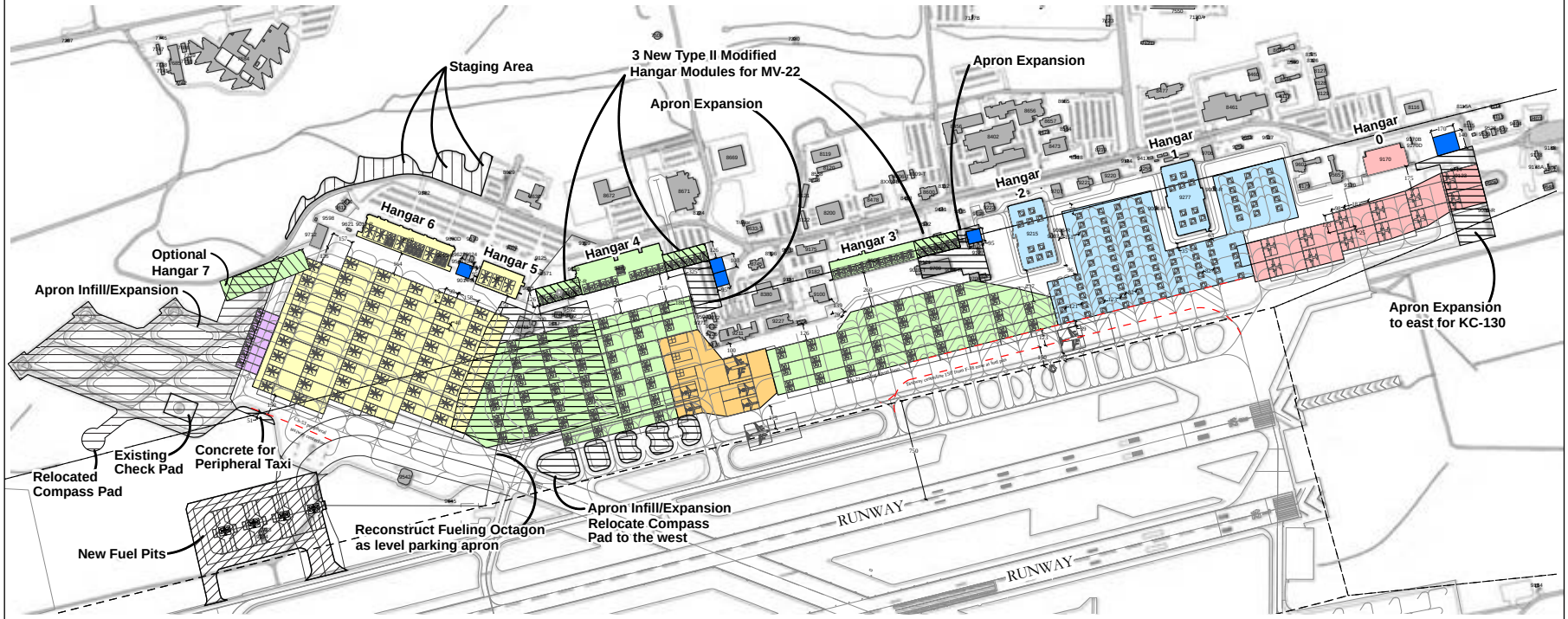
The proposed MV-22 airfield operations would replace approximately 17,000 annual airfield operations at MCAS Miramar currently being conducted by CH-46E aircraft (see section 3.2 for more details). This accounts for airfield operations by the four CH-46E squadrons (48 aircraft) currently based at MCAS Miramar as well as use by other transient (visiting) CH-46E aircraft from other air stations.

Table 2.3-3. Proposed Annual MV-22 Airfield Flight Operations at MCAS Miramar

Operation Type	10-Squadron Alternative (Full Basing)	8-Squadron Alternative (Maximum)	2-Squadron Alternative (Minimum)
Departure	21,351	16,327	3,767
Arrival (no break)	2,137	1,635	378
Overhead Break Arrival	19,219	14,696	3,392
Touch-and-Go	3,943	3,015	696
GCA Box	4,928	3,769	870
Low Work	165	126	29
Total	**51,743**	**39,568**	**9,132**

Notes:
GCA = Ground-Controlled Approach.
Touch-and-Go, GCA Box, and Low Work are counted as two operations each.
The 8-Squadron Alternative includes eight active duty squadrons, while the 2-Squadron Alternative includes two reserve squadrons.
The proposed MV-22 FCLPs would occur at MCB Camp Pendleton instead of the airfield.
See Appendix C for details.

MEU	CH-53 HMH	MV-22	Transient & HHS	VMFAT-101	VMFA	KC-130
3 UH-1N/Y 4 AH-1W/Z	4 HMH/CH-53 Squadrons 64 Total Aircraft 53 Aircraft on Apron 4 Hangar Modules (Hangars 5 & 6)	7 MV-22 Squadrons (8 Total, 1 Deployed at all times) 84 Total Aircraft 70 Aircraft on Apron 7 Hangar Module (Hangars 3 & 4)	4 C-9 3 UC-35 4 F-14 (3 F-14 on Apron) 2 C-17 (1 C-17 on Apron)	36 VMFA Aircraft 36 Total Aircraft 32 Aircraft on Apron 3 Hangar Module (Hangar 2)	5 VMFA Squadrons 56 Total Aircraft 47 Aircraft on Apron 5 Hangar Modules (Hangars 1 & 2)	1 KC-130 Squadrons 12 Total Aircraft 12 Aircraft on Apron 1 Hangar Module (Hangar 0)



Squadrons
- CH-53
- VMFA
- KC-130
- MEU
- MV-22
- Transient

New Airfield Construction
- New Hangars
- New Apron
- New Washracks
- New Fuel Pits
- Staging Area

- Imaginary Surface
- P-80 Criteria Taxiway Centerlines

0 700
Feet

Source: DoN 2008b

Site Layout Associated with the MCAS Miramar Maximum Partial Basing (8-Squadron) Alternative

FIGURE 2.3-3

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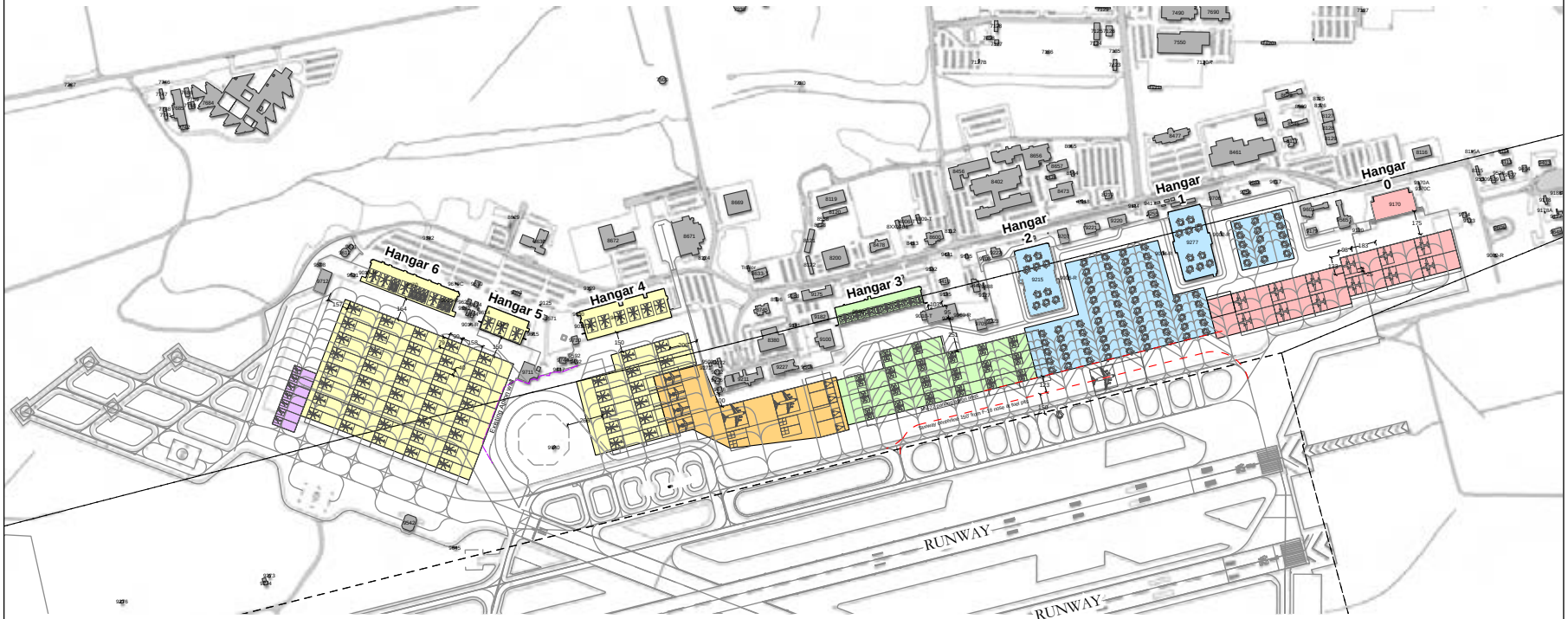
MEU	CH-53 HMH	MV-22	Transient & HHS	VMFAT-101	VMFA	KC-130
3 UH-1N/Y 4 AH-1W/Z	4 HMH/CH-53 Squadrons 64 Total Aircraft 53 Aircraft on Apron 5 Hangar Modules (Hangars 4, 5 & 6)	2 MV-22 Squadrons 24 Total Aircraft 20 Aircraft on Apron 2 Hangar Modules (Hangar 3)	4 C-9 3 UC-35 4 F-14 (3 F-14 on Apron) 2 C-17 (1 C-17 on Apron)	36 VMFA Aircraft 36 Total Aircraft 32 Aircraft on Apron 3 Hangar Module (Hangar 2)	5 VMFA Squadrons 56 Total Aircraft 47 Aircraft on Apron 5 Hangar Modules (Hangars 1 & 2)	1 KC-130 Squadrons 12 Total Aircraft 12 Aircraft on Apron 1 Hangar Module (Hangar 0)



Squadrons
- CH-53
- KC-130
- MEU
- MV-22
- Transient
- VMFA

New Construction
No construction or modifications needed.

- Imaginary Surface
- P-80 Criteria Taxiway Centerline
- Apron Wall

0 700
Feet

Source: DoN 2008b

Site Layout Associated with the MCAS Miramar Minimum Partial Basing (2-Squadron) Alternative

FIGURE 2.3-4

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2.3.2 MCAS Camp Pendleton Basing Alternatives

MCAS Camp Pendleton lies in the southern part of MCB Camp Pendleton, approximately 40 miles north of San Diego, California. The primary mission of MCAS Camp Pendleton is to provide services and support operations for Marine Aircraft Group-39, which is an element of the 3D MAW. The major occupants of MCAS Camp Pendleton are Marine Aircraft Group-39, Marine Aircraft Group-46 Detachment A, MCB Camp Pendleton Range Control, and the Center for Naval Aviation Technical Training (CNATT). It currently supports both rotary and fixed wing aircraft, and supports approximately 128,000 flight operations annually. Basing all ten MV-22 squadrons at MCAS Camp Pendleton would be advantageous for efficiency because it lies in close proximity to ground troops and training areas, and the air station met the three fundamental selection criteria. However, floodway and biological constraints (e.g., habitat for threatened and endangered species) to the north, the land-locked status of the flightline and support areas to the south, and the roadway and cultural resources to the east leave little room for reasonable expansion at this station. Even though the MV-22 would replace three squadrons of CH-46E helicopter, only two squadrons of MV-22 can be accommodated because the MV-22 footprint is much larger than the CH-46E footprint.

Facility Requirements

Partial Basing (2-Squadron) Alternative

Due to the limited amount of developable land along the flightline, the maximum number of MV-22 aircraft possible at MCAS Camp Pendleton is two squadrons. Up to eight MV-22 aircraft would be housed in hangars, and the rest on the aircraft parking apron. New support facilities, including a new hangar module, modifications to an existing hangar, new wash rack, and new parking apron, would be sited as shown on Figure 2.3-5 and Table 2.3-4. New facilities may require the demolition and relocation of an existing Explosive Ordnance Disposal (EOD) building, either as an addition to the proposed new hangar or as a standalone facility (the latter shown on Figure 2.3-5). The fuel farm would also be upgraded (see Figure 4.11-1 for location).

Table 2.3-4. Summary of Proposed Construction and Demolition at MCAS Camp Pendleton

	2-Squadron Alternative
CONSTRUCTION	
Building Facilities (square feet)	80,106
Airfield Facilities (square yards)	76,171
DEMOLITION	
Building Facilities (square feet)	1,344
Airfield Facilities (square yards)	0
Source: DoN 2008b	

MCAS Camp Pendleton has a designated construction staging/lay-down area in a parking lot outside of the flightline that has been used in the past for construction-related equipment and materials; this area would be used for the same purpose under this alternative.

Personnel Changes

The proposed net change in military personnel at MCAS Camp Pendleton is provided in Table 2.3-5. MALS-39 would continue to support the four HMLA squadrons (Hueys and Cobras) currently based at MCAS Camp Pendleton in addition to supporting the proposed MV-22 squadrons.

Table 2.3-5. Proposed Change in Aircraft and Personnel at MCAS Camp Pendleton

	Aircraft	Officers	Enlisted	Total Military Personnel
EXISTING AIRCRAFT/PERSONNEL TO BE REPLACED BY THE MV-22				
MCAS Camp Pendleton (three CH-46E active duty squadrons)*	42	124	845	969
PROPOSED MV-22 AIRCRAFT/PERSONNEL				
Partial Basing (2-Squadron) Alternative	24	100	612	712
NET CHANGE IN AIRCRAFT/PERSONNEL				
Partial Basing (2-Squadron) Alternative	-18	-24	-233	-257

Notes:
* See Table 2.1-1 for breakdown of existing personnel.

Airfield Use

Airfield use at MCAS Camp Pendleton would be dependent upon the number of squadrons based at the station. Table 2.3-6 provides an approximate number of annual MV-22 airfield operations expected for the Partial Basing Alternative at MCAS Camp Pendleton. An airfield flight operation is defined here as a single event that occurs at the air station, such as a departure, arrival, or touch down. For example, one aircraft departing and returning would represent two airfield flight operations. The Partial Basing Alternative includes two active duty squadrons in order to assess the maximum possible airfield operations proposed for MCAS Camp Pendleton.

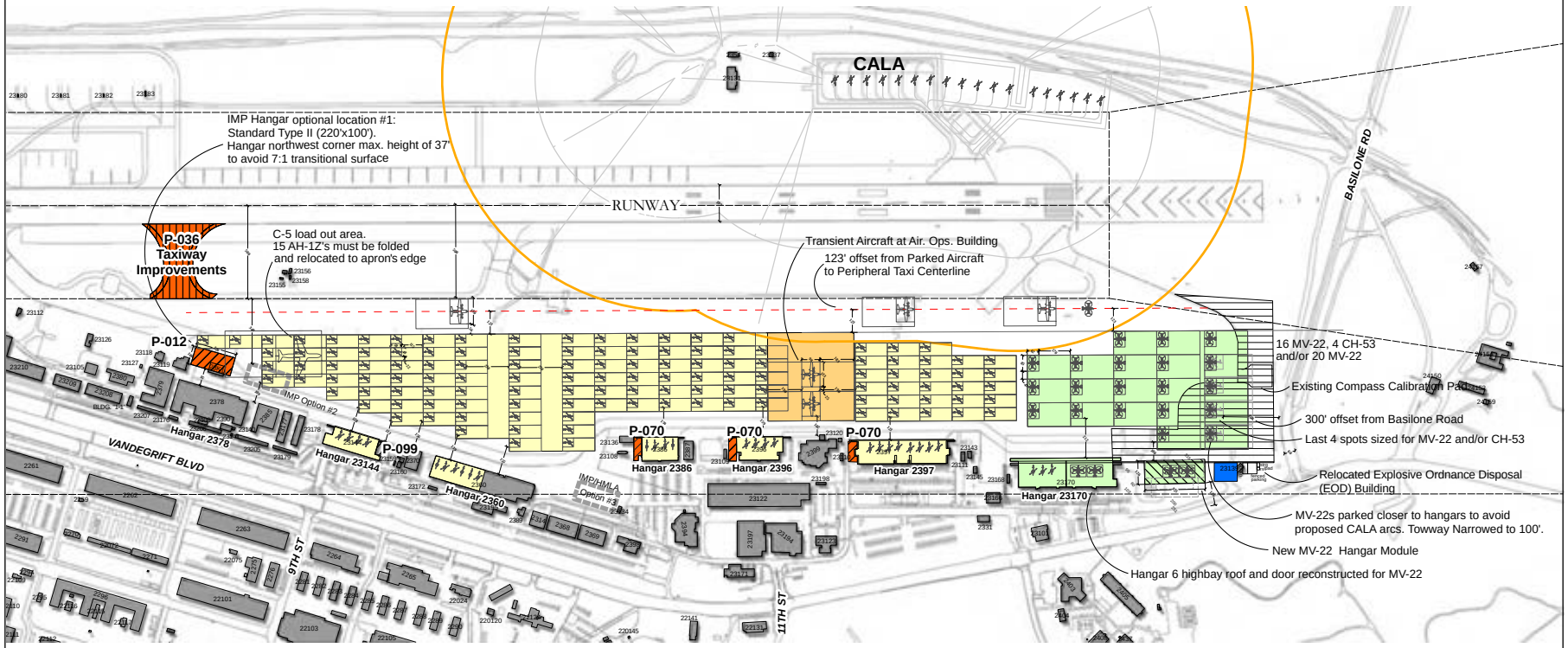
Table 2.3-6. Proposed Annual MV-22 Airfield Flight Operations at MCAS Camp Pendleton

Operation Type	2-Squadron Alternative
Departure	5,005
Arrival (no break)	5,005
Touch-and-Go	928
GCA Box	1,159
Total	**12,097**

Notes:
GCA = Ground-Controlled Approach.
Touch-and-Go and GCA Box are counted as two operations each.
The 2-Squadron Alternative includes two active duty squadrons.
The proposed MV-22 FCLPs would occur at MCB Camp Pendleton instead of the airfield.
See Appendix C for details.

The proposed MV-22 airfield operations would replace approximately 18,000 annual airfield operations at MCAS Camp Pendleton (see section 4.2 for more details). This accounts for airfield operations by the three CH-46E squadrons (42 aircraft) currently based at MCAS Camp Pendleton as well as use by other transient (visiting) CH-46E aircraft from other air stations.

HMT-303	Transient & HHS	HMLA	MV-22
1 HMLA Squadron 48 Total Aircraft 35 Aircraft on Apron 2 Hangar Modules	3 KC-130 4 UC-35 (Not on Apron)	4 HMLA Squadrons 108 Total Aircraft 90 Aircraft on Apron 4 Hangar Modules	2 MV-22 Squadrons 24 Total Aircraft 20 MV-22 and/or 16 MV-22, 4 CH-53 on apron 3 Hangar Modules



Existing CALA ESQD

Imaginary Surface Edges

Squadrons

- AH-1
- MV-22
- Transient

Improvements

Programmed or Planned

(Not associated with the proposed MV-22 action)

- Hangar Construction (P-012 IMP, P-099 IMP, P-070 HMLA Hangar Admin Additions)
- Taxiway Improvements (P-036)

New Construction

- New Apron
- New Hangar
- New Washrack

0 500

Feet

Source: DoN 2008b

Site Layout Associated with the MCAS Camp Pendleton Partial Basing (2-Squadron) Alternative

FIGURE

2.3-5

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2.3.3 MCAS Yuma Basing Alternatives

MCAS Yuma lies in Yuma, Arizona, and is one of the USMC's main aviation training installations. Its primary mission is to provide aviation ranges, facilities, and services that support operating forces, tenant commands and activities (MCAS Yuma 2007a). MCAS Yuma is home to a number of tenant units, including Marine Aviation Weapons and Tactics Squadron-1 (MAWTS-1), Marine Aircraft Group-13, Marine Wing Support Squadron-371, Marine Fighter Training Squadron-401, Marine Air Control Squadron-1 and Combat Logistics Company 16. The station also shares one side of the runway facilities with a commercial aviation airport. The airfield currently supports both fixed wing and rotary wing aviation assets, and has approximately 163,000 flight operations per year.

Land area at MCAS Yuma is substantially constrained, despite recently acquired land in its southern section, due to airfield safety criteria and ordnance storage safety requirements. MCAS Yuma has the ability to accommodate several partial basing options ranging from two to eight squadrons.

Facility Requirements

Maximum Partial Basing (8-Squadron) Alternative

Due to land constraints and lack of existing facilities that could be used by the MV-22, the maximum number of MV-22 squadrons possible at MCAS Yuma is eight. Figure 2.3-6 and Table 2.3-7 provide the details regarding proposed new construction and necessary demolition of existing facilities for the introduction of eight squadrons. Basing eight squadrons of MV-22 aircraft at MCAS Yuma would entail up to 28 MV-22 aircraft housed in hangars and the rest on the aircraft parking apron (hangar and apron space planning accounts for the fact at least 12 aircraft are deployed at all times). New support facilities would include seven new hangar modules, a new taxiway, parking apron, wash racks, a rinse facility, and other support facilities (e.g., headquarters, warehouse, van pads). The pavement associated with the old CALA and weapons complex (recently relocated) would provide room for the construction of new aircraft parking apron space.

MCAS Yuma has existing construction staging/lay-down areas that have been used in the past for construction-related equipment and materials; these areas would be used for the same purpose under this alternative.

Table 2.3-7. Summary of Proposed Construction and Demolition at MCAS Yuma

	8-Squadron Alternative (Maximum)	2-Squadron Alternative (Minimum)
CONSTRUCTION		
Building Facilities (square feet)	583,493	179,539
Airfield Facilities (square yards)	390,023	88,989
DEMOLITION		
Building Facilities (square feet)	24,830	12,506
Airfield Facilities (square yards)	0	0
Source: DoN 2008b		

Minimum Partial Basing (2-Squadron) Alternative

The 2-squadron configuration is similar to the 8-squadron configuration, except only two new hangars and a smaller amount of new apron space would be constructed (see Figure 2.3-7 and Table 2.3-7). Construction activities would include a new rinse facility and wash racks and other support facilities, but the new taxiway would not be necessary.

Personnel Changes

The net change in military personnel for each of the basing alternatives at MCAS Yuma is provided in Table 2.3-8. The existing MALS-13 at MCAS Yuma currently supports the AV-8B (Harrier), and it is possible that only a detachment of military personnel with MV-22 expertise would be needed to fulfill the MV-22 MALS support role at the station. However, in order to analyze the maximum possible change in personnel, Table 2.3-8 is based on a full complement of MALS core personnel (295 military personnel) for both the Maximum and Minimum Partial Basing Alternatives at MCAS Yuma.

Table 2.3-8. Proposed Change in Aircraft and Personnel at MCAS Yuma

	Aircraft	Officers	Enlisted	Total Military Personnel
EXISTING AIRCRAFT/PERSONNEL TO BE REPLACED BY THE MV-22				
MCAS Yuma*	0	0	0	0
PROPOSED MV-22 AIRCRAFT/PERSONNEL				
Maximum Partial Basing (8-Squadron) Alternative	96	323	1,692	2,015
Minimum Partial Basing (2-Squadron) Alternative	24	100	612	712
NET CHANGE IN AIRCRAFT/PERSONNEL				
Maximum Partial Basing (8-Squadron) Alternative	+96	+323	+1,692	+2,015
Minimum Partial Basing (2-Squadron) Alternative	+24	+100	+612	+712

Notes:
* There are no existing aircraft or personnel at MCAS Yuma associated with the nine squadrons to be replaced by the MV-22 on the West Coast.

Airfield Use

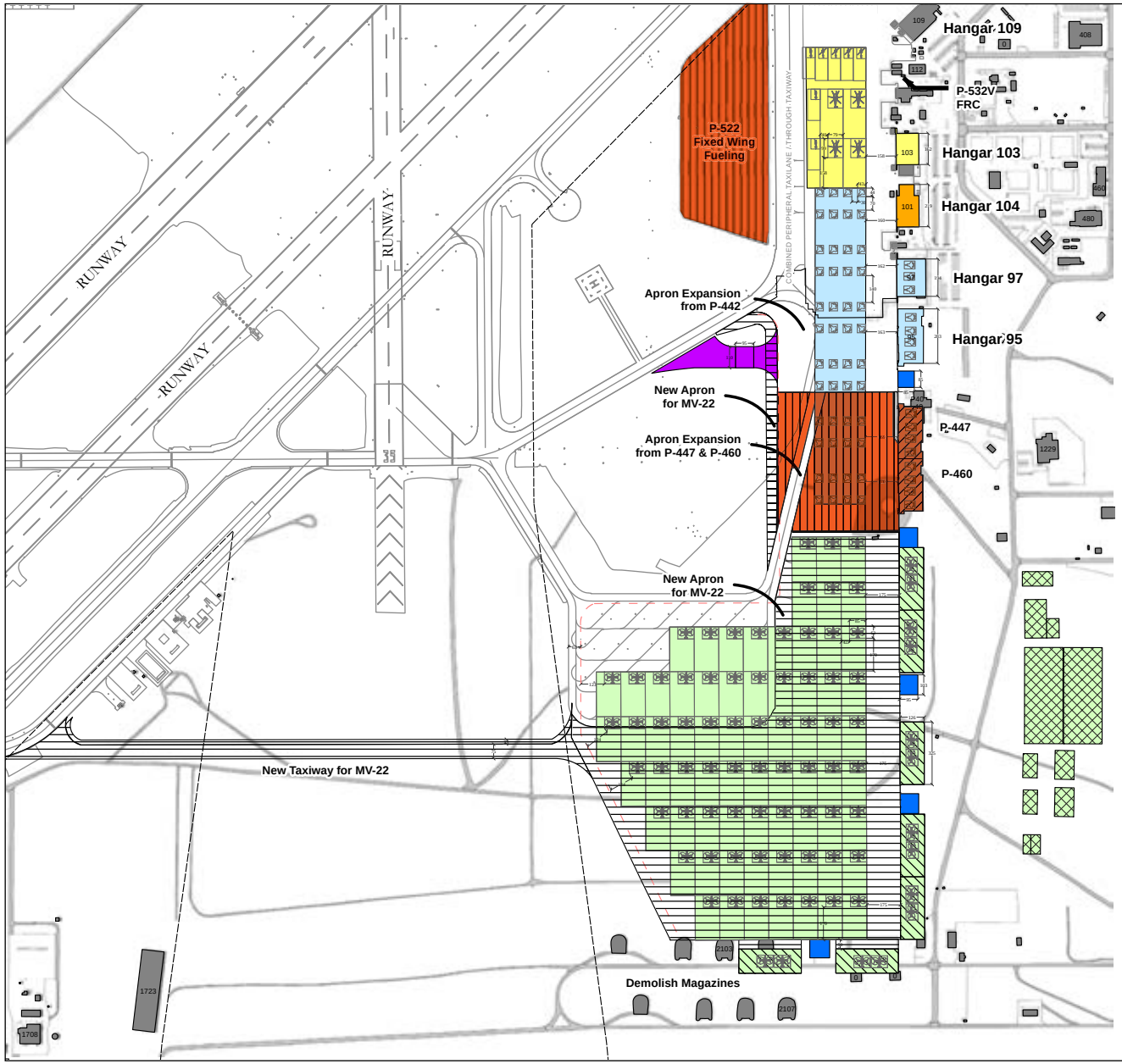
Airfield use at MCAS Yuma would be dependent upon the number of squadrons based at the station. Table 2.3-9 provides an approximate number of annual MV-22 airfield operations expected for each basing alternative at MCAS Yuma. An airfield flight operation is defined here as a single event that occurs at the air station, such as a departure, arrival, or touch-down. For example, one aircraft departing and returning would represent two airfield flight operations. The Maximum Partial Basing Alternative includes eight active duty squadrons in order to represent the maximum number of airfield operations under a partial basing scenario, while the Minimum Partial Basing Alternative includes two reserve squadrons to represent the minimum number of airfield operations under a partial basing scenario.

The proposed MV-22 airfield operations would replace approximately 2,800 annual airfield operations at MCAS Yuma by transient (visiting) CH-46E aircraft from other air stations (see section 5.2 for more details).

Table 2.3-9. Proposed Annual MV-22 Airfield Flight Operations at MCAS Yuma

Operation Type	8-Squadron Alternative (Maximum)	2-Squadron Alternative (Minimum)
Departure	17,584	3,767
Arrival (no break)	1,759	378
Overhead Break Arrival	15,827	3,392
Touch-and-Go	3,247	696
GCA Box	4,058	870
Low Work	136	29
Total	**42,611**	**9,132**

Notes:
GCA = Ground-Controlled Approach.
Touch-and-Go, GCA Box, and Low Work are counted as two operations each.
The 8-Squadron Alternative includes eight active duty squadrons, while the 2-Squadron Alternative includes two reserve squadrons.
The proposed MV-22 FCLPs would occur at the MCAS Yuma Auxiliary Field 2 (AUX-2) located within the Barry M. Goldwater Range (West) instead of the airfield.
See Appendix C for details.



VMA

4 AV-8 Squadrons
56 Total Aircraft
48 Aircraft on Apron
4 Hangar Modules

MV-22

7 MV-22 Squadrons
(8 Total, 1 Deployed at all times)
84 Total Aircraft
70 Aircraft on Apron
7 Hangar Modules

Transient

4 CH-53
3 AH-1
4 UH-1

Legend

Imaginary Surface Edges
Buildings

Squadrons

MALS
MV-22
Transient
VMA

Improvements

New Airfield Construction

New Hangars
New Taxiway and Apron
New Washracks
New Rinse Facility
Support Facilities

Programmed or Planned

(Not associated with the proposed MV-22 action)

Airfield Concrete (P-447 & P-460 Apron Additions, P-522 Fueling Facilities)

Hangar Construction (P-447 & P-460 two Type II Modules, P-532V FRC)

0 600
Feet

Source: DoN 2008b

Site Layout Associated with the MCAS Yuma Maximum Partial Basing (8-Squadron) Alternative

FIGURE

2.3-6

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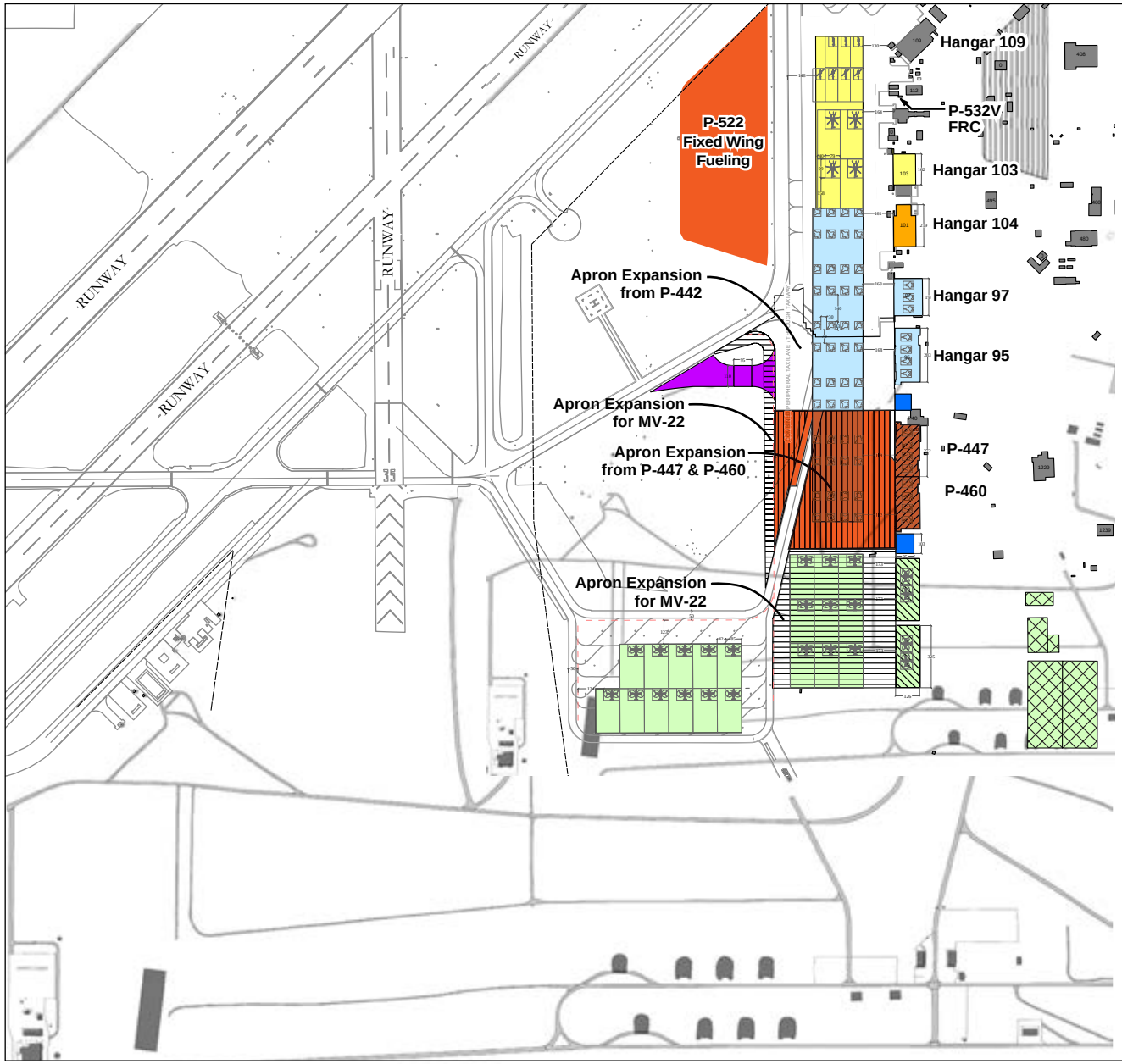

VMA

4 AV-8 Squadrons
56 Total Aircraft
48 Aircraft on Apron
4 Hangar Modules

MV-22

2 MV-22 Squadrons
24 Total Aircraft
20 Aircraft on Apron
2 Hangar Modules

Transient

4 CH-53
3 AH-1
4 UH-1

Legend

Imaginary Surface Edges
Buildings

Squadrons

MALS
MV-22
Transient
VMA

Improvements

New Airfield Construction

New Hangars
New Taxiway and Apron
New Washracks
New Rinse Facility
Support Facilities

Programmed or Planned
(Not associated with the proposed MV-22 action)

Airfield Concrete (P-447 & P-460 Apron Additions, P-522 Fueling Facilities)

Hangar Construction (P-447 & P-460 two Type II Modules, P-532V FRC)

0 600
Feet

Source: DoN 2008b

Site Layout Associated with the MCAS Yuma Minimum Partial Basing (2-Squadron) Alternative

FIGURE 2.3-7

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2.4 NO ACTION ALTERNATIVE

Analysis of the No Action Alternative provides a benchmark that enables decision-makers to evaluate the environmental consequences of the proposed basing alternatives. Section 1502.14(d) of the NEPA requires an EIS to analyze the No Action Alternative. No action means that an action would not take place, and the resulting environmental effects from taking no action would be compared with the effects of allowing the proposed basing activity to go forward.

Under the No Action Alternative, no aircraft would be replaced, aircraft operations would continue at the current level, and no construction/demolition or personnel changes related to basing the MV-22 aircraft on the West Coast would occur. Some MV-22 training by East Coast squadrons currently occurs on the West Coast, and would continue to occur under the No Action Alternative. It is possible that future construction efforts may be needed (e.g., wash racks at MCAS Yuma) related to this training activity under the No Action Alternative. Future construction efforts would likely focus on MCAS Yuma because this air station supports special exercises like WTI training activities, which currently includes participation by East Coast MV-22 squadrons.

The No Action Alternative would not meet mission requirements because the MV-22 would not be available for employment by 3D MAW and 4th MAW to provide medium lift capability to I MEF and other supported forces on the West Coast, despite congressional approval of the MV-22 as the replacement for outdated CH-46 helicopters that are quickly approaching the end of their service life. USMC readiness and essential support for Marines on the ground would be seriously compromised in the long term under the No Action Alternative as a result of the failure of the medium lift aviation mission.

2.5 PREFERRED ALTERNATIVE

Preferred Alternative. The DoN, acting on behalf of the USMC, has selected the following basing option as the Preferred Alternative: 8-squadrons at MCAS Miramar (Maximum Partial Basing Alternative at MCAS Miramar) and 2-squadrons at MCAS Camp Pendleton (Partial Basing Alternative at MCAS Camp Pendleton). This basing option best reflects both the Fundamental Selection Criteria and the Preferential Selection Criteria, while minimizing adverse effects on biological resources, specifically those located south of the runway at MCAS Miramar.

Environmentally Preferable Alternative. The NEPA also requires that an environmentally preferable alternative be identified. The No Action Alternative would have no significant impacts, and for NEPA purposes it would be the environmentally preferable alternative. However, the No Action Alternative would not meet mission requirements because the MV-22 would not be available for employment by 3D MAW and 4th MAW to provide medium lift capability to I MEF and other supported forces on the West Coast, as described in section 2.4 (No Action Alternative).

A summary of the environmental impacts of each alternative is provided in Chapter 7 and comparative matrices are provided in the Executive Summary and in Chapter 7.

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Chapter 3

Marine Corps Air Station Miramar

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3.0 MARINE CORPS AIR STATION MIRAMAR

3.1 INTRODUCTION

The focus of Chapter 3 is on airfield construction and operations at MCAS Miramar. MCAS Miramar could accommodate several basing options for the MV-22 including full basing of the ten squadrons (Full Basing Alternative), and partial basing of eight (Maximum Partial Basing Alternative) or two (Minimum Partial Basing Alternative) squadrons. This chapter provides baseline and impact assessment for each of these basing options as well as the No Action Alternative. This chapter also provides analysis for a "non-MCAS Miramar basing alternative" because, if the MV-22 were based elsewhere, there would be a loss of personnel and aircraft at MCAS Miramar due to the removal of four CH-46E squadrons.

Implementation of the Full Basing Alternative at MCAS Miramar would result in significant, unmitigable impacts to vernal pools and other biological resources. The Maximum Partial Basing Alternative at MCAS Miramar would result in significant impacts to vernal pools and other biological resources, but those impacts would be mitigated to less than significant. Mitigation measures outlined in section 3.14 related to these alternatives include compensatory restoration efforts (i.e., habitat restoration on other areas of MCAS Miramar). The following analysis accounts for any impacts to other resource areas (e.g., Land Use, Cultural Resources) related to these restoration efforts (see sections 3.3, 3.11, 3.12, 3.14, and 3.15).

3.2 AIRFIELDS AND AIRSPACE

This section provides an analysis of airfield use at MCAS Miramar. Aircraft from MCAS Miramar also train within Special Use Airspace under the authority of other military installations (e.g., MCB Camp Pendleton, Bob Stump Training Range Complex, MCAGCC). Information regarding off-station training is discussed in Chapter 6, even though such operations may originate from MCAS Miramar.

3.2.1 Affected Environment

MCAS Miramar has three runways, an LHD strip, and six helicopter pads with associated support facilities (see Figure 3.3-2). The primary (24R/06L) and secondary runway (24L/06R) parallel each other and are oriented in a southwest/northeast direction. The primary runway is 12,000 feet long, while the secondary runway is 8,000 feet long. Runway 28/10 is a 3,000 foot long runway extending to the south-east from Runway 24L. It is used for rotary wing operations. Due to wind direction and the implementation of noise abatement procedures, Runways 24R and 24L receive ninety-eight percent of operations-related air traffic. Runways 6L and 6R are used when wind, weather, or emergency conditions dictate. The LHD strip, designated Runway 24S/06S, is 1,000 feet long and is used for helicopter pattern operations. It is located parallel to the primary and secondary runways to the south. The six helicopter pads are located northwest of the main runway.

Flight operations by rotary wing aircraft at MCAS Miramar include the Sea Knight (CH-46) and Super Stallion (CH-53). Flight operations by fixed wing aircraft include the Hornet (F/A-18), Hercules (KC-130), Cessna Citation (UC-35), Turbo Mentor (T-34), and Huron (C-12). A breakdown of existing rotary wing and fixed wing operations at MCAS Miramar is shown in Table 3.2-1.

Table 3.2-1. Existing Annual Aircraft Flight Operations at MCAS Miramar

Aircraft Type	Departure	Arrival	Closed Patterns			Total
			TGO	FCLP	GCA	
ROTARY WING						
CH-46	3,892	4,128	8,941	-	361	17,322
CH-53	2,899	3,132	7,008	-	313	13,352
Transient	518	630	893	-	161	2,202
FIXED WING						
UC-35	254	128	14	-	14	410
T-34	396	396	173	-	35	1,000
C-12	869	435	150	-	150	1,604
F/A -18	19,312	20,204	16,052	10,756	972	67,296
KC-130	799	656	7,343	-	263	9,061
Total Operations	28,939	29,709	40,574	10,756	2,269	112,247

Notes:
TGO = Touch-and-Go; FCLP = Field Carrier Landing Practice; GCA = Ground-Controlled Approach.
Arrivals do not equal departures due to mission schedules.
GCA, TGO, and FCLP are counted as 2 operations.
See Appendix C for details.

Aviation operations at MCAS Miramar occur year-round, and consist of a variety of training exercises involving landings, take-off, and transport of personnel or material. Fixed wing aircraft at MCAS Miramar confine their take-off and landing operations to the existing runways at the station, and primarily involve local pattern work in controlled airspace. Rotary wing operations at MCAS Miramar include take-offs and landing from established LZs, CAL sites, and other locations not specifically prohibited to aircraft (MCAS Miramar 2006). Rotary wing operations are usually conducted 100 to 200 feet above ground level, and include external load practice, mountainous and/or confined areas landings, and night/low-light flight training (MCAS Miramar 2006). Helicopter pilots also perform Touch-and-Go and Ground-Controlled Approach patterns to ensure proficiency in these areas. The primary Touch-and-Go pattern is south of the runways on the LHD strip. Flight operations for helicopters are primarily conducted under VFR, subject to weather and air traffic conditions. Fixed wing operations, such as the F/A-18 and KC-130 aircraft, and are mainly conducted under IFR and through specific Air Traffic Control (ATC) clearance instructions with directional vectoring by the FAA.

Aircraft based and transiting to MCAS Miramar use a series of regional flight routes or corridors in and out of MCAS Miramar. There are four main arrival and departure routes for assigned CH-46 and CH-53 helicopters at MCAS Miramar: the Fairway Corridor, the Beach Route, the Interstate-15 Corridor, and the Yuma Corridor. The Fairway Corridor transits over the Torrey Pines Municipal Golf Course. The Beach Route follows the railroad tracks and heads towards the ocean turning west just south of Del Mar, proceeding over the Los Peñasquitos Lagoon to the ocean. The Interstate-15 Corridor follows Interstate-15 for transit north to ranges at MCB Camp Pendleton or the desert. Lastly, the Yuma Corridor heads east just south of the runways, proceeding over the Padre Dam Municipal Water District ponds (Santee Lakes) to a variety of ranges to the north and training facilities in multiple desert areas to the east.

3.2.2 Environmental Consequences

Full Basing (10-Squadron) Alternative

The basing of ten squadrons (120 aircraft) of MV-22 aircraft at MCAS Miramar would replace four CH-46E squadrons (48 aircraft) currently based at MCAS Miramar. This would result in a net

change of 72 additional aircraft based at MCAS Miramar, with a corresponding increase of approximately 34,421 airfield operations per year (Table 3.2-2) or a 31 percent increase in operations over existing conditions. This increase falls within historic use of the airfield, which has fluctuated between approximately 90,000 and 167,000 annual operations between 1996 and 2003 (MCAS Miramar 2005). Even with the introduction of more aircraft and a corresponding increase in operation levels over current levels, the MV-22 would operate in an airfield environment similar to the current operational environment. For example, the MV-22 would follow established local approach and departure patterns. No new flight tracks would be established.

Table 3.2-2. Proposed Change in Annual Airfield Flight Operations at MCAS Miramar under the Full Basing Alternative

Operation Type	Addition of MV-22 Operations	Reduction of CH-46 Operations	Change in Operation over Existing Conditions
Departure	21,351	-3,892	+17,459
Arrival	21,356	-4,128	+17,228
Touch-and-Go	3,943	-8,941	-4,998
GCA Box	4,928	-361	+4,567
Low Work	165	0	+165
Total	**51,743**	**-17,322**	**+34,421**

Notes:
1. An airfield flight operation is defined as a single event that occurs at the air station, such as a departure, arrival, or touch-down. For example, aircraft departing and returning would represent two airfield flight operations.
2. Touch-and-Go, GCA Box, and Low Work are counted as two operations each.
3. The proposed MV-22 FCLPs (13,429 operations) would occur at MCB Camp Pendleton instead of the airfield.

The ATC is aware of the speed differential between existing aircraft and the MV-22 with regard to departures and arrivals. Normal airspace de-confliction by ATC will resolve the issues of dissimilar aircraft operations within the airspace. In addition, a minimum separation of 500 feet is maintained between aircraft during maneuvers or training operations. This is no different than how air traffic is handled in traffic patterns where slow moving private aircraft and commercial jet liners share air traffic approach and departure routes in the airport environments within the Nation Airspace System.

Therefore, MCAS Miramar airspace management around the airfield and aircraft ground safety conditions would not change as a result of the new aircraft (see section 3.16 [Safety and Environmental Health] for information regarding aircraft mishap response). No significant impact would occur.

Mitigation Measures

Because there would be no significant impact on airfield operations, no mitigation measures are proposed.

Maximum Partial Basing (8-Squadron) Alternative

The basing of eight squadrons (96 aircraft) of MV-22 aircraft at MCAS Miramar would replace four CH-46E squadrons (48 aircraft) currently based at MCAS Miramar. This would result in a net change of 48 additional aircraft based at MCAS Miramar, with a corresponding increase of approximately 22,246 airfield operations per year (Table 3.2-3) or a 20 percent increase in operations over existing conditions. This increase falls within historic use of the airfield, which has fluctuated between approximately 90,000 and 167,000 annual operations between 1996 and 2003 (MCAS

Miramar 2005). Even with the introduction of more aircraft and a corresponding increase in operation levels over current levels, the MV-22 would operate in an airfield environment similar to the current operational environment. For example, the MV-22 would follow established local approach and departure patterns. No new flight tracks would be established.

Table 3.2-3. Proposed Change in Annual Airfield Flight Operations at MCAS Miramar under the Maximum Partial Basing Alternative

Operation Type	Addition of MV-22 Operations	Reduction of CH-46 Operation	Change in Operation over Existing Conditions
Departure	16,327	-3,892	+12,435
Arrival	16,331	-4,128	+12,203
Touch-and-Go	3,015	-8,941	-5,926
GCA Box	3,769	-361	+3,408
Low Work	126	0	+126
Total	**39,568**	**-17,322**	**+22,246**

Notes:
1. An airfield flight operation is defined as a single event that occurs at the air station, such as a departure, arrival, or touch-down. For example, aircraft departing and returning would represent two airfield flight operations.
2. Touch-and-Go, GCA Box, and Low Work are counted as two operations each.
3. The proposed MV-22 FCLPs (11,309 operations) would occur at MCB Camp Pendleton instead of the airfield.

The ATC is aware of the speed differential between existing aircraft and the MV-22 with regard to departures and arrivals. Normal airspace de-confliction by ATC will resolve the issues of dissimilar aircraft operations within the airspace. In addition, a minimum separation of 500 feet is maintained between aircraft during maneuvers or training operations. This is no different than how air traffic is handled in traffic patterns where slow moving private aircraft and commercial jet liners share air traffic approach and departure routes in the airport environments within the Nation Airspace System.

Therefore, MCAS Miramar airspace management around the airfield and aircraft ground safety conditions would not change as a result of the new aircraft (see section 3.16 [Safety and Environmental Health] for information regarding aircraft mishap response). No significant impact would occur.

Mitigation Measures

Because there would be no significant impact on airfield operations, no mitigation measures are proposed.

Minimum Partial Basing (2-Squadron) Alternative

The basing of two squadrons (24 aircraft) of MV-22 aircraft at MCAS Miramar would replace four CH-46E squadrons (48 aircraft) currently based at MCAS Miramar. This would result in a decrease of 24 aircraft based at MCAS Miramar, with a corresponding decrease of approximately 8,190 airfield operations per year (Table 3.2-4) or a seven percent decrease in operations over existing conditions. The MV-22 would operate in an airfield environment similar to the current operational environment, and would follow established local approach and departure patterns. Therefore, MCAS Miramar airspace management around the airfield and aircraft ground safety conditions would not change as a result of the new aircraft (see section 3.16 [Safety and Environmental Health] for information regarding aircraft mishap response). No significant impact would occur.

Table 3.2-4. Proposed Change in Annual Airfield Flight Operations at MCAS Miramar under the Minimum Partial Basing Alternative

Operation Type	Addition of MV-22 Operations	Reduction of CH-46 Operation	Change in Operation over Existing Conditions
Departure	3,767	-3,892	-125
Arrival	3,770	-4,128	-358
Touch-and-Go	696	-8,941	-8,245
GCA Box	870	-361	+509
Low Work	29	0	-29
Total	**9,132**	**-17,322**	**-8,190**

Notes:
1. An airfield flight operation is defined as a single event that occurs at the air station, such as a departure, arrival, or touch-down. For example, aircraft departing and returning would represent two airfield flight operations.
2. Touch-and-Go, GCA Box, and Low Work are counted as two operations each.
3. The proposed MV-22 FCLPs (2,120 operations) would occur at MCB Camp Pendleton instead of the airfield.

Mitigation Measures

Because there would be no significant impact on airfield operations, no mitigation measures are proposed.

Non-MCAS Miramar Basing Alternatives

Under a non-MCAS Miramar basing alternative, MCAS Miramar operations would decrease by approximately 17,322 operations (15 percent decrease) annually compared to current operating levels due to the elimination of four squadrons (48 aircraft) of CH-46E helicopter assets currently based at MCAS Miramar. Although no MV-22 squadrons would be based at MCAS Miramar, it is possible that transient MV-22 aircraft (aircraft based at other stations) would occasionally utilize the MCAS Miramar airfield. Transient MV-22 aircraft would follow established local approach and departure patterns. Therefore, MCAS Miramar airspace management around the airfield and aircraft ground safety conditions would not change as a result of the new aircraft (see section 3.16 [Safety and Environmental Health] for information regarding aircraft mishap response). No significant impact would occur.

Mitigation Measures

Because there would be no significant impact on safety and environmental health, no mitigation measures are proposed.

No Action Alternative

Under the No Action Alternative, MCAS Miramar operations would continue at the current level, and no construction or demolition would occur. The existing aircraft would continue to be based at MCAS Miramar, and airspace management around the airfield would remain as is. Therefore, no impact would occur.

3.3 LAND USE

Land use is the description of developed and undeveloped land occurring at a particular location. Land use categories typically include residential; commercial; manufacturing; transportation, communication, and utilities; recreation; institutional; mining and extraction; and agriculture and

forestry. On military installations, land use is often divided into operational and support functions. Management plans and zoning regulations determine the type and extent of land use allowable in specific areas and are often intended to protect specially designated or environmentally sensitive areas.

3.3.1 Affected Environment

Regional and Local Land Use

MCAS Miramar encompasses 23,616 acres (9,556 hectare [ha]) and is located approximately 13 miles (21 kilometers [km]) north of downtown San Diego, within the incorporated boundaries of the City of San Diego in San Diego County. The station is immediately bounded by the communities of Mira Mesa and Scripps Ranch to the north; Tierrasanta and Kearny Mesa to the south; Santee and East Elliot to the east; and La Jolla, University City, and Clairemont to the west (Figure 3.3-1). Each of these communities has a local plan that regulates growth and land use. The Mira Mesa Community Plan was adopted on 6 December 1994, and last amended on 19 June 2001. The Tierrasanta Community Plan was adopted by the City Council on 27 July 1982. The current Santee General Plan was adopted on 27 August 2003. The La Jolla Community Plan and Local Coastal Program Land Use Plan were updated in 2004. Scripps Miramar Ranch Community Plan was adopted July 1978. Major amendments to the plan occurred in November 1986 and 1987. The plan was reprinted in 2006 and incorporated amendments adopted through October 1999. The Universal City and Clairemont Community Plans were adopted by the City Council on 7 July 1987 and 26 September 1989, respectively. Additionally, East Miramar is bounded to the north and east by unincorporated portions of the County of San Diego.

Communities not directly adjacent to MCAS Miramar but affected or potentially affected by facility operations include the City of Poway, Rancho Bernardo, Sabere Springs, Caramel Mountain Ranch, Rancho Penasquito, Torrey Highlands, Pacific Highlands Ranch, Carmel Valley, Torrey Pines, Sorrento Hills/Torrey Hills, Del Mar Mesa, Miramar Ranch North, Sorrento Mesa, City of San Diego, and Rancho Entrada.

Land use and development on MCAS Miramar is guided by the MCAS Miramar Master Plan (DoN 2006), which includes development guidelines for optimum utilization of land and airspace to support MCAS Miramar's mission. MCAS Miramar's Integrated Natural Resources Management Plan (INRMP) also established guidelines for integrating MCAS Miramar's land use needs, in support of the military missions, with the management and conservation of natural resources (MCAS Miramar 2006). Although the INRMP does not dictate land use decisions, it does provide important resource information to support sound land use decisions and natural resource management.

The communities surrounding MCAS Miramar primarily consist of open, undeveloped space, industrial, commercial, and residential zones (MCAS Miramar 2006). The unincorporated lands north and east of East Miramar fall under the jurisdiction of the County of San Diego and are regulated by the County of San Diego General Plan which was last adopted in 1979 and is currently being updated. These areas are composed of industrial, commercial, and office land uses. These are located immediately north and south of the base, primarily to the west of Interstate-15. Additionally, several properties within the City of Poway are included in the San Diego Natural Community Conservation Planning (NCCP) program administered by the California Resource Agency and the California Department of Fish and Game (CDFG).

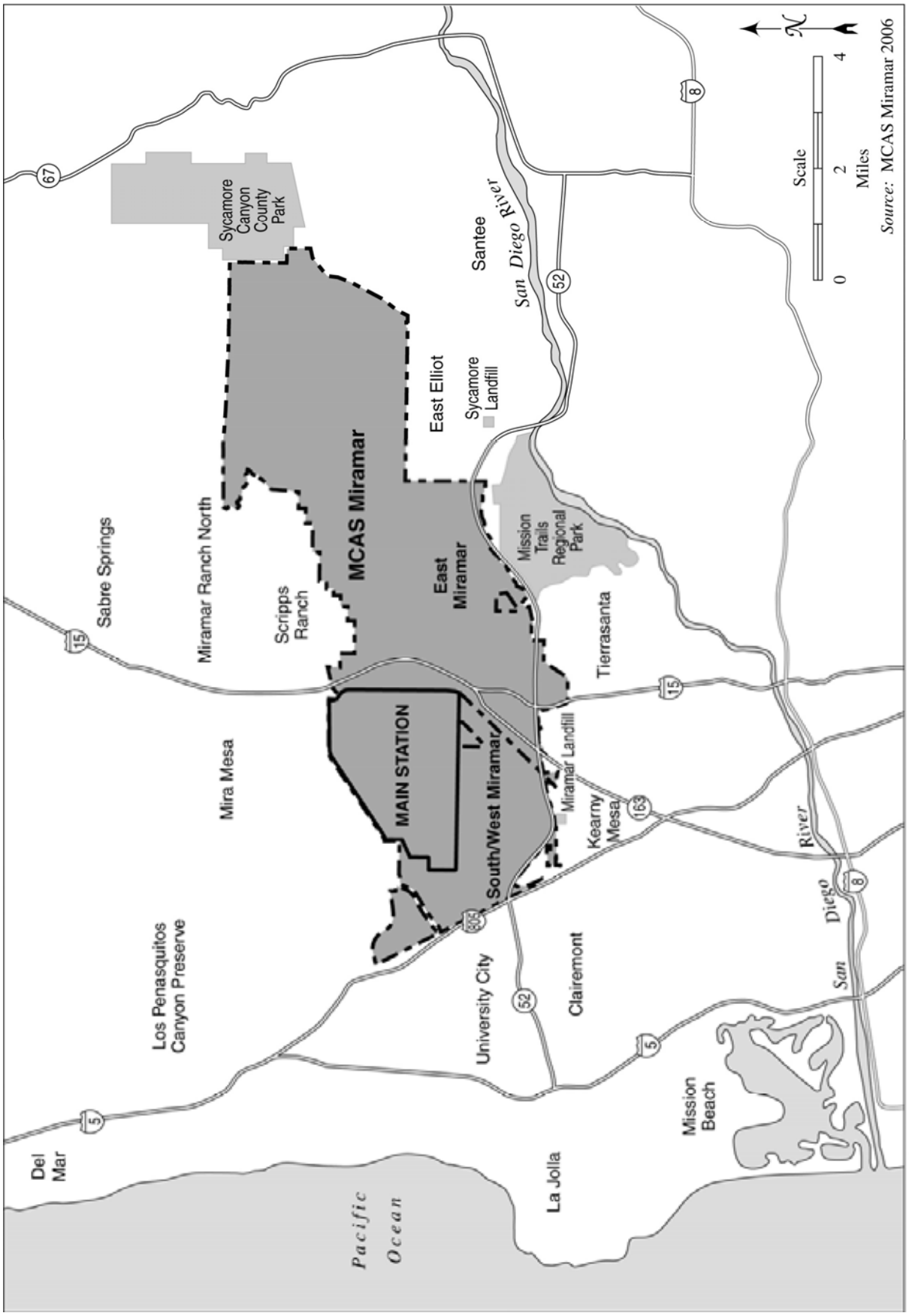


FIGURE 3.3-1

Regional Location of MCAS Miramar

Also abutting MCAS Miramar are areas within the Multiple Habitat Planning Areas (MHPA) as designated by the San Diego Multiple Species Conservation Program (MSCP) subregion of the southwestern portion of San Diego County. The MHPA is the area within which the permanent MSCP habitat reserve will be assembled and managed for its biological resources. Other specific land uses adjacent to MCAS Miramar include the Sycamore Canyon County Park, Mission Trails Regional Park, and the Sycamore Landfill (Figure 3.3-1).

Land uses within the boundaries of MCAS Miramar are divided into three major sectors including the Main Station, South/West Miramar, and East Miramar (Figure 3.3-1). The Main Station at MCAS Miramar is the primary developed area on the installation, which contains facilities that support the installation's overall functions. This area is divided into five zones: the flightline, Operations and Training, Community Support, Officer and Enlisted Housing, and Family Housing (Figure 3.3-2). The Flightline Zone is located south of Rose Canyon and provides on-station flightline and airfield functions. The Operations and Training Zone, located north of Rose Canyon, is used for aviation maintenance and supply, squadron support, and training facilities. The Community Support Zone is dispersed throughout Main Station and provides a commissary/exchange complex with personnel support and recreational facilities. The Officer and Enlisted Housing and Family Housing Zones are also dispersed throughout Main Station (DoN 2006). The proposed project area is located in the flightline district of the Main Station.

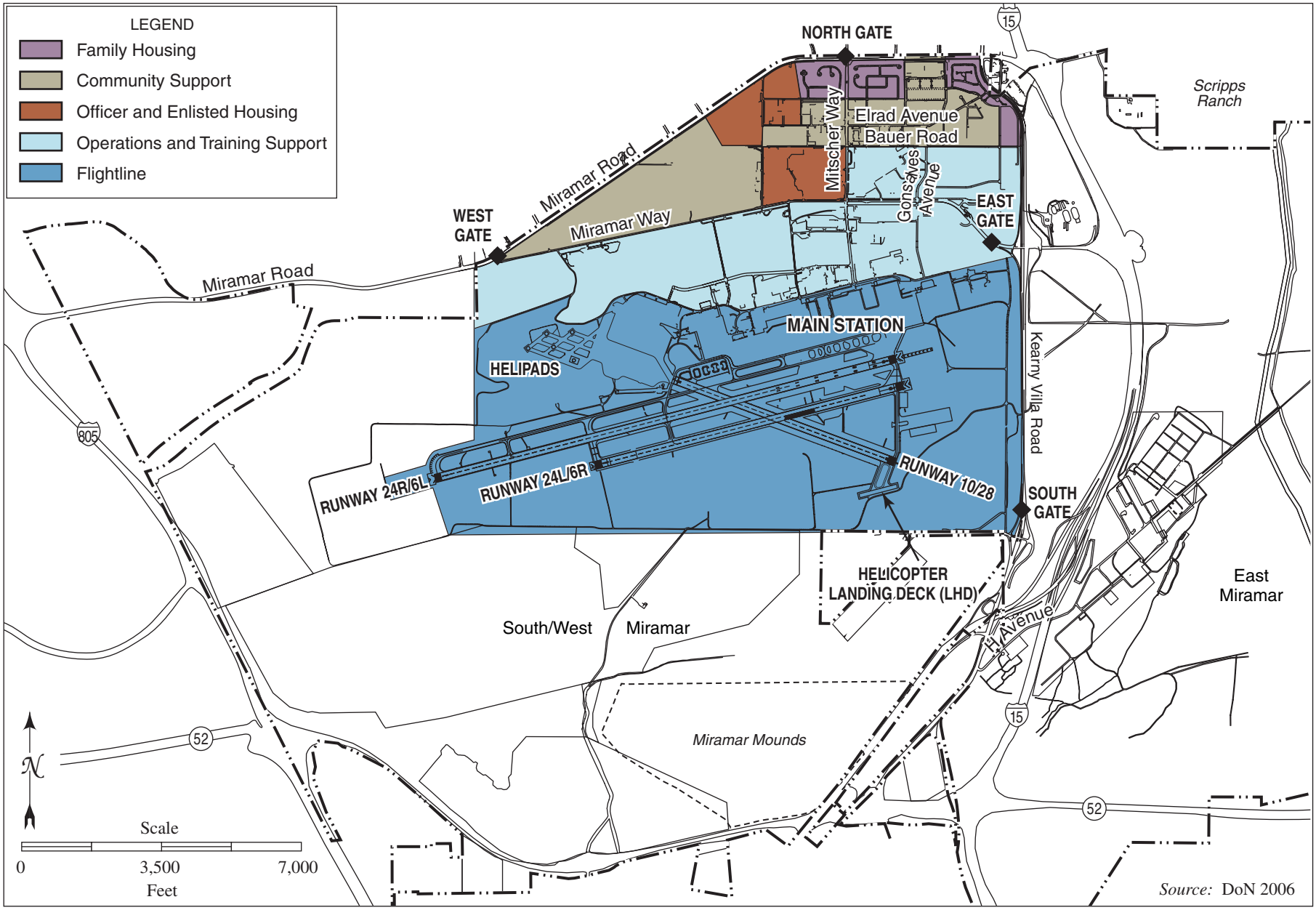
South/West Miramar consists primarily of undeveloped, open land bordering the Main Station on the south and west. Portions of South/West Miramar are located under the aircraft departure flight path where development is limited due to operational aircraft noise and safety constraints. Consequently, the area is largely undeveloped open space. Land uses in these areas include undeveloped areas, leased land for sanitary landfills and the Miramar Mounds National Natural Landmark, agricultural outleases, and air installation compatible use zone buffers.

East Miramar is a largely undeveloped area located to the east of Main Station. Land in this area is primarily used for warehousing and training and includes small arms and rifle ranges, infantry training, leased land areas, aircraft-related accident potential zone (APZ) buffers, magazine storage, training maneuver areas, ordnance operations, and natural conservation areas (DoN 2006). Military family housing is also planned for East Miramar.

Land Use and the Noise Environment

Land use activities most sensitive to noise typically include residential and commercial areas, public services, and areas associated with cultural and recreational uses. For MCAS Miramar, the identified noise-sensitive receptors are all residential areas (see section 3.8 [Noise] for more details).

Noise measurements related to aircraft operations to define the area of noise impact are expressed in terms of a Community Noise Equivalent (CNEL). The CNEL represents the average annual day community noise exposure from aircraft operations during a 24 hour period over a year. The DoD has established noise compatibility criteria for various land uses. According to these criteria, sound levels up to 65 decibel (dB) CNEL are compatible with land uses such as residences, transient lodging, and medical facilities.



Land Use in the Vicinity of the Proposed Action at MCAS Miramar

FIGURE 3.3-2

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The MCAS Miramar Air Installations Compatible Use Zones (AICUZ) program is intended to achieve compatibility between land uses on the station and in surrounding communities. In particular, the AICUZ seeks to reasonably reduce impacts to surrounding communities from airport noise generated at MCAS Miramar (MCAS Miramar 2005). Noise measurements for MCAS Miramar are expressed as 60, 65, 70, 75, and 80 dB CNEL contours. The type of land uses currently within the 65 dB CNEL contour for the station primarily consist of commercial/industrial parks, office space, residential areas, undeveloped open space, and local recreational parks (see Figure 3.8-1). Both existing noise contours and those associated with each alternative are presented in section 3.8 (Noise), along with a discussion of any affect on noise-sensitive receptors and nearby housing and population.

3.3.2 Environmental Consequences

Full Basing (10-Squadron) Alternative

Basing ten squadrons of MV-22 aircraft at MCAS Miramar would require placing 60 aircraft north of the runway and 48 aircraft south of the runway. Housing aircraft south of the runway would entail extensive construction in a previously undeveloped area, thus representing an increase in intensity of use from its current undeveloped condition. However, the project site is already characteristic of a military airfield and the proposed development south of the existing runway would be compatible with surrounding land uses. Facility construction would be designed and sited to be compatible with the existing base master plan and airfield safety guidelines and planning documents (including AICUZ and established APZs and clear zones). Furthermore, no significant impacts to surrounding communities would occur since proposed development would be contained within existing military designations at MCAS Miramar, and there would be no change to the existing airfield-related APZs and clear zones (see section 3.16, Safety and Environmental Health). Moreover, safety guidelines and land use plans would be updated to address MV-22 operations.

The projected noise contours under the Full Basing Alternative would extend the 65 dB CNEL noise contour slightly in a few areas, and decrease it in others (see section 3.8, Noise). The same type of land uses currently affected by the 65 dB CNEL would continue to be affected by the minimal extension of this contour (see Figure 3.8-2 and Table 3.8-5). Land uses within the extension are primarily compatible -- commercial/industrial parks and recreation areas. A minimal amount of additional existing residential property would lie within this contour. As summarized in Table 3.8-5, the Full Basing Alternative would increase the 65-75 dB CNEL contour by 40 acres, with an estimated 40 to 63 additional housing units compared to the existing condition. This area is built out. Therefore, no significant impacts to land use would occur with implementation of the Full Basing Alternative.

As noted in section 3.1, implementation of the Full Basing Alternative at MCAS Miramar would require a number of mitigation measures to compensate for lost biological resources. Compensatory restoration could result in the conversion of land elsewhere on the station from degraded habitat to high quality habitat. Creation of high quality habitat supporting threatened and endangered species in these areas would restrict future military development and use of those areas. However, the mitigation areas would be sited in locations that are not considered amenable for future training needs and would be located in compatible land use areas. Therefore, beneficial impacts to land use would occur with implementation of mitigation measures designed to compensate for lost biological resources.

Mitigation Measures

Implementation of the Full Basing Alternative at MCAS Miramar would not result in significant impacts to land use; therefore, no mitigation measures would be required.

Maximum Partial Basing (8-Squadron) Alternative

Basing eight squadrons of MV-22 aircraft at MCAS Miramar would require placing up to 28 aircraft in hangars and the rest on the aircraft parking apron. Facility construction would occur within previously developed areas of the airfield, and no construction would occur within the undeveloped area south of the runway. Implementation of the Maximum Partial Basing Alternative would not change existing land use designations and would be compatible with surrounding land uses. As discussed under the Full Basing Alternative, facility construction would be designed and sited to be compatible with the existing base master plan and airfield safety guidelines and planning documents (including AICUZ and established APZs and clear zones). Furthermore, no significant impacts to surrounding communities would occur since proposed development would be contained within existing military designations at MCAS Miramar, and there would be no change to the existing airfield-related APZs and clear zones (see section 3.16, Safety and Environmental Health). Moreover, safety guidelines and land use plans would be updated to address MV-22 operations.

As summarized at Table 3.8-7, contours above the 60-65 d B CNEL would increase by 24 net acres under the Maximum Partial Basing Alternative, impacting an estimated 23 to 52 additional housing units in a built-out residential area compared to the existing condition. Therefore, no significant impacts to land use would occur with implementation of the Maximum Partial Basing Alternative.

As noted in section 3.1, implementation of the Maximum Partial Basing Alternative at MCAS Miramar would require a number of mitigation measures to compensate for lost biological resources. Compensatory restoration could result in the conversion of land elsewhere on the station from degraded habitat to high quality habitat. Creation of high quality habitat supporting threatened and endangered species in these areas would restrict future military development and use of those areas. However, the mitigation areas would be sited in locations that are not considered amenable for future training needs and would be located in compatible land use areas. Therefore, beneficial impacts to land use would occur with implementation of mitigation measures designed to compensate for lost biological resources.

Mitigation Measures

Implementation of the Maximum Partial Basing Alternative at MCAS Miramar would not result in significant impacts to land use; therefore, no mitigation measures would be required.

Minimum Partial Basing (2-Squadron) Alternative

Basing two squadrons of MV-22 aircraft at MCAS Miramar would require placing up to eight aircraft in hangars and the rest on the aircraft parking apron. No facility construction would occur under this alternative. Therefore, implementation of the Minimum Partial Basing Alternative would not change existing land use designations and would be compatible with surrounding land uses. Moreover, safety guidelines and land use plans would be updated to address MV-22 operations. The projected noise contours would not appreciably change under the Minimum

Partial Basing Alternative, and no additional land uses would be affected by the projected 65 dB CNEL (see Figure 3.8-4 and Table 3.8-8). Therefore, no significant impacts to land use would occur with implementation of the Minimum Partial Basing Alternative.

Mitigation Measures

Implementation of the Minimum Partial Basing Alternative at MCAS Miramar would not result in significant impacts to land use; therefore, no mitigation measures would be required.

Non-MCAS Miramar Basing Alternatives

Under a non-MCAS Miramar basing alternative, the amount of aircraft and personnel at MCAS Miramar would be reduced due to the loss of four CH-46E squadrons, and no new construction or demolition would occur. Although there would be an overall reduction in military aircraft operations, ground-based activity, and personnel associated with the loss of the four CH-46E squadrons, the overall land use designations at MCAS Miramar would not change. Furthermore, the projected noise contours would not appreciably change under these alternatives, and no additional land uses would be affected by the projected 65 dB CNEL (see Figure 3.8-5 and Table 3.8-9). Therefore, no significant impacts to land use would occur with implementation of a non-MCAS Miramar basing alternative.

Mitigation Measures

Implementation of a non-MCAS Miramar basing alternative would not result in significant impacts to land use; therefore, no mitigation measures would be required.

No Action Alternative

Under the No Action Alternative, there would be no West Coast-based MV-22 personnel changes, new construction, demolition, or training activities. Therefore, existing conditions would remain unchanged, and no impacts to land use would occur.

3.4 SOCIOECONOMICS

Socioeconomics describes the basic attributes and resources associated with the human environment, particularly population and economic activity. Economic activity typically encompasses employment, personal income, and industrial growth. The project area for socioeconomics is defined as the area in which the principal effects arising from implementation of the proposed action are likely to occur. The proposed action has the potential to cause socioeconomic impacts to the communities around the stations through changes or relocation of personnel.

MCAS Miramar encompasses 23,116 acres (9,355 ha) and is located approximately 13 miles (21 km) north of downtown San Diego, California in San Diego County. The station is surrounded by the cities of Poway to the north, Santee to the south, and San Diego to the west. Therefore, the region of influence consists of these three communities and San Diego County. Socioeconomic data for the State of California is also provided as a general comparison.

3.4.1 Affected Environment

Demographics

As shown in Table 3.4-1, the cities of Poway and San Diego experienced growth exceeding 10 percent between 1990 and 2000. The population growth in Santee was substantially slower at only 0.4 percent. Recent population estimates by the U.S. Census Bureau (U.S. Census) and the California Department of Finance (DOF) vary. While the actual growth since 2000 is uncertain, the cities surrounding MCAS Miramar appear to have experienced slower growth rates than San Diego County and California as a whole.

Table 3.4-1. Population Trends

Geographic Area	1990	2000	% Change (1990 to 2000)	July 2006 Census Estimate	January 2007 DOF Estimate	% Change (2000 to 2006/2007)
Poway	43,516	48,295	11.0	48,117	50,830	-0.4 to 5.2
San Diego	1,110,549	1,223,341	10.2	1,256,951	1,316,837	2.7 to 7.6
Santee	52,902	53,090	0.4	52,530	55,158	-1.1 to 3.9
San Diego County	2,498,016	2,813,833	12.6	2,941,454	3,098,269	4.5 to 10.1
California	29,760,021	33,871,648	13.8	36,457,549	37,662,518	7.6 to 11.2

Sources: U.S. Census 2007a, U.S. Census 2007b, U.S. Census 2005, DOF 2007.

As of December 2007, MCAS Miramar supported a workforce population of 13,516 personnel, including 1,310 officers, 10,136 enlisted personnel, and 2,070 civilian employees (Lezarda 2007). There are 23,604 dependents associated with base military personnel.

Income and Employment

Median household and family incomes reported from the 2000 Census are shown in Table 3.4-2. Median household and family incomes for Poway and Santee are higher than for San Diego County and the state of California as a whole. The median household income for the City of San Diego is just less than that of the county and state, while the median family income for the City of San Diego is slightly below the county average and slightly above the state average.

Table 3.4-2. Income Levels (1999)

Geographic Area	Median Household Income ($)	Median Family Income ($)
Poway	71,708	77,875
San Diego	45,733	53,060
Santee	53,624	57,874
San Diego County	47,067	53,438
California	47,493	53,025

Source: U.S. Census 2007a.

Table 3.4-3 shows employment and compensation by (nonfarm) industry throughout San Diego County for 2001 and 2005. In 2005, the three largest industries in San Diego County with respect to employment were government (18.0 percent), retail trade (10.2 percent), and professional and technical services (9.6 percent). With respect to compensation, the three largest industries were government (26.1 percent), professional and technical services (11.1 percent), and manufacturing (9.9 percent). Employment increased by 133,108 (7.7 percent) in San Diego County between 2001 and 2005. As shown in Table 3.4-3, between 2001 and 2005 the percent growth in employment within the construction industry was 19.1 percent in San Diego County.

Table 3.4-3. Nonfarm Employment and Earnings by Industry Sector for San Diego County (2001 and 2005)

Industry	Employment			Compensation ($000s)	
	2001	2005	% Change	2001	2005
Private employment	1,408,111	1,532,751	8.9%	$48,424,257	$60,977,009
Forestry, fishing, related activities, and other	4,298	3,479	-19.1%	$78,631	$74,915
Mining	1,661	1,677	1.0%	$21,956	$34,236
Utilities	5,569	6,739	21.0%	$435,762	$693,384
Construction	100,900	120,194	19.1%	$3,794,918	$5,496,129
Manufacturing	129,802	114,176	-12.0%	$7,445,344	$8,144,911
Wholesale trade	48,673	54,620	12.2%	$2,509,642	$3,230,378
Retail trade	176,001	190,126	8.0%	$4,433,897	$5,417,157
Transportation and warehousing	29,847	30,384	1.8%	$856,104	$1,034,261
Information	47,044	44,747	-4.9%	$3,637,767	$4,458,055
Finance and insurance	74,102	82,252	11.0%	$3,351,057	$4,767,179
Real estate and rental and leasing	82,313	107,078	30.1%	$1,142,666	$1,537,113
Professional and technical services	163,663	178,488	9.1%	$7,650,189	$9,174,778
Management of companies and enterprises	19,108	18,907	-1.1%	$1,281,911	$1,416,733
Administrative and waste services	110,984	124,009	11.7%	$2,613,212	$3,341,875
Educational services	25,049	33,200	32.5%	$569,758	$888,375
Health care and social assistance	127,614	133,678	4.8%	$4,139,084	$5,327,929
Arts, entertainment, and recreation	39,515	43,318	9.6%	$730,511	$955,006
Accommodation and food services	123,870	137,304	10.8%	$2,126,580	$2,872,066
Other services, except public administration	98,098	108,375	10.5%	$1,605,268	$2,112,529
Government and government enterprises	327,356	335,824	2.6%	$16,772,015	$21,548,767
Federal, civilian	39,169	41,067	4.8%	$3,010,674	$3,714,682
Military	112,374	108,748	-3.2%	$5,693,853	$7,546,556
State and local	35,969	41,965	16.7%	$8,067,488	$10,287,529
Total (Nonfarm)	1,735,467	1,868,575	7.7%	$65,196,272	$82,525,776

Source: Bureau of Economic Analysis (BEA) 2007

The unemployment rate for Poway, San Diego, and Santee in 2006 was 2.3, 4.0, and 3.3 percent, respectively. In comparison, the unemployment rate for San Diego County and the State of California was 4.0 and 4.9 percent, respectively (Bureau of Labor Statistics [BLS] 2007).

The California Employment Development Department (EDD) also gathers and reports data on employment. This data varies in magnitude from the Bureau of Economic Analysis (BEA) data. For example, EDD estimated the employment in the construction industry in San Diego County to be 75,100 and 90,800 in 2001 and 2005, respectively, resulting in a growth of 20.9 percent (EDD 2007a). EDD labor market data indicates that growth in the construction industry slowed down during 2005 (3.5 percent) and 2006 (2.0 percent) compared to the growth in 2004 (9.4 percent). Between October 2006 and October 2007 the construction industry shed 4,700 jobs, declining by 5.1 percent over the year (EDD 2007b). Jobs lost in specialty trade contractors accounted for almost half of the decline. EDD also developed industry forecasts for San Diego County between 2004 and 2014 and estimated employment in the construction industry will grow 12.1 percent (10,600 jobs) (EDD 2007c).

Housing

Table 3.4-4 shows the distribution of housing in January 1999 for cities surrounding MCAS Miramar, San Diego County, and the State of California. The total number of housing units, percentages of owners and renters in occupied units, and percent vacant are shown.

Table 3.4-4. Housing (2000 U.S. Census)

Geographic Area	Housing Units	% Vacant	Occupied Housing Units		
			Total	% Owner	% Renter
Poway	15,833	1.6	15,587	77.6	22.4
San Diego	469,756	4.1	450,682	49.5	50.5
Santee	18,810	2.0	18,441	71.0	29.0
San Diego County	1,040,149	4.4	994,677	55.4	44.6
California	12,214,549	5.8	11,502,870	56.9	43.1
Source: U.S. Census 2007a					

As shown above, housing availability is fairly consistent throughout cities surrounding MCAS Miramar and San Diego County. In 2000, there were 1,040,149 housing units in San Diego County, 95.6 percent of which were occupied. Housing occupancy rates varied between 98.4 percent for Poway, 95.9 percent for San Diego, and 98.0 percent for Santee. Of the occupied housing units, Poway had the highest percentage of owner-occupied units (77.6 percent), while San Diego had the lowest percentage of owner-occupied units at 49.5 percent.

As of December 2007, housing facilities at MCAS Miramar consisted of 527 housing units (MCAS Miramar 2005; Lezarda 2007). There are plans to construct an additional 1,400 military family units in East Miramar (see Military Family Housing project in section 8.2.1).

3.4.2 Environmental Consequences

The action alternatives proposed at MCAS Miramar involve personnel and mission realignments, including facility modification and construction. The economic effects of these actions can be separated into non-recurring and recurring components. Economic effects related to construction activities are temporary, occurring only for the duration of the construction period; therefore they are considered non-recurring impacts. Economic effects related to operations that involve long-term changes in personnel levels are considered recurring impacts.

Estimated economic effects of the action alternatives were calculated based on proposed construction spending and personnel changes, which are anticipated to be implemented over a period of years. End-state economic impacts were calculated, as opposed to annual or temporal impacts, due to uncertainties in the timing of the relevant project events. Consequently, the estimated impacts represent the accumulation of impacts over time, and may appear substantial; however, in actuality the impacts would be dispersed over a period of many years. The exact magnitude of project spending and personnel changes, as well as the timing of the construction schedules and personnel transfers, may alter the estimated economic effects.

The factors driving potential economic impacts of the proposed alternatives at MCAS Miramar include construction expenditures and personnel changes, which are summarized in Table 3.4-5. Personnel changes represent the net change in personnel, following replacement of existing CH-46E aircraft by the MV-22, and include both military and civilian employees. The anticipated change in civilian support personnel is based on a typical ratio of 0.07 per military personnel. For example,

under the Full Basing Alternative, there would be an increase of 1,142 military personnel and an estimated increase of 80 (1,142 x 0.07) civilian support personnel.

Table 3.4-5. Proposed Construction Costs and Net Change in Personnel at MCAS Miramar

Alternative	Construction Costs	Net Personnel Change		
		Military	Civilian	Total
Full Basing Alternative	$ 572,675,646	+1,142	+80	+1,222
Maximum Partial Basing Alternative	$ 288,237,795	+746	+52	+798
Minimum Partial Basing Alternative	$ 0	-557	-39	-596
Non-MCAS Miramar Basing Alternatives	$0	-974	-68	-1,042

The economic factors presented in Table 3.4-5 represent the direct impacts of the proposed action alternatives. The economic activity associated with these factors generates regional output, income and employment through the multiplier effect of regional purchases (indirect effects) and payroll spending (induced effects). The total economic impact is equal to the sum of the direct, indirect and induced effects. Economic impacts were calculated for the region encompassed by San Diego County using IMPLAN impact analysis software.

Full Basing (10-Squadron) Alternative

Construction

Under the Full Basing Alternative, construction, renovation, or infrastructure improvement projects would be implemented over the period from 2009 to 2020 with the highest concentration of implementation occurring between FY 2010 and FY 2014. Estimated spending for proposed construction projects under this alternative is $573 million, which is defined as the direct output impact in Table 3.4-6. Potential direct impacts associated with this spending would include an estimated 5,557 annual construction jobs (i.e., man-years) over the entire construction period and $285 million in direct income. The total socioeconomic impact of proposed construction would amount to an estimated $1.0 billion in total output (spending), generating 10,048 annual jobs and personal earnings of $460 million. These impacts represent total, accumulated effects that would be distributed over the entire construction period.

Table 3.4-6. Economic Impact of the Full Basing Alternative at MCAS Miramar

	Direct Impact	Indirect Impact	Induced Impact	Total Impact
CONSTRUCTION-RELATED (NON-RECURRING)				
Output	$ 572,675,646	$ 188,262,283	$ 263,828,315	$ 1,024,766,244
Income	$ 285,468,992	$ 81,849,705	$ 92,697,858	$ 460,016,555
Employment	5,557	1,810	2,681	10,048
OPERATIONS-RELATED (RECURRING)				
Output	$61,283,428	$0	$42,981,208	$104,264,636
Income	$61,283,428	$0	$15,102,033	$76,385,461
Employment	1,222	0	437	1,659
Source: IMPLAN				

Compared to existing industry data discussed in the *Income and Employment* section, anticipated construction employment associated with the Full Basing Alternative could represent between one and five percent of total industry employment of about 100,000 jobs. It is likely employment demand related to proposed construction would be met by existing industry resources; therefore, in-migration of workers to the region would not be anticipated.

The construction-related economic effects would be temporary (i.e., only occurring for the duration of the construction period). No permanent or long-lasting socioeconomic impacts are associated with construction under the Full Basing Alternative.

Operations

Full basing of the MV-22 aircraft at MCAS Miramar would require personnel to operate and maintain the aircraft and provide necessary support services. The new MV-22 squadrons would replace existing CH-46E squadrons; consequently, the net change in personnel is not substantial. The net change in personnel under the Full Basing Alternative would be an increase of 1,222 positions, composed of 1,142 military and 80 civilian personnel. This change would amount to an increase of nine percent to the existing MCAS Miramar employment of 13,516 personnel. Payroll associated with these personnel would amount to an estimated $61 million (Table 3.4-6). The increase in payroll and household spending by station personnel would have a secondary effect of generating 437 regional jobs, $15 million in personal income and $43 million in total regional spending (output). Since the operations-related impacts of the Full Basing Alternative are recurring, these would be long-term, annual effects in the region.

Based on existing military dependent ratios at MCAS Miramar, an estimated 2,139 family members would arrive, for a total anticipated population increase of 3,361 persons. An increase of this size would amount to nine percent of the existing station population and 0.3 percent of the San Diego population. When viewed in the context of the large, dynamic San Diego community, the proposed change in station employment and the secondary economic effects generated are not likely to be noticeable within the region. In terms of effects at the station level, MCAS Miramar is a dynamic installation, accommodating regular changes in missions and personnel. With an additional 1,400 units of military housing planned, housing effects related to the incoming personnel and their families are not expected to be consequential.

Mitigation Measures

No significant socioeconomic impacts are anticipated under the Full Basing Alternative; therefore, no mitigation measures are proposed.

Maximum Partial Basing (8-Squadron) Alternative

Construction

Under the Maximum Partial Basing Alternative, construction, renovation, or infrastructure improvement projects would be implemented over the period from 2009 to 2020 (highest concentration between FY 2010 and FY 2014). Estimated spending for proposed construction projects under this alternative is $288 million, which is defined as the direct output impact in Table 3.4-7. Potential direct impacts associated with this spending would include an estimated 2,796 annual construction jobs over the entire construction period and $144 million in direct income. The total socioeconomic impact of the proposed construction projects would amount to an estimated $516 million in total output (spending), generating 5,055 annual jobs and personal earnings of $232 million. These impacts represent total, accumulated effects that would be distributed over the entire construction period.

Table 3.4-7. Economic Impact of the Maximum Partial Basing Alternative at MCAS Miramar

	Direct Impact	Indirect Impact	Induced Impact	Total Impact
CONSTRUCTION-RELATED (NON-RECURRING)				
Output	$288,237,795	$94,755,739	$132,789,492	$515,783,026
Income	$143,681,600	$41,196,405	$46,656,473	$231,534,478
Employment	2,796	910	1,349	5,055
OPERATIONS-RELATED (RECURRING)				
Output	$40,019,784	0	$28,067,925	$68,087,709
Income	$40,019,784	0	$9,862,048	$49,881,832
Employment	798	0	285	1,083
Source: IMPLAN				

Compared to existing industry data discussed in the *Income and Employment* section, anticipated construction employment associated with the Maximum Partial Basing Alternative would represent less than three percent of total industry employment of about 100,000 jobs. It is likely employment demand related to proposed construction would be met by existing industry resources; therefore, in-migration of workers to the region would not be anticipated.

The construction-related economic effects would be temporary, however, only occurring for the duration of the construction period. No permanent or long-lasting socioeconomic impacts are associated with construction under the Maximum Partial Basing Alternative.

Operations

The net change in personnel under the Maximum Partial Basing Alternative would be an increase of 798 positions, composed of 746 military and 52 civilian personnel. This change would amount to an increase of six percent to the existing MCAS Miramar employment of 13,516 personnel. Payroll associated with these personnel would amount to an estimated $40 million (Table 3.4-7). The increase in payroll and household spending by station personnel would have a secondary effect of generating 285 regional jobs, $9 million in related personal income, and $28 million in total regional spending. Since the operations-related impacts of the Maximum Partial Basing Alternative are recurring, these would be long-term, annual effects in the region.

Based on existing military dependent ratios at MCAS Miramar, an estimated 1,396 family members would arrive, for a total anticipated population increase of 2,194 persons. An increase of this size would amount to six percent of the existing station population and 0.2 percent of the San Diego population. When viewed in the context of the large, dynamic San Diego community, the proposed change in station employment and the secondary economic effects generated are not likely to be noticeable within the region. In terms of effects at the station level, MCAS Miramar is a dynamic installation, accommodating regular changes in missions and personnel. With an additional 1,400 units of military housing planned, housing effects related to the incoming personnel and their families are not expected to be consequential.

Mitigation Measures

No significant socioeconomic impacts are anticipated under the Maximum Partial Basing Alternative; therefore, no mitigation measures are proposed.

Minimum Partial Basing (2-Squadron) Alternative

Construction

No construction or demolition is associated with the implementation of the Minimum Partial Basing Alternative at MCAS Miramar. Therefore, no construction-related impacts would occur.

Operations

The number of incoming personnel under the Minimum Partial Basing Alternative would not be sufficient to offset the number of departing personnel associated with the replaced CH-46E aircraft. The net change in personnel would be a decrease of 596 positions, composed of 557 military and 39 civilian personnel. This change would amount to a decline of 4.4 percent to the existing MCAS Miramar employment of 13,516 personnel. Payroll associated with these personnel would amount to an estimated $30 million (Table 3.4-8). The decrease in payroll and household spending by departing station personnel would have a secondary effect of losing 213 regional jobs, $7 million in personal income, and $21 million in total regional spending. The loss of induced jobs and income would comprise less than 0.1 percent of the total number of San Diego County non-farm jobs and non-farm earnings as shown in Table 3.4-3. Since the operations-related impacts of the Minimum Partial Basing Alternative are recurring, these would be long-term, annual effects in the region.

Table 3.4-8. Economic Impact of the Minimum Partial Basing Alternative at MCAS Miramar

	Direct Impact	Indirect Impact	Induced Impact	Total Impact
OPERATIONS-RELATED (RECURRING)				
Output	-$29,889,462	0	-$20,963,011	-50,852,473
Income	-$29,889,462	0	-$7,365,639	-37,255,101
Employment	-596	0	-213	-809
Source: IMPLAN				

Based on existing military dependent ratios at MCAS Miramar, an estimated 1,043 family members would depart, for a total anticipated population decrease of 1,639 persons. A decrease of this size would amount to 4.4 percent of the existing station population and 0.1 percent of the San Diego population. When viewed in the context of the large, dynamic San Diego community, the proposed change in station employment and the secondary economic effects generated are not likely to be noticeable within the region. In terms of effects at the station level, MCAS Miramar is a dynamic installation, accommodating regular changes in missions and personnel. It is very unlikely that such a small relative change in population would be consequential.

Mitigation Measures

No significant socioeconomic impacts are anticipated under the Minimum Partial Basing Alternative; therefore, no mitigation measures are proposed.

Non-MCAS Miramar Basing Alternatives

Under a non-MCAS Miramar basing alternative, there would be no incoming MV-22 personnel to offset the loss of the CH-46E squadrons. Since no construction projects are proposed, there would be no construction-related consequences. Personnel changes associated with this alternative consist of the estimated 1,042 departing positions, composed of 974 military and 68 civilian personnel. This loss

would amount to a decrease of 7.7 percent to the existing MCAS Miramar employment of 13,516 personnel. Payroll associated with these personnel would amount to an estimated $52 million (Table 3.4-9). The decrease in payroll and household spending by departing station personnel would have a secondary effect of a loss of 372 regional jobs, $13 million in personal income, and $37 million in regional spending. The loss of induced jobs and income would comprise less than 0.1 percent of the total number of San Diego County non-farm jobs and non-farm earnings as shown in Table 3.4-3. Since the operations-related impacts are recurring, these would be long-term, annual effects in the region.

Table 3.4-9. Economic Impact at MCAS Miramar of a Non-MCAS Miramar Basing Alternative

	Direct Impact	Indirect Impact	Induced Impact	Total Impact
OPERATIONS-RELATED (RECURRING)				
Output	-$52,256,408	0	-$36,650,096	-$88,906,504
Income	-$52,256,408	0	-$12,877,510	-$65,133,918
Employment	-1,042	0	-372	-1,414
Source: IMPLAN				

Based on existing military dependent ratios at MCAS Miramar, an estimated 1,824 family members would depart, for a total anticipated population decrease of 2,866 persons. A decrease of this size would amount to 7.7 percent of the existing station population and 0.2 percent of the San Diego population. When viewed in the context of the large, dynamic San Diego community, the proposed change in station employment and the secondary economic effects generated are not likely to be noticeable within the region. In terms of effects at the station level, MCAS Miramar is a dynamic installation, accommodating regular changes in missions and personnel. It is unlikely the anticipated change in population would generate significant socioeconomic consequences.

Mitigation Measures

No significant socioeconomic impacts are anticipated under a non-MCAS Miramar basing alternative; therefore, no mitigation measures are proposed.

No Action Alternative

No construction projects or personnel changes at MCAS Miramar are associated with the No Action Alternative; consequently, no socioeconomic impacts would be anticipated.

3.5 COMMUNITY FACILITIES AND SERVICES

Community facilities and services include medical, security, fire and other emergency support services, education, and recreational services. Housing is discussed under section 3.4 (Socioeconomics). This section describes the range of community facilities within the vicinity of MCAS Miramar potentially affected by implementation of the proposed action or alternatives. It also describes the availability of fire and emergency services at the airfields where aircraft landings and take-offs occur.

3.5.1 Affected Environment

Health Services

San Diego County has an extensive range of healthcare providers including services dedicated to military personnel and their families (i.e., Naval Medical Center), as well as hospitals, clinics and

specialized and emergency care facilities open to the general public. These facilities include Scripps Health, Sharp Healthcare, University of California San Diego Healthcare, Tri-City Medical Center, San Diego Children's Hospital and Health Center, Fallbrook Hospital, and Paradise Valley Hospital.

The Branch Medical Clinic and Branch Dental Clinic at MCAS Miramar provide medical and dental care for active duty personnel, including emergency services for dependents (DoN 2006). Primary medical and dental services for dependents are provided through NAVCARE clinics located in neighboring communities (DoN 2006). The closest civilian hospitals are Scripps Hospital and Sharp Hospital in San Diego.

Security Services

Regional security services are provided by the San Diego County Sheriff's Department and various city police forces (e.g., City of San Diego Police Department). The Sheriff's Department deploys approximately 212 patrol cars to handle law enforcement services in both the unincorporated area of the county and the nine cities which contract for law enforcement services with the Sheriff. This operation requires approximately 1,200 staff members, of which 723 are deputy sheriffs. These deputy sheriffs are assigned to patrol, traffic, detective and other necessary support functions

Security services at MCAS Miramar are provided by the on-station Security Department that consists of three divisions: the counterintelligence division, the Provost Marshal division, and the structural fire protection division. The security force is composed of 59 military police personnel (DoN 2007). The majority of law enforcement, crime prevention, and physical security issues on base are addressed by the Provost Marshal division. In addition, the security director at MCAS Miramar coordinates with the Naval Criminal Investigative Service in all cases involving security and counterintelligence matters (DoN 2006).

Fire Protection

Regional fire protection is provided by San Diego County's fifty-three Fire Agencies. These agencies include city fire departments (e.g., Poway City Fire Department), volunteer fire fighting agencies, and federal agencies (e.g., U.S. Forest Service).

Fire protection at MCAS Miramar is provided by the on-station Fire Department. This department consists of two structural fire stations, one crash station, and a staff of approximately 47 firefighters. MCAS Miramar is planning to construct an additional new fire station in East Miramar in 2009 or 2010 (DoN 2007). The MCAS Miramar Fire Department works cooperatively with four community organizations: the City of San Diego, San Diego County, U.S. Fish and Wildlife Service (USFWS), and the Bureau of Land Management.

Education

The majority of students affiliated with MCAS Miramar attend school in the San Diego Unified School District (MCAS Miramar 2009b). The school district consists of 113 elementary schools, 23 middle/junior high schools, and 27 high schools as well as a variety of alternative and charter schools (SDUSD 2009). Military families may apply to attend one of the San Diego Unified School District's 202 schools. The Poway Unified School District also receives students from MCAS Miramar.

A number of junior colleges and universities (including San Diego State University, University of California, San Diego, and the University of San Diego) are located nearby.

Park and Recreation Facilities

San Diego County has a plethora of parks and recreation opportunities including water sports facilities; professional sporting events; theaters; museums; gardens; local, state, and national parks; national monuments; golf courses; hiking trails; and theme parks such as Sea World, Legoland, and the San Diego Wild Animal Park. Recreation facilities at MCAS Miramar include a variety of sports facilities, two swimming pools, a gymnasium, bowling alley, youth center, a community center, a Commissioned Officer's Club, Mills Park, and riding stables (DoN 2006).

3.5.2 Environmental Consequences

Full Basing (10-Squadron) Alternative

Under the Full Basing Alternative, the amount of aircraft and personnel at MCAS Miramar would increase (see Table 2.3-2). In addition, there would be an overall increase in military aircraft operations, ground-based activity, and personnel associated with the ten MV-22 squadrons. There would be a net increase of 1,222 personnel under this alternative (see Table 3.4-5). However, for the range of community facilities and services discussed below, the installation has planned for and assessed all essential services to ensure that the proposed increase in personnel and their dependents would be accommodated under the Full Basing Alternative. The installation is currently updating its Base Master Plan and Base Facility Requirements to include the MV-22 squadrons. According to installation personnel, the existing community facilities and services are not considered deficient and the introduction of the proposed additional personnel would not impact those services (LCDR Garvin, personal communication 2009).

Health Services

The installation has planned for and assessed all essential services to ensure that the existing health services can adequately accommodate the proposed increase of personnel and their dependents with implementation of the Full Basing Alternative. Therefore, no significant impacts would occur.

Security Services

The installation has planned for and assessed all essential services to ensure that the existing security services can adequately accommodate the proposed increase of aircraft and personnel with implementation of the Full Basing Alternative. Therefore, no significant impacts would occur.

Fire Protection

The installation has planned for and assessed all essential services to ensure that the existing fire protection services can adequately accommodate the proposed increase of aircraft and personnel with implementation of the Full Basing Alternative. Therefore, no significant impacts would occur.

Education

The installation has planned for and assessed all essential services to ensure that existing educational services can adequately accommodate the proposed increase of personnel and their dependents with implementation of the Full Basing Alternative. A variety of schools and universities are located in San

Diego County that can accommodate the proposed increase of personnel dependents with implementation of the Full Basing Alternative. In the event that space becomes limited at the schools surrounding the base, any number of the 202 schools within the district would have sufficient capacity to accommodate those students. Therefore, no significant impacts would occur.

Park and Recreation Facilities

The installation has planned for and assessed all essential services to ensure that existing parks and recreation facilities can adequately accommodate the proposed increase of personnel and their dependents with implementation of the Full Basing Alternative. Therefore, no significant impacts would occur.

Mitigation Measures

Implementation of the Full Basing Alternative at MCAS Miramar would not result in significant impacts to community facilities and services; therefore, no mitigation measures would be required.

Maximum Partial Basing (8-Squadron) Alternative

Impacts to community facilities and services for the Maximum Partial Basing Alternative would be similar to those described under the Full Basing Alternative. There would be a net increase of 798 personnel under this alternative (see Table 3.4-5). Although there would be an overall increase in military aircraft operations, ground-based activity, and personnel associated with the eight MV-22 squadrons, as discussed under the Full Basing Alternative, the installation has planned for and assessed all essential services to ensure that the existing community facilities and services are adequate and would accommodate the proposed increase in personnel and their dependents (LCDR Garvin, personal communication 2009). Therefore, no significant impacts to community facilities and services would occur with implementation of the Maximum Partial Basing Alternative.

Mitigation Measures

Implementation of the Maximum Partial Basing Alternative at MCAS Miramar would not result in significant impacts to community facilities and services; therefore, no mitigation measures would be required.

Minimum Partial Basing (2-Squadron) Alternative

Under the Minimum Partial Basing Alternative, the amount of aircraft and personnel at MCAS Miramar would be reduced due to the loss of four CH-46E squadrons (see Table 2.3-2). There would be a net reduction of 596 personnel under this alternative (see Table 3.4-5). Although there would be an overall reduction in military aircraft operations, ground-based activity, and personnel associated with the four CH-46E squadrons, the overall community facilities and services would not significantly change. Therefore, no significant impacts to community facilities and services would occur with implementation of the Minimum Partial Basing Alternative.

Mitigation Measures

Implementation of the Minimum Partial Basing Alternative at MCAS Miramar would not result in significant impacts to community facilities and services; therefore, no mitigation measures would be required.

Non-MCAS Miramar Basing Alternatives

Under a non-MCAS Miramar basing alternative, the amount of aircraft and personnel at MCAS Miramar would be reduced due to the loss of four CH-46E squadrons, and no new construction or demolition would occur. There would be a net reduction of 1,042 personnel under this alternative (see Table 3.4-5). Although there would be an overall reduction in military aircraft operations, ground-based activity, and personnel associated with the four CH-46E squadrons, the overall community facilities and services would not significantly change. Therefore, no significant impacts to community facilities and services would occur with implementation of a non-MCAS Miramar basing alternative.

Mitigation Measures

Implementation of a non-MCAS Miramar basing alternative at MCAS Miramar would not result in significant impacts to community facilities and services; therefore, no mitigation measures would be required.

No Action Alternative

Under the No Action Alternative, there would be no West Coast-based MV-22 personnel changes, new construction, demolition, or training activities. Therefore, existing conditions would remain unchanged, and no impacts to community facilities and services would occur.

3.6 GROUND TRAFFIC AND TRANSPORTATION

Ground traffic and transportation refer to the movement of vehicles throughout a road and highway network. Roadways are classified into one of three types according to the function they serve in moving traffic: arterial highways, collector roadways, and local streets. Arterial highways and interstates serve the movement of traffic regionally and between population and activity centers with a minimal level of access to adjacent properties. Collector roadways serve the movement of traffic from population and activity centers and funnel them onto arterial highways with a moderate level of access to adjacent properties. Local roadways provide access to adjacent properties and move traffic onto collector and arterial roadways.

Roadways are evaluated by comparing the average daily traffic (ADT) that is carried on the roadway segment to the design capacity of the roadway. Each roadway segment is then given a corresponding Level of Service (LOS) designation. LOS designation is a professional industry standard by which the operating conditions of a given roadway segment or intersections are measured. LOS is defined on a scale of A to F; where LOS A represents the best operating conditions and LOS F represents the worst operating conditions. LOS A facilities are characterized as having free flowing traffic conditions with no restrictions on maneuvering or operating speeds; traffic volumes are low and travel speeds are high. LOS F facilities are characterized as having forced flow with many stoppages and low operating speeds.

3.6.1 Affected Environment

Regional and Local Circulation

MCAS Miramar is located 13 miles north of downtown San Diego and four miles east of the Pacific Ocean. The base is split into three areas known as Main Station, South/West Miramar and East Miramar (see Figure 3.3-2). The Main Station, which includes the flightline and the proposed

project area, and South/West Miramar are bordered by Miramar Road to the north, Kearny Villa Road to the east, Interstate-805 to the west, and State Route 52 (SR-52) to the south. East Miramar is bordered by Kearny Villa Road to the west, SR-52 to the south, Pomerado Road and Beller Canyon Road to the north, and Sycamore Canyon Road to the east.

The regional routes that provide access to MCAS Miramar are Interstate-15 and Interstate-805 from areas north and south of the base and SR-52 from areas east and west of the base. The following provides more detail regarding the principal roadways that may be utilized to gain access to MCAS Miramar (see Figures 3.3-1 an 3.3-2):

- Interstate-5 is an eight-lane freeway running in a north/south direction approximately two miles west of the base. Freeway on ramps and off ramps in the vicinity of the base are located at Interstate-805, Sorrento Valley Road, Genesee Avenue, La Jolla Village Drive (becomes Miramar Road at Interstate-805), Nobel Drive, Gilman Drive, and SR-52. Interstate-5 currently carries an ADT volume of 142,000 to 179,000 vehicles in the area (Caltrans 2006).
- Interstate-805 is an eight-lane freeway running in a north/south direction along the western boundary of the base. Freeway on ramps and off ramps in the vicinity of the base are located at Interstate-5, Sorrento Valley Road/Mira Mesa Boulevard, Miramar Road, Nobel Drive, Nobel Drive, Governor Drive, SR-52, and Clairemont Mesa Boulevard. Interstate-805 currently carries an ADT volume of 176,000 to 204,000 vehicles in the area (Caltrans 2006).
- Interstate-15 is an eight-lane freeway running in a north/south direction through the base. Freeway on ramps and off ramps are located at Mira Mesa Boulevard, Carroll Canyon Road, Miramar/Pomerado Road, Miramar Way, SR-163, and SR-52. Interstate-15 currently carries an ADT volume of 166,000 to 300,000 vehicles in the vicinity of the base (Caltrans 2006).
- SR-52 is a six-lane freeway running in an east/west direction along the southern boundary of the base. Freeway on ramps and off ramps are located at Interstate-5, Regents Road, Genesee Avenue, Interstate-805, Convoy Street, SR-163, and Interstate-15. SR-52 currently carries an ADT volume of 73,000 to 111,000 vehicles in the vicinity of the base (Caltrans 2006).
- SR-163 is an eight-lane freeway running in a north/south direction through the base. Freeway on ramps and off ramps are located at Interstate-15, Kearny Villa Road, and SR-52. SR-163 currently carries an ADT volume of 136,000 to 141,000 vehicles in the vicinity of the base (Caltrans 2006).
- Miramar Road runs primarily in an east/west direction along the north boundary of the base, and provides access to the North and West Gates of the base. It becomes Pomerado Road east of Interstate-15. Miramar Road from Interstate-805 and Eastgate Mall is a six-lane prime arterial with a capacity of 60,000 ADT at LOS E. Miramar Road between Miramar Place and Camino Santa Fe is a four-lane major arterial with a capacity of 50,000 ADT at LOS E. Miramar Road between Miramar Way and Kearny Mesa Road is a six-lane prime arterial with a capacity of 60,000 ADT at LOS E. Miramar Road currently carries an ADT volume of 42,230 to 70,000 vehicles between Interstate-805 and Interstate-15 (City of San Diego 2004).
- Kearny Villa Road is a four-lane major arterial running in a north/south direction through the base, and provides access to the East and South Gates of the base. Kearny Villa Road in the vicinity of the base currently carries an ADT volume of 23,560 to 25,420 vehicles from north of Miramar Road to SR-52 (City of San Diego 2004). The existing capacity of Kearny Villa Road is approximately 40,000 ADT at LOS E.

- Black Mountain Road is a four-lane major arterial running in a north/south direction from Miramar Road north of the base. In the vicinity of the base, the road currently carries an ADT volume of 18,370 to 26,280 vehicles between Miramar Road and Mira Mesa Boulevard (City of San Diego 204). The existing capacity of Black Mountain Road is approximately 40,000 ADT at LOS E.
- Camino Ruiz is a four-lane major arterial running in a north/south direction from Miramar Road north of the base. In the vicinity of the base, the road currently carries an ADT volume of 22,090 to 30,790 vehicles between Miramar Road and Mira Mesa Boulevard (City of San Diego 2004). The existing capacity of Camino Ruiz is approximately 40,000 ADT at LOS E.

Circulation at MCAS Miramar

Access to MCAS Miramar's main station is provided by four gates: East Gate (also known as Main Gate), North Gate (also known as Housing Gate), West Gate, and South Gate (see Figure 3.3-2). East Gate, which is the main entry point to the station, is located off of Interstate-15 on Miramar Way at the intersection with Kearny Villa Road. The North Gate is located off of Miramar Road. Either the East Gate or the North Gate would provide access to the project area. The West Gate is a minor gate open during the morning and afternoon rush hour and is located on Miramar Road. This gate is closest to Interstate-805. The South Gate is located southeast of the runway and is primarily used for access to and from East Miramar in support of ordnance operations.

Table 3.6-1 provides existing roadway segment daily LOS of the MCAS Miramar area. The road system within MCAS Miramar is a grid-like system. The main roadway to the north of the base is Miramar Road and Miramar Way, and both trend east/west and can be accessed by both the West and North Gates. To the east of the base is Kearny Villa Road, which runs north/south, and can be accessed from the East (Main) Gate and the South Gate. Mitscher Way, which intersects with Miramar Way, traverses north/south towards the middle of the base. The intersection of Miramar Way and Mitscher Way, located at approximately the center of the Main Base, supports the highest traffic volumes. These two streets, along with Kearny Villa Road, are the primary routes from both the North Gate and East Gate to the flightline facilities and the project area. As shown in Table 3.6-1, all of the existing roadway segments operate at LOS D or better under existing conditions with the exception of the following roadway segments:

- Interstate-15 between Mira Mesa Boulevard and Miramar Road (operates at LOS F(0) under existing conditions);
- Interstate-15 between Miramar Road and Miramar Way (operates at LOS F(1) under existing conditions);
- Interstate-805 between Mira Mesa Boulevard and Miramar Road (operates at LOS E under existing conditions);
- Miramar Road between Interstate-805 and Nobel Drive (operates at LOS F under existing conditions);
- Miramar Road between Nobel Drive and the Eastgate Mall (operates at LOS E under existing conditions);
- Miramar Road between the Eastgate Mall and Camino Santa Fe (operates at LOS F under existing conditions);

- Miramar Road between Camino Ruiz and Clayton Drive (operates at LOS F under existing conditions);
- Pomerado Road east of the Interstate-15 (operates at LOS F under existing conditions); and
- Miramar Way between Kearny Villa Road and Interstate-15 (operates at LOS F under existing conditions).

Table 3.6-1. Existing Roadway Segment Daily Level of Service for MCAS Miramar Area

Roadway Segment	Classification	Capacity[2]	ADT	LOS
INTERSTATE-15				
Mira Mesa Blvd. to Miramar Rd.	10-Lane Freeway	(1)	**278,000**	**F(0)**
Miramar Rd. to Miramar Wy.	10-Lane Freeway	(1)	**291,000**	**F(1)**
South of Miramar Wy.	10-Lane Freeway	(1)	**295,000**	**F(1)**
INTERSTATE-805				
Mira Mesa Blvd to Miramar Rd.	8-Lane Freeway	(1)	**182,000**	**E**
South of Miramar Rd.	8-Lane Freeway	(1)	**184,000**	**E**
MIRAMAR ROAD				
Interstate-805 to Nobel Dr.	Prime Arterial	60,000	**60,580**	**F**
Nobel Dr. to Eastgate Mall	Prime Arterial	60,000	**58,550**	**E**
Miramar Pl. to Camino Santa Fe	Major Arterial	50,000	**69,300**	**F**
Miramar Wy to Carroll Rd	Prime Arterial	60,000	42,230	C
Carroll Rd to Camino Ruiz	Prime Arterial	60,000	48,500	C
Camino Ruiz to Clayton Dr	Prime Arterial	60,000	**70,000**	**F**
Clayton Dr to Kearny Villa Rd	Prime Arterial	60,000	50,060	D
Kearny Villa Rd to Kearny Mesa Rd	Prime Arterial	60,000	50,060	D
POMERADO ROAD				
East of Interstate-15 NB Ramp	Collector	15,000	**32,510**	**F**
KEARNY VILLA ROAD				
Miramar Rd. to Miramar Wy.	4-Ln Major Arterial	40,000	23,560	C
Miramar Wy. to SR-163	4-Ln Major Arterial	40,000	25,420	C
MIRAMAR WAY				
Near West Gate	2-Ln Collector	10,000	6,995	B
Between Mitscher Wy. & Schilt Av.	4-Ln Collector	30,000	9,616	A
Between Mitscher Wy. & Gonsalves Av.	4-Ln Collector	30,000	12,114	B
Near East (Main) Gate	4-Ln Major Arterial	40,000	24,599	C
Kearny Villa Rd to Interstate-15	Collector	15,000	**15,600**	**F**
ELROD AVENUE				
Near the Gymnasium	2-Ln Collector	10,000	3,667	A
Near McDonalds	2-Ln Collector	10,000	5,336	B
BAUER ROAD				
Between Mitscher Wy. & Anderson Av.	2-Ln Collector	10,000	5,048	B
Between Mitscher Wy. & Foster Ln.	2-Ln Collector	10,000	4,518	B
MITSCHER WAY				
Near North Gate	4-Ln Collector	30,000	16,107	C
Between Bauer Rd. & Miramar Wy.	4-Ln Collector	30,000	13,284	B
Between Miramar Wy. & Silva Rd.	4-Ln Collector	30,000	10,852	B
Just south of Edson Rd.	4-Ln Collector	30,000	9,010	A
GONSALVES AVENUE				
Between Shields Dr. & Miramar Wy.	2-Ln Collector w/ TWLTL	15,000	10,756	D
H AVENUE				
Just inside Elliot Gate	2-Ln Collector	10,000	706	A
RIFLE RANGE ROAD				
North of Magazine Rd.	2-Ln Collector	10,000	160	A

Notes:
1. The levels of service for Interstate-15 were determined based on the Caltrans District 11 procedures (Caltrans 2002).
2. Capacity is based on the upper limit of LOS E per the City of San Diego (City of San Diego 1998).

ADT = Average Daily Traffic, LOS = Level of Service, TWLTL=Two-way Left-turn Lane
Source: DoN 2002a

Per USMC parking policy, the privately owned vehicles of Marines deployed for longer than 30 days are to be stored in a secured area located on the air station. In the past, deployed troops parked their vehicles in on-station residential parking areas, displacing parking spaces needed by other military personnel (MCAS Miramar 1998). Development of a long-term parking area on East Miramar was analyzed in a 1998 EA (East Miramar Storage) and sought to remedy the shortfall of these fenced parking areas on the air station (MCAS Miramar 1998). Since then, three parking lots have been designated for deployed troops and another two are kept in reserve (Dagostino, personal communication 2008).

Daily Hours of Operation at MCAS Miramar

Regular hours of operation at MCAS Miramar are 0700 to 2400 Pacific Standard Time (PST) Monday through Thursday, 0700 to 1800 PST on Friday and 0800 to 1800 on weekends and holidays.

3.6.2 Environmental Consequences

Full Basing (10-Squadron) Alternative

Construction

Construction hours at MCAS Miramar would occur between 0700 to 1700 Monday through Friday PST and 0800 to 1300 PST on Saturday. During the construction phase at MCAS Miramar for the Full Basing Alternative, it is estimated that 12,207 truck trips would be required to haul demolished material off-site and provide the needed construction materials. Estimating that each truck would make one inbound and one outbound trip, and that the construction traffic would be evenly distributed over a one year period (51 work weeks)[1], there would be approximately 88 daily two-way truck trips added to the adjacent roadway network. Estimating that each truck is equivalent to two passenger cars, a net of 176 daily two-way passenger car equivalent (PCE) trips would be added to the existing roadway network during construction. It should be noted that the construction traffic would likely enter/exit through the East (Main) Gate. As shown in Table 3.6-2, if all 176 daily PCE trips are added to Miramar Way at the East (Main) Gate, Miramar Way would continue to operate at an acceptable LOS C; however, construction-related traffic would be a significant portion of the total traffic volumes for the segment of Miramar Way between Kearny Villa Road and Interstate-15.

Operations

The MCAS Miramar Full Basing Alternative would add a net of 1,142 military personnel and 80 civilian employees. Estimating that each employee makes two trips per day and that all employees would be on the base at the same time, the implementation of the Full Basing Alternative would add an additional 2,444 trips onto the existing roadway conditions after the construction phase is completed.

[1] To be conservative, total construction-related truck traffic was estimated to occur within a one-year time frame instead of a two or more year time frame for all alternatives. This means that the daily truck trips are likely an overestimate of what would actually occur.

Table 3.6-2 MCAS Miramar Full Basing Alternative
Construction Traffic Roadway Segment Daily Level of Service

Roadway Segment	Capacity	Existing			Existing + Project			Impact?		
		ADT	V/C	LOS	ADT	V/C	LOS	Δ ADT(3)	Δ V/C(4)	Sig.? (5)
INTERSTATE-15										
Mira Mesa Blvd. to Miramar Rd.	(1)	**278,000**	**1.209**	**F(0)**	**278,070**	**1.209**	**F(0)**	**70**	**0.000**	**No**
Miramar Rd. to Miramar Wy.	(1)	**291,000**	**1.269**	**F(1)**	**291,070**	**1.269**	**F(1)**	**70**	**0.000**	**No**
South of Miramar Wy.	(1)	**295,000**	**1.283**	**F(1)**	**295,106**	**1.283**	**F(1)**	**106**	**0.000**	**No**
MIRAMAR WAY										
Main Gate to Kearny Villa Rd.	40,000	24,599	0.615	C	24,775	0.619	C	176	0.004	No
Kearny Villa Rd. to Interstate-15 SB Ramp	15,000	**15,600**	**1.040**	**F**	**16,928**	**1.129**	**F**	**176**	**0.089**	**Yes**

Notes:
1. The levels of service for Interstate-15 were determined based on the Caltrans District 11 procedures (Caltrans 2002).
2. Capacity is based on the upper limit of LOS E per the City of San Diego (City of San Diego 1998).
3. The incremental change in conditions associated with the proposed action (i.e., the difference between existing with project and existing without project conditions).
4. Using the City of San Diego guidelines as a reference point for significance, LOS E has a threshold of 0.02 and LOS F has a threshold of 0.01 (City of San Diego 2007b).
5. Significant impacts assess whether the project traffic, itself, is a considerable portion of the total direct impacts.

ADT = Average Daily Traffic; LOS = Level of Service; v/c = volume-to-capacity; Δ = Change In; Sig.? = Significant

Table 3.6-3 shows the operations-related traffic associated with this alternative. As shown in Table 3.6-3, the operations-related traffic associated with this alternative would be a significant portion of the total traffic volumes for the segment of Miramar Way between Kearny Villa Road and Interstate-15.

Table 3.6-3 MCAS Miramar Full Basing Alternative
Operations-Related Traffic Roadway Segment Daily Level of Service

Roadway Segment	Capacity	Existing			Existing + Project			Impact?		
		ADT	V/C	LOS	ADT	V/C	LOS	Δ ADT(3)	Δ V/C(4)	Sig.? (5)
INTERSTATE-15										
Mira Mesa Blvd to Miramar Rd.	(1)	**278,000**	**1.209**	**F(0)**	**278,885**	**1.213**	**F(0)**	**885**	**0.004**	**No**
Miramar Rd to Miramar Wy.	(1)	**291,000**	**1.269**	**F(1)**	**291,885**	**1.272**	**F(1)**	**885**	**0.003**	**No**
South of Miramar Wy.	(1)	**295,000**	**1.283**	**F(1)**	**296,328**	**1.288**	**F(1)**	**328**	**0.005**	**No**
INTERSTATE-805										
Mira Mesa Blvd. to Miramar Rd.	(1)	**182,000**	**0.956**	**E**	**182,195**	**0.957**	**E**	**195**	**0.001**	**No**
South of Miramar Rd.	(1)	**184,000**	**0.967**	**E**	**184,196**	**0.968**	**E**	**196**	**0.001**	**No**
MIRAMAR ROAD										
Interstate-805 to Nobel Dr.	60,000	**60,580**	**1.010**	**F**	**60,971**	**1.016**	**F**	**391**	**0.006**	**No**
Nobel Dr. to Eastgate Mall	60,000	**58,550**	**0.976**	**E**	**58,941**	**0.982**	**E**	**391**	**0.006**	**No**
Miramar Pl. to Camino Santa Fe	50,000	**69,300**	**386**	**F**	**69,691**	**1.394**	**F**	**391**	**0.008**	**No**
Miramar Wy. to Carroll Rd.	60,000	42,230	0.704	C	42,230	0.704	C	0	0.000	No
Carroll Rd. to Camino Ruiz	60,000	48,500	0.808	C	48,500	0.808	C	0	0.000	No
Camino Ruiz to Clayton Dr.	60,000	**70,000**	**1.167**	**F**	**70,000**	**1.167**	**F**	**0**	**0.000**	**No**
Clayton Dr to Kearny Villa Rd.	60,000	50,060	0.834	D	50,945	0.849	D	885	0.015	No
Kearny Villa Rd. to Kearny Mesa Rd.	60,000	50,060	0.834	D	50,945	0.849	D	885	0.015	No
KEARNY VILLA ROAD										
Miramar Rd. to Miramar Wy.	40,000	23,560	0.589	C	23,560	0.589	C	0	0.000	No
Miramar Wy. to SR-163	40,000	25,420	0.636	C	25,420	0.636	C	0	0.000	No
MIRAMAR WAY										
Main Gate to Kearny Villa Rd.	40,000	24,599	0.615	C	25,927	0.648	C	1,328	0.033	No
Kearny Villa Rd. to Interstate-15 SB Ramp	15,000	**15,600**	**1.040**	**F**	**16,928**	**1.129**	**F**	**1,328**	**0.089**	**Yes**

Notes:
1. The levels of service for Interstate-15 were determined based on the Caltrans District 11 procedures (Caltrans 2002).
2. Capacity is based on the upper limit of LOS E per the City of San Diego (City of San Diego 1998).
3. The incremental change in conditions associated with the proposed project (i.e. the difference between existing w/ project and existing without project conditions).
4 Using the City of San Diego guidelines as a reference point for significance, LOS E has a threshold of 0.02 and LOS F has a threshold of 0.01 (City of San Diego 2007b).
5. Significant impacts assess whether the project traffic, itself, is a considerable portion of the total direct impacts.

ADT = Average Daily Traffic; LOS = Level of Service; v/c = volume-to-capacity; Δ = Change In; Sig.? = Significant

Mitigation Measures

These significant traffic impacts cannot be mitigated because the additional traffic volume does not meet eligibility criteria for the Defense Access Roads Program (23 U.S. Code § 210), and the DoN has no other legal authority for funding roadway improvements outside the installation. Therefore, implementation of the Full Basing Alternative at MCAS Miramar would result in a significant unmitigable impact.

Maximum Partial Basing (8-Squadron) Alternative

Construction

During the construction phase at MCAS Miramar for the Maximum Partial Basing Alternative, it is estimated that 7,169 truck trips would be required to haul demolished material off-site and provide the needed construction materials. Estimating that each truck would make one inbound and one outbound trip, and that the construction traffic would be evenly distributed over a one year period (51 work weeks), there would be approximately 52 daily two-way truck trips added to the adjacent roadway network. Estimating that each truck is equivalent to two passenger cars, a net of 104 daily two-way PCE trips would be added to the existing roadway network during construction. As shown in Table 3.6-4, if the 104 daily PCE trips are added to Miramar Way at the East (Main) Gate, Miramar Way would continue to operate at an acceptable LOS C; however, the construction-related traffic would be a significant portion of the total traffic volumes for the segment of Miramar Way between Kearny Villa Road and Interstate-15.

Table 3.6-4 Maximum Partial Basing Alternative
Construction Traffic Roadway Segment Daily Level of Service

Roadway Segment	Capacity	Existing			Existing + Project			Impact?		
		ADT	V/C	LOS	ADT	V/C	LOS	Δ ADT(3)	Δ V/C(4)	Sig.? (5)
INTERSTATE-15										
Mira Mesa Blvd to Miramar Rd.	(1)	**278,000**	**1.209**	**F(0)**	**278,042**	**1.209**	**F(0)**	**42**	**0.000**	**No**
Miramar Rd to Miramar Wy.	(1)	**291,000**	**1.269**	**F(1)**	**291,042**	**1.269**	**F(1)**	**42**	**0.000**	**No**
South of Miramar Wy.	(1)	**295,000**	**1.283**	**F(1)**	**295,062**	**1.283**	**F(1)**	**62**	**0.000**	**No**
MIRAMAR WAY										
Main Gate to Kearny Villa Rd.	40,000	24,599	0.615	C	25,466	0.637	C	867	0.022	No
Kearny Villa Rd. to Interstate-15 SB Ramp	15,000	**15,600**	**1.040**	**F**	**16,467**	**1.098**	**F**	**867**	**0.058**	**Yes**

Notes:
1. The levels of service for Interstate-15 were determined based on the Caltrans District 11 procedures (Caltrans 2002).
2. Capacity is based on the upper limit of LOS E per the City of San Diego (City of San Diego 1998).
3. The incremental change in conditions associated with the proposed project (i.e. the difference between existing w/ project and existing without project conditions).
4. Using the City of San Diego guidelines as a reference point for significance, LOS E has a threshold of 0.02 and LOS F has a threshold of 0.01 (City of San Diego 2007b).
5. Significant impacts assess whether the project traffic, itself, is a considerable portion of the total direct impacts.

ADT = Average Daily Traffic; LOS = Level of Service; v/c = volume-to-capacity; Δ = Change In; Sig.? = Significant

Operations

The MCAS Miramar Maximum Partial Basing Alternative would add a net of 746 military personnel and 52 civilian employees. Estimating that each employee makes two trips per day and that all employees would be on the base at the same time, the implementation of the Maximum Partial Basing Alternative would add an additional 1,596 trips onto the existing roadway conditions after the construction phase is completed.

Table 3.6-5 shows the operations-related traffic associated with this alternative. As shown in Table 3.6-5 the operations-related traffic is considered to be a significant portion of the total traffic volumes for the segment of Miramar Way between Kearny Villa Road and Interstate-15.

Table 3.6-5 Maximum Partial Basing Alternative Operations-Related Traffic Roadway Segment Daily Level of Service

Roadway Segment	Capacity	Existing			Existing + Project			Impact?		
		ADT	V/C	LOS	ADT	V/C	LOS	Δ ADT(3)	Δ V/C(4)	Sig.? (5)
INTERSTATE-15										
Mira Mesa Blvd to Miramar Rd.	(1)	**278,000**	**1.209**	**F(0)**	**278,578**	**1.211**	**F(0)**	**578**	**0.002**	**No**
Miramar Rd. to Miramar Wy.	(1)	**291,000**	**1.269**	**F(1)**	**291,578**	**1.271**	**F(1)**	**578**	**0.002**	**No**
South of Miramar Wy.	(1)	**295,000**	**1.283**	**F(1)**	**295,867**	**1.286**	**F(1)**	**867**	**0.003**	**No**
INTERSTATE-805										
Mira Mesa Blvd to Miramar Rd.	(1)	**182,000**	**0.956**	**E**	**182,127**	**0.957**	**E**	**127**	**0.001**	**No**
South of Miramar Rd.	(1)	**184,000**	**0.967**	**E**	**184,128**	**0.968**	**E**	**128**	**0.001**	**No**
MIRAMAR ROAD										
Interstate-805 to Nobel Dr.	60,000	**60,580**	**1.010**	**F**	**60,835**	**1.014**	**F**	**255**	**0.004**	**No**
Nobel Dr. to Eastgate Mall	60,000	**58,550**	**0.976**	**E**	**58,805**	**0.980**	**E**	**255**	**0.004**	**No**
Miramar Pl. to Camino Santa Fe	50,000	**69,300**	**1.386**	**F**	**69,555**	**1.391**	**F**	**255**	**0.005**	**No**
Miramar Wy. to Carroll Rd.	60,000	42,230	0.704	C	42,230	0.704	C	0	0.000	No
Carroll Rd. to Camino Ruiz	60,000	48,500	0.808	C	48,500	0.808	C	0	0.000	No
Camino Ruiz to Clayton Dr.	60,000	**70,000**	**1.167**	**F**	**70,000**	**1.167**	**F**	**0**	**0.000**	**No**
Clayton Dr. to Kearny Villa Rd.	60,000	50,060	0.834	D	50,638	0.844	D	578	0.010	No
Kearny Villa Rd. to Kearny Mesa Rd.	60,000	50,060	0.834	D	50,638	0.844	D	578	0.010	No
KEARNY VILLA ROAD										
Miramar Rd. to Miramar Wy.	40,000	23,560	0.589	C	23,560	0.589	C	0	0.000	No
Miramar Wy. to SR-163	40,000	25,420	0.636	C	25,420	0.636	C	0	0.000	No
MIRAMAR WAY										
Main Gate to Kearny Villa Rd.	40,000	24,599	0.615	C	25,466	0.637	C	867	0.022	No
Kearny Villa Rd. to Interstate-15 SB Ramp	15,000	**15,600**	**1.040**	**F**	**16,467**	**1.098**	**F**	**867**	**0.058**	**Yes**

Notes:
1. The levels of service for Interstate-15 were determined based on the Caltrans District 11 procedures (Caltrans 2002).
2. Capacity is based on the upper limit of LOS E per the City of San Diego (City of San Diego 1998).
3. The incremental change in conditions associated with the proposed project (i.e. the difference between existing w/ project and existing without project conditions).
4. Using the City of San Diego guidelines as a reference point for significance, LOS E has a threshold of 0.02 and LOS F has a threshold of 0.01 (City of San Diego 2007b).
5. Significant impacts assess whether the project traffic, itself, is a considerable portion of the total direct impacts.

ADT = Average Daily Traffic; LOS = Level of Service; v/c = volume-to-capacity; Δ = Change In; Sig.? = Significant

Mitigation Measures

These significant traffic impacts cannot be mitigated because the additional traffic volume does not meet eligibility criteria for the Defense Access Roads Program (23 U.S. Code § 210), and the DoN

has no other legal authority for funding roadway improvements outside the installation. Therefore, implementation of the Maximum Partial Basing Alternative at MCAS Miramar would result in a significant unmitigable impact.

Minimum Partial Basing (2-Squadron) Alternative

Construction

No construction or demolition is associated with the implementation of the Minimum Partial Basing Alternative at MCAS Miramar. Therefore, no construction-related impacts would occur.

Operations

The MCAS Miramar Minimum Partial Basing Alternative would result in a reduction of 557 military personnel and a reduction of 39 civilian employees. Estimating that each employee makes two trips per day and that all employees would be on the base at the same time, the implementation of the Minimum Partial Basing Alternative would reduce the existing roadway conditions by 1,192 trips per day after the construction phase is completed. Thus there would be a decrease in traffic associated with this alternative, resulting in a beneficial impact. As such, no significant adverse impacts would occur on the traveled roadway system on or off-base.

Mitigation Measures

Because there would be no significant impact on ground traffic and transportation, no mitigation measures are proposed.

Non-MCAS Miramar Basing Alternatives

Construction

Under a non-MCAS Miramar basing alternative, the MV-22 would be based at MCAS Camp Pendleton and MCAS Yuma, not at MCAS Miramar. No construction would occur at MCAS Miramar under this alternative; therefore, no construction-related impacts would occur on the traveled roadway system on or within the vicinity of MCAS Miramar.

Operations

If no MV-22 squadrons are based at MCAS Miramar, there would be a reduction of 974 military personnel and a reduction of 68 civilian employees due to the removal of the existing squadrons of CH-46E at MCAS Miramar. Estimating that each employee makes two trips per day and that all employees would be on the base at the same time, this would reduce the existing roadway conditions by 2,084 trips per day. Thus, there would be a decrease in traffic at MCAS Miramar resulting in a beneficial impact. As such, no significant adverse impacts would occur on the traveled roadway system on or within the vicinity of MCAS Miramar.

Mitigation Measures

Because there would be no significant impact on ground traffic and transportation, no mitigation measures are proposed.

No Action Alternative

No construction would occur under this alternative, and ground traffic and transportation would operate as described above under the existing conditions. Therefore, there would not be an

increase or decrease in traffic associated with the project, and no impacts would occur on the traveled roadway system.

3.7 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 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 maximum acceptable pollutant concentrations that are not to be equaled or exceeded. The national and state ambient air quality standards are shown in Table 3.7-1. In California, the ARB is responsible for enforcing both the federal and state air pollution standards.

Table 3.7-1. National and California Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	National Standards [a]	
			Primary [b,c]	Secondary [b,d]
Ozone (O3)	8-hour	0.07 ppm (140 μg/m^3)	0.075 ppm (147 μg/m^3)	Same as primary
	1-hour	0.09 ppm (180 μg/m^3)	–	–
Carbon monoxide (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)	–
Nitrogen dioxide (NO2)	Annual	0.03 ppm (56 μg/m^3)	0.053 ppm (100 μg/m^3)	Same as primary
	1-hour	0.18 ppm (338 μg/m^3)	–	–
Sulfur dioxide (SO2)	Annual	–	0.03 ppm (80 μg/m^3)	–
	24-hour	0.04 ppm (105 μg/m^3)	0.14 ppm (365 μg/m^3)	–
	3-hour	–	–	0.5 ppm (1,300 μg/m^3)
	1-hour	0.25 ppm (655 μg/m^3)	–	–
PM10	Annual	20 μg/m^3	–	–
	24-hour	50 μg/m^3	150 μg/m^3	Same as primary
PM2.5	Annual	12 μg/m^3	15 μg/m^3	
	24-hour	–	35 μg/m^3	
Lead	Rolling 3-month period	–	0.15 μg/m^3	Same as primary
	30-day average	1.5 μg/m^3	–	–

Notes:

a Standards other than the 1-hour ozone, 24-hour PM10, 24-hour PM2.5, and those based on annual averages are not to be exceeded more than once a year. The 8-hour ozone national standard has replaced the 1-hour ozone national standard.

b Concentrations are expressed first in units in which they were promulgated. Equivalent units given in parenthesis.

c Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. Each state must attain the primary standards no later than 3 years after that states implementation plan is approved by the USEPA.

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

Toxic compounds are toxic air pollutants (TACs) that have been determined to present some level of acute or chronic health risk (cancer or non-cancer) to the general public. Units of concentration for both of these types of pollutants are generally expressed in parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). 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) have no established ambient standards, they are important as precursors to O_3 formation.

3.7.1 Affected Environment

Region of Influence

Air emissions produced from construction and operation of the proposed action would mainly affect air quality within San Diego County, which is the region of the San Diego Air Basin (SDAB). The general project region for the proposed action includes MCAS Miramar, proposed training areas, and aircraft flight routes between these locations. 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 and particulates in the form of dust), 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 VOCs. In the presence of solar radiation, the maximum effect of precursor emissions on ozone levels usually occurs several hours after they are emitted and many miles from their source.

The analysis of aircraft emissions associated with the proposed action is limited to operations that occur within the lowest 3,000 feet (914 meters) of the atmosphere, as this is the typical depth of the atmospheric mixing layer where emissions released into this layer could affect ground-level pollutant concentrations. Emissions released above the mixing layer generally would not appreciably affect ground-level air quality.

Existing Air Quality

In regard to the NAAQS, the USEPA designates all areas of the U.S. in terms of having air quality better (attainment) or worse than (nonattainment) the NAAQS. An area generally is in nonattainment for a pollutant if its NAAQS has been exceeded more than once per year. Former nonattainment areas that have attained the NAAQS are designated as maintenance areas. Presently, the SDAB is in attainment of the NAAQS for all pollutants except O_3.

Additionally, the western portion of the SDAB (the portion of the County generally west of the interior desert region) was historically in nonattainment of the NAAQS for CO. Due to a reduction in emissions caused by national emission standards for new vehicles and a state vehicle emissions testing program, the region has attained the CO standards since 1991. As a result, the region was re-designated to attainment of the CO NAAQS by the USEPA in June 1998, and it is now considered a maintenance area for CO.

The ARB also designates areas of the state that are in attainment or nonattainment of the CAAQS. An area is in nonattainment for a pollutant if its CAAQS has been exceeded more than once in 3 years. Presently, the SDAB is in attainment of the CAAQS for all air pollutants except O_3, PM_{10}, and $PM_{2.5}$. The county is considered a severe ozone nonattainment area by the ARB.

Ozone concentrations are the highest during the warmer months of the year and coincide with the period of maximum insolation. Maximum O_3 concentrations tend to be homogeneously spread throughout a region, since it often takes several hours to convert precursor emissions to O_3 in the atmosphere. Inert pollutants, such as CO, tend to have the highest concentrations during the colder months of the year, when light winds and nighttime/early morning surface-based temperature inversions inhibit atmospheric dispersion. Maximum inert pollutant concentrations are usually found near an emission source.

MCAS Miramar Emissions

Table 3.7-2 presents an estimation of annual operational stationary and mobile source emissions associated with the current basing of 48 CH-46E aircraft at MCAS Miramar (URS 2003b). These data represent emissions that the proposed alternatives would replace at MCAS Miramar, and they include aircraft operations below 3,000 feet (914 meters) above ground level in proximity to MCAS Miramar and include departure and arrival, Touch-and-Go, Ground-Controlled Approach box pattern, and engine maintenance and testing activities.

Table 3.7-2. Annual Emissions from Current CH-46E Operations at MCAS Miramar

Activity Type	Air Pollutant Emissions (tons/year)					
	VOC	CO	NOx	SOx	PM10	PM2.5
CH-46E Aircraft	41.00	161.00	19.00	2.66	24.13	24.13
Personal-Owned Vehicles	8.42	64.17	6.10	0.04	0.22	0.22
Government-Owned Vehicles	0.85	5.73	2.07	0.01	0.07	0.07
Ground/Tactical Support Equipment	8.20	80.78	7.02	0.04	0.77	0.76
Construction	0.12	1.22	0.49	0.00	0.05	0.05
Other Sources	0.61	2.93	0.61	0.04	0.34	0.10
Stationary Sources (1)	3.00	2.50	9.20	0.42	10.49	6.71
Total Existing Emissions	**62.20**	**318.33**	**44.50**	**3.21**	**36.08**	**32.04**

Notes:

The above data for sources other than stationary were obtained from an analysis of conformity-related emissions (VOC, CO, and NOx) and do not include emissions from sources that require SDCAPCD air permits (such as certain stationary sources) (URS 2004). Data for POVs, GOVs, construction, and other sources calculated by multiplying the total emissions for each of these source category for the build-out scenario at MCAS Miramar in Tables 4-6 through 4-12 by 0.122, which is the personnel population associated with the CH-46Es at MCAS Miramar (1,269) / total personnel population at MCAS Miramar assumed in the conformity analysis (10,377). Emissions from G/TSE were estimated by multiplying G/TSE emissions due to current CH-46 operations at MCAS Camp Pendleton (Table 4.7-2) by the ratio of existing CH-46 aircraft numbers at MCAS Miramar / MCAS Pendleton (48/41).

1. Data estimated by multiplying the stationary source emissions category in Table 4.2-3, *FEIS for Realignment of MCAS Miramar* (DoN 1996) by the MCAS Miramar population associated with the current CH-46E basing (1,269)/total MCAS Miramar population responsible for the emissions in Table 4.2-3 (12,600).

Greenhouse Gas Emissions

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. These emissions occur from natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the earth's temperature. 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 negative environmental, economic and social consequences across the globe.

Recent observed changes due to global warming include shrinking glaciers, thawing permafrost, a lengthened growing season, and shifts in plant and animal ranges (Intergovernmental Panel on Climate Change 2007). 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, damage to marine and terrestrial ecosystems, and an increase in the incidence of infectious diseases, asthma, and other human health problems (California Environmental Protection Agency 2006).

The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Examples of GHGs created and emitted primarily through human activities include fluorinated gases (hydro fluorocarbons and per fluorocarbons) and sulfur hexafluoride. Each GHG is assigned a global warming potential (GWP). The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. The GWP rating system is standardized to CO_2, which has a value of one. For example, CH_4 has a GWP of 21, which means that it has a global warming effect 21 times greater than CO_2 on an equal-mass basis. To simplify 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 emission of each GHG by its GWP and adding the results together to produce a single, combined emission rate representing all GHGs.

Federal agencies are, on a national scale, addressing emissions of GHGs by reductions mandated in federal laws and Executive Orders, most recently, Executive Order 13423. Several states have promulgated laws as a means to reduce statewide levels of GHG emissions. In particular, the California Global Warming Solutions Act of 2006 directs the State of California to reduce statewide GHG emissions to 1990 levels by the year 2020. In addition, groups of states (such as the Western Climate Initiative) have formed regionally-based collectives 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 Executive Order 13123 and the Energy Policy Act of 2005, the DoN and USMC have implemented a number of renewable energy projects (Naval Facilities Engineering Command [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 continues to promote and install new renewable energy projects within the NAVFAC Southwest region.

The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Therefore, the impact of proposed GHG emissions to climate change is discussed in the context of cumulative impacts in Chapter 8 of this EIS. Appendix B presents estimates of GHG emissions generated by each alternative.

Regional Climate

The climate of San Diego County is classified as Mediterranean, characterized by dry summers and wet winters. The major influences on the regional climate are the Eastern Pacific high pressure system, topography, and the moderating effects of the Pacific Ocean. Seasonal variations in the position and strength of the high pressure system are a key factor in area weather changes.

Precipitation

Precipitation within the project area occurs as rainfall. However, snowfalls do occur in the higher elevations of the Laguna Mountains to the east of the project region and on rare occasions in the highest peaks of the Santa Margarita Mountains within nearby MCB Camp Pendleton. Over 90 percent of the total annual precipitation in the project area occurs from November through April. Annual precipitation increases from about 10 inches (25 centimeters [cm]) per year along the coast to as much as 40 inches (101 cm) in the Laguna Mountains. The annual average precipitation for MCAS Miramar is 10.6 inches (27.0 cm) (National Oceanographic and Atmospheric Administration [NOAA] 2001). Although most of the precipitation in the project region is produced by winter storm systems from the north Pacific, summer rainfall can occur on occasion. This precipitation occurs from the transport of tropical moisture from Mexico into the region. However, thunderstorms and showers from these tropical air masses are infrequent within the project region and mainly affect the mountain and desert regions to the east.

Temperature

Due to the moderating effect of the Pacific Ocean and lower elevation, temperatures are less extreme along the coastal sections of the project region compared to more inland locations. Maximum temperatures during the summer months average in the 70s (degrees Fahrenheit [°F]) along the coast to the low 90s in the interior foothills. Minimum summer temperatures average in the 60s over most of the project region. Maximum temperatures during winter months average in the 60s throughout most of the project region. Minimum winter temperatures are usually in the upper 40s along the coast to the mid 30s in the inland foothills.

Prevailing Winds

Concurrent with the presence of the Eastern Pacific high west of California, a thermal low pressure system persists in the interior desert region due to intense solar heating. The resulting pressure gradient between these two systems produces an onshore air flow in San Diego County for most of the year. Sea breezes usually occur during the daytime and disperse air pollutants toward the interior regions. During the evening hours and colder months of the year, land breezes often replace sea breezes and blow in the opposite direction toward the offshore areas. These weak offshore flows may continue until daytime heating reverses the flow back onshore.

During the colder months, the Eastern Pacific high often combines with high pressure over the continent to produce extended periods of light winds and low-level inversion conditions in the region. These atmospheric conditions limit dispersion and can produce adverse air quality. Excessive build-up of high pressure over the continent can produce a "Santa Ana" condition, characterized by warm, dry, northeast winds. Santa Ana winds help to ventilate the air basin of locally generated emissions. However, Santa Ana conditions can also transport air pollutants from the Los Angeles metropolitan area into the project region. When stagnant atmospheric conditions

occur during a weak Santa Ana, local emissions, combined with pollutants transported from the Los Angeles area, can lead to significant O_3 impacts in the project region.

Applicable Regulations and Standards

The Federal Clean Air Act and its subsequent amendments (the CAA) 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. In the SDAB, the San Diego County Air Pollution Control District (SDCAPCD) has this responsibility. 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 project actions.

Federal Regulations

Section 176(c) of the CAA, as articulated in the USEPA General Conformity Rule, states that a federal agency cannot issue a permit for 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 must not (1) cause or contribute to any new violation of a NAAQS, (2) increase the frequency or severity of any existing violation, or (3) delay the timely attainment of any standard, interim emission reduction, or other milestone. SDCAPCD Rule 1501 implements the USEPA's General Conformity Rule. Within the SDAB, if net annual emissions of VOCs, CO, or NO_x increase by less than 100 tons each, a CAA conformity determination is not required. If emissions of one or more of these compounds exceed a *de minimis* threshold, the DoN must demonstrate conformity under one of the methods prescribed by SDCAPCD Rule 1501.

The *Ozone Redesignation Request and Maintenance Plan for San Diego County* (*1-Hour Ozone Maintenance Plan)* is the most recent federally-approved O_3 SIP for the SDAB (SDCAPCD 2002). This plan includes an annual NO_x emissions growth budget for military programs within the SDAB that allows for an emissions growth of 4,161 tons between 2005 and 2014, including over 3,285 tons for MCAS Miramar and MCB Camp Pendleton (USMC 2004b). The air quality analysis in this EIS estimates that the maximum net change in annual VOC/NO_x emissions for any proposed action alternative within the SDAB is -89/+225 tons in year 2017. These emissions would fit within the military programs emissions budget allowed in the SIP. Therefore, pursuant to SDCAPCD Rule 1501, Section 1551.858(a)(1), any proposed action alternative within the SDAB would conform to the most recent federally-approved SIP. The project conformity determination for the MV-22 proposed action within the SDAB is summarized in section 7.3.6 and is presented in complete form in Appendix B.1 of this EIS.

State Regulations

TACs include air pollutants that can cause serious illnesses or increased mortality, even in low concentrations. Toxic air contaminants are compounds that generally have no established ambient standards, but are known or suspected to cause short-term (acute) and/or long-term (chronic non-carcinogenic or carcinogenic) adverse health effects. The ARB designates diesel particulate matter (DPM) from the combustion of diesel fuel as a TAC, and they have identified DPM as a substance that can cause cancer and chronic non-cancer health risks. Since the proposed action includes a

variety of diesel-powered emission sources, this EIS includes an analysis of the impact of proposed DPM emissions to public health.

Local Regulations

MCAS Miramar is located within San Diego County, which is within the SDAB. The SDCAPCD is responsible for regulating stationary sources of air emissions in the SDAB. The 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 2008).

As part of the O_3 attainment planning process in the SDAB, the SDCAPCD developed the *1-Hour Ozone Maintenance Plan*. In 2003, the USEPA approved this plan and re-designated the SDAB from nonattainment to attainment of the one-hour national O_3 standard (USEPA 2003). In May 2007, the SDCAPCD submitted the *Eight-Hour Ozone Attainment Plan for San Diego County* (8-*Hour Ozone Attainment Plan)* to the USEPA (SDCAPCD 2007). Emissions associated with the MV-22 and F-35 proposed actions were provided by the USMC to the SDCAPCD for inclusion in this plan. The *8-Hour Ozone Attainment Plan* demonstrates that the County will attain this standard by the required date of June 2009. However, a recent court ruling will require areas designated as in "basic" nonattainment of the O_3 standard, such as the SDAB, to comply with requirements for "moderate" nonattainment areas. The USEPA will finalize these requirements in 2009 and the SDCAPCD will have a year from then to submit a new 8-*Hour Ozone Attainment Plan*. Final USEPA approval of a new 8-Hour O_3 SIP for the SDAB is not expected until 2011 or 2012.

3.7.2 Environmental Consequences

Air quality impacts were reviewed for significance in light of federal, state, and local air pollution standards and regulations. For the purposes of the present analysis, if project emissions were projected to exceed a threshold requiring a conformity determination in the SDAB (i.e., 100 tons per year of VOC, NOx, or CO), further analysis was conducted 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 criteria pollutants for which the SDAB is in attainment of NAAQS, the analysis looked at whether the magnitude and location of project emissions reasonably would be expected to cause a significant adverse impact to air quality.

Full Basing (10-Squadron) Alternative

Construction

Air quality impacts from construction of the Full Basing Alternative would occur from (1) combustive emissions due to the use of fossil fuel-powered equipment and (2) fugitive dust emissions (PM_{10}) during demolition activities, earth-moving activities, and the operation of equipment on bare soil. Equipment usage estimated for proposed construction activities were used to estimate project combustive and fugitive dust emissions (DoN 2007).

Factors needed to derive construction source emission rates were obtained from *Compilation of Air Pollution Emission Factors, AP-42, Volume I* (USEPA 1995), *EMFAC2007 Model* for on-road vehicles (ARB 2006a), and *OFFROAD2007 Model* for off-road construction equipment (ARB 2006b). The analysis estimates that construction equipment equates to a SCAB average fleet of year 2010. The analysis also reduced PM_{10} emissions from earth-moving activities by 75 percent from uncontrolled levels to simulate implementation of best management practices (BMPs) for fugitive dust control. Appendix B includes data and assumptions used to calculate proposed construction emissions.

Table 3.7-3 summarizes the annual and total construction emissions associated with the Full Basing Alternative. The analysis estimates that construction activities would be evenly split between years 2010 and 2011. The data in Table 3.7-3 show that annual VOC, CO, and NO_x emissions for proposed construction activities would not exceed the conformity *de minimis* thresholds. The SDAB is in attainment for SO_2, PM_{10}, and $PM_{2.5}$, and the nominal construction emissions of these criteria pollutants are only a small fraction of their conformity *de minimis* levels in a nonattainment area (100 tons per year). Air quality impacts associated with these emissions would not be significant. The main sources of $PM_{10}/PM_{2.5}$ emissions would occur as fugitive dust from earth-moving and demolition activities.

Table 3.7-3. Annual and Total Emissions Due to Construction of the Full Basing Alternative at MCAS Miramar

Construction Activity	Air Pollutant Emissions (tons)					
	VOC	CO	NOx	SOx	PM10	PM2.5
2010						
Demolition – Building Facilities	0.04	0.22	0.56	0.00	0.23	0.07
Demolition – Airfield Facilities	0.20	1.20	2.94	0.00	1.22	0.35
Construction – Building Facilities	0.46	1.60	2.71	0.00	0.72	0.31
Construction – Airfield Facilities	1.01	3.90	6.80	0.01	2.49	0.90
Annual Emissions (1)	**1.71**	**6.91**	**13.02**	**0.01**	**4.66**	**1.63**
Conformity *De Minimis* Level	**100**	**100**	**100**	**NA**	**NA**	**NA**
Total Emissions	**3.42**	**13.82**	**26.03**	**0.03**	**9.32**	**3.26**

Note:
1. Year 2010 emissions equal to 50% of total emissions.

Project construction equipment would emit TACs that could potentially impact public health. The main source of TACs would occur in the form of particulates from the combustion of diesel fuel. Due to the mobile and intermittent operation of proposed diesel-powered construction equipment over a large construction area, they would produce minimal ambient impacts of TACs in a localized area. As a result, construction of the Full Basing Alternative would produce less than significant impacts to public health.

Operations

Air quality impacts associated with the Full Basing Alternative were determined by comparing the net change in emissions between current operations of 48 CH-46 aircraft and future proposed operations of 120 MV-22 aircraft within the SDAB. Existing and proposed sources affected by the replacement action would include (1) operations and engine maintenance/testing of CH-46 and MV-22 aircraft, (2) personal- and government-owned vehicles (POVs and GOVs), (3) ground/tactical support equipment (G/TSE), (4) construction activities performed by each detachment as part of routine operations, and (5) stationary and other sources.

Operational data used to calculate proposed MV-22 emissions were obtained from the USMC (USMC 2007 and Wyle Laboratories 1999). Factors used to calculate combustive emissions for the MV-22 aircraft were obtained from the DoN (Aircraft Environmental Support Office [AESO] 2001a and 2001b). Emissions from source categories other than G/TSE were estimated by multiplying emissions from current CH-46 operations at MCAS Miramar (Table 3.7-2) by the ratio of the proposed MV-22 and current CH-46 basing populations (2,411/1,269). Emissions from G/TSE were estimated by multiplying G/TSE emissions due to current CH-46 operations at MCAS Camp Pendleton (Table 4.7-2) by the ratio of proposed MV-22 and current CH-46 aircraft numbers (120/41). It is expected that this technique overestimates proposed ground/tactical support equipment emissions, as it does not consider the replacement of newer and cleaner emitting equipment into the proposed fleet. However, emissions of POVs/GOVs were factored by the ratio of 2012/2000 San Diego County average emission factors obtained from the *EMFAC2007 Model* Burden output to take this effect into consideration. Details of emission source data and calculations used to estimate operational emissions are included in Appendix B of this EIS.

Table 3.7-4 presents a summary of the annual operational emissions that would occur from the Full Basing Alternative at MCAS Miramar. These data show that replacement of the current CH-46 operations at MCAS Miramar with the Full Basing Alternative would reduce annual VOC and CO emissions but would increase NO_x emissions to above the conformity *de minimis* threshold. Given that the San Diego County project region does not attain the NAAQS for O_3, this EIS further analyzes whether this increase in NO_x emissions would produce significant impacts to ambient O_3 levels in the SDAB.

Table 3.7-4. Annual Emissions Due to Operation of the Full Basing Alternative at MCAS Miramar

Activity	Air Pollutant Emissions (tons) [1,2]					
	VOC	*CO*	*NOx*	*SOx*	*PM10*	*PM2.5*
MV-22 Operations	0.89	58.71	134.62	6.65	22.91	22.91
MV-22 Engine Maintenance/Testing	0.23	15.10	26.81	1.33	4.45	4.45
Personal-Owned Vehicles	5.59	40.59	5.19	0.03	0.37	0.36
Government-Owned Vehicles	0.57	3.63	1.76	0.01	0.12	0.12
Ground/Tactical Support Equipment	20.49	201.95	17.56	0.09	1.93	1.89
Construction	0.23	2.32	0.93	0.00	0.10	0.10
Other Sources	1.16	5.56	1.16	0.08	0.65	0.18
Stationary Sources	5.70	4.75	17.48	0.80	19.93	12.75
Annual Emissions	**34.85**	**332.61**	**205.51**	**8.99**	**50.46**	**42.77**
Net Change from Existing Conditions	**-27.35**	**14.28**	**161.01**	**5.78**	**14.38**	**10.73**
Conformity *De Minimis* Level	**100**	**100**	**100**	**NA**	**NA**	**NA**

Notes:
1. Represents the net change in emissions between current operations of 48 CH-46 aircraft and proposed operations of 120 MV-22 aircraft.
2. Year 2017 emissions.
3. – indicates a reduction in emissions.

The December 2002 Ozone Re-designation Request and Maintenance Plan for San Diego County specifically identifies and accounts for a Military Growth Increment in anticipation of potential actions at Navy and Marine Corps facilities in San Diego County over the next decade that could require conformity determinations. The Military Growth Increment totals 4,151 tons per year. Emissions associated with the Full Basing Alternative at MCAS Miramar would produce a maximum net change in annual VOC/NO_x emissions of -27/+161 tons in year 2017. Therefore NO_x emissions associated with the Full Basing Alternative would conform to the SIP and would produce less than significant impacts to ambient O_3 levels.

The SDAB is in attainment for SO_2, PM_{10}, and $PM_{2.5}$, and the nominal increase in proposed operational emissions of these criteria pollutants are only a small fraction of their conformity *de minimis* levels in a nonattainment area (100 tons per year). Air quality impacts associated with these emissions would not be significant.

Operation of the Full Basing Alternative would emit TACs that could potentially impact public health. The main sources of TACs from the alternative would include aircraft and G/TSE. TACs generally are subsets of VOC and PM_{10} emissions. The alternative would reduce combined VOC and PM_{10} emissions by 13.0 tons compared to current CH-46 operations. Additionally, the main sources of proposed TACs are mostly mobile and intermittent in nature and, therefore, they would produce minimal impacts of TACs in a localized area. As a result, operation of the Full Basing Alternative would produce less than significant impacts to public health.

Mitigation Measures

The project air quality analysis determined that operation of the Full Basing Alternative within the SDAB would produce less than significant impacts to air quality. However, to minimize fugitive dust and equipment combustive emissions during proposed construction activities, the project construction contractor shall implement the following measures as part of a Construction Emissions Mitigation Plan.

Measure 1. Fugitive dust control measures. The construction contractor shall implement the following measures during all proposed ground disturbance activities.

1. Use water trucks or sprinkler systems to keep all areas of vehicle movement damp enough to prevent dust from leaving the construction area.
2. Minimize the amount of disturbed ground area at a given time.
3. Minimize traffic speeds on all unpaved roads.
4. Install gravel pads at construction area access points to prevent tracking of soil onto paved roads.
5. Provide temporary wind fencing around sites being graded or cleared.
6. Suspend all soil disturbance activities when winds exceed 25 mph or when visible dust plumes emanate from the site. Stabilize all disturbed areas at this time.
7. Cover truck loads that haul dirt, sand, or gravel or maintain at least two feet of freeboard in accordance with Section 23114 of the California Vehicle Code.
8. After completion of clearing, grading, earthmoving, or excavation, treat the disturbed areas by watering, re-vegetation, or by spreading non-toxic soil binders until they are paved or otherwise developed to prevent dust generation.
9. Designate personnel to monitor the dust control program and to order increased watering, as necessary, to prevent the transport of dust off-site. Their duties shall include holiday and weekend periods when work may not be in progress.

Measure 2. Construction equipment emission control measures. The construction contractor shall implement the following measures during all proposed construction activities, where feasible.

1. Maintain equipment according to manufacturer specifications.
2. Restrict idling of equipment and trucks to a maximum of five minutes at any location.
3. Use diesel oxidation catalysts and/or catalyzed diesel particulate traps.
4. Use electricity from power poles rather than temporary diesel- or gasoline-powered generators.
5. Provide temporary traffic control, such as flag person, during all phases of construction to maintain smooth traffic flow.
6. Keep construction equipment and equipment staging areas away from sensitive receptor areas (such as day care centers).
7. Re-route construction trucks away from congested streets or sensitive receptor areas.
8. Use construction equipment with engines that meet EPA Tier 3 and 4 nonroad standards.
9. Use alternatively-fueled construction equipment, such as compressed natural gas (CNG), liquefied natural gas (LNG), or electric.

Maximum Partial Basing (8-Squadron) Alternative

Construction

Similar to the Full Basing Alternative, air quality impacts from construction of the Maximum Partial Basing Alternative would occur from (1) combustive emissions due to the use of fossil fuel-powered equipment and (2) fugitive dust emissions during demolition activities, earth-moving activities, and the operation of equipment on bare soil. The methods used to estimate emissions associated with construction of the Maximum Partial Basing Alternative were the same as those used for the Full Basing Alternative. Appendix B includes data and assumptions used to calculate proposed construction emissions.

Table 3.7-5 summarizes the annual and total construction emissions associated with the Maximum Partial Basing Alternative. These data show that annual VOC, CO, and NO_x emissions for construction of the alternative would not exceed the conformity *de minimis* thresholds. The SDAB is in attainment for SO_2, PM_{10}, and $PM_{2.5}$ and the nominal construction emissions of these criteria pollutants are only a small fraction of their conformity *de minimis* levels in a nonattainment area (100 tons per year). Air quality impacts associated with these emissions would not be significant. The main sources of PM_{10}/$PM_{2.5}$ emissions would occur as fugitive dust from earth-moving and demolition activities.

Project construction equipment would emit TACs that could potentially impact public health. The main source of TACs would occur in the form of particulates from the combustion of diesel fuel. Due to the mobile and intermittent operation of proposed diesel-powered construction equipment over a large construction area, they would produce minimal ambient impacts of TACs in a localized area. As a result, construction of the Maximum Partial Basing Alternative would produce less than significant impacts to public health.

Table 3.7-5. Annual and Total Emissions Due to Construction of the Maximum Partial Basing Alternative at MCAS Miramar

Construction Activity	Air Pollutant Emissions (tons)					
	VOC	CO	NOx	SOx	PM10	PM2.5
2010						
Demolition – Building Facilities	0.04	0.26	0.66	0.00	0.27	0.08
Demolition – Airfield Facilities	0.23	1.35	3.30	0.00	1.37	0.40
Construction – Building Facilities	0.38	1.33	2.25	0.00	0.60	0.26
Construction – Airfield Facilities	0.60	2.19	3.80	0.00	1.16	0.46
Annual Emissions [1]	**1.24**	**5.12**	**10.01**	**0.01**	**3.41**	**1.19**
Conformity *De Minimis* Level	**100**	**100**	**100**	**NA**	**NA**	**NA**
Total Emissions	**2.49**	**10.24**	**20.03**	**0.02**	**6.82**	**2.39**

Note: 1. Year 2010 emissions equal to 50% of total emissions.

Operations

Air quality impacts associated with the Maximum Partial Basing Alternative were determined by comparing the net change in emissions between current operations of 48 CH-46 aircraft and future proposed operations of 96 MV-22 aircraft within the SDAB. Similar to the Full Basing Alternative, existing and proposed sources affected by the replacement action would include (1) operations and engine maintenance/testing of CH-46 and MV-22 aircraft, (2) POVs and GOVs, (3) G/TSE, (4) routine construction activities, and (5) stationary and other sources.

The methods used to estimate emissions associated with the operation of the Maximum Partial Basing Alternative were the same as those used for the Full Basing Alternative. Appendix B includes data and assumptions used to calculate proposed operational emissions.

Table 3.7-6 presents a summary of the annual operational emissions that would occur from the Maximum Partial Basing Alternative at MCAS Miramar. These data show that replacement of the current CH-46 operations at MCAS Miramar with the Maximum Partial Basing Alternative would reduce annual VOC and CO emissions but would increase NO_x emissions to above the NO_x conformity *de minimis* threshold. Given that the San Diego County project region does not attain the NAAQS for O_3, this EIS further analyzes whether this increase in NO_x emissions would produce significant impacts to ambient O_3 levels in the SDAB.

Table 3.7-6. Annual Emissions Due to Operation of the Maximum Partial Basing Alternative at MCAS Miramar

Activity	Air Pollutant Emissions (tons) [1,2]					
	VOC	CO	NOx	SOx	PM10	PM2.5
MV-22 Operations	0.73	48.35	110.86	5.48	18.86	18.86
MV-22 Engine Maintenance/Testing	0.19	12.44	22.08	1.09	3.67	3.67
Personal-Owned Vehicles	4.60	33.43	4.27	0.02	0.30	0.30
Government-Owned Vehicles	0.47	2.99	1.45	0.01	0.10	0.10
Ground/Tactical Support Equipment	16.87	166.31	14.46	0.07	1.59	1.56
Construction	0.19	1.91	0.76	0.00	0.08	0.08
Other Sources	0.95	4.58	0.95	0.06	0.53	0.15
Stationary Sources	4.69	3.91	14.39	0.66	16.41	10.50
Annual Emissions	**28.70**	**273.91**	**169.24**	**7.40**	**41.55**	**35.22**
Net Change from Existing Conditions	**-33.50**	**-44.42**	**124.74**	**4.19**	**5.47**	**3.18**
Conformity *De Minimis* Level	**100**	**100**	**100**	**NA**	**NA**	**NA**

Notes:
1. Represents the net change in emissions between current operations of 48 CH-46 aircraft and proposed operations of 96 MV-22 aircraft.
2. Year 2015 emissions.
3. – indicates a reduction in emissions.

The December 2002 Ozone Re-designation Request and Maintenance Plan for San Diego County specifically identifies and accounts for a Military Growth Increment in anticipation of potential actions at Navy and Marine Corps facilities in San Diego County over the next decade that could require conformity determinations. The Military Growth Increment totals 4,151 tons per year. Emissions associated with the Maximum Partial Basing Alternative at MCAS Miramar would produce a maximum net change in annual VOC/NO_x emissions of -34/+125 tons in year 2017. Therefore NO_x emissions associated with the Maximum Partial Basing Alternative would conform to the SIP and would produce less than significant impacts to ambient O_3 levels.

The SDAB is in attainment for SO_2, PM_{10}, and $PM_{2.5}$, and the nominal increase in proposed operational emissions of these criteria pollutants are only a small fraction of their conformity *de minimis* levels in a nonattainment area (100 tons per year). Air quality impacts associated with these emissions would not be significant.

Operation of the Maximum Partial Basing Alternative would emit TACs that could potentially impact public health. The main sources of TACs from the alternative would include aircraft and G/TSE. TACs generally are subsets of VOC and PM_{10} emissions. The alternative would reduce combined VOC and PM_{10} emissions by 28.0 tons compared to current CH-46 operations. Additionally, the main sources of proposed TACs are mostly mobile and intermittent in nature and therefore they would produce minimal impacts of TACs in a localized area. As a result, operation of the Maximum Partial Basing Alternative would produce less than significant impacts to public health.

Conformity Analysis

The conformity determination for the proposed action is summarized in section 7.3.6 and presented in complete form in Appendix B.2 of this EIS.

Mitigation Measures

The project air quality analysis determined that operation of the Maximum Partial Basing Alternative within the SDAB would produce less than significant impacts to air quality. However, to minimize fugitive dust and equipment combustive emissions during proposed construction activities, the project construction contractor shall implement the Construction Emissions Mitigation Plan identified in the mitigation measures section for the Full Basing Alternative.

Minimum Partial Basing (2-Squadron) Alternative

Construction

No construction or demolition is associated with the implementation of the Minimum Partial Basing Alternative at MCAS Miramar. Therefore, the alternative would not produce any air quality impacts from construction activities.

Operations

Air quality impacts associated with the Minimum Partial Basing Alternative were determined by comparing the net change in emissions between current operations of 48 CH-46 aircraft and future proposed operations of 24 MV-22 aircraft within the SDAB. Similar to the Full Basing Alternative,

existing and proposed sources affected by the replacement action would include (1) operations and engine maintenance/testing of CH-46 and MV-22 aircraft, (2) POVs and GOVs, (3) G/TSE, (4) routine construction activities, and (5) stationary and other sources.

The methods used to estimate emissions associated with the operation of the Minimum Partial Basing Alternative were the same as those used for the Full Basing Alternative. Appendix B includes data and assumptions used to calculate proposed operational emissions.

Table 3.7-7 presents a summary of the annual operational emissions that would occur from the Minimum Partial Basing Alternative at MCAS Miramar. These data show that replacement of the current CH-46 operations at MCAS Miramar with the Minimum Partial Basing Alternative would substantially reduce annual emissions of all air pollutants. Therefore, operation of the Minimum Partial Basing Alternative would produce less than significant and beneficial air quality impacts.

Table 3.7-7. Annual Emissions Due to Operation of the Minimum Partial Basing Alternative at MCAS Miramar

Activity	Air Pollutant Emissions (tons) [1,2]					
	VOC	CO	NOx	SOx	PM10	PM2.5
MV-22 Operations	0.16	10.36	23.76	1.17	4.04	4.04
MV-22 Engine Maintenance/Testing	0.04	2.66	4.73	0.23	0.79	0.79
Personal-Owned Vehicles	1.65	11.99	1.53	0.01	0.11	0.11
Government-Owned Vehicles	0.17	1.07	0.52	0.00	0.04	0.04
Ground/Tactical Support Equipment	4.10	40.39	3.51	0.02	0.39	0.38
Construction	0.07	0.68	0.27	0.00	0.03	0.03
Other Sources	0.34	1.64	0.34	0.02	0.19	0.05
Stationary Sources	1.68	1.40	5.16	0.24	5.88	3.77
Annual Emissions	**8.21**	**70.20**	**39.83**	**1.70**	**11.47**	**9.20**
Net Change from Existing Conditions	**-53.99**	**-248.13**	**-4.67**	**-1.51**	**-24.61**	**-22.84**
Conformity *De Minimis* Level	**100**	**100**	**100**	**NA**	**NA**	**NA**

Note:
1. Represents the net change in emissions between current operations of 48 CH-46 aircraft and proposed operations of 24 MV-22 aircraft.
2. Year 2017 emissions.
3. – indicates a reduction in emissions

Operation of the Minimum Partial Basing Alternative would emit TACs that could potentially impact public health. The main sources of TACs from the alternative would include aircraft and G/TSE. TACs generally are subsets of VOC and PM10 emissions. The alternative would reduce combined VOC and PM10 emissions by 78.6 tons compared to current CH-46 operations. Additionally, the main sources of proposed TACs are mostly mobile and intermittent in nature and therefore they would produce minimal impacts of TACs in a localized area. As a result, operation of the Minimum Partial Basing Alternative would produce less than significant and beneficial impacts to public health.

Mitigation Measures

Since the Minimum Partial Basing Alternative would produce less than significant air quality impacts, no mitigation measures are required.

Non-MCAS Miramar Basing Alternatives

Construction

No new construction or demolition would occur at MCAS Miramar due to implementation of a non-MCAS Miramar basing alternative. Therefore, the alternative would not produce any air quality impacts from construction activities.

Operations

Implementation of a non-MCAS Miramar basing alternative would eliminate all CH-46 aircraft operations and associated emissions. The data in Table 3.7-2 show the annual operational emissions that the alternative would eliminate from MCAS Miramar. Therefore, operation of a non-MCAS Miramar basing alternative would produce less than significant and beneficial air quality and public health impacts.

Mitigation Measures

Since mplementation of a non-MCAS Miramar basing alternative would produce less than significant air quality impacts, no mitigation measures are required.

No Action Alternative

No new construction, demolition, or operational activities would occur at MCAS Miramar due to the No Action Alternative. Therefore, the No Action Alternative would not produce any new air quality impacts compared to existing conditions.

3.8 NOISE

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air or water, and are sensed by the human ear. Sound is all around us. Noise is defined as unwanted or annoying sound that interferes with or disrupts normal human activities. Although exposure to very high noise levels can cause hearing loss, the principal human response to noise is annoyance. 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.

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

3.8.1 Noise Metrics

Noise and sound are expressed in logarithmic units of decibels (dB). A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet

listening conditions. Normal speech has a sound level of approximately 60 dB; sound levels above 120 dB begin to be felt inside the human ear as discomfort. Sound levels between 130 to 140 dB are felt as pain (Berglund and Lindvall 1995). The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. On average, a person perceives a doubling (or halving) of the sound's loudness when there is a 10 dB change in sound level.

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

In accordance with DoD guidelines and standard practice for environmental impact analysis documents, the noise analysis herein utilizes the following (A-weighted) noise descriptors or metrics: Maximum Sound Level (ALM), Sound Exposure Level (SEL), Day-Night Average Sound Level (DNL) and Community Noise Equivalent Level (CNEL). ALM and SEL describe single noise events whereas DNL and CNEL are time-averaged metrics describing the cumulative noise environment of individual noise events over longer periods, usually up to 24 hours. DNL and CNEL account for single-event noise levels and also weight or penalize those levels depending on the time period in which they occur, weighting evening and nighttime sounds up to 10 dB. CNEL is specific to California and DNL is applicable to the remaining 49 states. The Onset-Rate Adjusted Monthly variant of DNL and CNEL, denoted L_{dnmr} and CNELmr, respectively, are specifically utilized for describing aircraft noise exposure from Special Use Airspace operations. Each descriptor, along with other noise metrics, is described in more detail in Appendix C.

3.8.2 Noise Modeling

In accordance with DoN AICUZ guidelines (DoN 2002b), the noise exposure area is divided into three noise zones. Noise Zone I (less than 65 dB DNL/CNEL) is essentially an area of low or no impact. Noise Zone II (65 dB DNL/CNEL to less than 75 dB DNL/CNEL) is an area of moderate impact where some land use controls are needed. Noise Zone III (greater than or equal to 75 dB DNL/CNEL) is the most severely impacted area and requires the greatest degree of compatible land use controls.

As noise from future aircraft operations cannot be physically measured in the present, this EIS computes and estimates the noise generated by aircraft operations and compares exposures from operational alternatives. Analysis of aircraft noise exposure and compatible land use around DoD airfields and airspace areas are typically accomplished using the following computer programs: NOISEMAP (Wyle 1998), the Rotorcraft Noise Model (RNM) (Wyle 2007a), and MOA-Range NOISEMAP (MR_NMAP) (Wyle 1997). These programs are described in detail in Appendix C, and it is important to note that their computations draw from a spectral database of actual aircraft noise measurements. These programs are most appropriate for comparing "before-and-after" noise impacts, which would result from proposed changes or alternative actions, when the calculations

are made in a consistent manner. The model allows noise predictions for such proposed actions without the actual implementation or noise monitoring for those actions.

For airfield environments, lines of equal noise level (i.e., contours of DNL or CNEL) associated with the aforementioned Noise Zones are typically plotted from the output of NOISEMAP and RNM. For airspace environments, L_{dnmr}/CNELmr contours are plotted and/or tabulated from the MR_NMAP program, depending on the magnitude of the exposure. This EIS shows contours and tabulated levels.

Noise levels from flight operations exceeding ambient 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 ambient. This EIS focuses only on aircraft noise levels (not the non-aircraft ambient) and their change due to operational alternatives.

The methodology for analyzing the potential for indoor speech interference and sleep disturbance is described in Appendix C.

3.8.3 Affected Environment

The existing aircraft noise environment at MCAS Miramar is primarily derived from its 2004 AICUZ Study Update (DoN 2005a), which in turn was based on results from a computer modeling study (Wyle 2004). As is described later in this section, the data from the 2004 study was slightly modified with resultant noise exposure re-computed for this EIS. The Prospective scenario from WR 03-05 (Wyle 2004) represents the existing (CY 2007) aircraft noise environment for MCAS Miramar. The Prospective scenario is associated with the 2004 Air Conformity Analysis (URS 2004) for a build-out scenario of the highest expected numbers of operations and a mission readiness of 85 percent.

The following factors were considered in the analysis of noise levels from existing aircraft operations at the air station: flight operations, runway utilization, flight tracks, flight track utilization, flight profiles, climatological data, pre-flight run-ups, maintenance run-up operations and low work operations. These factors are described in detail in Appendix C. Modeled flight operations are summarized below.

Seventeen noise-sensitive receptor locations chosen by the USMC for analysis in a previous Base Realignment and Closure (BRAC)-related noise study (Wyle 1995a) are considered relevant to this EIS for MCAS Miramar. These locations represent residential areas in the vicinity of the air station (see Figure 3.8-1 and Table 3.8-3).

Flight Operations

The baseline condition for MCAS Miramar considered approximately 112,000 flight operations (see Table 3.2-1). Approximately 107,000 annual flight operations were modeled for the affected environment (Table 3.8-1; see Appendix C for details). Only those operations which would contribute significantly to the overall aircraft noise environment and/or those which have unique noise signatures (e.g., helicopters) were modeled. Nearly two-thirds of the modeled flight operations are by F/A-18C/D Hornet (twin engine jet fighter) aircraft, the dominant aircraft noise

source for the air station. At approximately 17,000 annual flight operations, the CH-46E Sea Knight (twin engine, twin rotor helicopter) accounts for 16 percent of the total modeled flight operations. Of the total modeled flight operations, CNEL evening and nighttime flight operations account for 16 percent and 5 percent, respectively (see Appendix C).

All fixed wing flight operations were modeled to depart/arrive Runways 24L and 24R. Many flight tracks were modeled to support the flight operations with utilization identical to WR 03-05 (Wyle 2004). The following changes were made to the track modeling relative to the Prospective scenario of WR 03-05 (Wyle 2004): (a) correction to an overhead break flight track from a 'numbers' break to a midfield break, (b) deletion of obsolete or extraneous flight tracks, and (c) changes to initial headings of arrival flight tracks to comply with published procedures. Numbers of modeled departure flight operations were also increased to equal the number of modeled arrival flight operations for each modeled aircraft type.

Table 3.8-1. Modeled Annual Aircraft Flight Operations for Existing Conditions at MCAS Miramar

			Closed Patterns			
Aircraft Type	**Departure**	**Arrival**	**TGO**	**FCLP**	**GCA Box**	**Total**
Rotary Wing						
CH-46	4,008	4,010	8,941	-	361	17,320
CH-53	3,015	3,017	7,008	-	313	13,353
Fixed Wing						
F/A -18C/D	19,760	19,756	16,052	10,756	972	67,296
KC-130	721	722	7,343	-	263	9,049
Total Operations	**27,504**	**27,505**	**39,344**	**10,756**	**1,909**	**107,018**

Notes:
TGO = Touch-and-Go; FCLP = Field Carrier Landing Practice; GCA = Ground-Controlled Approach.
Arrivals do not equal departures due to rounding.
GCA Box, TGO, and FCLP are counted as 2 operations.
See Appendix C for details.

The following changes were made to the modeled flight profiles relative to WR 03-05 (Wyle 2004): (a) rotary wing closed-pattern altitudes were changed for conformance with current course rules and consideration of terrain, (b) KC-130 departures were corrected to include a 4,000 feet take-off roll, (c) for all fixed wing arrivals, the threshold crossing altitude was raised to 525 feet MSL for terrain considerations, and (d) the altitudes of all closed patterns on or near the runway were raised to 490 feet MSL for terrain considerations.

Modeled run-up profiles were identical to those modeled for WR 03-05 (Wyle 2004).

Relative to WR 03-05 (Wyle 2004), the fidelity of the modeling of the ground elevation was increased via the resolution of the elevation grid from a spacing of 1,000 feet to 200 feet. Similarly, the fidelity of the noise grid was increased from a spacing of 1,000 feet to 500 feet. The increased fidelity of the grids serves to increase the fidelity of the resultant noise exposure calculations and contours. For the MCAS Miramar noise modeling, sampling ground elevation at every 1,000 feet instead of a lesser spacing results in less accurate terrain features that are input to the noise model. The higher fidelity noise grid takes advantage of the higher fidelity elevation grid and better balances computational accuracy between operational input and resultant noise contours. It is also consistent with the methods used for modeling the proposed action discussed below.

Noise Exposure

Using the data described above and in Appendix C, the NOISEMAP and RNM computer models were used to calculate and plot the CNEL contours for annual average daily aircraft operations. Figure 3.8-1 shows the 60 to 85 dB CNEL contours, in 5 dB increments, for the existing condition and for the published AICUZ. The 60 dB CNEL contour for the existing condition is similar in shape to the 60 dB CNEL contour for the AICUZ. There are three major lobes following the main routes to and from the airfield. The eastern lobe lies under the final approach of arrival tracks to Runway 24R. It extends approximately six miles east of Interstate-15 and lies within the MCAS Miramar property boundary. The northern lobe follows the Julian departure corridor and extends 4 to 4.5 miles north of the base boundary. In the AICUZ, the northwestern lobe in the Seawolf/Beach/Fairway departure corridor extended west to the intersection of Interstate-5 and Interstate-805. In the current baseline, the lobe continues west to the ocean, most closely following the rotary wing aircraft's Fairway departure tracks.

The reasons for the difference between the shape and extent of the CNEL contours for the existing condition and the published AICUZ (WR 03-05; Wyle 2004) were provided in the previous subsection. The primary reason for the difference is the higher fidelity elevation and noise grid modeling. These noise propagation and technology improvements provide a more accurate depiction of the noise environment within surrounding communities. However, these changes are statistically insignificant for land use planning purposes.

Table 3.8-2 shows the noise exposure in terms of estimated acreage, housing units and population within each CNEL contour band. These estimates exclude MCAS Miramar itself and bodies of water. Based on census data analysis, Noise Zone II (65 – 75 dB) includes 1,834 housing units and 4,724 people. Noise Zone III (75 dB and greater) includes 50 housing units and 222 people. Based on a review of the airphotos by zooming into each affected area and counting actual houses and other domestic residences, it was estimated that Noise Zone II includes 371 housing units and Noise Zone III contains no housing units.

Table 3.8-2. Off-Station Aircraft Noise Exposure for Existing Conditions at MCAS Miramar

Contour Band (CNEL, dB)(1)	Acreage	Population (2)	Housing Units (2)
60-65	7,213	25,189	9,548
65-70	2,193	4,243 (3)	1,695 (3)
70-75	596	481 (3)	139 (3)
75-80	332	218 (3)	50 (3)
80-85	8	4	-
85+	-	-	-

Notes:
1. Exclusive of upper bound for all bands; excludes MCAS Miramar itself and bodies of water.
2. Estimated based on 2005 Census with population density methodology.
3. Based on verifying actual housing using airphoto analysis, 371 total housing units are located within the 65-70 dB CNEL contour with an estimated population of 950 persons. No housing units are located in the 70 dB CNEL or greater contours.

Table 3.8-3 presents the baseline CNEL for each of the 17 representative noise-sensitive receptors. All receptors experience less than 65 dB CNEL except for Receptor A2 in Mira Mesa in the Seawolf corridor. The estimated CNEL for Receptor A2 is 65.0 dB. Nearly half of the receptors are primarily affected by fixed wing aircraft alone and nearly half by the existing helicopters alone at MCAS Miramar. Both aircraft categories share dominance for two of the receptors -- A1 in the Seawolf corridor and C4 in the Interstate-15 corridor.

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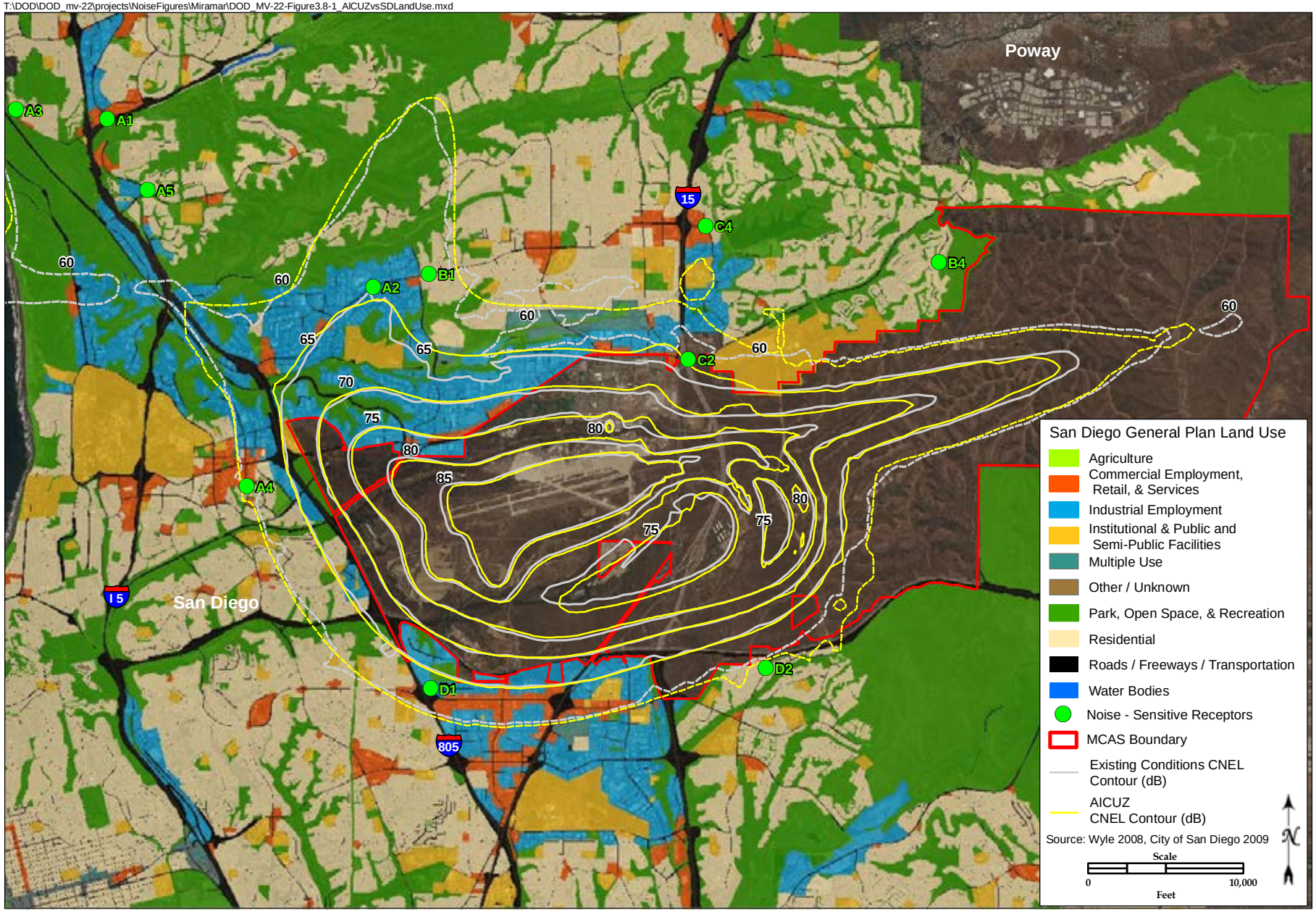

Aircraft Noise Contours from Operations at MCAS Miramar for Existing Conditions and AICUZ

FIGURE

3.8-1

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Table 3.8-3. Estimated Aircraft CNEL for Representative Noise-Sensitive Receptors for Existing Conditions Near MCAS Miramar

Receptor ID	Location of Residential Area	Estimated CNEL (dB)	Dominant Aircraft Category(1)
SEAWOLF CORRIDOR			
A1	Carmel Valley-Via Del Mar	50.0	None
A2	Mira Mesa-Steadman St.	65.0	Fixed wing
A3	Caminito Del Rocio	53.6	Fixed wing
A4	Int'n of La Jolla Village Dr./Golden Haven	60.4	Fixed wing
A5	Carmel Mountain Rd./El Camino Real	54.0	Rotary
GCA BOX PATTERN			
B1	Mira Mesa/Glendover Ln.	62.5	Fixed wing
B2A	Rancho Peñasquitos-Oviedo Way	49.7	Fixed wing
B2B	Rancho Peñasquitos-Peñasquitos Ct.	50.8	Rotary
B3A	Poway-Arbolitos	40.8	Rotary
B3B	Poway-Quiet Valley Ln.	41.5	Rotary
B4	Scripps Ranch-Semillon Blvd./Birch Bluff Ave.	50.0	Fixed wing
INTERSTATE-15 CORRIDOR			
C1	Paseo Bolero Dr.	49.2	Rotary
C2	Pomerado and Interstate-15	62.9	Fixed wing
C3	Bernardo Center and Bajada	49.9	Rotary
C4	Int'n Mira Mesa Blvd/Scripps Ranch Blvd.	54.0	None/All
FCLP			
D1	Copley Park and Hickam Field Dr.	62.7	Fixed
D2	Santo and Portobello Ct.	59.1	Fixed

Notes:
1. Dominant means the CNEL due to flight operation of the specified aircraft category was at least 3 dB greater than other categories.
2. See Figure 3.8-1 for location of noise-sensitive receptors in close vicinity to MCAS Miramar.

Noise due to construction and maintenance equipment, as well as general vehicle traffic is a common ongoing occurrence in the station environment. Trucks, as well as heavy equipment, are usually found in the station environment on a daily basis to support existing facility operations and infrastructure upgrades.

3.8.4 Environmental Consequences

Aircraft noise impacts would be considered potentially significant if the increase in CNEL to an affected population relative to the Baseline/No Action conditions is at least 1.5 dB within the alternative's 65 dB CNEL contour (FICON 1992).

Prior to discussing the potential impacts due to each alternative, the following information provides modeling parameters common to all alternatives involving the MV-22 aircraft at MCAS Miramar:

- Detailed flight operations by type of operation, CNEL period and general airfield routing were derived from data provided by the USMC (NAVFAC 2007), and is based on best estimates by MV-22 operators for this new aircraft.
- All FCLP flight operations would be conducted at Helicopter Outlying Landing Field (HOLF) at MCB Camp Pendleton. These are discussed further in section 6.1.8.
- USMC personnel provided runway and initial flight track utilization (NAVFAC 2007). No new tracks/routes would be necessary for the MV-22 basing. MV-22 aircraft would use runways, pads and tracks historically modeled for fixed and rotary wing aircraft at the air station. The MV-22 flight tracks were modeled to/from the West Ramp, Runways 24L and 24R, and the LHD south of Runway 24L. Further detail regarding runway/pad and flight track utilization percentages is contained in Appendix C.

- MV-22 flight profiles for each modeled track were created based on MV-22 flight profiles for MCOLF Oak Grove in North Carolina (Wyle 2007b) and flight simulator data provided by the USMC (Bianca 2007). Although the MV-22 cannot take-off or land like an airplane with its rotors in the horizontal position, it can take-off and land in various other partial-helicopter modes; however, for the purposes of the EIS modeling and based on the best available data, only a few of the modes were modeled. For example, although 25 percent of all MV-22 departures would be "vertical" and 75 percent would be "rolling", all departures were modeled as "rolling". Although 50 percent of the non-break arrivals would be "conversion" and 50 percent would be "running", all non-break and break arrivals were modeled as "conversion". Although 50 percent of the touch-and-go patterns would be "airplane transition to helo" and 50 percent would be "conversion", all touch-and-go patterns to the main runways were modeled as "airplane transition to helo". The touch-and-go pattern modeled at the West Ramp was modeled as a "conversion". Appendix C contains maps of representative modeled flight profiles for each type of flight operation.
- Low Work flight operations were modeled as run-ups consistent with the East Coast basing EIS noise study (Wyle 1999). It was estimated that the Low Work activity would be conducted at Pad 6 on the West Ramp.
- Most maintenance activity on MV-22 engines would occur off-site at the engine manufacturer (Moye and Aitchison 2007). However, for the purposes of the EIS, the MV-22 maintenance run-ups were estimated to be identical to those modeled for the East Coast basing EIS noise study (Wyle 1999) and were estimated to be located at on the parking apron/flightline in front of Hangar 4. MV-22 run-ups were modeled with in-frame CH-53E aircraft source data as the noise model's database does not yet contain source acoustic data for the MV-22. Appendix C provides further modeling details.

Full Basing (10-Squadron) Alternative

The Full Basing Alternative involves the addition of ten squadrons of MV-22 aircraft at MCAS Miramar and the removal of CH-46E aircraft currently based at the air station. However, it is estimated that one squadron would be deployed at all times. Therefore, the noise modeling is based on nine squadrons of MV-22 aircraft, and would consist of seven active duty squadrons and two reserve squadrons. Table 3.8-4 shows the numbers of proposed annual MV-22 flight operations for the Full Basing Alternative. Proposed MV-22 flight operations would total approximately 52,000 annually, with 29 percent during the CNEL evening period and 6 percent during the CNEL nighttime period. Approximately 83 percent of the MV-22 flight operations at the air station would consist of departures and arrivals to/from other places and 17 percent would consist of closed-pattern operations in the vicinity of the air station.

Additionally, approximately 17,000 modeled flight operations by CH-46E aircraft would be removed from the air station, along with run-ups associated with the CH-46E. The modeled flight and run-up operations for the F/A-18, KC-130 and CH-53E aircraft would remain unchanged relative to existing conditions.

Using the data described above and in Appendix C, the NOISEMAP and RNM computer models were used to calculate and plot the CNEL contours for annual average daily aircraft operations. Figure 3.8-2 shows the 60 to 85 dB CNEL contours, in 5 dB increments, for the Full Basing Alternative. The Full Basing Alternative contours are similar in shape and size to the existing conditions contours, with the primary differences in the lengths of the lobes. The eastern lobe

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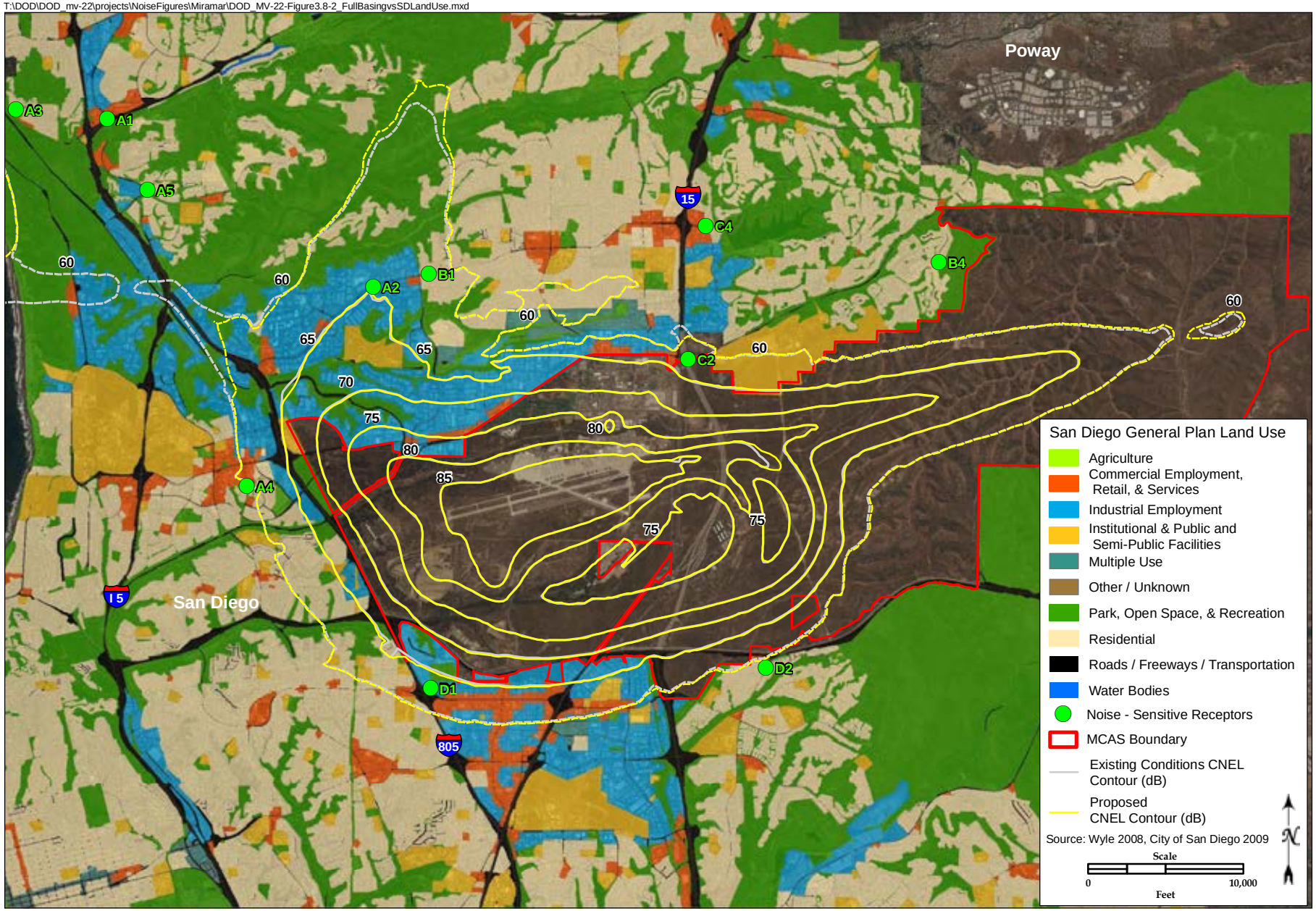

Aircraft Noise Contours from Operations at MCAS Miramar for Full Basing Alternative

FIGURE

3.8-2

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Table 3.8-4. Proposed Annual MV-22 Flight Operations for Each Alternative at MCAS Miramar

Operation Type	Full Basing Alternative				Maximum Partial Basing Alternative				Minimum Partial Basing Alternative			
	Day	Evening	Night	Total	Day	Evening	Night	Total	Day	Evening	Night	Total
Departure	12,729	7,062	1,560	21,351	9,734	5,400	1,193	16,327	2,246	1,246	275	3,767
Arrival (no break)	1,273	707	157	2,137	974	541	120	1,635	225	125	28	378
Overhead Break Arrival	11,457	6,357	1,405	19,219	8,761	4,861	1,074	14,696	2,022	1,122	248	3,392
Touch-and-Go	3,548	395	-	3,943	2,713	302	-	3,015	626	70	-	696
GCA Box	4,435	493	-	4,928	3,392	377	-	3,769	783	87	-	870
Low Work	148	17	-	165	113	13	-	126	26	3	-	29
Total	**33,590**	**15,031**	**3,122**	**51,743**	**25,687**	**11,494**	**2,387**	**39,568**	**5,928**	**2,653**	**551**	**9,132**

Notes:
Day = 0700-1859, Evening = 1900-2159, Night = 2200-0659
Touch-and-Go, Ground-Controlled Approach (GCA) Box and Low Work are counted as two operations each.
Low Work comprised of maintenance check flights, hover work and any other low work training operations conducted at less than 50 feet above ground level, lasting 7 minutes, on average.
100% of FCLP operations would be conducted at HOLF at MCB Camp Pendleton; departures and arrival operations account for off-site FCLP missions.
See Appendix C for details.

extends approximately seven miles past Interstate-15, but is still within the MCAS Miramar property boundary. The northern lobe extends 0.5 miles farther than the same lobe in the baseline condition, 4.5 miles north of the base boundary. The western lobe is approximately 0.3 miles narrower and the southern extent is approximately the same as that of the baseline condition.

Table 3.8-5 shows the noise exposure in terms of estimated acreage, housing units and population within each CNEL contour band. These estimates exclude MCAS Miramar itself and bodies of water. Based on census data analysis, Noise Zone II (65-75 dB CNEL) would include 1,874 housing units and 4,822 people. Noise Zone III (75 dB CNEL and greater) would include 50 housing units and 222 people. Relative to existing conditions, Noise Zone II would increase by 40 housing units and 98 people. Housing units and population would not increase in Noise Zone III relative to existing conditions.

Table 3.8-5. Off-Station Aircraft Noise Exposure for the Full Basing Alternative at MCAS Miramar

Contour Band (CNEL, dB)(1)	Full Basing Alternative			Change Compared to Baseline/ No Action Conditions		
	Acreage	Population (2)	Housing Units (2)	Acreage	Population(2)	Housing Units (2)
60-65	6,850	25,532	9,557	-363	+343	+9
65-70	2,242	4,349	1,738	+49	+106 (3)	+43 (3)
70-75	587	473	136	-9	-8 (3)	-3 (3)
75-80	333	218	50	+1	-	- (3)
80-85	9	4	-	+1	-	- (3)
85+	-	-	-	-	-	-

Notes:
1. Exclusive of upper bound for all bands; excludes MCAS Miramar itself and bodies of water.
2. Estimated based on 2005 Census with population density methodology.
3. Based on counting actual housing using airphoto analysis, 434 total housing units are located within the 65-70 dB CNEL contour with an estimated population of 1,105. This is an estimated increase of 63 housing units and 156 people compared to baseline. No housing units are located in the 70 dB CNEL or greater contours.

Based on a review of the airphotos by zooming into each affected area and counting actual houses and other domestic residences, it was estimated that Noise Zone II would increase by 63 housing units and 156 people. Housing units and population would not increase in Noise Zone III relative to existing conditions.

Table 3.8-6 presents the CNEL for each of the 17 representative noise-sensitive receptors. All receptors would experience less than 65 dB CNEL except for Receptor A2 in Mira Mesa in the Seawolf corridor, which is currently at an estimated 65.0 dB CNEL under existing conditions.

The estimated CNEL for Receptor A2 under the Full Basing Alternative is 65.1 dB. Additionally, two sites, B3A and B3B near the Ground-Controlled Approach Box pattern, would primarily be affected by the MV-22, and the MV-22 aircraft would share dominance with other aircraft categories for four other sites – B2B near the Ground-Controlled Approach Box pattern and C1 through C3 in the Interstate-15 corridor.

As discussed in Appendix C, the Full Basing Alternative would reduce the number of events causing speech interference at up to five noise sensitive receptors, although it would increase the number of speech-interfering events for receptor D1 near the FCLP pattern. Additionally, the Full Basing Alternative would not change the number of events causing sleep disruptions for any noise sensitive receptor except at two receptors; it would decrease the number of expected sleep

disruptions at receptor C4 in the Interstate-15 corridor and would increase the number of sleep disruptions at receptor D1 near the FCLP pattern. See Appendix C for full details.

Table 3.8-6. Estimated Change in Aircraft CNEL for Representative Noise-Sensitive Receptors for Each Alternative Near MCAS Miramar

Receptor ID	Baseline Estimate CNEL (dB)	Full Basing Alternative Change in CNEL(dB)	Maximum Partial Basing Alternative Change in CNEL (dB)	Minimum Partial Basing Alternative Change in CNEL (dB)	Non-MCAS Miramar Basing Alternatives Change in CNEL (dB)
SEAWOLF CORRIDOR					
A1	50.0	-0.3	-0.3	-0.4	-0.4
A2	65.0	0.1	0.1	0.1	-0.1
A3	53.6	-0.2	-0.2	-0.2	-0.3
A4	60.4	0.0	0.0	0.0	0.0
A5	54.0	-0.5	-0.6	-0.6	-0.7
GROUND-CONTROLLED APPROACH BOX PATTERN (DOWNWIND LEG)					
B1	62.5	0.1	0.1	0.1	-0.1
B2A	49.7	0.4	0.3	0.1	-0.1
B2B	50.8	-2.1	-2.2	-2.4	-2.4
B3A	40.8	0.5	0.3	-0.5	-0.8
B3B	41.5	-0.4	-0.7	-1.5	-1.9
B4	50.0	0.2	0.1	0.0	0.0
INTERSTATE-15 CORRIDOR					
C1	49.2	-1.1	-1.2	-1.4	-1.4
C2	62.9	-0.1	-0.2	-0.2	-0.3
C3	49.9	-1.4	-1.4	-1.6	-1.7
C4	54.0	-1.1	-1.1	-1.2	-1.3
FCLP (DOWNWIND LEG)					
D1	62.7	0.3	0.2	0.1	-0.1
D2	59.1	0.3	0.3	0.1	-0.1

The Full Basing Alternative would cause short-term noise increases due to construction. Construction would include the use of trucks, bulldozers, and other heavy construction equipment for the major construction projects (e.g., hangars, aircraft parking facilities, and apron). Construction associated with this alternative would be undertaken adjacent to the flightline and occupy industrial areas, and would be isolated from any off-base communities. In addition, construction would take place during daylight hours and would follow BMPs to minimize noise levels. Construction noise would be contained within the station environment because most of the heavy construction would occur near the flightline, where noise would be compatible with current and ongoing activities.

Although the MV-22 would be significantly quieter than existing aircraft operating at MCAS Miramar on a single-event basis, the population within the 65-75 dB CNEL contour would increase by approximately 98 to 156 people (depending on method of calculation). The increase in population would be due to a near net tripling of flight operations relative to existing modeled CH-46 flight operations, a 40 percent increase in overall flight operations relative to existing conditions, and a significant proportion of MV-22 flight operations during the evening period (28 percent). However, the F/A-18 aircraft would remain the noise-dominant aircraft for most of the MCAS Miramar vicinity. Overall, as the Full Basing Alternative would not cause an increase in CNEL to an affected population relative to the Baseline/No Action conditions of at least 1.5 dB within the alternative's 65 dB CNEL contour, the Full Basing Alternative would not cause a significant (aircraft) noise impact.

Therefore, there would be no significant noise impact from construction or operations at MCAS Miramar from the Full Basing Alternative.

Mitigation Measures

Because there would be no significant impacts, no mitigation measures would be required.

Maximum Partial Basing (8-Squadron) Alternative

The Maximum Partial Basing Alternative involves the addition of eight active duty squadrons of MV-22 aircraft at MCAS Miramar and the removal of CH-46E aircraft currently based at the air station. However, it is estimated that one squadron would be deployed at all times. Therefore, the noise modeling is based on seven active duty squadrons. Table 3.8-4 shows the numbers of proposed annual MV-22 flight operations for the Maximum Partial Basing Alternative. Proposed MV-22 flight operations would total approximately 40,000 annually, with 29 percent during the CNEL evening period and 6 percent during the CNEL nighttime period. Approximately 83 percent of the MV-22 flight operations at the air station would consist of departures and arrivals to/from other places and approximately 17 percent would consist of closed-pattern operations in the vicinity of the air station.

Additionally, approximately 17,000 modeled flight operations by CH-46E aircraft would be removed from the air station, along with run-ups associated with the CH-46E. The modeled flight and run-up operations for the F/A-18, KC-130 and CH-53E aircraft would remain unchanged relative to existing conditions.

Using the data described above and in Appendix C, the NOISEMAP and RNM computer models were used to calculate and plot the CNEL contours for annual average daily aircraft operations. Figure 3.8-3 shows the 60 to 85 dB CNEL contours, in 5 dB increments, for the Maximum Partial Basing Alternative. The Maximum Partial Basing Alternative contours are similar in shape and size to the existing conditions contours, with the primary differences in the lengths of the lobes. The eastern lobe extends approximately seven miles past Interstate-15, but is still within the MCAS Miramar property boundary. The northern lobe extends approximately 0.3 miles farther than the same lobe in the baseline condition, 4.5 to 5 miles north of the base boundary. The western lobe is approximately 0.3 miles narrower and the southern extent is approximately the same as that of the baseline condition.

Table 3.8-7 shows the noise exposure in terms of estimated acreage, housing units and population within each CNEL contour band. These estimates exclude MCAS Miramar itself and bodies of water. Based on census data analysis, Noise Zone II (65-75 dB CNEL) would include 1,857 housing units and 4,780 people. Noise Zone III (75 dB CNEL and greater) would include 50 housing units and 222 people. Relative to existing conditions, Noise Zone II would increase by 23 housing units and 56 people. Housing units and population would not increase in Noise Zone III relative to existing conditions.

Based on a review of the airphotos by zooming into each affected area and counting actual houses and other domestic residences, it was estimated that Noise Zone II would increase by 52 housing units and 129 people. Housing units and population would not increase in Noise Zone III relative to existing conditions.

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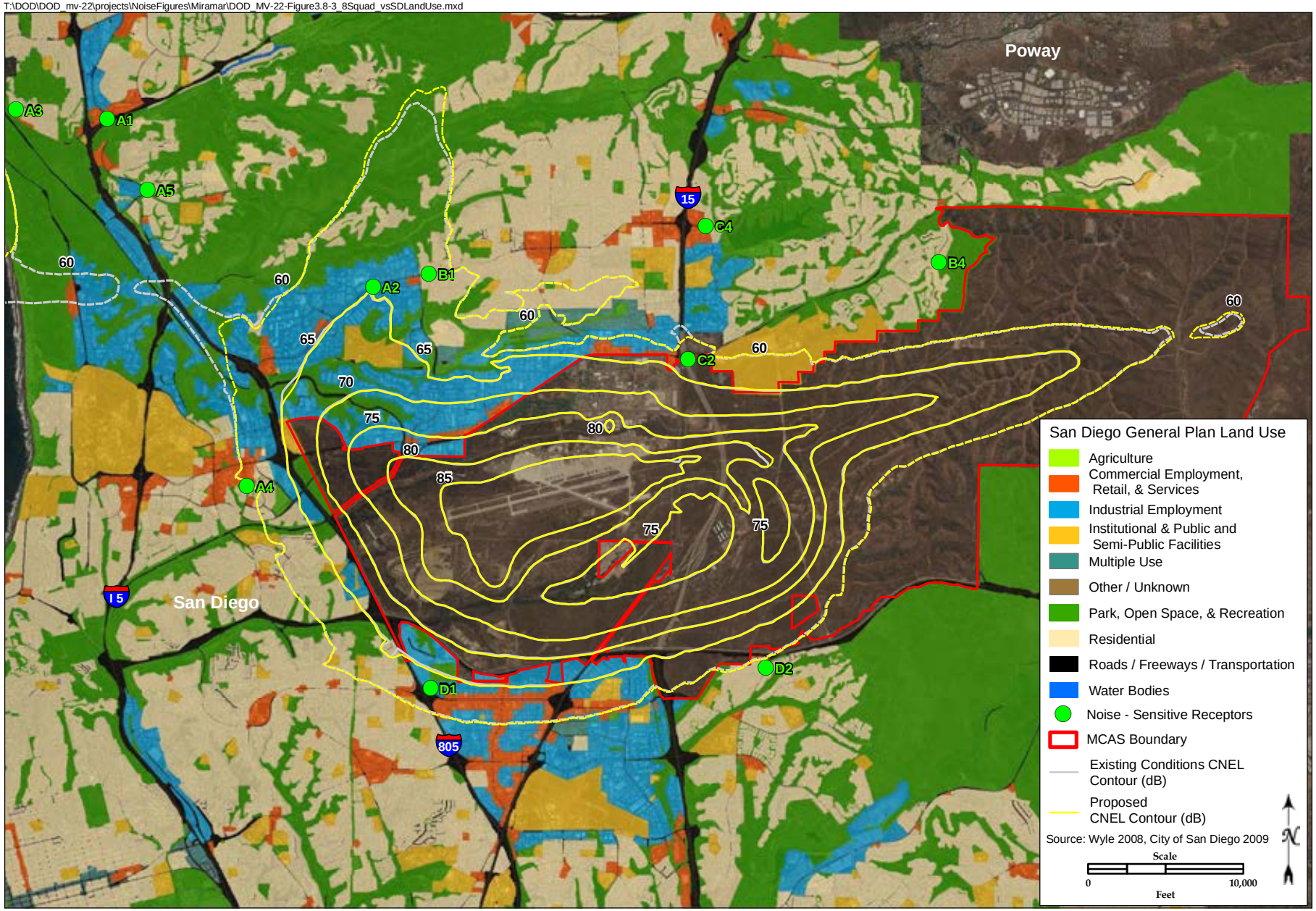

Aircraft Noise Contours from Operations at MCAS Miramar for 8 - Squadron Alternative

FIGURE

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Table 3.8-7. Off-Station Aircraft Noise Exposure for the Maximum Partial Basing Alternative at MCAS Miramar

Contour Band (CNEL, dB)(1)	Maximum Partial Basing Alternative			Change Compared to Baseline/ No Action Conditions		
	Acreage	Population (2)	Housing Units (2)	Acreage	Population (2)	Housing Units (2)
60-65	6,783	25,278	9,490	-430	+89	-58
65-70	2,225	4,308	1,721	+32	+65 (3)	+26 (3)
70-75	586	472	136	-10	-9 (3)	-3 (3)
75-80	333	218	50	+1	- (3)	-
80-85	9	4	-	+1	-	-
85+	-	-	-	-	-	-

Notes:
1. Exclusive of upper bound for all bands; excludes MCAS Miramar itself and bodies of water.
2. Estimated based on 2005 Census with population density methodology.
3. Based on counting actual housing using airphoto analysis, 423 total housing units are located within the 65-70 dB CNEL contour with an estimated population of 1,078. This is an estimated increase of 52 housing units and 129 people compared to baseline. No housing units are located in the 70 dB CNEL or greater contours.

Table 3.8-6 presents the CNEL for each of the 17 representative noise-sensitive receptors. All receptors experience less than 65 dB CNEL except for Receptor A2 in Mira Mesa in the Seawolf corridor, which is currently at an estimated 65.0 dB CNEL under existing conditions. The estimated CNEL for Receptor A2 is 65.1 dB. Additionally, one site, B3B near the Ground-Controlled Approach Box pattern, would primarily be affected by the MV-22, and the MV-22 aircraft would share dominance with other aircraft categories for four other sites – B2B and B3A near the Ground-Controlled Approach Box pattern and C1 and C3 in the Interstate-15 corridor.

As discussed in Appendix C, the Maximum Partial Basing Alternative would reduce the number of events causing speech interference at up to five noise sensitive receptors, although it would increase the number of speech-interfering events for receptor D1 near the FCLP pattern. Additionally, the Maximum Partial Basing Alternative would not change the number of events causing sleep disruptions for any noise sensitive receptor except at two receptors; it would decrease the number of expected sleep disruptions at receptor C4 in the Interstate-15 corridor and would increase the number of sleep disruptions at receptor D1 near the FCLP pattern. See Appendix C for full details.

The Maximum Partial Basing Alternative would cause short-term noise increases due to construction. Construction would include the use of trucks, bulldozers, and other heavy construction equipment for the major construction projects (e.g., hangars, aircraft parking facilities, and apron). Construction associated with this alternative would be undertaken adjacent to the flightline and occupy industrial areas, and would be isolated from any off-base communities. In addition, construction would take place during daylight hours and would follow BMPs to minimize noise levels. Construction noise would be contained within the station environment because most of the heavy construction would occur near the flightline, where noise would be compatible with current and ongoing activities.

Although the MV-22 would be significantly quieter than existing aircraft operating at MCAS Miramar on a single-event basis, the population within the 65-75 dB CNEL contour would increase by approximately 56 to 129 people (depending on method of calculation). The increase in

population would be due to a 130 percent increase of flight operations relative to existing modeled CH-46 flight operations, an approximate 21 percent increase in overall flight operations relative to existing conditions, and significant proportion of MV-22 flight operations during the evening period (29 percent). However, the F/A-18 aircraft would remain the noise-dominant aircraft for most of the MCAS Miramar vicinity. Overall, as the Maximum Partial Basing Alternative would not cause an increase in CNEL to an affected population relative to the Baseline/No Action condition of at least 1.5 dB within the alternative's 65 dB CNEL contour, the Maximum Partial Basing Alternative would not cause a significant (aircraft) noise impact.

Therefore, there would be no significant noise impact from construction or operations at MCAS Miramar from the Maximum Partial Basing Alternative.

Mitigation Measures

Because there would be no significant impacts, no mitigation measures would be required.

Minimum Partial Basing (2-Squadron) Alternative

The Minimum Partial Basing Alternative involves the addition of 2 reserve squadrons of MV-22 aircraft at MCAS Miramar and the removal of CH-46E aircraft currently based at the air station. Table 3.8-4 shows the numbers of proposed annual MV-22 flight operations for the Minimum Partial Basing Alternative. Proposed MV-22 flight operations would total approximately 9,100 annually, with 29 percent during the CNEL evening period and 6 percent during the CNEL nighttime period. Approximately 83 percent of the MV-22 flight operations at the air station would consist of departures and arrivals to/from other places and approximately 17 percent would consist of closed-pattern operations in the vicinity of the air station.

Additionally, approximately 17,000 modeled flight operations by CH-46E aircraft would be removed from the air station, along with run-ups associated with the CH-46E. The modeled flight and run-up operations for the F/A-18, KC-130 and CH-53E aircraft would remain unchanged relative to existing conditions.

Using the data described above and in Appendix C, the NOISEMAP and RNM computer models were used to calculate and plot the CNEL contours for annual average daily aircraft operations. Figure 3.8-4 shows the 60 to 85 dB CNEL contours, in 5 dB increments, for the Minimum Partial Basing Alternative. This alternative's contours are nearly identical to the existing conditions contours. The primary difference is that the Seawolf/Beach/Fairway departure lobe in the 60 dB contour of the Minimum Partial Basing Alternative is up to 0.6 miles narrower than the baseline (due to removal of the CH-46E and inconsequential MV-22 exposure). The noise exposure would decrease below 60 dB CNEL west of Interstate-5 and increase above 60 dB CNEL approximately 0.6 miles to the northwest due to topography effects from varying terrain elevation near the Torrey Pines State Reserve.

Table 3.8-8 shows the noise exposure in terms of estimated acreage, housing units and population within each CNEL contour band. These estimates exclude MCAS Miramar itself and bodies of water. Noise Zone II (65-75 dB CNEL) would include 1,828 housing units and 4,702 people. Noise Zone III (75 dB CNEL and greater) would include 50 housing units and 220 people. Relative to existing conditions, Noise Zone II would decrease by six housing units and 22 people. Noise Zone III would decrease by two people, relative to existing conditions.

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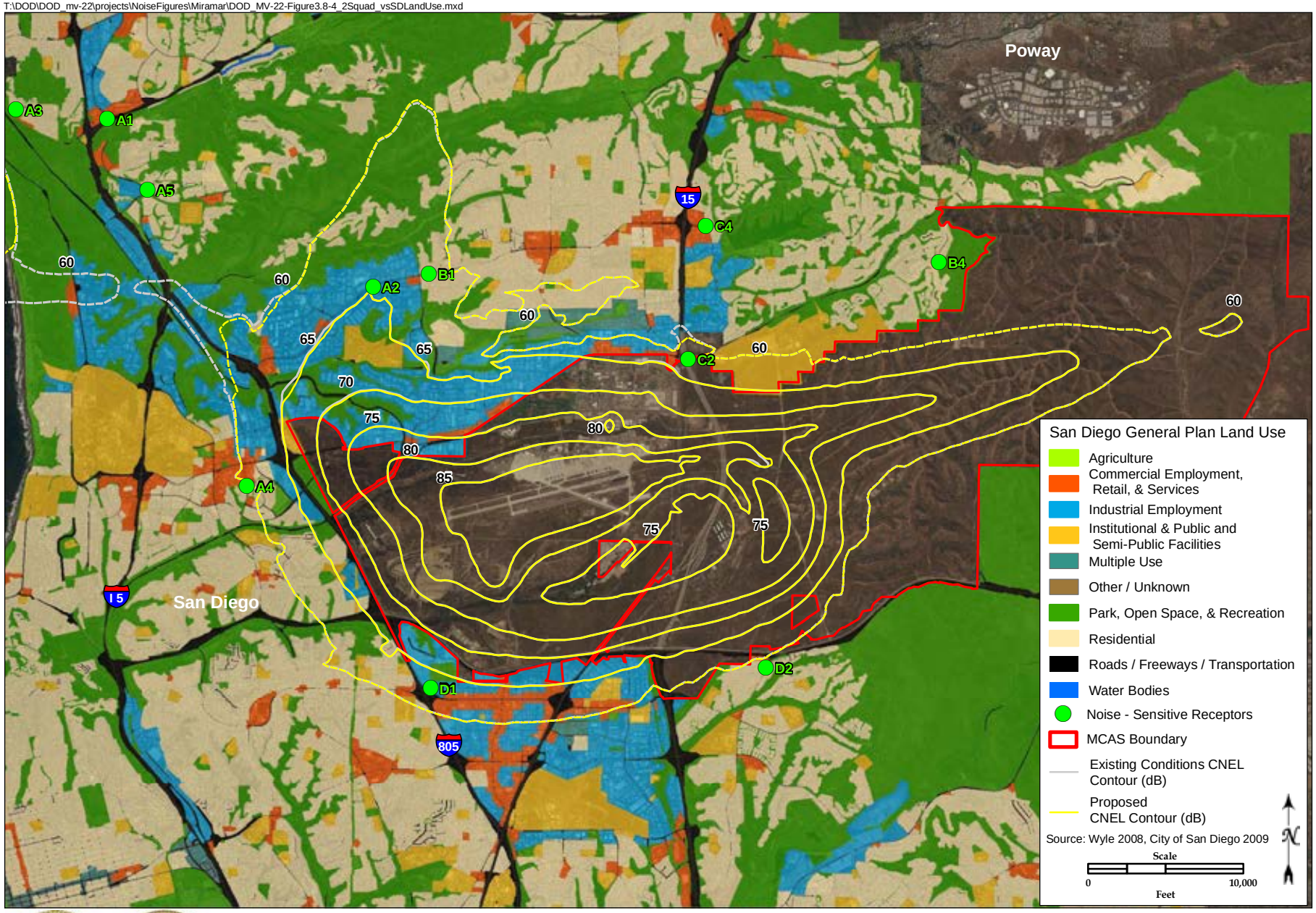

Aircraft Noise Contours from Operations at MCAS Miramar for 2 - Squadron Alternative

FIGURE

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Table 3.8-8. Off-Station Aircraft Noise Exposure for the Minimum Partial Basing Alternative at MCAS Miramar

Contour Band (CNEL, dB)(1)	Minimum Partial Basing Alternative			Change Compared to Baseline/No Action Conditions		
	Acreage	Population (2)	Housing Units (2)	Acreage	Population (2)	Housing Units (2)
60-65	6,624	24,589	9,306	-589	-600	-242
65-70	2,177	4,230	1,692	-16	-13 (3)	-3 (3)
70-75	587	472	136	-9	-9 (3)	-3 (3)
75-80	330	216	50	-2	-2 (3)	-
80-85	8	4	-	-	-	-
85+	-	-	-	-	-	-

Notes:
1. Exclusive of upper bound for all bands; excludes MCAS Miramar itself and bodies of water.
2. Estimated based on 2000 Census with population density methodology.
3. Based on counting actual housing using airphoto analysis, 377 total housing units are located within the 65-70 dB CNEL contour with an estimated population of 965. This is an estimated increase of 6 housing units and 15 people compared to baseline. No housing units are located in the 70 dB CNEL or greater contours.

Based on a review of the airphotos by zooming into each affected area and counting actual houses and other domestic residences, it was estimated that Noise Zone II would increase by 6 housing units and 15 people. Housing units and population would not increase in Noise Zone III relative to existing conditions.

Table 3.8-6 presents the CNEL for each of the 17 representative noise-sensitive receptors. Rounding to the nearest decibel, all receptors experience less than 65 dB CNEL except for Receptor A2 in Mira Mesa in the Seawolf corridor, which is currently at an estimated 65 dB CNEL under existing conditions. The estimated CNEL for Receptor A2 under the Minimum Partial Basing Alternative is 65.1 dB. None of the representative sites would primarily be affected by the MV-22. The MV-22 aircraft would share dominance with the CH-53E aircraft for five other sites – B2B, B3A and B3B near the Ground-Controlled Approach Box pattern and C1 and C3 in the Interstate-15 corridor.

As discussed in Appendix C, the Minimum Partial Basing Alternative would reduce the number of events causing speech interference at up to five noise sensitive receptors, although it would increase the number of speech-interfering events for receptor D1 near the FCLP pattern. Additionally, the Minimum Partial Basing Alternative would only change the number of events causing sleep disruptions at one receptor; it would decrease the number of expected sleep disruptions at receptor C4 in the Interstate-15 corridor. See Appendix C for full details.

MCAS Miramar and its vicinity would experience nearly a 54 percent decrease in flight operations relative to existing modeled CH-46 flight operations and an approximate eight percent decrease in overall flight operations relative to existing conditions. The population within the 65-75 dB CNEL contour would change somewhere between a decrease of 24 people to an increase in 15 people (depending on method of calculation). The F/A-18 aircraft would remain the noise-dominant aircraft for most of the MCAS Miramar vicinity. Overall, as the Minimum Partial Basing Alternative would not cause an increase in CNEL to an affected population relative to the Baseline/No Action conditions of at least 1.5 dB within the alternative's 65 dB CNEL contour, the Minimum Partial Basing Alternative would not cause a significant noise impact.

Additionally, no construction would occur under the Minimum Partial Basing Alternative.

Therefore, there would be no significant noise impact at MCAS Miramar from the Minimum Partial Basing Alternative.

Mitigation Measures

Because there would be no significant impacts, no mitigation measures would be required.

Non-MCAS Miramar Basing Alternatives

The Non-MCAS Miramar Basing Alternatives only involve the removal of CH-46E aircraft currently based at MCAS Miramar. As listed in Table 3.8-1, approximately 17,000 modeled flight operations by CH-46E aircraft would be removed from the air station along with its associated run-ups. The modeled flight and run-up operations for the F/A-18, KC-130 and CH-53E aircraft would remain unchanged relative to existing conditions.

Using the data described above and in Appendix C, the NOISEMAP and RNM computer models were used to calculate and plot the CNEL contours for annual average daily aircraft operations. Figure 3.8-5 shows the 60 to 85 dB CNEL contours, in 5 dB increments, for a non-MCAS Miramar basing alternative. This alternative's contours would be nearly identical to the baseline contours. The primary difference would be the Seawolf/Beach/Fairway departure lobe in the 60 dB CNEL contour would be up to 0.6 miles narrower than the baseline due to removal of the CH-46E. The alternative's noise exposure would decrease below 60 dB CNEL west of Interstate-5 and would increase above 60 dB CNEL approximately 0.6 miles to the northwest due to terrain elevation effects near the Torrey Pines State Reserve.

Table 3.8-9 shows the noise exposure in terms of estimated acreage, housing units and population within each CNEL contour band. These estimates exclude MCAS Miramar itself and bodies of water. Noise Zone II (65-75 dB CNEL) would include 1,793 housing units and 4,624 people. Noise Zone III (75 dB CNEL and greater) would include 50 housing units and 222 people. Relative to existing conditions, Noise Zone II would decrease by 41 housing units and 100 people. Housing units and population would not change in Noise Zone III relative to existing conditions.

Table 3.8-9. Off-Station Aircraft Noise Exposure for the Non-MCAS Miramar Basing Alternatives at MCAS Miramar

	Non-MCAS Miramar Basing Alternatives			Change Compared to Baseline/No Action Conditions		
Contour Band (CNEL, dB)(1)	Acreage	Population(2)	Housing Units (2)	Acreage	Population(2)	Housing Units(2)
60-65	6,588	24,420	9,259	-625	-769	-289
65-70	2,158	4,155	1,658	-35	-88 (3)	-37 (3)
70-75	584	469	135	-12	-12 (3)	-4 (3)
75-80	332	218	50	-	-	-
80-85	8	4	-	-	-	-
85+	-	-	-	-	-	-

Notes:
1. Exclusive of upper bound for all bands; excludes MCAS Miramar itself and bodies of water.
2. Estimated based on 2000 Census with population density methodology.
3. Based on counting actual housing using airphoto analysis, 352 total housing units are located within the 65-70 dB CNEL contour with an estimated population of 902. This is an estimated decrease of 19 housing units and 47 people compared to baseline. No housing units are located in the 70 dB CNEL or greater contours.

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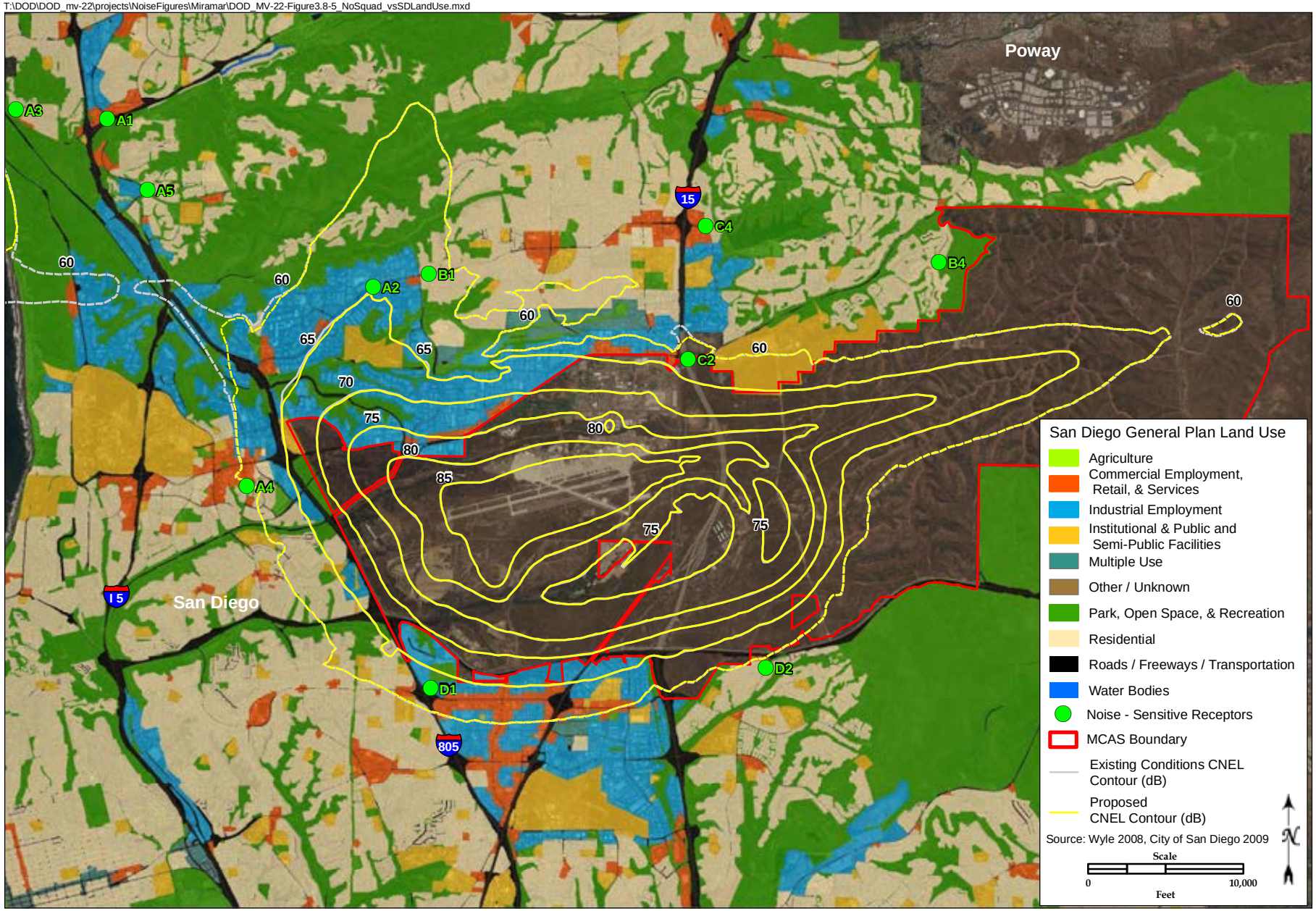

Aircraft Noise Contours from Operations at MCAS Miramar for Non-MCAS Miramar Basing Alternatives

FIGURE

3.8-5

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Based on a review of the airphotos by zooming into each affected area and counting actual houses and other domestic residences, it was estimated that Noise Zone II would decrease by 19 housing units and 47 people. Housing units and population would not change in Noise Zone III relative to existing conditions.

Table 3.8-6 presents the CNEL for each of the 17 representative noise-sensitive receptors. Rounding to the nearest decibel, all receptors experience less than 65 dB CNEL except for Receptor A2 in Mira Mesa in the Seawolf corridor, which is currently at an estimated 65.0 dB CNEL under existing conditions. The estimated CNEL under the Non-MCAS Miramar Basing Alternatives for Receptor A2 is 64.9 dB. Ten of the receptors would be primarily affected by fixed wing aircraft alone. Five of the receptors, near the Ground-Controlled Approach Box pattern and in the Interstate-15 corridor, would be primarily affected by the CH-53E aircraft. Both aircraft categories would share dominance for two of the receptors -- A1 and A5 in the Seawolf corridor.

As discussed in Appendix C, the Non-MCAS Miramar Basing Alternatives would reduce the number of events causing speech interference at up to five noise sensitive receptors, and the number of speech-interfering events would not change for the remaining twelve receptors. Additionally, the Non-MCAS Miramar Basing Alternatives would not change the number of events causing sleep disruptions for any noise sensitive receptor except at one location; it would decrease the number of expected sleep disruptions at receptor C4 in the Interstate-15 corridor. See Appendix C for full details.

MCAS Miramar and its vicinity would experience nearly an 18 percent decrease in overall flight operations relative to existing conditions. The population within the 65-75 dB CNEL contour would decrease by approximately 47 to 100 people (depending on method of calculation). The F/A-18 aircraft would remain the noise-dominant aircraft for most of the MCAS Miramar vicinity. Overall, as the non-MCAS Miramar Basing Alternatives would not cause an increase in CNEL to an affected population relative to the Baseline/No Action conditions of at least 1.5 dB within the alternatives' 65 dB CNEL contour, the non-MCAS Miramar Basing Alternatives would not cause a significant noise impact.

Additionally, no construction at MCAS Miramar would occur under a non-MCAS Miramar basing alternative.

Therefore, there would be no significant noise impact at MCAS Miramar from the implementation of a non-MCAS Miramar basing alternative.

Mitigation Measures

Because there would be no significant impacts, no mitigation measures would be required.

No Action Alternative

There would be no change in current airfield operations under the No Action Alternative. Therefore, the noise exposure for the No Action Alternative would be identical to the noise exposure for the baseline condition, and no noise impact would occur.

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3.9 INFRASTRUCTURE AND UTILITIES

Infrastructure and utilities include water supply, wastewater treatment and disposal facilities, electrical supply facilities, solid waste management facilities, natural gas, and stormwater drainage facilities.

3.9.1 Affected Environment

This section discusses the infrastructure and utilities supplied to the San Diego region as well as to MCAS Miramar. The utilities at MCAS Miramar are owned, planned for, maintained, and operated by the Public Works Center.

Water Supply

The San Diego County Water Authority (SDCWA) supplies over 90 percent of the regional water supply through its 23 member agencies. This water is imported from the Colorado River and Northern California by a single supplier, the Metropolitan Water District of Southern California. The rest comes from local water sources including groundwater, local surface water, recycled water, seawater desalination and conservation. The SDCWA has five major pipelines with the maximum capacity to carry 925 million gallons a day. These pipelines bring either treated or untreated water into San Diego County from the Metropolitan Water District. Delivery points from the Metropolitan Water District are located south of the Riverside/ San Diego county line (SDCWA 2009).

The potable water supply for MCAS Miramar is obtained under contract from the City of San Diego. This water supply is routed from the City of San Diego water system to the station through a main connection located along the northwest side of MCAS Miramar (near Miramar Road and Jupiter Road). MCAS Miramar is supplied water from this main connection by a metered 16-inch (41 cm) pipeline that delivers 77 to 87 pounds per square inch (psi) (5.4 to 6.1 kilograms per square centimeter [kg per cm^2]) of static pressure. A backup 16-inch (41 cm) connection point is also located at Kearny Villa Road on the northeast side of the station. In order to store and disperse water on-station, MCAS Miramar has two one-million-gallon storage tanks and one 750,000-gallon storage tank (DoN 2006). The station has a separate closed fire system for protection of the aircraft hangars that is fed from two one-million-gallon storage tanks and six pump stations (DoN 2006).

East Miramar and Sycamore Canyon have five small storage tanks, and 40,000 linear feet (12,192 linear meters) of distribution system (DoN 2006).

The City of San Diego is in the process of installing reclaimed water distribution lines along Miramar Road for use by MCAS Miramar (DoN 2006).

Wastewater Treatment and Disposal

Regional wastewater is treated by the City of San Diego's Metropolitan Wastewater Department's (MWWD) Point Loma Wastewater Treatment Plant, serving the Greater San Diego population of 2.2 million from 16 cities and districts generating approximately 180 million gallons of wastewater per day. Planned improvements would increase wastewater treatment capacity to serve an estimated population of 2.9 million through the year 2050. It is estimated that nearly 340 million

gallons of wastewater will be generated each day by that year. The MWWD treats the wastewater in a 450-square-mile area (stretching from Del Mar and Poway to the north, Alpine and Lakeside to the east, and south to the Mexican border) and has a capacity of 240 million gallons per day (City of San Diego 2007a).

The Miramar Water Treatment Plant Upgrade and Expansion Project that processes biosolids is located on land associated with the Miramar Landfill. This project consists of expanding the capacity of the Treatment Plant from 140 to 215 million gallons per day and upgrading existing facilities (City of San Diego 2009a). Although occupied on land owned by MCAS Miramar, the Miramar Water Treatment Plant is owned and operated by the City of San Diego. A secondary wastewater treatment facility servicing northern San Diego communities is the North City Water Reclamation Plant, which is a state-of-the-art facility that can treat up to 30 million gallons of wastewater per day (City of San Diego 2009b).

Wastewater produced at MCAS Miramar is conveyed and discharged to the City of San Diego MWWD system. The wastewater system consists of 202,862 linear feet (61,832 linear meters) of 6- to 15-inch (15- to 38-cm) pipeline, septic tanks, oil/water separators, and a sewage lift station located near Building 8462. Additional tanks and oil/water separators are located in East Miramar and Sycamore Canyon (DoN 2006).

MCAS Miramar and NAVFAC Utilities have been coordinating with the City of San Diego MWWD regarding inflow and infiltration (I&I) of stormwater to the sewer system during heavy rain events. MCAS Miramar is in the process of identifying and eliminating sources of I&I on MCAS Miramar (MCAS Miramar 2009a). All eight of MCAS Miramar's aircraft wash racks have a rainwater diversion system in place that is annually inspected by City of San Diego MWWD staff as a condition of its Industrial User Discharge Permit.

Electrical Supply Facilities

Regional electricity is supplied by San Diego Gas and Electric (SDG&E). SDG&E is a regulated public utility that provides safe and reliable energy service to 3.3 million consumers through 1.3 million electric meters and more than 800,000 natural gas meters in San Diego and southern Orange counties. The utility's area spans 4,100 square miles.

Electrical power for MCAS Miramar is provided through a 12-kilovolt (kv) underground connection originating at the SDG&E substation located on Miramar Road (DoN 2006). This feeder connects to the 12 kv switching station at Building 454; electricity is then distributed via a 12-kv loop that feeds five additional substations throughout the base. Most of MCAS Miramar is served from circuit breakers that provide a secondary voltage of 4160 volts. The electrical distribution system at MCAS Miramar consists of over 90 miles (145 km) of transmission lines.

Four hundred Hz of power is provided to five maintenance hangars, avionics shop, airframe shop, and other ground installations by a central system composed of four generators and a distribution network of 60 converts of varying sizes (DoN 2006).

Power during normal power outages is provided to the station by SDG&E's Miramar Power Block "combustion turbines (DoN 2006). Additionally, MCAS Miramar has 30 fixed standby generators with a total capacity of 2,200 kilowatts and five portable generators that provide 275 kilowatts to support essential buildings and functions

Solid Waste Management Facilities

The San Diego region hosts seven operating landfills. These include the Las Pulgas and San Onofre Landfills in MCB Camp Pendleton, the Borrego Springs, Ramona, and Otay/Otay Annex Landfills in the unincorporated areas of San Diego County, and the Sycamore and Miramar Landfills in the City of San Diego. The Las Pulgas and San Onofre Landfills are owned and operated by the USMC and accept military waste only. All of the other landfills, except for the Miramar Landfill, are owned and operated by Allied Waste Industries, a private waste management firm that purchased the County of San Diego's solid waste system in late 1997. The Miramar Landfill in the City of San Diego is owned by MCAS Miramar, but leased and operated by the City of San Diego. Like the Allied Landfills, the Miramar Landfill accepts waste from jurisdictions throughout the region in addition to the waste it receives from the military (for which, as part of the terms of the lease, there is no charge). The Miramar Landfill primarily serves the City of San Diego.

The waste produced at MCAS Miramar is collected by Moore Refuse (a private contractor) and transported to the West Miramar Landfill (DoN 1996). It is estimated that DoN installations in San Diego produce 15 to 20 percent of the total solid waste placed in the West Miramar Landfill. Waste reduction and recycling programs implemented by MCAS Miramar are expected to extend the capacity of the landfill until 2012 (DoN 2007). The DoN recently amended the City of San Diego's lease to allow for vertical expansion of the Miramar Landfill, which will extend its capacity to accept waste for an additional three to ten years (San Diego County Public Works 1996). According to MCAS Miramar's Quality Recycling Program Standard Operating Procedures, the overall goal of the MCAS Miramar Recycling Program is to reduce the amount of materials sent to a landfill by 40 percent by the year 2010. Participation of the station's Recycling Program is the responsibility of all members of the MCAS Miramar community (including military and civilian personnel, family members, visitors, and tenants) who generate solid waste.

For a discussion of Hazardous Waste Management Facilities, see section 3.11 (Hazardous Materials Management).

Natural Gas

The regional supply of natural gas is supplied by SDG&E (see *Electrical Supply Facilities* above) and the Southern California Gas Company, both subsidiaries of Sempra Energy Co. The Southern California Gas Company, the nation's largest natural gas distribution utility, serves 19.2 million people through 5.4 million meters. The company's service territory covers 23,000 square miles.

Natural gas is supplied to MCAS Miramar by SDG&E from a distribution main located adjacent to Maxam Avenue (DoN 2006). Three meters at MCAS Miramar deliver and disperse gas throughout the station; two of these meters are located near the east entrance of the station. These two meters deliver gas through a 2- to 3-inch (5- to 8-cm) line that connects to the central heating plant (Building 7212) and Buildings 6310, 6214, 5305, and 5479. The third meter, located in the northeast corner of the station, delivers gas through a 2-inch (5-cm) line to housing areas, Buildings 2257, 2264, 2273, 2495, and 2499, and the Temporary Lodge. Gas is distributed through 11 miles (17.7 km) of buried lines that are located within the northern portion of the station. Two propane gas tanks and associated distribution systems are also used throughout the station.

Stormwater Drainage Facilities

The San Diego Regional Water Quality Control Board (RWQCB) regulates surface and ground water quality within the area stretching along 85 miles of coastline from Laguna Beach in Orange County to the Mexican border, and extending 50 miles inland to the crest of the coastal mountain range. The region has eleven watersheds: San Juan, Santa Margarita, San Luis Rey, Carlsbad, San Dieguito, Peñasquitos, San Diego, Pueblo, Sweetwater, Otay, and Tijuana. Jurisdictions within the eleven watersheds have collaborated on the development of a Watershed Urban Runoff Management Plan (WURMP) for each watershed, which addresses high priority stormwater quality issues found within the various watersheds (Project Clean Water 2007).

MCAS Miramar is on the southern edge of the Peñasquitos watershed, and stormwater quality issues identified within this watershed are discussed in the Peñasquitos WURMP. Stormwater aboard MCAS Miramar is regulated by Clean Water Act Section 402 (Clean Water Act 402 Phase I), California State Water Resources Control Board (Water Quality Order No. 97-03-DWQ), and National Pollution Discharge Elimination System (NPDES) General Permit for discharges of stormwater associated with industrial activities (Permit No CAS000001). The storm drainage system on MCAS Miramar consists of 2,300 linear feet (701 linear meters) of 6- to 36-inch 15- to 91-cm) distribution pipeline, catch basins, culverts, and oil/water separators. There are approximately 12 storm drain discharge points located throughout the station (DoN 2006). Stormwater is discharged to Rose Canyon and San Clemente Canyon (MCAS Miramar 2009a).

3.9.2 Environmental Consequences

Full Basing (10-Squadron) Alternative

There would be a net increase of 1,222 personnel (see Table 3.4-5) as well as the construction of various facilities under the Full Basing Alternative. However, for the range of infrastructure and utilities discussed below, the installation has planned for and assessed infrastructure and utility needs to ensure that the proposed increase in personnel would be accommodated under the Full Basing Alternative. The installation identifies infrastructure or utility needs within the scope of each corresponding MILCON project. If particular projects require additional infrastructure or utilities, they are added as a part of that project. This process ensures that any infrastructure or utility deficiencies are indentified within the initial planning stages (LCDR Garvin, personal communication 2009). Therefore, no significant impacts to infrastructure and utilities would occur with implementation of the Full Basing Alternative.

Water Supply

The City of San Diego maintains adequate water supply to meet the needs of its users, including MCAS Miramar. In addition, installation has planned for and assessed infrastructure and utilities within the scope of each corresponding MILCON project to ensure that the current system can adequately accommodate the proposed increase of aircraft and personnel with implementation of the Full Basing Alternative. Therefore, no significant impacts would occur. See also section 3.13 (Water Resources) for additional information.

Wastewater Treatment and Disposal Facilities

Improvements to the Point Loma Wastewater Treatment Plant are currently underway, which will increase the capacity of the wastewater system for all regional customers. MCAS Miramar/NAVFAC Utilities and the City of San Diego MWWD are in the process of reassessing the current wastewater service agreement that defines a peak flow of 1.6 million gallons per day. As a customer of the City of San Diego MWWD wastewater services, MCAS Miramar is committed to adhering to the requirements of the Industrial User Discharge Permit and to supporting the mission of the City of San Diego's MWWD. While continuing to work with the City of San Diego MWWD to eliminate sources of I&I of stormwater to the sewer system, the existing and future wastewater capacity would adequately accommodate the proposed increase of aircraft and personnel with implementation of the Full Basing Alternative. Therefore, no significant impacts would occur.

Electrical Supply Facilities

The installation has planned for and assessed infrastructure and utilities within the scope of each corresponding MILCON project to ensure that sufficient electricity capacity exists to adequately accommodate the proposed increase of aircraft and personnel with implementation of the Full Basing Alternative. Therefore, no significant impacts would occur.

Solid Waste Management Facilities

Construction, demolition, and operational activities associated with implementation of the Full Basing Alternative would contribute to an overall increase in solid waste generation, requiring landfill disposal. However, much of this increase would be of limited duration during the initial stages of implementation. The increase in personnel and equipment use would also contribute to an increase in solid waste generation. Sufficient capacity exists within the West Miramar Landfill to accommodate the increase in solid waste generation, and materials would be recycled whenever possible. The DoN also recently amended the City of San Diego's lease to allow for vertical expansion of the Miramar Landfill, which will extend its capacity to accept waste for an additional three to ten years. Implementation of the Miramar Landfill expansion plans, coupled with compliance with the MCAS Miramar Solid Waste Management Plan and established waste reduction and recycling programs, would accommodate the increase in overall solid waste generation as a result of implementation of the Full Basing Alternative. Therefore, no significant impacts would occur.

Natural Gas

The installation has planned for and assessed infrastructure and utilities within the scope of each corresponding MILCON project to ensure that sufficient natural gas supply exists to adequately accommodate the proposed increase of aircraft and personnel with implementation of the Full Basing Alternative. Therefore, no significant impacts would occur.

Stormwater Drainage Facilities

Implementation of the Full Basing Alternative would contribute to additional demands on the existing stormwater drainage system. However there would be no significant increase to overall impermeable surfaces at MCAS Miramar that would result in stormwater management concerns under this alternative. In addition, the installation has planned for and assessed infrastructure and

utilities within the scope of each corresponding MILCON project to ensure that the existing stormwater drainage system has sufficient capacity to handle surface runoff associated with the Full Basing Alternative. The Full Basing Alternative would comply with NPDES Permit requirements and stormwater management guidelines for the base. Therefore, no significant impacts would occur.

Mitigation Measures

Implementation of the Full Basing Alternative at MCAS Miramar would not result in significant impacts to infrastructure and utilities; therefore, no mitigation measures would be required.

Maximum Partial Basing (8-Squadron) Alternative

Impacts to infrastructure and utilities for the Maximum Partial Basing Alternative would be similar to albeit, less than those described under the Full Basing Alternative. There would be a net increase of 798 personnel under this alternative (see Table 3.4-5), as well as construction of various new facilities. Similar to the Full Basing Alternative, there would be no significant increase to overall impermeable surfaces at MCAS Miramar under this alternative. Although there would be an overall increase in military aircraft operations, ground-based activity, and personnel associated with the eight MV-22 squadrons, as discussed under the Full Basing Alternative, the installation has planned for and assessed infrastructure and utilities within the scope of each corresponding MILCON project to ensure that the existing infrastructure and utilities are adequate and would accommodate the proposed increase (LCDR Garvin, personal communication 2009). Therefore, no significant impacts to infrastructure and utilities would occur with implementation of the Maximum Partial Basing Alternative.

Mitigation Measures

Implementation of the Maximum Partial Basing Alternative at MCAS Miramar would not result in significant impacts to infrastructure and utilities; therefore, no mitigation measures would be required.

Minimum Partial Basing (2-Squadron) Alternative

Under the Minimum Partial Basing Alternative, the amount of aircraft and personnel at MCAS Miramar would be reduced due to the loss of four CH-46E squadron (see Table 2.3-2), and no new construction or demolition would occur (i.e., no increase in impermeable surfaces as MCAS Miramar). There would be a net reduction of 596 personnel under this alternative (see Table 3.4-5). Although there would be an overall reduction in military aircraft operations, ground-based activity, and personnel associated with the four CH-46E squadrons, the overall use of infrastructure and utilities would not significantly change. Therefore, no significant impacts to infrastructure and utilities would occur with implementation of the Minimum Partial Basing Alternative.

Mitigation Measures

Implementation of the Minimum Partial Basing Alternative at MCAS Miramar would not result in significant impacts to infrastructure and utilities; therefore, no mitigation measures would be required.

Non-MCAS Miramar Basing Alternatives

Under a non-MCAS Miramar basing alternative, the amount of aircraft and personnel at MCAS Miramar would be reduced due to the loss of four CH-46E squadrons, and no new construction or demolition would occur. There would be a net reduction of 1,042 personnel under this alternative (see Table 3.4-5). Although there would be an overall reduction in military aircraft operations, ground-based activity, and personnel associated with the four CH-46E squadrons, the overall use of infrastructure and utilities would not significantly change. Therefore, no significant impacts to infrastructure and utilities would occur with implementation of a non-MCAS Miramar basing alternative.

Mitigation Measures

Implementation of a non-MCAS Miramar basing alternative would not result in significant impacts to infrastructure and utilities; therefore, no mitigation measures would be required.

No Action Alternative

Under the No Action Alternative, there would be no West Coast-based MV-22 personnel changes, new construction, demolition, or training activities. Therefore, existing conditions would remain unchanged, and no impacts to infrastructure and utilities would occur.

3.10 AESTHETICS AND VISUAL RESOURCES

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 effect 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. These social considerations equate to visual sensitivity and are defined as the degree of public interest in a visual resource and concern over potential adverse changes in the quality of that resource.

3.10.1 Affected Environment

The visual environment at MCAS Miramar consists of developed areas characteristic of a military installation (e.g., buildings and training areas) and open undeveloped space. Human-made features at MCAS Miramar include access roads, buildings, aircraft runways, and hangars. The MCAS Miramar Base Exterior Architecture Plan provides aesthetic and functional guidelines to create a coordinated visual environment throughout the station. The plan provides design direction for future project construction, renovation, demolition, and maintenance.

Other physical elements that contribute to the visual character at MCAS Miramar include edges, landmarks, and views. The edges at MCAS Miramar consist primarily of frontage roads and freeways adjoining the station. In addition, the station is bisected by Interstate-15, which serves as

an effective divider between the two general areas of the station. Rose Canyon and the water tower located in the eastern portion of the installation serve as two landmarks. However, the most prominent visual feature of MCAS Miramar is the visibility of aircraft arriving and departing throughout the day (DoN 1996). Aircraft have been flying out of this location for the past half century.

MCAS Miramar lies within the Coastal Plains geographic province. The topography consists of rolling hills and mesas with elevations ranging from 200 to 1,000 feet (61 to 305 meters) above MSL. The western portion of MCAS Miramar is relatively flat with deeply incised canyons, while the eastern portion is composed of moderate to steep slopes with elevations ranging from 900 to 1,200 feet above MSL. These slopes form a visual backdrop and offer relief from the developed nature of the station. Hummocky topography termed Mima Mounds are associated with wetland and vernal pool complexes that support a variety of specialized plant and animal species. Approximately 400 acres of Mima Mounds occur at MCAS Miramar (DoN 2006). Native vegetation on the station is composed mainly of a mix of coastal sage scrub, chaparral, and perennial grasslands. Several other vegetation types occur to a lesser extent within the station including: vernal pools, vernal marsh, fresh water marsh, riparian forest, willow scrub, mulefat scrub, and coast live oak woodland (DoN 2006).

3.10.2 Environmental Consequences

Full Basing (10-Squadron) Alternative

Implementation of the Full Basing Alternative would entail extensive construction in a previously undeveloped area south of the existing runway. However, since the visual environment of MCAS Miramar is already characteristic of a military airfield and local visual sensitivity is low, the overall visual environment at MCAS Miramar would not significantly change. In addition, proposed construction would be visually consistent with existing structures and would adhere to the Base Exterior Architecture Plan. Even though there would be a 31 percent increase in airfield operations over existing conditions, the MV-22 would follow established local approach and departure patterns. Away from the airfield, the MV-22 would fly more often in fixed wing mode, which is higher and faster than typical rotary wing aircraft. This would lessen any perceived visual impact from the MV-22. Therefore, no significant impacts to aesthetics and visual resources are expected with implementation of the Full Basing Alternative.

Mitigation Measures

Implementation of the Full Basing Alternative at MCAS Miramar would not result in significant impacts to aesthetics and visual resources; therefore, no mitigation measures would be required.

Maximum Partial Basing (8-Squadron) Alternative

Implementation of the Maximum Partial Basing Alternative would not affect the overall visual environment at MCAS Miramar. Proposed construction would be visually consistent with existing structures and would adhere to the Base Exterior Architecture Plan. In addition, the visual environment of MCAS Miramar is already characteristic of a military airfield, and local visual sensitivity is low. Even though there would be a 20 percent increase in airfield operations over existing conditions, the MV-22 would follow established local approach and departure patterns. Away from the airfield, the MV-22 would fly more often in fixed wing mode, which is higher and faster than typical rotary wing aircraft. This would lessen any perceived visual impact from the

MV-22. Therefore, no significant impacts to aesthetics and visual resources are expected with implementation of the Maximum Partial Basing Alternative.

Mitigation Measures

Implementation of the Maximum Partial Basing Alternative at MCAS Miramar would not result in significant impacts to aesthetics and visual resources; therefore, no mitigation measures would be required.

Minimum Partial Basing (2-Squadron) Alternative

No construction or demolition is associated with the implementation of the Minimum Partial Basing Alternative at MCAS Miramar. Although there would be an overall reduction in military aircraft operations, ground-based activity, and personnel compared to existing conditions, the overall visual environment at MCAS Miramar would not change. Therefore, no impact to aesthetics and visual resources would occur with implementation of a non-MCAS Miramar basing alternative.

Mitigation Measures

Implementation of the Minimum Partial Basing Alternative at MCAS Miramar would not result in impacts to aesthetics and visual resources; therefore, no mitigation measures would be required.

Non-MCAS Miramar Basing Alternatives

Under a non-MCAS Miramar basing alternative, the amount of aircraft and personnel at MCAS Miramar would be reduced due to the loss of four CH-46E squadrons, and no new construction or demolition would occur. Although there would be an overall reduction in military aircraft operations, ground-based activity, and personnel associated with the four CH-46E squadrons, the overall visual environment at MCAS Miramar would not change. Therefore, no impacts to aesthetics and visual resources would occur with implementation of a non-MCAS Miramar basing alternative.

Mitigation Measures

Implementation of a non-MCAS Miramar basing alternative would not result in impacts to aesthetics and visual resources; therefore, no mitigation measures would be required.

No Action Alternative

Under the No Action Alternative, there would be no West Coast-based MV-22 personnel changes, new construction, demolition, or training activities. Therefore, existing conditions would remain unchanged, and no impacts to aesthetics and visual resources would occur.

3.11 HAZARDOUS MATERIALS MANAGEMENT

Hazardous materials are chemical substances that pose a substantial hazard to human health or the environment. Hazardous materials include hazardous substances, extremely hazardous substances, hazardous chemicals, and toxic chemicals. In general, these materials pose hazards because of their quantity, concentration, physical, chemical, or infectious characteristics. A

hazardous waste may be a solid, liquid, semi-solid, or contained gaseous material that alone or in combination may: 1) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; or 2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

This describes hazardous materials/waste management at MCAS Miramar and provides background information on potential hazardous waste contamination areas being investigated as part of the Defense Environmental Restoration Program (DERP). As part of DERP, the DoD has created the Installation Restoration Program (IRP) and the Military Munitions Response (MR) program. These programs were instituted to satisfy the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for former and current hazardous waste sites.

The CERCLA definitions of hazardous substances (42 USC § 9601[14]) and pollutants or contaminants (42 USC § 9601[33]) specifically exclude petroleum unless specifically listed. The USEPA interprets the term petroleum to include hazardous substances found naturally in crude oil and crude oil fractions, such as benzene, and hazardous substances normally added to crude oil during refining. Petroleum additives or contaminants that increase in concentration in petroleum during use are not excluded from CERCLA regulations.

Hazardous waste at MCAS Miramar is regulated under the Resource Conservation and Recovery Act (RCRA), which gave the USEPA the authority to control hazardous waste from the "cradle-to-grave", including the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also sets forth a framework for the management of non-hazardous waste, including Petroleum, Oil, and Lubricants (POL) sites, which are regulated under the Underground Storage Tank/Aboveground Storage Tank (UST/AST) program at MCAS Miramar.

3.11.1 Affected Environment

Hazardous Materials/Waste Management

Activities at MCAS Miramar require the use and storage of a variety of hazardous materials and subsequent generation of wastes, including flammable and combustible liquids, acids, corrosives, caustics, compressed gases, solvents, paints, paint thinners, and various other petroleum oils and lubricants. Principal users of hazardous materials and generators of hazardous waste are the aircraft and vehicle repair and maintenance divisions of MCAS Miramar. Hazardous waste-generating activities include painting, solvent cleaning and degreasing, mechanical and chemical paint and rust removal, fluids change-out, and welding/soldering (Beck, personal communication 2001).

Non-bulk hazardous materials are received through the MCAS Miramar Hazmin Center, where shipments are inspected for proper labeling and documentation, and stored properly until issue. Materials are supplied to the operational units at the station by the Hazmin Center in accordance with an approved "Authorized Use List" (AUL) (Beck, personal communication 2001).

Hazardous materials (i.e., new or in-use products) are properly stored in various locations, including storage tanks, flammable storage lockers, shelves, and materials storage warehouses. Appropriate Material Safety Data Sheets are located on a computerized database, and hardcopies are maintained in the using unit's "Hazardous Materials Business Plan". Excess hazardous materials are returned to the

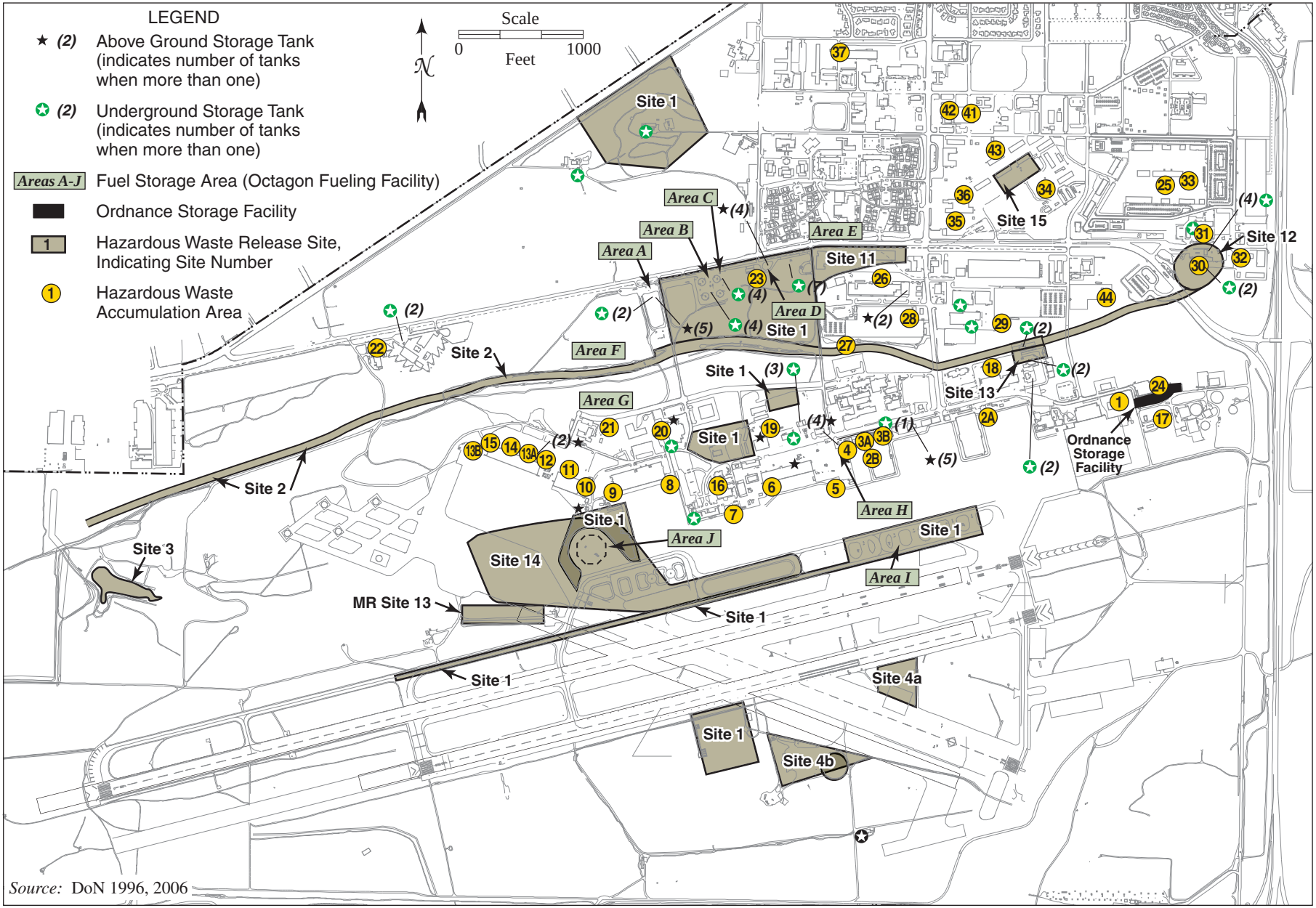
Hazmin Center, where they are screened for use by other units. Hazardous materials storage tanks at MCAS Miramar include 18 active jet fuel, diesel, and gasoline underground storage tanks (USTs) and 104 active diesel, synthetic lubricant oil, and surplus fuel aboveground storage tanks (ASTs). On-base hazardous materials storage areas are depicted on Figure 3.11-1 (DoN 1996; McGuinness, personal communication 2004; Covington, personal communication 2001; Beck, personal communication 2001; McGuinness, personal communication 2009).

MCAS Miramar is a large quantity generator of hazardous waste, as defined by RCRA. Hazardous waste is generated and managed in compliance with USEPA, State of California, and San Diego County regulations. There is no permanent hazardous waste storage areas operated on MCAS Miramar (Beck, personal communication 2001). Hazardous waste is temporarily stored in 60-Day Waste Accumulation Sites and Waste POL tanks. These sites are regulated under California Code of Regulations Title 22 and inspected by the County of San Diego Environmental Health Department. Hazardous waste is picked up weekly upon request, so as not to exceed 60 days. MCAS Miramar uses one USEPA ID number (CA9170024740) and disposes of hazardous waste under a NAVFAC Southwest contract, using Clean Harbors as the hazardous waste contractor (McGuinness, personal communication 2009).

The fuel complex at MCAS Miramar consists of eleven distinct storage, hydrant, and parking areas, covering approximately 27 acres. Fuel is received into base fuel storage tanks via a dedicated pipeline from the Naval Supply Center San Diego at Point Loma (DoN 2006). Fuel is filtered at a receiving station on base and flows to the fuel farm, where the fuel is inspected, stored, and distributed. Fuel is stored in above ground storage tanks and 7 separate USTs. A backup system for delivery of aviation fuels to the airfield is supplied by means of tanker trucks and pipeline delivery from the Kinder Morgan pipeline and the Defense Energy Support Point in Norwalk (DoN 1996, 2006; Covington, personal communication 2001).

As part of a separate action, MCAS Miramar proposes to replace seven jet petroleum fuel (JP-5) USTs with three above ground tanks with greater storage capacity, as well as modify the distribution pipeline system so that it does not traverse Rose Canyon. The existing, aging facilities have the potential for undetectable leaks that could contaminate the soil and/or enter the Rose Canyon drainage. The action is also needed to avoid a risk of reducing fuel supply capacity below the level needed to meet mission requirements. The action would remove six of the seven USTs associated with the existing fuel system and replace those tanks with three above ground tanks, eliminating the potential for undetected leaks underground and additional repair expenditures for the USTs. Additionally, the new distribution system would be equipped with a centralized leak detection device (USMC 2006).

Asbestos-containing materials (ACMs) may be present in buildings or other facilities that would be modified or demolished as part of the proposed action. ACMs have been classified as a hazardous air pollutant by the USEPA, in accordance with Section 112 of the CAA (USEPA 2002a). Surveys would be conducted for ACMs, as required by 40 CFR 61.145 and OPNAVINST 5100.23E, during the design phase of the project and prior to demolition of the structure. Proposed building demolition activities that include the removal and/or handling of regulated asbestos-containing material (RACM) would comply with requirements of SDCAPCD Rule 361.145. Included in this rule are requirements for facility surveys, notification of intent to disturb RACM, control measures, RACM removal, and handling and disposal techniques.



Source: DoN 1996, 2006

FIGURE 3.11-1

Storage Tanks, Fuel Storage Areas, Ordnance Storage Facilities, Hazardous Waste Release Sites, and Hazardous Waste Accumulation Areas at MCAS Miramar

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Lead-based paint may also be present in buildings or other facilities that would be modified or demolished as part of the proposed action. Surveys would be conducted for lead-based paint in accordance with California Code of Regulations, Title 8 – Section 1532.1 and Title 17 – Sections 35022 and 35038, pertaining to lead-based paint at construction sites and in the work place. In addition, 15 USC Section 2601, of the Federal Toxic Substances Control Act, would apply to analysis of lead-based paint in on-site structures. Included in these regulations are requirements for facility surveys, notification of intent to disturb lead-based paint, control measures, removal measures, and handling and disposal techniques. Proposed building demolition activities that include the removal and/or handling of lead-based paint would have to comply with these regulations.

Hazardous Waste Release Sites

In accordance with the IRP, an Initial Assessment Study (IAS) was conducted in 1984 at MCAS Miramar to identify and assess potentially hazardous disposal sites and contaminated areas caused by past hazardous waste storage, handling, or disposal practices (DoN 1984). The Naval Energy and Environmental Support Activity (NEESA) performed the IAS to address problems resulting from past operations. The IAS identified ten sites potentially contaminated by petroleum products or hazardous substances. The NAS Miramar Division Director for Environmental/Hazardous Waste identified eight additional IRP sites since the IAS was conducted. Three of these IRP sites, including Sites 1, 4, and 14, are located in the vicinity of the proposed action, as illustrated in Figure 3.11-1. The following is a description of these three IRP sites (Stegman, personal communication 2005; DoN 2006).

IRP Site 1 - Fuel Farm Operation Area

The Fuel Farm Operation Area (IR Site 1) consists of several locations where waste POLs were sprayed or spread on the ground, between the early 1940s through 1975 for dust control. These locations have all been grouped under Site 1 for convenience. POLs included jet fuel, chlorinated solvents (including trichlorethane, trichloroethylene, and carbon tetrachloride), non-chlorinated solvents, paint thinners and strippers, leaded aviation and motor transport fuels, and possibly small quantities of polychlorinated biphenyl (PCB) dielectric fluids. Also disposed at the same on-base locations were Bunker C fuel tank bottoms, a heavy, tar-like substance resembling an oily sludge, generated by tank cleaning operations at the U.S. Naval Supply Center Fuel Annex at Point Loma, California. An estimated 6.3 to 7.4 million gallons of POL wastes were disposed at these locations. Between 1.8 and 2.1 million gallons of this total volume were Bunker C tank bottoms.

A Verification Phase Confirmation Study, completed in 1987, concluded that IRP Site 1 warranted further study to fully characterize the extent of contamination and develop engineering alternatives for remedial action at the site. Although the POL contamination is likely only present in the upper one to two feet of soil, there may be coincidental, unrelated environmental contamination at depth as a result of ongoing/recent releases from fueling systems (i.e., Octagon Fueling Facility and associated fueling system, see below). IRP Site 1 has not been characterized with respect to surface and near-surface contamination, and as a result, has not been closed with respect to regulatory compliance (Vanwinkle, personal communication 2009).

IRP Site 4 – Fire Training Areas

Two areas located adjacent to the runways at MCAS Miramar have been used as training for firefighters in the suppression of fuel and oil fires. The older of the two training areas, Site 4a (see

Figure 3.11-1), was paved throughout the period of use, from 1958 and the late 1960s. However, a more recent fire training area, Site 4b, used from the early 1960s to at least the mid-1980s, was never paved. Waste materials burned primarily consisted of POL products, similar to those present at Site 1. Pure AvGas or MoGas was typically used to ignite the waste POL. During drills, these substances were poured directly onto the ground around old aircraft fuselages. It is estimated that between 2.7 and 4.7 million gallons of POL products were burned at the old training area and that between 2.6 and 4.7 million gallons of such materials were burned at the more recent training area, prior to 1981.

A Verification Phase Confirmation Study, completed in 1987, concluded that IRP Site 4 warranted further study to fully characterize the extent of contamination and develop engineering alternatives for remedial action at the site. IRP Site 4 has been closed with respect to regulatory compliance by the California RWQCB.

IRP Site 14 – Hangar No. 6 Ditch

Soil contamination occurred in the vicinity of Hangar 6 and the Octagon Fueling Facility as a result of a clogged oil/water separator, spills from aircraft refueling operations, and a leaking UST at the Octagon Fueling Facility. Site 14 overlaps with a portion of Site 1, as illustrated in Figure 3.11-1. A Site Inspection, completed at IRP Site 14 in 1994, recommended removal action due to elevated levels of total petroleum hydrocarbons and low levels of volatile organic compounds, resulting in completion of remediation by 1995. Similar to Site 4, IRP Site 14 has been closed with respect to regulatory compliance by the California Regional Water Quality Control Board (RWQCB).

Munitions Response (MR) Sites

Three MR sites are located at MCAS Miramar in the vicinity of the proposed action. MR Site 1 is a former grenade course; MR Site 9 is a former pistol range; and MR Site 13 is a former boresight range. These sites have resulted in potentially hazardous disposal sites and contaminated areas caused by past hazardous (i.e., munitions) waste storage, handling, or disposal practices. MR Site 13 is shown on Figure 3.11-1 and MR Sites 1 and 9 are shown on Figure 3.14-6.

RCRA Petroleum, Oil, and Lubricants (POL) Sites

One POL site is located in the vicinity of the proposed action. Fuel Pit 13 at the existing Octagon Fueling Facility, located within the north-central portion of the flightline at MCAS Miramar, has had several documented fuel releases. The site is listed as San Diego Department of Environmental Health Release No. H80004-121, which has oversight by the San Diego RWQCB. The source of the contamination was a leaking six-inch fuel (JP-5) supply line and two-inch return line, located at hydrant No. 13. The leaks were repaired in October 2007, but soils in the vicinity of the releases were contaminated. Free product and approximately 70 cubic yards of visually stained soils were removed as an initial action (Shaw Environmental, Inc. 2009; Murukis, personal communication 2009).

A contract through NAVFAC Southwest is being pursued to conduct a site assessment for either possible remediation or closure as-is. There is limited threat to the primary regional aquifer, which is present approximately 160 to 200 feet below ground surface. However, perched groundwater is locally present on MCAS Miramar, at depths of 10 to 30 feet below ground surface. Discontinuous

perched groundwater has also been observed at depths in excess of 100 feet below ground surface. In addition, the lateral and vertical extent of the released JP-5 fuel is currently unknown. A site assessment work plan has been submitted to NAVFAC Southwest in association with this fuel spill (Shaw Environmental, Inc. 2009; Murukis, personal communication 2009).

3.11.2 Environmental Consequences

Full Basing (10-Squadron) Alternative

Construction

ASBESTOS-CONTAINING MATERIAL

ACMs may be present in structures proposed to be modified or demolished and relocated. Surveys would be conducted for ACMs, as required by 40 CFR 61.145, during the design phase of the project and prior to demolition of the structures. Such surveys would categorize any ACMs found in the facilities into four different categories, depending on the friable nature of the material. Based on this categorization, a California licensed asbestos abatement contractor would determine the proper technique for removing the ACMs and demolishing the facilities. ACMs would be removed, characterized, managed, transported, and disposed according to applicable state and federal requirements for protecting human health and safety and the environment. All other proposed construction would be new buildings, such that ACMs would not be present. Therefore, significant impacts associated with ACMs would not occur.

LEAD-BASED PAINT

Similar to ACMs, surveys would be conducted on structures to be modified or demolished and relocated for lead-based paint during the design phase of the project and prior to structure demolition and relocation. Lead-based paint sampling would be conducted on the structures to be removed and analyzed in accordance with USEPA approved Toxicity Characteristic Leaching Procedure (TCLP) methodology. Based on this Federal testing methodology, the paint would be considered hazardous if lead is detected at concentrations greater than five micrograms per liter (µg/l). If lead-based paint were detected at hazardous concentrations, these materials would be removed. Lead-based paint would be characterized, managed, transported, and disposed according to applicable state and federal requirements for protecting human health and safety and the environment. Therefore, significant impacts associated with lead-based paint would not occur.

INSTALLATION RESTORATION PROGRAM (IRP) AND PETROLEUM, OIL, AND LUBRICANTS (POLS) SITES

New construction associated with the Full Basing Alternative north of the runway would include one new hangar module, parking apron expansion, four new fuel pits, and a new wash rack, as shown on Figure 2.3-1. Similarly, new construction south of the runway would include new hangars, aircraft parking apron, taxiways, wash racks, three new fuel pits, and associated fuel lines. In comparing Figure 3.11-1 with Figure 2.3-1, the proposed fuel pits and a portion of one of the proposed new aircraft parking aprons, located north of the runways, coincides partially with IRP Sites 1 and 14, as well as the Octagon Fueling Facility POL site. Among other facilities, the existing Octagon Fueling Facility would be removed for construction of this aircraft parking apron. Soils in this area, especially in the vicinity of the Octagon Fueling Facility, have been contaminated by prior

fuel leaks. Proposed new aircraft apron, taxiway, hangar, and wash rack construction south of the runways is located in the vicinity of IRP Sites 1 and 4b.

The various areas of IRP Site 1 and the Octagon Fueling Facility POL site have not been characterized or remediated with respect to subsurface contamination. However, the USMC will conduct remedial actions, pursuant to CERCLA, to remove hazardous substances, pollutants, or contaminants present at these sites, prior to or in conjunction with the commencement of grading and construction activities, in coordination with the Department of Toxic Substances Control (DTSC), RWQCB, or San Diego County Department of Environmental Health, as appropriate.

Although many of the contaminated sites at MCAS Miramar have been sufficiently characterized, remediated, and closed with respect to regulatory compliance (e.g., IRP Sites 4 and 14), it is possible that residual contamination remains in the subsurface at these locations and may be excavated or disturbed during construction. Unknown or undocumented subsurface contamination may also be encountered in construction areas located outside of designated IRP and POL sites. If contaminated soil or groundwater is encountered or disturbed during demolition or construction-related activities, potentially significant impacts on surface water, groundwater, or the health and safety of on-site workers could occur. However, through implementation of the following actions proposed as part of project planning and design, significant impacts would not occur:

- Prior to any demolition, excavation, or construction activities, known utilities (including fuel, sewer, steam, and electrical) would be identified by the demolition and construction contractor.
- The USMC will conduct remedial actions, pursuant to CERCLA, to remove hazardous substances, pollutants, or contaminants present at these sites, prior to or in conjunction with the commencement of grading and construction activities, in coordination with the DTSC, RWQCB, or San Diego County Department of Environmental Health, as appropriate.
- Remedial actions and excavations would be conducted in compliance with all federal and state statutes and regulations pertaining to soil and groundwater contamination.

Construction personnel current with respect to Occupational Safety and Health Administration (OSHA) 40-hour training for hazardous materials would complete excavations in areas of potentially contaminated soil. An OSHA 40-hour trained monitor, with experience in identification of contaminated soil, would also be present during grading and excavations to determine whether petroleum-based contaminated soil and/or groundwater are encountered. Contaminated soils would be segregated from clean soils prior to offsite disposal.

The contractor would also prepare and implement a Health and Safety Plan prior to the start of grading/excavating to establish policies and procedures to protect workers and the public from potential hazards posed by potentially contaminated soil. The plan would identify all contaminants, appropriate OSHA 40-hour trained workers, public health and environmental protection equipment and procedures; emergency response procedures, route to the hospital, etc. The plan would be reviewed and signed off by all workers that may be in contact with potentially contaminated soil.

These actions would be subject to the requirements of CERCLA. DoN would coordinate with CERCLA program managers before executing the proposed action to ensure conformance with CERCLA requirements for this location. In addition, construction in contaminated areas would be

conducted in accordance with National Contingency Plan (NCP) (40 CFR 300, CERCLA Section 105) and the following regulations and guidance manuals.

- 29 CFR 1910.120 (addresses hazardous waste releases and health and safety of workers);
- Department of the Navy Environmental Restoration Program Manual, August 2006 (protocol to evaluate, characterize, and control the potential migration of possible contaminants resulting from past operations and disposal practices at DoD facilities);
- EM 385-1-1 U.S. Army Corps of Engineers (USACE) Safety and Health Requirement Manual, September 1996 (addresses health and safety issues for workers handling potentially hazardous materials or waste);
- OPNAVINST 5090.1C, Environmental and Natural Resources Program Manual; and
- MCO 5090.2a, USMC Environmental Compliance and Protection Manual.

Other IRP and POL sites are located throughout MCAS Miramar; however, project-related construction is not proposed in these areas. Therefore, impacts would not occur.

MUNITIONS RESPONSE (MR) SITES

New construction associated with the Full Basing Alternative north of the runway would include one new hangar module, parking apron expansion, four new fuel pits, and a new wash rack, as shown on Figure 2.3-1. In addition, vernal pool restoration sites are proposed southeast of the runway, as shown on Figure 3.14-6. In comparing Figure 3.11-1 with Figure 2.3-1, the former Boresight Range (MR Site 13) is located adjacent to the proposed fuel pits. Similarly, the former grenade course (MR Site 1) and pistol range (MR Site 9) are located in the vicinity of the proposed habitat restoration sites (Figure 3.14-6). Former munitions use at these former training sites has potentially resulted in hazardous substances in on-site soils.

MR Site 9 lies adjacent to a potential habitat restoration site and has been closed with respect to regulatory compliance. Therefore, the potential for encountering munitions waste in the vicinity of this MR site during habitat restoration activities is low.

MR Site 1 directly overlies a potential habitat restoration site. The restoration sites illustrated on Figure 3.14-6 show potential areas for habitat restoration. Exact locations of restoration activities within these areas would be decided during biological mitigation planning. However, avoidance of the area within the MR Site 1 boundary during all restoration activities will be implemented during subsequent restoration planning and design.

MR Site 13 lies adjacent to the proposed fuel pits. Because this MR site does not directly coincide with the proposed fuel pits, the potential for encountering munitions waste during construction is low. However, unknown or undocumented subsurface munitions waste may be encountered in construction areas located outside of designated MR sites. If munitions waste is encountered or disturbed during demolition or construction-related activities, potentially significant impacts on surface water, groundwater, or the health and safety of on-site workers could occur. However, through implementation of the following actions proposed as part of project planning and design, significant impacts would not occur:

- Excavations at MR Sites would be conducted in accordance with CERCLA regulations.

- A Health and Safety Plan (HASP) would be conducted prior to grading and excavation activities.
- Remediation would be conducted in accordance with CERCLA and in coordination with the California DTSC, the Remedial Project Manager at NAVFAC, and IRP Manager.
- No construction would occur on contaminated sites until the site has been remediated, in accordance with MCO P5090.2A.

Other MR sites are located throughout MCAS Miramar; however, project-related construction is not proposed in these areas. Therefore, impacts would not occur.

INCIDENTAL SPILLS AND CONSTRUCTION WASTE

Construction would include the use of heavy equipment that would be subject to potential spills of fuel, oil, lubricants, coolant, transmission fluid, hydraulic oil, or other miscellaneous fluids. Servicing these vehicles could similarly result in spills of such petroleum products. In addition, the project may generate small quantities of hazardous waste, such as solvents, adhesives, and paint. Spills of petroleum products or hazardous waste could potentially penetrate into on-site soils resulting in soil and/or groundwater contamination. However, through implementation of the following actions proposed as part of project planning and design, significant impacts would not occur:

- Contractors would be adequately prepared to respond and clean up accidental spills and releases of hazardous materials used or contained in equipment and heavy machinery. Spill response equipment, such as sorbent pads and containment booms, would be available in fueling and maintenance areas.
- Construction-generated petroleum and hazardous waste (e.g., gasoline, solvents, adhesives, and paint) would be properly managed and disposed.
- Contractors would identify, manage, transport, and dispose of regulated wastes (solid waste, hazardous waste, recyclable waste, etc.) in accordance with Title 22 California Code of Regulations and the California Health and Safety Code.
- Shipping paperwork (hazardous waste manifests, special waste manifests, bills of lading, etc.) used to transport waste from the station would be reviewed and signed by the Waste Management Division.
- Cleared construction and demolition materials would be recycled in accordance with the Navy Affirmative Procurement Instruction.
- Contractors would remove excess hazardous materials from the site once work is completed.

In addition, construction, repair, modifications, and maintenance activities that involve the storage of oils in quantities equal or greater than 55 gallons would be required to implement Spill Prevention, Control, and Countermeasure (SPCC) requirements, as presented in 40 CFR 112, MCO P5090.2A, Chapter 7 and MCAS Miramar Oil and Hazardous Substance SPCC Plan of May 2008. These requirements include any container used for standby storage, seasonal storage, temporary storage, or storage not otherwise considered "permanently closed". Additionally, spill containment structures would be provided to prevent spills, leaks, and unauthorized discharges.

The aforementioned statutes and regulations pertaining to IRP sites, POL Sites, MR sites, incidental spills, and construction waste are aimed at protecting human health and the environment. These statutes and regulations address worker safety, regulatory notification, clean-up requirements, and handling, storage, treatment, and disposal requirements for hazardous materials and waste. Compliance with all applicable federal, state, and local regulations would reduce the potential for significant adverse impacts from contaminants such that significant impacts would not occur. Also, refer to section 3.13 (Water Resources) regarding implementation of a site-specific Stormwater Pollutions Prevention Plan (SWPPP) to control potentially contaminated surface runoff during demolition and construction-related activities.

Operations

Potential impacts to surface or groundwater quality, through the accidental release of chemicals during MV-22 operations (e.g., refueling and maintenance) would be reduced by implementation of an NPDES-mandated SWPPP and compliance with federal, state, and local statutes and regulations regarding stormwater retention/treatment and soil and groundwater contamination (described above), such that significant impacts would not occur. As indicated in section 3.13 (Water Resources), the SWPPP includes a SPCC plan, which provides protective and corrective measures for accidental releases of hazardous substances or petroleum products, as described above. Therefore, operational impacts would not be significant.

Habitat Restoration

As noted above, implementation of the Full Basing Alternative at MCAS Miramar will require a number of mitigation measures for habitat restoration. As discussed above, the former grenade course (MR Site 1) and pistol range (MR Site 9) are located in the vicinity of the proposed habitat restoration sites (see Figure 3.14-6). Prior to selecting final restoration sites, the air station would identify and assess potentially hazardous disposal sites and contaminated areas located within the proposed restoration sites, including MR Sites 1 and 9. Where present, the actions described above under the *Installation Restoration Program (IRP) Sites* and *Munitions Response (MR) Sites* would be implemented.

Mitigation Measures

Significant impacts would not occur; therefore, no mitigation measures are proposed.

Maximum Partial Basing (8-Squadron) Alternative

Construction

Under this alternative, hazardous materials impacts would be less than under the Full Basing Alternative, because no construction would occur south of the runway (see Table 2.3-1).

Similar to the Full Basing Alternative, ACMs and lead-based paint may be present in structures proposed to be modified or demolished and relocated. Surveys would be conducted for both of these materials and all lead-based paint and ACMs would be characterized, managed, transported, and disposed according to applicable state and federal requirements for protecting human health and safety and the environment. Therefore, significant impacts associated with lead-based paint and ACMs would not occur.

New construction associated with the Maximum Partial Basing Alternative, in the vicinity of IRP and POL sites north of the runway, would be similar to the Full Basing Alternative. In comparing Figure 3.11-1 with Figure 2.3-3, the proposed fuel pits and a portion of one of the proposed new aircraft parking aprons coincides partially with IRP Sites 1 and 14, as well as the Octagon Fueling Facility POL site. Among other facilities, the existing Octagon Fueling Facility would be removed for construction of the parking apron. However, no construction is proposed south of the runway, in the vicinity of IRP Sites 1 and 4b. The various areas of IRP Site 1 and the Octagon Fueling Facility POL site have not been characterized with respect to subsurface contamination and remediation has not been completed. Contaminated soil removal actions will be completed within IRP Site 1 and the Octagon Fueling Facility POL site, prior to or in conjunction with grading and construction for the proposed action, as described for the Full Basing Alternative. Therefore, significant impacts would not occur in association with construction in known contaminated areas.

Although many of the contaminated sites at MCAS Miramar have been sufficiently characterized, remediated, and closed with respect to regulatory compliance (e.g., Site 14), it is possible that residual contamination remains in the subsurface at this location and may be excavated or disturbed during construction. Similarly, residual contamination may be located outside of designated IRP and POL sites. However, contaminated soil removal actions will be completed within these areas in conjunction with grading and construction for the proposed action, as described for the Full Basing Alternative. Therefore, significant impacts would not occur in association with construction in unknown contaminated areas.

Similarly, in comparing Figure 3.11-1 with Figure 2.3-3, the former Boresight Range (MR Site 13) is located adjacent to the proposed fuel pits. In addition, the former grenade course (MR Site 1) and pistol range (MR Site 9) are located in the vicinity of the proposed habitat restoration sites, as shown on Figure 3.14-6. Former munitions use at these former training sites has potentially resulted in hazardous substances in on-site soils. Therefore, grading, construction, and habitat restoration activities may encounter contaminated soil in the vicinity of MR Sites 1, 9, and 13. As described under the Full Basing Alternative, MR Site 1 would be avoided during habitat restoration planning. In addition, if necessary, remediation would be conducted in accordance with CERCLA and in coordination with the California DTSC, the Remedial Project Manager at NAVFAC, and IRP Manager. No construction would occur on contaminated sites until the site has been remediated, in accordance with MCO P5090.2A.

Other IRP and MR sites are located throughout MCAS Miramar; however, project-related construction is not proposed in these areas. Therefore, impacts would not occur. Unknown or undocumented subsurface contamination may also be encountered in construction areas. If contaminated soil or groundwater is encountered or disturbed during demolition or construction-related activities, potentially significant impacts on surface water, groundwater, or worker health and safety could occur as a result of a discharge or accidental release. However, these potential impacts would be reduced by implementation of the actions outlined for the Full Basing Alternative, such that significant impacts would not occur.

Construction would include the use of heavy equipment that would be subject to potential spills of fuel, oil, lubricants, coolant, transmission fluid, hydraulic oil, or other miscellaneous fluids. Servicing these vehicles could similarly result in spills of such petroleum products. In addition, the project may generate small quantities of hazardous waste, such as solvents, adhesives, and paint. Spills of petroleum products or hazardous waste could potentially penetrate into on-site soils

resulting in soil and/or groundwater contamination. However, these potential impacts would be reduced by implementation of the actions outlined for the Full Basing Alternative, such that significant impacts would not occur.

In addition, construction, repair, modifications, and maintenance activities that involve the storage of oils in quantities equal or greater than 55 gallons would be required to implement SPCC requirements, as presented in 40 CFR 112, MCO P5090.2A, Chapter 7 and MCAS Miramar Oil and Hazardous Substance SPCC Plan of May 2008. These requirements include any container used for standby storage, seasonal storage, temporary storage, or storage not otherwise considered "permanently closed". Additionally, spill containment structures would be provided to prevent spills, leaks, and unauthorized discharges. Compliance with all applicable federal, state, and local regulations would reduce the potential for significant adverse impacts from contaminants, such that significant impacts would not occur. Also, refer to section 3.13 (Water Resources) regarding implementation of a site-specific SWPPP to control potentially contaminated surface runoff during demolition and construction-related activities.

Operations

Potential impacts to surface or groundwater quality through the accidental release of chemicals during MV-22 operations (e.g., refueling) would be reduced by implementation of an NPDES-mandated SWPPP and compliance with federal, state, and local statutes and regulations regarding stormwater retention/treatment and soil and groundwater contamination (described above), such that significant impacts would not occur. As indicated in section 3.13 (Water Resources), the SWPPP includes an SPCC plan, which provides protective and corrective measures for accidental releases of hazardous substances or petroleum products, as described above for the Full Basing Alternative. Therefore, operational impacts would not be significant.

Habitat Restoration

As noted above, implementation of the Maximum Partial Basing Alternative at MCAS Miramar will require a number of mitigation measures for habitat restoration. As discussed above, the former grenade course (MR Site 1) and pistol range (MR Site 9) are located in the vicinity of the proposed habitat restoration sites (see Figure 3.14-6). Prior to selecting final restoration sites, the air station would identify and assess potentially hazardous disposal sites and contaminated areas located within the proposed restoration sites, including MR Sites 1 and 9. Where present, the actions described above under the *Installation Restoration Program (IRP) Sites* and *Munitions Response (MR) Sites* would be implemented.

Mitigation Measures

Significant impacts would not occur; therefore, no mitigation measures are proposed.

Minimum Partial Basing (2-Squadron) Alternative

Construction

No construction or demolition is associated with the implementation of the Minimum Partial Basing Alternative at MCAS Miramar. Therefore, no construction-related impacts would occur.

Operations

Potential impacts to surface or groundwater quality through the accidental release of chemicals during MV-22 operations (e.g., refueling) would be reduced by implementation of an NPDES-mandated SWPPP and compliance with federal, state, and local statutes and regulations regarding stormwater retention/treatment and soil and groundwater contamination (described above), such that significant impacts would not occur. As indicated in section 3.13 (Water Resources), the SWPPP includes an SPCC plan, which provides protective and corrective measures for accidental releases of hazardous substances or petroleum products, as described above for the Full Basing Alternative. Therefore, operational impacts would not be significant.

Mitigation Measures

Significant impacts would not occur; therefore, no mitigation measures are proposed.

Non-MCAS Miramar Basing Alternatives

A non-MCAS Miramar basing alternative would represent a reduction of aircraft being stationed at MCAS Miramar, with respect to existing conditions. Four existing CH-46E squadrons would be removed and MV-22 squadrons would be located at other installations. As a result, no new construction would occur and the net effect would represent a decrease in operational activity at MCAS Miramar. Therefore, no hazardous materials impacts would occur at MCAS Miramar.

Mitigation Measures

Because there would be no hazardous materials impacts, no mitigation measures are proposed.

No Action Alternative

Under the No Action Alternative, the existing MCAS Miramar facilities would not be modified and new facilities would not be constructed. Fielding of the MV-22 at MCAS Miramar would not occur. MCAS Miramar would continue to support several squadrons of CH-46s and CH-53s. Therefore, hazardous materials impacts would not occur.

3.12 TOPOGRAPHY, GEOLOGY, AND SOILS

This section describes the general geology, topography, soils, and seismicity at MCAS Miramar. The geologic resources of an area consist of all soil and bedrock materials. For the purpose of this study, the terms soil and rock refer to unconsolidated and consolidated earth materials, respectively, regardless of depth.

3.12.1 Affected Environment

General Geology and Topography

MCAS Miramar is located on a gently sloping mesa surface dissected by Rose Canyon, San Clemente Canyon, and their tributary canyons. The canyons drain primarily to the west. The western portion of the station, which includes the project area, is underlain primarily by the Lindavista Formation, which consists of interbedded sandstone and conglomerate. Alluvium, slope wash deposits, and

Stadium Conglomerate are exposed in Rose Canyon, which traverses the project area. Elevations at the station range from approximately 1,000 to 1,200 feet in the east to 200 feet in the west (DoN 2006).

Soils

The soils in the vicinity of MCAS Miramar have been mapped as Redding gravelly loam or Redding cobbly loam (DoN 2006). These soils are generally not susceptible to settlement, but have a moderate to high expansion potential, and a severe potential for erosion (U.S. Department of Agriculture [USDA] 1973, DoN 1996).

Seismicity

The California Division of Mines and Geology (CDMG) classifies faults as either active or potentially active, according to the Alquist-Priolo Special Studies Zone Act of 1972 (CDMG 1999). A fault which has exhibited surface displacement within the Holocene Epoch (the last 11,000 years) is defined as active by the CDMG. The CDMG suggests that this definition be used to evaluate faults located within a 60-mile (96- km) radius of a project site. A fault which has exhibited surface displacement during the Pleistocene Epoch (which began about 1.6 million years ago and ended about 11,000 years ago) is defined as potentially active. Pre-Pleistocene faults are considered inactive.

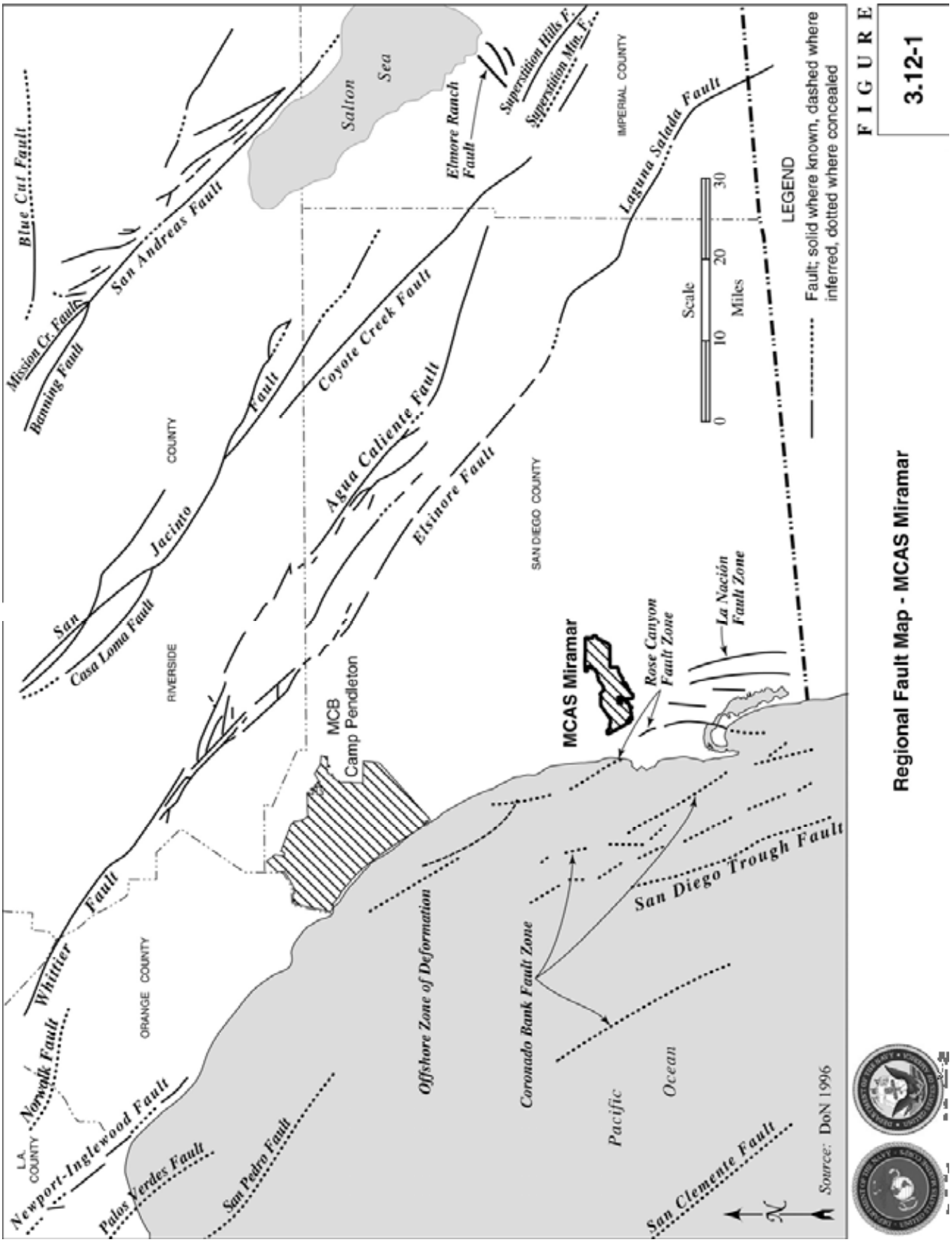
MCAS Miramar is located in a highly seismic region. No known active or potentially active faults underlie the station and major seismic activity is not historically known in the Miramar area. Major regional faults located in the vicinity of Miramar include the Elsinore/Aqua Caliente, the San Jacinto, and the San Andreas. Several minor faults occur northwest of the station including; La Nacion, San Clemente, Sweetwater, and Rose Canyon. Of these, five are known active faults and are located within a 60-mile (96-km) radius of the project area (Figure 3.12-1). Table 3.12-1 presents the distances and maximum credible earthquakes for regional and active faults capable of affecting

Table 3.12-1. Seismic Parameters for Major Active Faults Within 60 Miles (96 km) of MCAS Miramar

Fault	Distance to Project Area (miles/kilometers)	Maximum Credible Earthquake (Richter Magnitude)
Elsinore	37/59	7.5
San Jacinto	60/96	7.5
Coronado Bank	12/19	6.75
Rose Canyon	4/6	7.15
Offshore Zone of Deformation	13/21	7.5
San Clemente	55/88	7.65
Source: Greensfelder 1974, CDMG 1994		

the site in terms of ground shaking. The most notable probable seismic event likely to affect the project area would be an earthquake of Richter magnitude 6.5 associated with the active Rose Canyon fault zone, located approximately 4 miles (6 km) west of the site. This fault zone is capableof generating peak ground and repeatable high ground accelerations of 0.48 and 0.31 g, respectively, where "g" equals acceleration due to gravity (DoN 1996).

Large earthquakes along extensive faults, such as the San Andreas, can produce ground accelerations with longer wavelengths and durations than smaller faults, even though the latter structures may be closer and thus generate greater peak acceleration values. The wavelength, amplitude, and duration of seismic shaking can contribute to the destructive potential of individual earthquake events (Seed and Idriss 1982; CDMG 1994, DoN 1996).


Blue Cut Fault
Mission Cr. Fault
Banning Fault
San Andreas Fault
Salton Sea
Elmore Ranch Fault
Superstition Hills F.
Superstition Mtn. F.
IMPERIAL COUNTY
Laguna Salada Fault
LEGEND
Fault; solid where known, dashed where inferred, dotted where concealed
Scale
0 10 20 30
Miles
Coyote Creek Fault
Agua Caliente Fault
Elsinore Fault
San Jacinto Fault
San Casa Loma Fault
RIVERSIDE COUNTY
SAN DIEGO COUNTY
La Nación Fault Zone
Rose Canyon Fault Zone
MCAS Miramar
MCB Camp Pendleton
Whittier Fault
Norwalk Fault
ORANGE COUNTY
LA COUNTY
Newport-Inglewood Fault
Palos Verdes Fault
San Pedro Fault
Offshore Zone of Deformation
Coronado Bank Fault Zone
San Diego Trough Fault
Pacific Ocean
San Clemente Fault
Source: DoN 1996
FIGURE 3.12-1
Regional Fault Map - MCAS Miramar

A 1981 earthquake safety investigation determined that a major earthquake event could cause significant danger and serious damage to existing structures and utilities at MCAS Miramar (DoN 2006).

The majority of MCAS Miramar has a very low potential for liquefaction (i.e., the process by which soils become liquid when subject to ground shaking) and compaction of soils during seismic events because of the well-consolidated and dense nature of the earth materials and the lack of a shallow groundwater table (DoN 1996).

3.12.2 Environmental Consequences

Full Basing (10-Squadron) Alternative

Topography

New construction associated with the Full Basing Alternative north of the runway would include one new hangar module, parking apron expansion, four new fuel pits, and a new wash rack, as shown on Figure 2.3-1. Minimal grading would be required since a majority of the area is generally flat, has been previously graded, and is currently developed. New construction south of the runway would include new hangars, aircraft parking apron, taxiways, wash racks, three new fuel pits, and associated fuel lines. Construction south of the runway would occur in an undeveloped area that is also generally flat, resulting in minimal grading. Therefore, changes to the existing topography would be minimal. Grading/construction would be completed in accordance with Uniform Building Code and DoD Unified Facilities Criteria (UFC) requirements. In addition, a site-specific geotechnical report would be prepared for the proposed construction areas. Due to the limited changes to the existing topography and completion of grading in accordance with Uniform Building Code (Chapter 70) and UFC specifications and geotechnical consulting recommendations, topographic impacts would not occur as a result of the proposed action.

Geology and Soils

Soils at MCAS Miramar are generally not susceptible to settlement, but have a moderate to high expansion potential, and a severe potential for erosion. Construction activities at MCAS Miramar would be completed in compliance with the geotechnical recommendations incorporated into the project design, which would include provisions for mitigating expansive soil. Site grading and construction of the proposed facilities would result in temporary soil disturbance. The relatively flat topography in the construction areas would minimize the erosion potential during construction.

In addition, construction activities would be completed in compliance with a project-specific NPDES General Construction Permit. As part of the permit, a SWPPP would be prepared. The SWPPP would incorporate measures as recommended in the standard, site-specific geotechnical report for the proposed construction. As outlined in the USEPA NPDES Phase II Stormwater Regulations (USEPA 1999a), BMPs would be implemented prior to, and during, the rainy season for erosion and sediment control to be effective. Provisions for both temporary and permanent erosion and sediment control measures would be implemented in accordance with the SWPPP prepared/designed specifically for the construction sites. Once implemented, these control measures would be monitored and maintained to ensure their effectiveness. Due to compliance with geotechnical recommendations and implementation of BMPs, including incorporation of

standard erosion control measures, significant erosional and expansive soil impacts associated with project construction would not occur.

Seismicity

MCAS Miramar is not underlain by any active or potentially active faults, nor does MCAS Miramar overlie areas of high liquefaction potential. However, active faults located within 60 miles (97 km) of MCAS Miramar (see Figure 3.12-1) could result in strong seismically induced ground motion and associated ground shaking. As a result, proposed construction and operations could increase exposure of people and property to seismic hazards from a major or great earthquake. However, new facilities would be designed and constructed in accordance with a site-specific geotechnical investigation and would comply with the seismic design criteria identified in the Uniform Building Code, the NAVFAC P-355 Seismic Design Manual, and the most stringent criteria identified in the latest design specifications of the Structural Engineering Association of California. With incorporation of such standard geotechnical protocol, significant impacts associated with seismically induced ground motion and ground shaking would not occur.

Habitat Restoration

As noted in section 3.1, implementation of the Full Basing Alternative at MCAS Miramar will require a number of mitigation measures for habitat restoration. Compensatory restoration of habitat could result in the conversion of land on station from degraded habitat to high quality habitat occupied by endangered species. Habitat restoration in these areas would alter topography and disturb soil; however, these changes could be viewed as beneficial or of no impact.

Mitigation Measures

Because there would be no significant geologic impacts, no mitigation measures are proposed.

Maximum Partial Basing (8-Squadron) Alternative

Under this alternative, geologic impacts would be less than under the Full Basing Alternative, because no construction would occur south of the runway (see Table 2.3-1). Similar to the Full Basing Alternative, changes to the existing topography and erosion would be minimal during construction due to the relatively flat topography. Based on compliance with geotechnical recommendations and implementation of BMPs, including incorporation of standard erosion control measures, significant erosional impacts associated with project construction would not occur. In addition, similar to the Full Basing Alternative, proposed structures and infrastructure would be subject to expansive soils. However, new facilities would be designed and constructed in accordance with a site-specific geotechnical investigation and would comply with the design criteria identified in the Uniform Building Code and UFC requirements, and the most stringent criteria identified in the latest design specifications of the Structural Engineering Association of California. Therefore, significant impacts associated with expansive soils would not occur.

As described for the Full Basing Alternative, MCAS Miramar is not underlain by any active or potentially active faults. However, active faults located within 60 miles (97 km) of MCAS Miramar could result in strong seismically induced ground motion and associated ground shaking. As a result, proposed construction and operations could increase exposure of people and property to seismic hazards from a major or great earthquake. However, with incorporation of standard

geotechnical protocol, significant impacts associated with seismically induced ground motion and ground shaking would not occur.

As noted in section 3.1, implementation of the Maximum Partial Basing Alternative at MCAS Miramar will require a number of mitigation measures for habitat restoration. Compensatory restoration of habitat could result in the conversion of land on station from degraded habitat to high quality habitat occupied by endangered species. Habitat restoration in these areas would alter topography and disturb soil; however, these changes could be viewed as beneficial or of no impact.

Mitigation Measures

Because there would be no significant geologic impacts, no mitigation measures are proposed.

Minimum Partial Basing (2-Squadron) Alternative

No construction or demolition is associated with the implementation of the Minimum Partial Basing Alternative at MCAS Miramar. Additionally, there would be an overall reduction in military aircraft operations, ground-based activity, and personnel compared to existing conditions. Therefore, significant geologic impacts would not occur.

Mitigation Measures

Because there would be no significant geologic impacts, no mitigation measures are proposed.

Non-MCAS Miramar Basing Alternatives

A non-MCAS Miramar basing alternative would represent a reduction of aircraft being stationed at MCAS Miramar, with respect to existing conditions. Four existing CH-46E squadrons would be removed and MV-22 squadrons would be located at other installations. As a result, no new construction would occur and the net effect would represent a decrease in operational activity at MCAS Miramar. Therefore, no geologic impacts would occur at MCAS Miramar.

Mitigation Measures

Because there would be no geologic impacts, no mitigation measures are proposed.

No Action Alternative

Under the No Action Alternative, the existing MCAS Miramar facilities would not be modified and new facilities would not be constructed. Fielding of the MV-22 at MCAS Miramar would not occur. MCAS Miramar would continue to support several squadrons of CH-46s and CH-53s. Therefore, geologic impacts would not occur.

3.13 WATER RESOURCES

This section describes the surface and groundwater hydrology at MCAS Miramar, including water quality, water supply, and flooding. Hydrology is the science that deals with global water, its properties, circulation, and distribution, on and under the surface of the earth and in the atmosphere, from the moment of precipitation until it returns to the atmosphere through evapotranspiration or is discharged into the ocean. Water quality describes the chemical and

physical composition of water as affected by natural conditions (e.g., erosion) and human activities (e.g., hazardous waste spills). Water supply includes a general discussion of groundwater availability in the vicinity of the site.

Floodplains are generally located adjacent to rivers and other bodies of water and in low-lying areas near a water source. Floodplains are areas with a one percent chance of flooding in any given year. Floodways are more hazardous due to the anticipated velocities of the floodwaters and expected damage to life and property. Floodplains are identified with respect to project components to determine the likelihood of inundation following high intensity rainfall events.

3.13.1 Affected Environment

Surface Water

MCAS Miramar is located on the coastal plain of San Diego County, within the San Clemente and Rose Canyon drainage basins. These canyons converge three miles (five km) west of the site. The major streams of San Clemente Canyon and Rose Canyon traverse from east to west and intersect several minor tributaries that flow in north/south trending canyons. Surface water in these areas occurs primarily as overland sheet flow during periods of heavy rainfall in early spring and winter. Due to low average rainfall, surface water runoff is relatively low. Surface runoff from MCAS Miramar primarily drains into Rose Canyon and to a lesser extent into San Clemente and Sycamore canyons. Drainage occurs through natural topographic gradients and man-made drains (RWQCB 1994; DoN 1996).

Potential sources of surface water contamination, as a result of surface soil and sediment transport, have been identified at MCAS Miramar. Various sites were inspected to determine whether release of hazardous substances had occurred. Surface soils at some of these sites contain concentrations of total petroleum hydrocarbons (TPH), polychlorinated aromatic hydrocarbons (PAH), and/or metals. Surface water samples were collected at the discharge point into Rose Canyon, and the results were compared with USEPA - Region 9, Preliminary Remediation Goals (PRGs). These results indicated that contaminant concentrations in the surface water samples were below the PRG values. Therefore, no evidence of surface water quality degradation has been observed to originate from MCAS Miramar (DoN 1996).

Rose Canyon and San Clemente Canyon are known to have stream bank erosion problems. Rose Canyon was identified as a source of high concentrations of organically rich fine sediments draining into Mission Bay, aggravating silting of the bay and degrading bottom sediment quality (MCAS Miramar 2006).

Stormwater runoff during construction and operational phases of the project would be regulated under a NPDES Permit and associated SWPPP, prior to discharge into Rose and San Clemente canyons. NPDES is the national program for issuing, modifying, revoking, etc., permits under Sections 307, 318, 402, and 405 of the Clean Water Act. The NPDES permit is an authorization issued by the USEPA, or an approved state agency, to discharge under certain specified conditions. The SWPPP is designed to minimize water quality degradation through establishment of project-specific BMPs, implementation of standard erosion control measures, and implementation of a SPCC plan. Currently, MCAS Miramar maintains an activity-wide (base-wide) SWPPP. New facilities construction would require a separate SWPPP for construction activities. This plan would override existing SWPPPs. Following construction, BMPs would be applied to new operational activities.

Flooding

Flooding is a geologic hazard within San Diego County. Floodplains are generally located adjacent to rivers and other bodies of water and in low-lying areas near a water source. Floodplains are areas with a one percent chance of flooding in any given year. Floodways are more hazardous due to the anticipated velocities of the floodwaters and expected damage to life and property.

Federal Emergency Management Agency (FEMA) floodplain maps do not extend into MCAS Miramar (i.e., MCAS Miramar is marked as "area not included"). The FEMA floodplain maps for 100-year and 500-year flood events have been prepared for only certain portions of San Clemente and Rose canyons, located outside of MCAS Miramar. However, SANDAG has mapped 100-year flood plains of San Clemente and Rose Canyon creeks in the vicinity of MCAS Miramar. These floodplains extend to the northern and southern perimeter of MCAS Miramar, but do not extend onto the air station (SANDAG 2004). Similarly, NAVFAC (DoN 2006) has mapped 100-year flood plains of San Clemente and Rose Canyon creeks in the vicinity of MCAS Miramar. These floodplains extend immediately north, west, and southeast of proposed project grading and construction areas, but do not encroach on these areas (see Figure 3.13-1).

Groundwater

Groundwater at MCAS Miramar generally occurs in two aquifers: the Quaternary alluvium and the confined regional aquifer of the Scripps Formation. In addition, groundwater potentially occurs in the transient, gravity-controlled system in the Stadium Conglomerate and Lindavista Formation (DoN 1996).

Quaternary alluvium occupies San Clemente and Rose canyons. Tributary groundwater flows toward these canyons and recharges the shallow aquifer within the alluvium, which occurs at a depth of approximately 10 to 25 feet (3 to 7 meters) below ground surface. Although the groundwater is permanent and supports sycamore and oak trees, this alluvial aquifer is not considered a significant groundwater basin (RWQCB 1994; DoN 1996).

A regional aquifer occurs within the sand and gravel layers of the Eocene Scripps Formation, located at a depth of approximately 160 to 250 feet (48 to 75 meters) below ground surface. Groundwater flow in this aquifer in the southern and western portions of MCAS Miramar is predominantly to the west and southwest, parallel to Rose and San Clemente canyons, whereas groundwater flow in the northeastern portion is to the northwest (DoN 1996; Shaw Environmental, Inc. 2009; Murukis, personal communication 2009). An aquiclude is a low-permeability unit that forms the upper or lower boundary of an aquifer. Aquicludes in the Scripps Formation consist of sandy clays and claystones of overlying deposits that create confining conditions. The resulting pressure on the aquifer is sufficient to raise the groundwater as much as 100 feet (30 meters) above the water table (DoN 1996).

The amount of groundwater within the Stadium Conglomerate and the Lindavista Formation overlying the aquicludes of the regional aquifer is variable and limited in quantity. Low annual rainfall, combined with low average soil moisture and the very low permeability of the Stadium Conglomerate, result in limited groundwater recharge (DoN 1996).

Groundwater quality beneath MCAS Miramar is generally poor due to high total dissolved solids (TDS) concentrations. TDS concentrations generally exceed the groundwater quality objective of 750 milligrams/liter. The regional confined aquifer beneath the project area has been designated

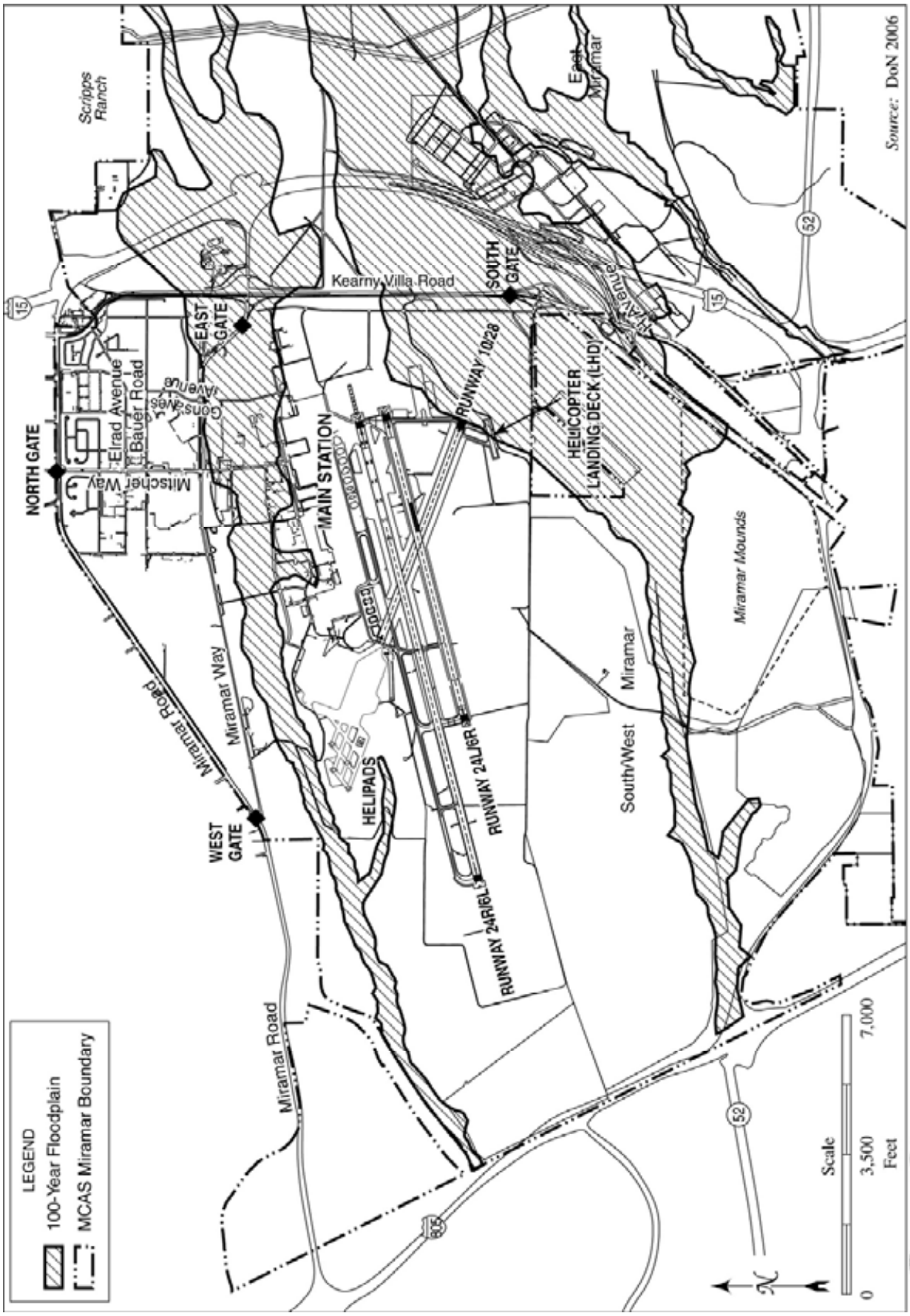


FIGURE 3.13-1

100-Year Floodplain at MCAS Miramar

by the RWQCB - San Diego Region as having no existing beneficial uses (RWQCB 1994; DoN 1996). Therefore, MCAS Miramar receives potable water supplies from the City of San Diego Water Department (Rowlands, personal communication 2005).

3.13.2 Environmental Consequences

Full Basing (10-Squadron) Alternative

Water Quality

New construction associated with the Full Basing Alternative north of the runway would include one new hangar module, parking apron expansion, four new fuel pits, and a new wash rack, as shown on Figure 2.3-1. Similarly, new construction south of the runway would include new hangars, aircraft parking apron, taxiways, wash racks, three new fuel pits, and associated fuel lines.

Surface water quality of nearby drainages and creeks, including Rose Canyon and to a lesser extent San Clemente and Sycamore canyons, could potentially be impacted by fuel spills and surface water run-off associated with construction-related activities. However, stormwater runoff would be regulated under a NPDES permit and associated SWPPP prepared specifically for the construction activities associated with the proposed action. The SWPPP would be designed to minimize water quality degradation through establishment of project-specific BMPs, including implementation of a SPCC plan. Construction-related erosion control measures would include, but not be limited to, erosion control blankets, soil stabilizers, temporary seeding, silt fencing, hay bales, sand bags, and storm drain inlet protection devices. Due to implementation of BMPs, including incorporation of a SPCC plan, significant water quality impacts associated with project construction would not occur.

Flooding

The 100-year flood plains of San Clemente and Rose Canyon creeks extend to the northern and southern perimeter of MCAS Miramar, but do not extend onto the air station. Therefore, impacts on the proposed action due to flooding would not occur.

Water Supply

Construction and operation activities associated with the proposed action would likely have minimal impact on water supply, as the MV-22 would be replacing an existing rotary wing squadron. Regarding expected changes in water supply, a wash rack typically uses 23,000 gallons per day, washing 6 to 7 aircraft per day (Kruse, personal communication 2008), and it is estimated that personnel use an average of 100 gallons per day, per person (Kruse, personal communication 2008). Water would continue to be derived from the San Diego Water Department, which would be able to provide the additional needed supplies (Rowlands, personal communication 2005).

Mitigation Measures

Significant impacts would not occur; therefore, no mitigation measures are proposed.

Maximum Partial Basing (8-Squadron) Alternative

Under this alternative, surface water quality impacts would be less than under the Full Basing Alternative, because no construction would occur south of the runway. Similar to the Full Basing Alternative, surface water quality of nearby drainages and creeks, including Rose Canyon and to a lesser extent San Clemente and Sycamore canyons, could potentially be impacted by fuel spills and surface water run-off associated with construction-related activities. However, due to implementation of BMPs, including incorporation of a SPCC plan, significant water quality impacts associated with project construction would not occur.

Similar to that described for the Full Basing Alternative, the 100-year flood plains of San Clemente and Rose Canyon creeks extend to the northern and southern perimeter of MCAS Miramar, but do not extend onto the air station. Therefore, impacts on the Maximum Partial Basing Alternative, due to flooding, would not occur.

Also similar to the Full Basing Alternative, construction and operation activities associated with the Maximum Partial Basing Alternative would likely have minimal impact on water supply, as the MV-22 would be replacing an existing rotary wing squadron. Water would continue to be derived from the San Diego Water Department, which would be able to provide the additional needed supplies (Rowlands, personal communication 2005).

Mitigation Measures

Significant impacts would not occur; therefore, no mitigation measures are proposed.

Minimum Partial Basing (2-Squadron) Alternative

No construction or demolition is associated with the implementation of the Minimum Partial Basing Alternative at MCAS Miramar. Additionally, there would be an overall reduction in military aircraft operations, ground-based activity, and personnel compared to existing conditions. Overall, water usage for MV-22 operations would likely not differ significantly from existing conditions (Rowlands, personal communication 2005), and may decrease based on a decrease in military personnel and their dependents. Therefore, significant impacts associated would not occur.

Mitigation Measures

Significant impacts would not occur; therefore, no mitigation measures are proposed.

Non-MCAS Miramar Basing Alternatives

A non-MCAS Miramar basing alternative would represent a reduction of aircraft being stationed at MCAS Miramar, with respect to existing conditions. Four existing CH-46E squadrons would be removed and MV-22 squadrons would be located at other installations. As a result, no new construction would occur and the net effect would represent a decrease in operational activity at MCAS Miramar. Therefore, no water quality, flooding, or water supply impacts would occur at MCAS Miramar.

Mitigation Measures

Because there would be no impacts, no mitigation measures are proposed.

No Action Alternative

Under the No Action Alternative, the existing MCAS Miramar facilities would not be modified and new facilities would not be constructed. Fielding of the MV-22 at MCAS Miramar would not occur. MCAS Miramar would continue to support several squadrons of CH-46s and of CH-53s. Therefore, water resources impacts would not occur.

3.14 BIOLOGICAL RESOURCES

This section describes the existing biological conditions at MCAS Miramar, including vegetation, wildlife, and special status species and habitats. It focuses on the biological resources that are present within and in the vicinity of the undeveloped areas that could directly or indirectly be affected by the proposed action. No project-specific sensitive plant or wildlife surveys were completed for this project; however, sensitive species locations and habitat associations are well understood and documented on MCAS Miramar. Rare plant and fairy shrimp species that occur associated with vernal pool and other seasonally ponded habitats in the vicinity of the project area were comprehensively surveyed and mapped between 2001 and 2005 (MCAS Miramar 2008b). Basewide protocol surveys for California gnatcatcher (*Polioptila californica californica*) and complete wetland delineation surveys in the Main Station and flightline areas were completed in 2007.

The baseline biological resources information for MCAS Miramar was collected from several key sources, primarily the following: the MCAS Miramar INRMP (MCAS Miramar 2006), station specific geographic information system (GIS) database that is updated on an ongoing basis as new studies are completed (MCAS Miramar 2008b), and various reports and studies specific to known resources at MCAS Miramar. The USMC provided baseline GIS information current through September 2008 (MCAS Miramar 2008b).

3.14.1 Affected Environment

Vegetation Communities and Wildlife Habitats

Much of the natural areas of MCAS Miramar were affected by the Cedar Fire in 2003, which burned approximately 17,600 acres (7,122 ha) on the station (MCAS Miramar 2006). The fire burned approximately 67 percent of coastal sage scrub (California gnatcatcher habitat) and 75 percent of vernal pool habitat on the station (MCAS Miramar 2006). In addition, the fire burned nearly 100 percent of willowy monardella (*Monardella linoides* ssp. *viminea*) populations, Del Mar manzanita (*Arctostaphylos glandulosa ssp. crassifolia*) populations, and least Bell's vireo (*Vireo bellii pusillus)* habitat (MCAS Miramar 2006). Much of plant community mapping and sensitive species locations used in this section are based on pre-fire conditions; however, where appropriate, additional discussion is provided to present post-fire baseline conditions.

Proposed project components would occur within the Main Station area on a level mesa that is bordered by Rose Canyon on the north and San Clemente Canyon on the south. Figure 3.14-1 presents a map of the plant communities in the vicinity of the areas proposed for new project construction. No project specific vegetation mapping occurred; however, basewide mapping is included as part of the MCAS Miramar Natural Resources Division GIS dataset. The "limits of mapping" boundary depicted on Figure 3.14-1 is an arbitrarily defined area that encompasses all proposed project components as well as some context of surrounding communities. This information is summarized below and provides the baseline biological environment for the proposed action.

The classification system used for vegetation mapping is consistent with the CDFG system developed by Holland (1986). Several new or combined categories were added to differentiate distinctive or ecologically important vegetation features on MCAS Miramar. In addition to native and non-native vegetation types, the classification includes a "disturbed" category for each vegetation type defined as an area where more than half the vegetation normally present is either bare ground and/or consists of weedy species characteristic of disturbed areas. Most of the plant communities within the Main Station area of MCAS Miramar include some level of disturbance.

The majority of Main Station is covered by developed land. Diegan coastal sage scrub, chaparral, and native and non-native grassland historically occurred in the undeveloped areas south of the runway; however, the area was substantially affected by the 2003 Cedar Fire and is currently at various stages of recovery. Most of the remaining native communities mapped are substantially disturbed and support 50 percent or less of their primary native component (MCAS Miramar 2006, 2008b). Table 3.14-1 presents the primary plant communities in the vicinity of proposed project activities. The percentages include both the primary and disturbed categories for each community. A detailed discussion of these communities is provided below.

Table 3.14-1. Plant Communities in the Vicinity of Proposed Project Components on MCAS Miramar

Community Type[1]	Area Acres (Hectares)[2]	Percent of Mapped Area (%)[3]
Developed	990.1 (400.7)	44.5
Chaparral (several types)	252.0 (102.0)	11.3
Native and Non-Native Grassland	377.2 (152.6)	16.9
Diegan Coastal Sage Scrub	258.1 (104.4)	11.6
Disturbed Habitat[4]	330.3 (133.7)	14.8
Eucalyptus Woodland	11.7 (4.7)	0.5
Coastal and Fresh Water Marsh	0.1 (<0.1)	<0.1
Vernal Marsh	7.1 (2.9)	0.3
Total	**2,226.7 (901.1)**	**100**

Notes:
1. Most communities within the "limits of mapping" include some level of disturbance.
2. Plant Communities and distribution are based on the "limits of mapping" presented in Figure 3.14-1. The "limits of mapping" is an arbitrarily defined boundary encompassing all project components to provide context for understanding the distribution of plant communities in the area.
3. Plant Communities and distribution are based on the "limits of mapping" presented in Figure 3.14-1. The "limits of mapping" is an arbitrarily defined boundary encompassing all project components to provide context for understanding the distribution of plant communities in the area.
4. Areas classified as "disturbed habitat" are essentially barren but are of concern where the habitat includes vernal pools and/or their surrounding drainage areas.

Source: MCAS Miramar 2008b

Developed

This category includes developed or severely disturbed areas that are essentially devoid of vegetation except for minimal amounts of ruderal weeds or ornamental landscaping. Developed areas within the project area include the runways, taxiways, roads, hangars and other associated structures.

Chaparral (Several Types)

Chaparral is characterized by a dense cover of evergreen woody shrubs, usually occurring on more mesic sites than coastal sage scrub. Several types of chaparral occur on MCAS Miramar including the following:

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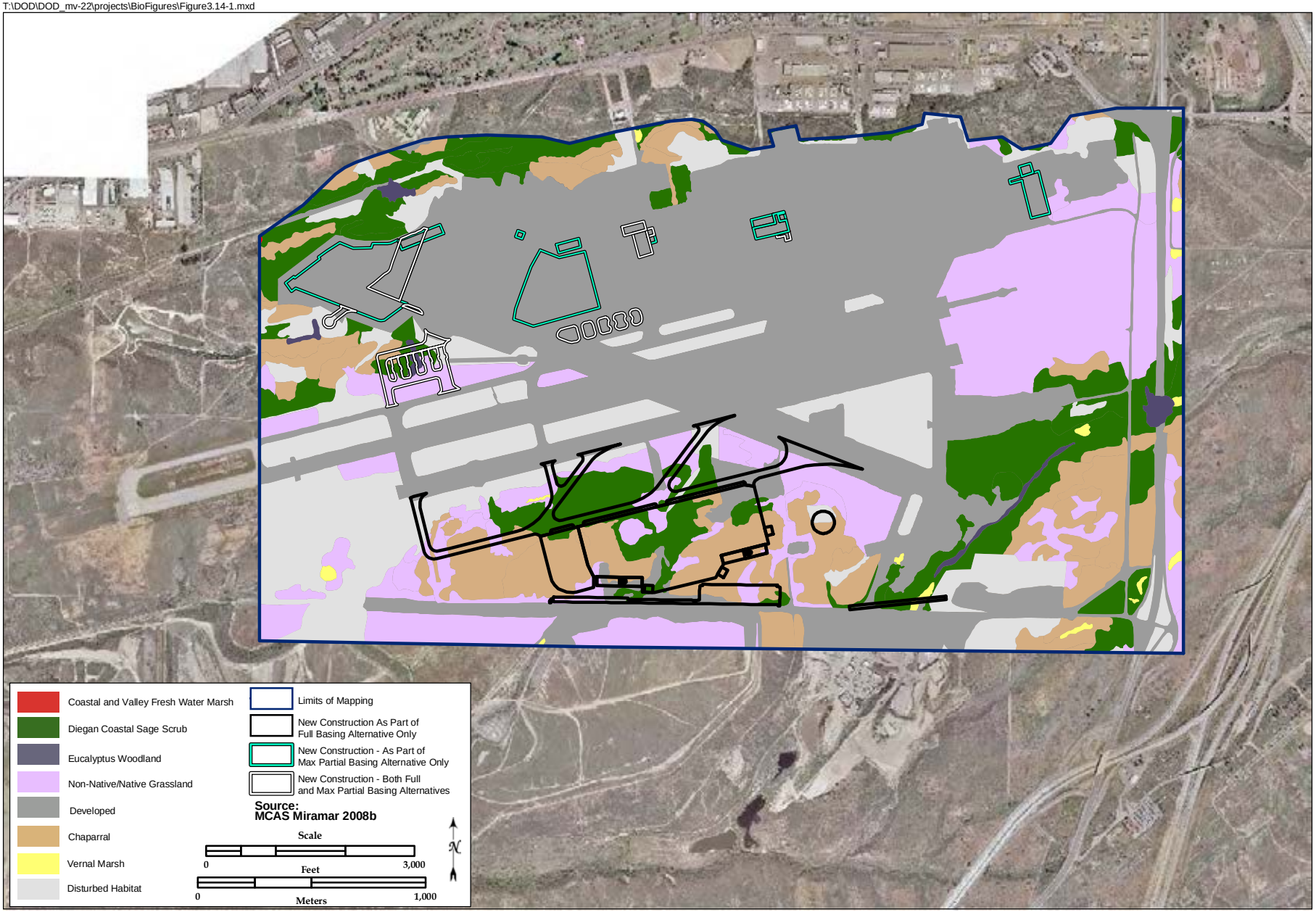

Plant Communities in the Vicinity of Proposed Project Activities, MCAS Miramar

FIGURE

3.14-1

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- chamise (*Adenostoma fasciculatum*) chaparral - dominated by chamise;
- scrub oak (*Quercus dumosa*) chaparral - characterized by the coastal species of scrub oak in combination with mountain mahogany (*Cercocarpus betuloides*), toyon (*Heteromeles arbutifolia*), and other woody species; and
- southern mixed chaparral - a diverse shrub community that includes chamise, scrub oak, toyon, yerba santa (*Eriodictyon crassifolium*), mission manzanita (*Xylococcus bicolor*), ceanothus (*Ceanothus* spp.), and others.

Chamise chaparral is the most abundant chaparral community in the vicinity of proposed project activities. Most of the chamise chaparral type south of the runway was substantially disturbed as a result of the 2003 Cedar Fire.

Native and Non-Native Grassland

Grassland vegetation on the Main Station is dominated by non-native annual grass and forb species, including bromes (*Bromus* spp.), barley (*Hordeum* spp.), slender wild oats (*Avena barbata*), foxtail fescue (*Vulpia megalura*), and red-stemmed filaree (*Erodium cicutarium*). Patches of native grassland characterized by purple needlegrass (*Nassella pulchra*), occur to a limited extent within the project area and are most commonly found intermixed with non-native grassland.

Diegan Coastal Sage Scrub

Diegan coastal sage scrub vegetation is characterized by low-growing, soft-woody, somewhat drought-deciduous shrubs. This habitat type typically occurs as a distinctive community on relatively dry, low- to mid-elevation (below 3,000 feet [914 meters]) coastal slopes in southern California, from Los Angeles County into Baja California. Shrub cover varies but is typically dominated by one or more of the following shrub species: California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), black sage (*Salvia mellifera*), laurel sumac (*Malosma laurina*), lemonadeberry (*Rhus integrifolia*), white sage (*Salvia apiana*), saw-toothed goldenbush (*Hazardia squarrosa*), and coast goldenbush (*Isocoma veneta*). Two-thirds of this plant community within the mapped area consists of a sparse distribution of shrubs and exhibits effects of disturbance. Several special status animal species are associated with Diegan coastal sage scrub including coastal California gnatcatcher, described in more detail under the Federally Listed Species section. Although not legally protected, coastal sage scrub is considered a sensitive community because of the habitat quality for federally listed and state listed plants and animals as well as the increasing loss of this community due to urbanization and human disturbance.

Disturbed Habitat

Disturbed habitat is defined as essentially barren land that has not been paved or developed. Disturbed habitat that includes vernal pools, other seasonally ponded areas, and/or their surrounding drainage areas are of particular concern and are discussed further under "Sensitive Habitats." This community makes up a large portion of the mapped area, mostly south of the runway.

Eucalyptus Woodland

Stands of planted eucalyptus, mostly blue gum (*Eucalyptus globulus*) and red gum (*E. camaldulensis*), occur at scattered locations on the Main Station in the vicinity of proposed project components.

Wildlife

MCAS Miramar maps and rates habitat quality within the installation as part of its natural resources management program (MCAS Miramar 2006). Proposed project areas south of the flightline are categorized as a combination of very high value and low value habitat, generally based on the presence of vernal pools, chaparral, and Diegan coastal sage scrub habitats. Additionally, native plant communities on MCAS Miramar also support migratory bird species, which are subject to the Migratory Bird Treaty Act (MBTA). A variety of common wildlife species would be expected to occur in association with these vegetation communities on Main Station, and based on the presence of suitable habitat, have the potential to occur in the project vicinity, including Lindahl's fairy shrimp (*Branchinecta lindahli*), common chorus frog (*Pseudacris regilla*), bullfrog (*Rana catesbeiana*), western fence lizard (*Sceloporus occidentalis*), side-blotched lizard (*Uta stansburiana*), San Diego alligator lizard (*Gerrhonotus multicarinatus webbi*), California quail (*Callipepla californica*), killdeer (*Charadrius vociferus*), mourning dove (*Zenaida macroura*), Anna's hummingbird (*Calypte anna*), California thrasher (*Toxostoma redivivum*), raccoon (*Procyon lotor*), coyote (*Canis latrans*), mule deer (*Odocoileus hemionus*), California ground squirrel (*Spermophilus beecheyi*), and California vole (*Microtus californicus*) (MCAS Miramar 2006). Most common wildlife habituate native and non-native undeveloped areas that provide diverse habitat features, food, cover, and water. Rose and San Clemente canyons also serve as corridors for wildlife movement within and across MCAS Miramar.

Endangered, Threatened, and Sensitive Species

Sensitive species include those that are (1) listed, proposed, or candidates for listing as threatened or endangered under the federal Endangered Species Act (ESA); (2) species that have similar status under the California ESA; and (3) other species that are of regional concern due to rarity and potential vulnerability to extinction. Sensitive habitats include (1) the critical habitat designations of federally listed endangered species; (2) other habitats that support endangered and other sensitive species and are therefore important to the conservation of these species; and (3) wetlands and other Clean Water Act regulated waters. Sensitive species and habitats in the vicinity of the Main Station are identified on Figures 3.14-2 through 3.14-5.

Sensitive Plant Species

Sensitive plants are defined as:

- species listed under the federal or California ESAs, and/or the Native Plant Protection Act (NPPA) §1901,
- candidates for such listing, and
- species that would meet the criteria for listing but have not yet been formally listed, such as plants included in Lists 1A, 1B, and 2 of the California Native Plant Society's (CNPS) Inventory (Skinner and Pavlik 1994).

MCAS Miramar routinely surveys and monitors populations of rare plants on the station. The most recent upland surveys of west Miramar were in 2006 and 2008 (Dossey and Associates 2006 and 2008). These surveys are non-project specific and support ongoing operations at MCAS Miramar. Dossey and Associates (2008) targeted ten federally listed plant species and several additional federal species of concern or plants otherwise listed as sensitive by the CNPS. The 2008 surveys covered areas north and west of the airfield, including Rose Canyon, Eastgate Mall, areas adjacent to the 805 freeway, and the flightline area west of Interstate-15. The 2006 surveys covered areas east and south of the airfield, including San Clemente Canyon and Miramar Mounds

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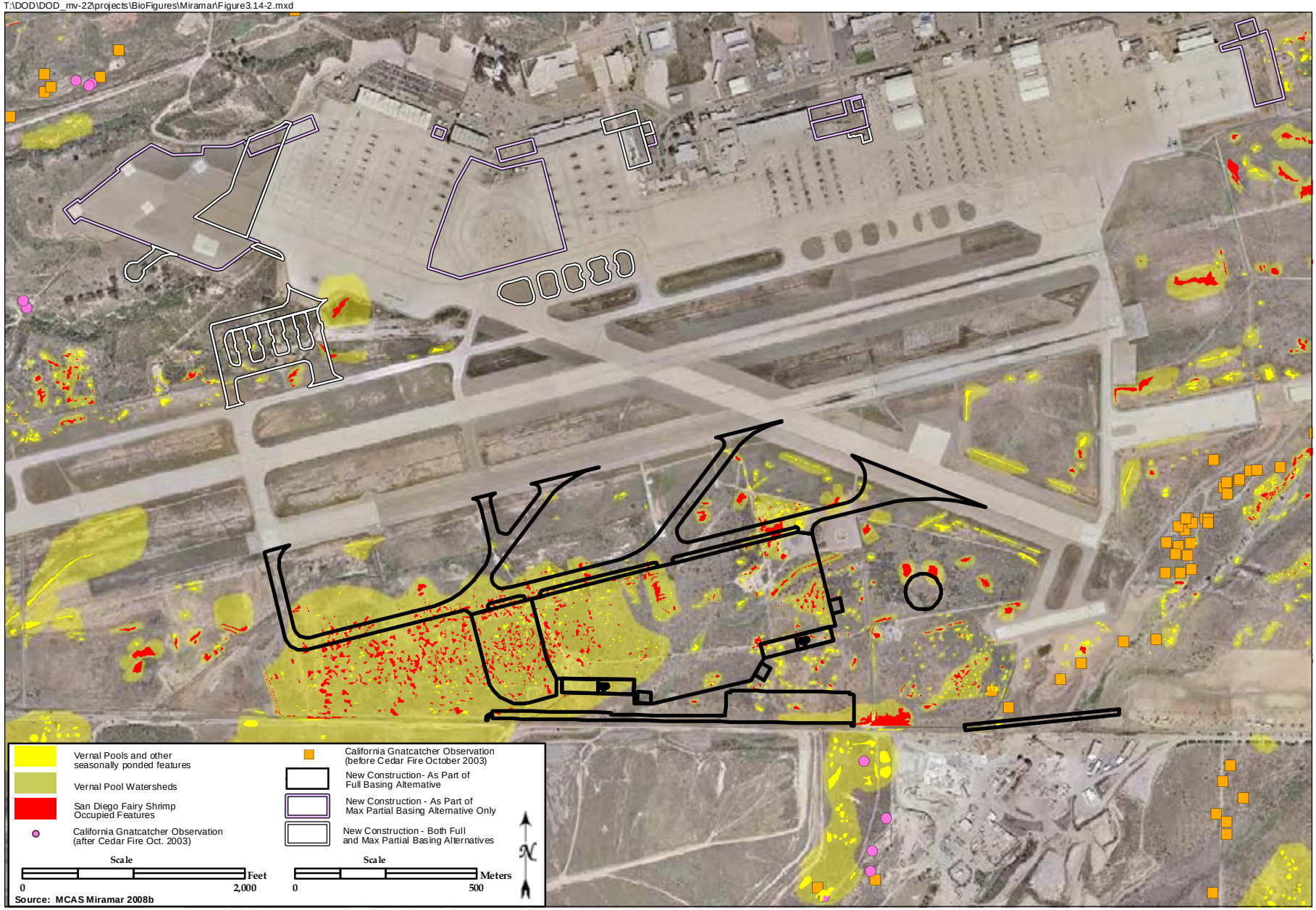

Sensitive Resources in the Vicinity of Proposed Project Activities, MCAS Miramar - San Diego Fairy Shrimp and California Gnatcatcher

FIGURE

3.14-2

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National Natural Landmark. Vernal pool species mapping efforts have occurred throughout the last decade with concentrated efforts in 2001 and 2005 (MCAS Miramar 2006), which included most of the Main Station area. A comprehensive installation-wide mapping effort continues to map those areas away from the Main Station. Table 3.14-2 presents the federally listed and other non-federally listed sensitive plant species that were surveyed for within MCAS Miramar boundaries and either occur or potentially occur within the project area.

Table 3.14-2. Sensitive Plants Occurring or Potentially Occurring on MCAS Miramar

Scientific Name Common Name	Regulatory Status (Federal/ State/CNPS)	Habitat Association	Occurrence in the Project Area
Artemisia palmeri San Diego sagewort	FSC/-/4	Prefers sandy soils, primarily in coastal sage scrub (MCAS Miramar 2006); southwestern San Diego County to Baja California, Mexico.	Moderate likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station (MCAS Miramar 2006, Dossey and Associates 2008). This species is abundant in San Clemente Canyon south of the project area and in the western portion of Rose Canyon west of the project area.
Brodiaea orcuttii Orcutt's brodiaea	-/-/1B	Meadows and seeps, valleys and foothill grassland, vernal pools, closed-cone coniferous forest, chaparral, cismontane woodland.	Moderate potential to occur in vernal pool complexes. Known to occur in the proposed project vicinity associated with vernal pools. This species was observed during rare plant surveys on all the mesa tops (Dossey and Associates 2008).
Ceanothus verrucosus wart-stemmed lilac	FSC/-/2	Chaparral habitat on dry hills and mesas in San Diego County.	This species is known to occur abundantly on the western side of MCAS Miramar just north of the project area along the rims of Rose Canyon on the north and south-facing escarpments and in western San Clemente Canyon from rare and sensitive plant surveys (MCAS Miramar 2006, Dossey and Associates 2006 and 2008).
Chorizanthe polygonoides var. longispina long-spined spineflower	FSC/-/1B	Dry places in chaparral habitat, close-coned coniferous forest, and coastal sage scrub, usually below 5,000 feet; western Riverside and San Diego counties (MCAS Miramar 2006).	High likelihood of occurrence. Known to occur abundantly in west and east Miramar associated with coastal sage and chaparral habitats. During rare plant surveys in 2006, this species was identified within 100 feet of the apron infill expansion on the west end of the project area and frequently along Rose Canyon north of the project area (MCAS Miramar 2006, Dossey and Associates 2006).
Comarostaphylis diversifolia ssp. Diversifolia summer holly	FSC/-/1B	Dry slopes in chaparral habitat; predominantly in low elevation situations, usually along the coast; San Diego County southward to northern Baja California.	Known to occur on the north-facing slopes at the western portion of San Clemente Canyon and tributaries to Rose Canyon (MCAS Miramar 2006, Dossey and Associates 2006 and 2008). Suitable habitat for this species exists south of the flightline in chaparral. Known outside flightline near Helo Pads.

Table 3.14-2. Sensitive Plants Occurring or Potentially Occurring on MCAS Miramar

Scientific Name Common Name	Regulatory Status (Federal/ State/CNPS)	Habitat Association	Occurrence in the Project Area
Eryngium aristulatum var. parishii San Diego button-celery	FE/CE/1B	Vernal pools and vernally moist areas in San Diego and Riverside counties.	Known to occur in eight of ten vernal pool management units on MCAS Miramar. This species has been recorded associated with vernal pools throughout the installation and occurs south of the runway in most pools in the project area. This species also occurs north of the flightline.
Monardella linoides ssp. viminea (also recognized as *M. viminea* [Elvin and Sanders[) willowy monardella	FE/CE/1B	Rocky washes and drainages in coastal sage scrub, chaparral, closed-cone coniferous forest, and riparian scrub woodland.	Known to occur in western MCAS Miramar associated with Rose and San Clemente Canyon drainages. Closest recorded occurrences are approximately 0.8 mile upstream and 0.9 mile downstream of the proposed bridge (Full Basing Alternative only). No occurrences are recorded in the vicinity of the proposed project (MCAS Miramar 2006, Dossey and Associates 2006 and 2008).
Muilla clevelandii San Diego goldenstar	FSC/-/1B	Chaparral, coastal sage scrub, and vernal pool grasslands on mesas in San Diego County.	Moderate likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station near the project area (MCAS Miramar 2006, Dossey and Associates 2006 and 2008). This species is known to occur on the mesa south of the Miramar Fish Pond and north of the flightline (Dossey and Associates 2006 and 2008).
Myosurus minimus ssp. apus little mousetail	FSC/-/3	Alkaline vernal pools.	Known to occur in a single vernal pool in the vicinity of the proposed project components. Moderate likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station near the project area (MCAS Miramar 2006).
Navarretia fossalis spreading navarretia	FT/-/1B	Vernal pools within chenopod scrub and coastal sage scrub.	Known to occur north of the flightline (within the HH1+ vernal pool group) approximately 1,900 feet (550 meters) west of the proposed project activities (MCAS Miramar 2008b) and within the EEI vernal pool group south of the runways.
Orcuttia californica California Orcutt grass	FE/CE/1B	Vernal pools, sandy soils in coastal sage scrub, chaparral, and close-coned coniferous forest habitats.	Known to occur north of the flightline (within the HH1+ vernal pool group) approximately 1,900 feet (550 meters) west of proposed project activities (MCAS Miramar 2008b) and within the EEI vernal pool group south of the runways.

Table 3.14-2. Sensitive Plants Occurring or Potentially Occurring on MCAS Miramar

Scientific Name Common Name	Regulatory Status (Federal/ State/CNPS)	Habitat Association	Occurrence in the Project Area
Pogogyne abramsii San Diego mesa mint	FE/CE/1B	Vernal pools in chaparral, coastal sage scrub and grassland habitats.	This species has been recorded mostly south of the runway associated with vernal pool complexes (EE1 vernal pool group) and other seasonally ponded features, but also occurs north of the runway (HH1+ vernal pool group), west of the proposed fuel pits within approximately 1,300 feet of the project area (MCAS Miramar 2006, 2008b).
Quercus dumosa Nuttall's scrub oak	FSC/-/1B	Chaparral occurring along the coast of California.	High likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the western and northern portions of the air station (MCAS Miramar 2006, Dossey and Associates 2006 and 2008). This species and its hybrids occur on north-facing slopes along the southern side of Rose and San Clemente Canyons (Dossey and Associates 2006 and 2008).

Notes:

Federal ESA
FE: Federally Listed as Endangered
FT: Federally Listed as Threatened
FSC: Federal Special Concern Species
-: No listing

California ESA
CE: California listed as endangered
CT: California listed as threatened
CSC: California species of concern
-: No listing

California Native Plant Society
1A: Presumed extinct in California
1B: Rare, threatened, or endangered in California and elsewhere
2: Rare, threatened, or endangered in California but more common elsewhere
3: Plants about which more information is needed to determine their status
4: Plants of limited distribution

Five federally listed species have a reasonable likelihood of occurring or are known to occur based on the results of rare plant surveys or suitable habitat: San Diego button-celery (*Eryngium aristulatum* var. *parishii*), spreading navarretia (*Navarretia fossalis*), California Orcutt grass (*Orcuttia californica*), San Diego mesa mint (*Pogogyne abramsii)*, and willowy monardella (*Monardella linoides* spp. *viminea*) (Table 3.14-2). Based on negative results from recent (2006 and 2008) non-proposed action specific rare plant surveys, five additional federally listed species are known to the region, but do not occur nor are they expected to occur on West Miramar or anywhere in the vicinity of proposed project components: San Diego thornmint (*Acanthomintha ilicifolia*), San Diego ambrosia (*Ambrosia pumilia*), Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*), Encinitas baccharis (*Baccharis vanessae*), and Orcutt's spineflower (*Chorizanthe orcuttiana*). As a result of recent and ongoing negative survey results, lack of historic occurrences, and presence of low quality habitat for these species, they are considered not present on West Miramar and will not be evaluated further. The remainder of this section provides summaries of the basic biology and distribution of the plant species federally listed as threatened or endangered that occur or may potentially occur in the project vicinity. Sensitive plants with no potential to occur within the project area are not discussed.

SAN DIEGO BUTTON-CELERY

San Diego button-celery (*Eryngium aristulatum* var. *parishii*), a member of the carrot family (Apiaceae), is an herbaceous perennial with heads of greenish flowers and spine-tipped bract margins at the base of the flower stalk. This species is restricted in California to vernal pools and vernally moist areas in San Diego and Riverside counties; it is also known from Baja California Norte. It is typically associated with white clay bottom pools devoid of hard pans, but within MCAS Miramar the species occurs in the vicinity of and in vernal pool basins and is more abundant in the moist watershed/grassland areas near vernal pools. San Diego button-celery blooms from May through June (USFWS 1993a). This plant is usually an annual; however, under favorable conditions it can become a perennial herb with a perennial tap root. Other sensitive species that typically occur with this species include San Diego mesa mint (*Pogogyne abramsii*) and California orcutt grass (*Orcuttia californica*) among others. Approximately 65 remnant populations exist in San Diego County (USFWS 1993a).

San Diego button-celery was listed as endangered on 3 August 1993 (USFWS 1993a), after the USFWS determined that the present range was being rapidly reduced and the continued existence of the species was being threatened by habitat loss and degradation due to urban and agricultural development, livestock grazing, off-road vehicle use, trampling, invasions from weedy non-native plants, and other factors. The plant has a USFWS recovery priority of 3C, indicating that it is a subspecies or variety facing a high degree of threat but having a high potential for recovery. The "C" indicates that the species may be in conflict with construction or development projects. Protection measures for San Diego button-celery are provided in the recovery plan for vernal pools of southern California, released in 1998 (USFWS 1998a). San Diego button-celery was listed by the State of California as endangered in July of 1979, under the California ESA. Critical habitat has not been designated for this species.

San Diego button-celery is predominantly associated with vernal pool complexes south of the runway in the flightline area, but has also been identified west of the proposed fuel pits area, and near Hangar 0 to the east (Figure 3.14-4). Specifically, this species is known to occur throughout vernal pools and seasonally ponded areas south of the runway and within proposed project areas (MCAS Miramar 2006, 2008b). A multitude of vernal pools and other seasonally ponded areas have been documented within the project area, as illustrated in Figures 3.14-2 through 3.14-4. The majority of these pools are scattered throughout the south side of the existing runways, with a smaller number occurring to the northwest and east of the runways. Vernal pool plant species data, including San Diego button-celery, were collected at sites ponding water as part of protocol San Diego fairy shrimp surveys throughout MCAS Miramar in 2001 and 2005, and all basins within the vicinity of the proposed project have been comprehensively surveyed. Eight of ten vernal pool management units on MCAS Miramar support San Diego button-celery (MCAS Miramar 2006).

SPREADING NAVARRETIA

Spreading navarretia (*Navarretia fossalis*) is a low, spreading or ascending, annual herb and is a member of the phlox family (Polemoniaceae). This wetland species typically associated with vernal pools within chenopod scrub and coastal sage scrub (Hickman 1993; Skinner and Pavlik 1994). In San Diego County, spreading navarretia appears to be endemic to vernal pools.

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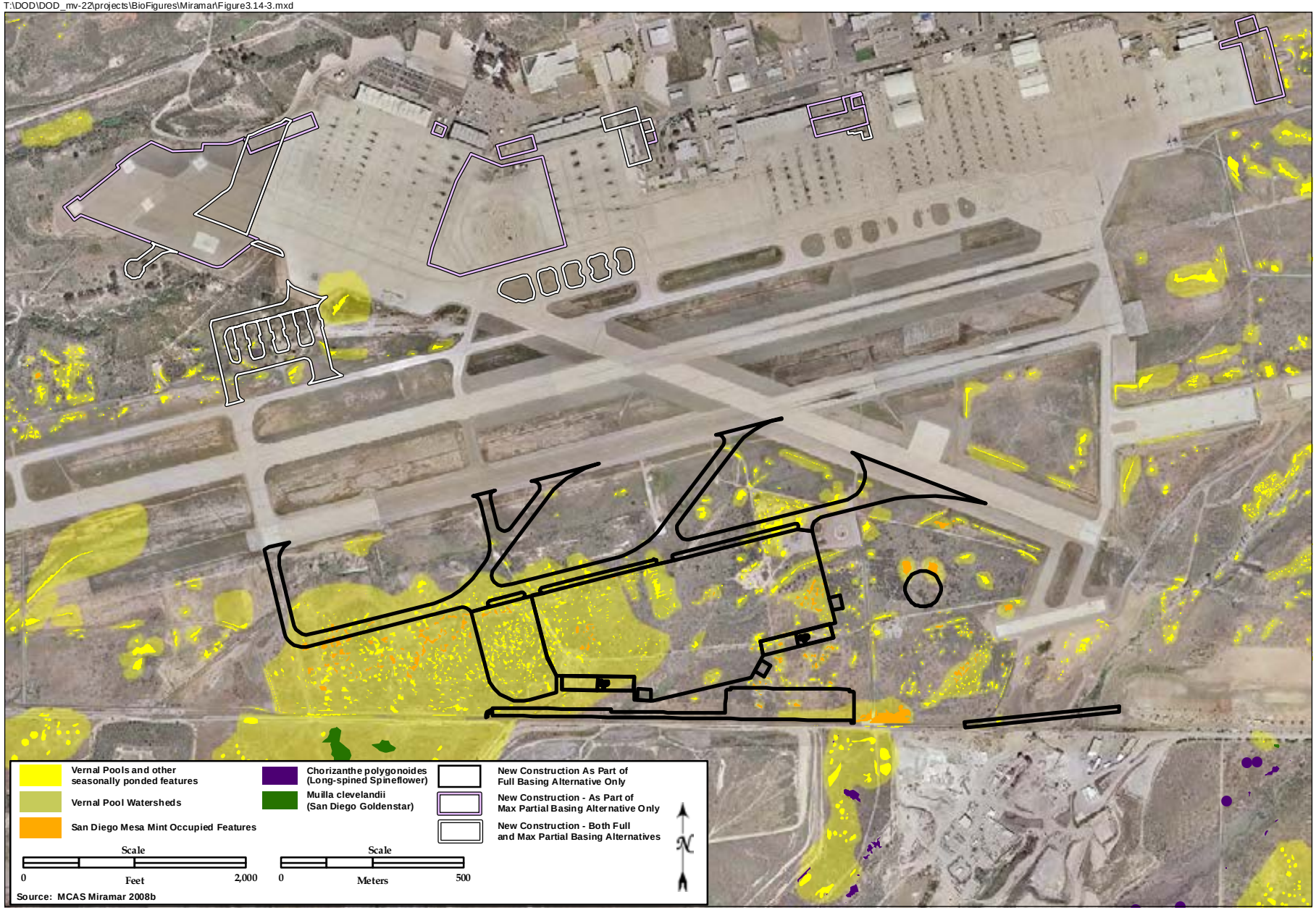

Sensitive Resources in the Vicinity of Proposed Project Activities, MCAS Miramar - San Diego Mesa Mint, Long-spined Spineflower, and San Diego Goldenstar

FIGURE

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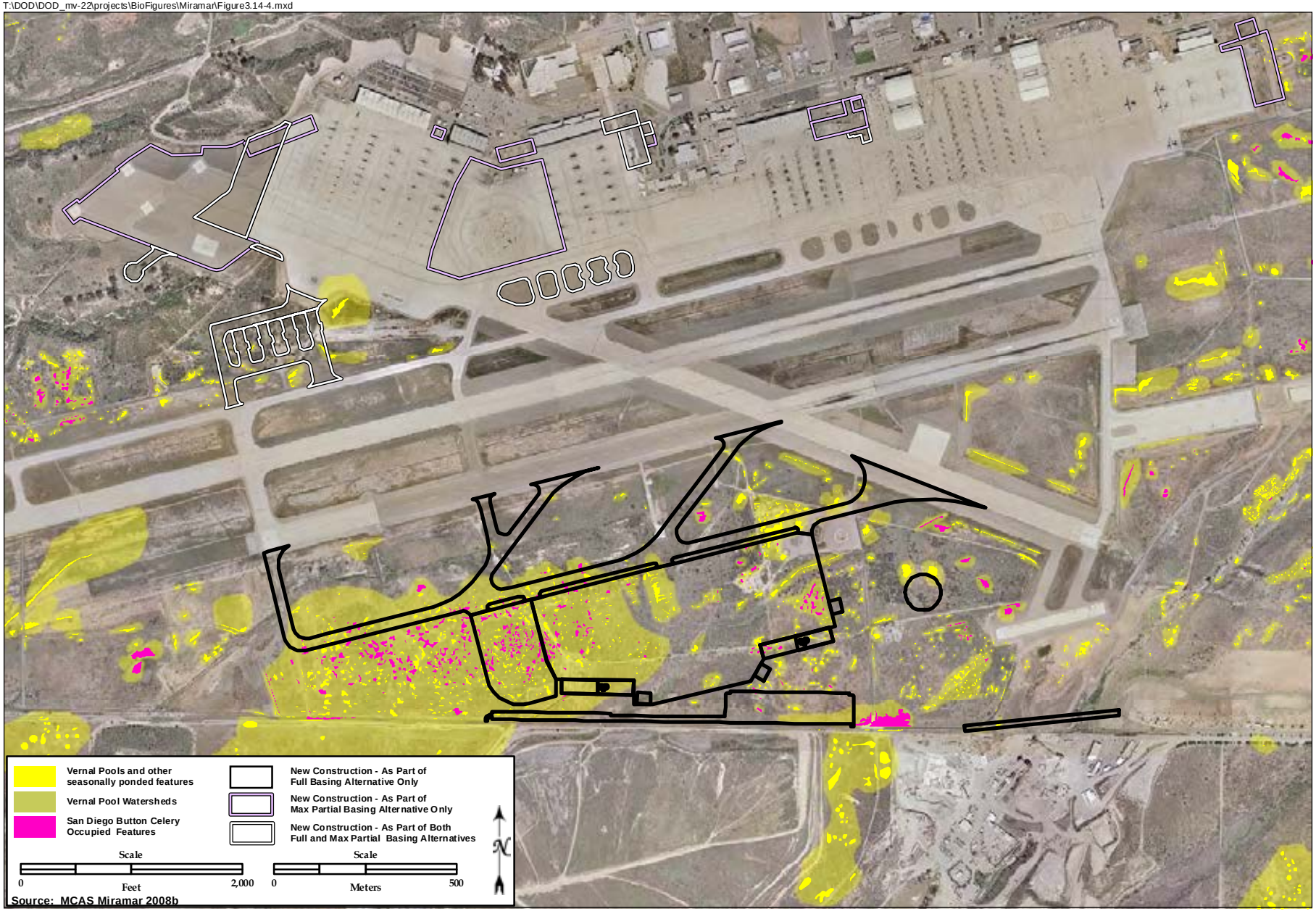

Source: MCAS Miramar 2008b

Sensitive Resources in the Vicinity of Proposed Project Activities, MCAS Miramar - San Diego Button Celery

FIGURE

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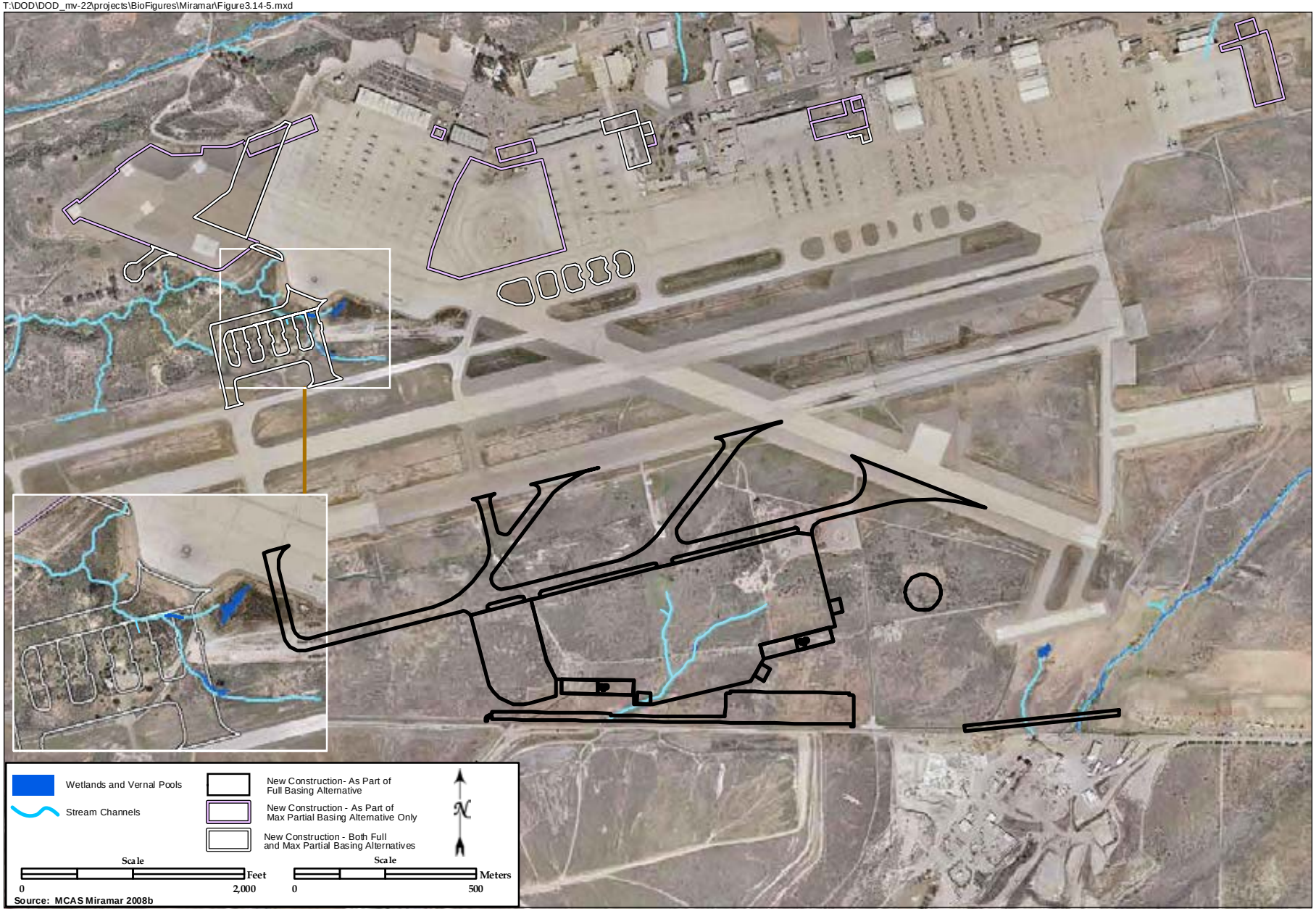

Clean Water Act Regulated Waters in the Vicinity of the Proposed Project Activities
MCAS Miramar

FIGURE
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However, it occurs in relatively undisturbed and moderately disturbed vernal pools and in alkali playa habitats near Hemmet, along the San Jacinto River in Riverside County and on MCB Camp Pendleton (MCAS Miramar 2006). Historical records indicate that spreading navarretia is also known from two occurrences near Creston in San Luis Obispo County.

This plant species was proposed for listing as threatened on 13 October 1998 (USFWS 1998b) after the USFWS determined that spreading navarretia was declining as a result of habitat destruction and fragmentation from agricultural development, pipeline construction, alteration of wetland hydrology by draining or channelization, off-road vehicle activity, cattle and sheep grazing, weed abatement, fire suppression practices, and competition from nonnative plant species. Spreading navarretia is known from widely disjunct and restricted populations extending from the Santa Clarita region of Los Angeles County, east to the western lowlands of Riverside County, south through coastal and foothill San Diego County, and south to San Quintin, Baja California, Mexico. Fewer than 30 populations exist in the U.S. Nearly 60 percent of these populations are concentrated in three locations in California: on Otay Mesa in southern San Diego County, along the San Jacinto River in Riverside County, and near Hemet in western Riverside County (USFWS 1994a).

The closest mapped occurrence for spreading navarettia is located within the HH1+ vernal pool group, north of the runways and within the EE1 vernal pool group south of the runways. This species has also been recorded in two features at vernal pool Management Unit 7 (MCAS Miramar 2008b), well south of the project area.

CALIFORNIA ORCUTT GRASS

California Orcutt grass (*Orcuttia californica*) is a small annual member of the grass family (Poaceae) and reaches about four inches (10 cm) in height, is bright gray-green, secretes sticky droplets, and blooms from May through July. It is usually found in vernal pool habitats. California Orcutt grass occurs in San Diego, Riverside, Los Angeles, and Ventura Counties as well as throughout Baja, Mexico. Within Los Angeles County, this species has historically been reported to occur in at least four locations in Los Angeles County. However, it is currently known to occur at only two localities; one near Santa Clarita, California (Cruzan Mesa) and near Woodland Hills (Los Angeles County). An occurrence is known from the Carlsberg vernal pool located in the City of Moorpark in Ventura County. In San Diego County, California Orcutt grass is found on MCAS Miramar, in the City of Carlsbad, in four pool complexes on Otay Mesa, within Oak Crest Park in Encinitas, and a population of approximately 600 plants inhabits the Naval Submarine Base, San Diego (MCAS Miramar 2006). In Baja California, Mexico, California Orcutt grass has been found on Mesa de Colonet and in pools at San Quintin. These Baja populations are believed to still exist, but in danger of being extirpated due to agricultural conversion.

California Orcutt grass was federally listed as endangered on 3 August 1993 (USFWS 1993a). The USFWS determined that the species' range was being rapidly reduced and the continued existence of the species was threatened by habitat loss and degradation due to urban and agricultural development, livestock grazing, off-road vehicle use, trampling, invasions from weedy nonnative plants, and other factors. The plant has a USFWS recovery priority of 5C, indicating that it is a species facing a high degree of threat and having a low potential for recovery.

California Orcutt grass is known from a few pools south of the runway in Management Unit 7, west of the flightline approximately 1,900 feet west of the proposed fuel pit construction, and one pool east of Main Station in Management Unit 8. No occurrences have been recorded in the vicinity of proposed project components (MCAS Miramar 2006, 2008b).

SAN DIEGO MESA MINT

San Diego mesa mint (*Pogogyne abramsii)* is an annual herb in the mint family (Lamiaceae). This species occasionally reaches 1 foot (30 cm) in height and typically blooms from May to early July. The San Diego mesa mint inhabits vernal pool complexes in chaparral and coastal sage scrub and grassland habitats. It may also be found on coastal terraces and mesas in San Diego County (Hickman 1993; Skinner and Pavlik 1994).

San Diego mesa mint is endemic to San Diego County. The northern limit of distribution for this species is Del Mar Mesa, and it occurs south on Mira Mesa, MCAS Miramar, and Kearny Mesa, with a few scattered populations in western Tierrasanta. San Diego mesa mint populations have been extirpated from the Linda Vista area, the vicinity of Balboa Park, Normal Heights, and the area surrounding San Diego State University. San Diego mesa mint was listed as endangered on 28 September 1978 (USFWS 1978). The USFWS determined that the present range was being rapidly reduced and the continued existence of the species was being threatened by highway construction, housing development, off-road vehicle use, illegal dumping, and agricultural conversion. A recovery plan for the species was finalized in 1998 (USFWS 1998g). The plant has a USFWS recovery priority of 2C, indicating that it is a species facing a high degree of threat but having a high potential for recovery. No critical habitat has been designated for this species. San Diego mesa mint was listed by the State of California as endangered in January of 1979, under the California ESA.

San Diego mesa mint has been reported from all ten of the vernal pool management units on MCAS Miramar (MCAS Miramar 2006). This species has been recorded associated with vernal pool complexes and other seasonally ponded features south of the runway, one area west of the fuel pits, and occurs within approximately 1,300 feet (396 meters) of the project area (Figure 3.14-3).

WILLOWY MONARDELLA

Willowy monardella (*Monardella linoides* spp. *viminea*) is an erect perennial herb and is a member of the mint family (Lamiaceae). The USFWS noted in the 5-Year Review: Summary and Evaluation (USFWS 2008a) that "…Elvin and Sanders (2003) split the taxon into two separate entities. They elevated the southern occurrences to species status as *Monardella stoneana*. The remaining occurrences were still considered willowy monardella but were elevated by Elvin and Sanders (2003) to the original rank of species as *M. viminea*." At that time, the USFWS believed that it was prudent to continue to treat all populations as listed and at the subspecies rank; however, the Elvin and Sanders (2003) placement has been recognized by CDFG, CNPS, the Jepson Online Interchange, and the 4th Edition of the Checklist of San Diego County Vascular Plants. As of December 2008, the USFWS considers all populations of willowy monardella identified in the listing rule as *M. linoides* ssp. *viminea* a subspecies protected by the ESA (USFWS 2008a). This species occurs in rocky washes and drainages in coastal sage scrub, chaparral, close-coned coniferous forest, and riparian scrub woodland areas (Hickman 1993; MCAS Miramar 2008b). It was federally listed as endangered on 13 October 1998 (USFWS 1998d).

Populations of this species that occur on private property have been damaged or destroyed by off-road vehicles, fire, road construction, and are threatened by sand and gravel mining activities (USFWS 1995c). Additionally, habitat for the willowy monardella has been degraded by stream erosion, trash dumping, and the invasion of non-native species (USFWS 1995c).

Most populations of this species occur on MCAS Miramar, including one of the largest populations composed of 1,700 individuals observed in 1994 (USFWS 1998d, MCAS Miramar 2006). Willowy monardella on MCAS Miramar and surrounding areas are located in the canyons in East Miramar and along San Clemente Canyon in West Miramar (MCAS Miramar 2006). The nearest occurrences of this species to project components are approximately 0.8 mile (0.2 km) upstream and 0.9 mile (0.3 km) downstream of the proposed bridge crossing of San Clemente Canyon (associated with the Full Basing Alternative only). Suitable habitat does exist within San Clemente Canyon and individuals of this species have been observed immediately west of Kearny Villa Road (north of the access road).

Sensitive Wildlife Species

Sensitive wildlife species include those listed as the following:

- threatened or endangered under the federal or California ESAs;
- species proposed for listing;
- species of special concern; and
- other species identified either by the USFWS, CDFG, or CNDDB as unique or rare, and which have the potential to occur within the base.

Sensitive wildlife species that occur or have the potential to occur in the vicinity of the project area, based on species range and suitable habitat, are listed in Table 3.14-3. In addition, federally listed species are discussed in detail below under the *Federal Species* section. Four federally listed species (Quino checkerspot butterfly, southwestern willow flycatcher, Riverside fairy shrimp, and least Bell's vireo) are not expected to occur within the project area due to the lack of suitable habitat present and negative results from focused survey efforts. Quino checkerspot has not been observed anywhere on MCAS Miramar (MCAS Miramar 2006). Riverside fairy shrimp is also only known to occur east of Interstate-15 in two small earthen reservoirs, and there are no vernal pool habitats in the project vicinity that pond water in sufficient duration to support this species. In 2008 breeding season surveys, Least Bell's vireo was only found on the eastern border of MCAS Miramar (Amdyne 2008). As a result, these species are not expected to be affected by any of the proposed alternatives and are not considered further.

Suitable habitat and survey results were also reviewed for several non-listed sensitive species (southwestern pond turtle [*Clemmys marmorata pallid*], tri-colored blackbird [*Agelaius tricolor*], San Diego cactus wren [*Camplyorhynchus brunneicapillus sandiegensis*], Mexican long-tongued bat [*Choeronycteris Mexicana*], California mastiff bat [*Eumops perotis californicus*], western small-footed myotis [*Myotis ciliolabrum*], big free-tailed bat [*Nyctinomops macrotis*], and Townsend's big-eared bat [*Plecotus townsendii*]). These species are not known or expected to be present based on a lack of suitable habitat and/or negative survey results. Therefore, these species are not discussed further.

Table 3.14-3. Sensitive Wildlife with the Potential to Occur in the Vicinity of MCAS Miramar

Scientific Name Common Name	Regulatory Status (Federal/ State)	Habitat Association	Occurrence in the Study Area
INVERTEBRATES			
Branchinecta sandiegonensis San Diego fairy shrimp	FE/-	Small, shallow vernal pools within grassland, agriculture, coastal sage scrub, and chaparral habitats.	Known to occur throughout vernal pools and other seasonally ponded features within MCAS Miramar including complexes north of the flightline (MCAS Miramar 2006, 2008b).
Streptocephalus woottoni Riverside fairy shrimp	FE/-	Deep, cool water pools and ephemeral wetlands.	Suitable habitat for this species exists associated with some deep vernal pools. On MCAS Miramar, focused surveys for Riverside fairy shrimp have identified an occurrence from two small earthen reservoirs east of Interstate-15 (Vernal Pool Unit 4, group AA1 south; MCAS Miramar 2006). Protocol surveys from 1999-2005 did not record this species associated with pools and features in the vicinity of proposed project construction. Additionally, no habitats in the vicinity of the proposed project pond water of sufficient duration for this species.
Lycaena hermes Hermes copper butterfly	-/CSA	Where redberry (*Rhamnus crocea*) is present, especially in mixed chaparral (MCAS Miramar 2006); ranges throughout southern California.	Although not known from the project area, there is a moderate likelihood of occurrence due to the presence of potentially suitable habitat and the existence of a large population in the eastern portion of the air station (MCAS Miramar 2006).
AMPHIBIANS			
Spea hammondii western spadefoot toad	-/CSC	Grassland habitats in lowlands, foothills, and plains along the Coast Range from northern California to northern Baja California, Mexico.	High likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station (MCAS Miramar 2006).
REPTILES			
Cnemidophorus hyperythrus beldingi orange-throated whiptail	-/CSC	Coastal sage scrub and chaparral and along the borders of riparian zones and washes.	Moderate likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station adjacent to the project area (MCAS Miramar 2006).
REPTILES (CONTINUED)			
Cnemidophorus tigris multiscutatus coastal western whiptail	-/CSA	Coastal sage scrub, chaparral, and open grassland; arid and semi-arid habitats with sparse to dense vegetation and open areas for fleeing potential predators; cismontane southern California.	Moderate likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station (MCAS Miramar 2006).
Crotalus ruber ruber northern red diamond rattlesnake	-/CSC	Coastal sage scrub and chaparral; oak woodland and canyon bottoms and along the borders of riparian zones and washes; entire length of the peninsular ranges from the Moreno Valley, California area to the tip of Baja California, Mexico.	High likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station in the vicinity of the project area (MCAS Miramar 2006).

Table 3.14-3. Sensitive Wildlife with the Potential to Occur in the Vicinity of MCAS Miramar

Scientific Name Common Name	Regulatory Status (Federal/ State)	Habitat Association	Occurrence in the Study Area
Diadophis punctatus similis San Diego ringneck snake	-/CSA	Chaparral, oak woodland, canyon bottoms, and riparian woodlands; southwestern San Bernardino County south to coastal San Diego County and northern Baja California, Mexico.	Moderate likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station in the vicinity of the project area (MCAS Miramar 2006).
Eumeces skiltonianus interparietalis Coronado Island skink	-/CSC	Oak woodlands and coastal sage scrub habitats; Los Angeles County into northwest Baja California, Mexico.	High likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence throughout the air station (MCAS Miramar 2006).
Phrynosoma coronatum blainvillei San Diego horned lizard	-/CSC	Coastal sage scrub, chaparral, oak, and pine woodland, and along washes.	High likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence in the general project area (MCAS Miramar 2006).
Salvadora hexalepis virgultea coast patch-nosed snake	-/CSC	Grasslands, chaparral, and desert scrub; friable or sandy soils and enough cover to escape predation; coastal southern California and northern Baja California, Mexico.	Moderate likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station (MCAS Miramar 2006).
Thamnophis hammondii two-striped garter snake	-/CSC	Along permanent streams, creeks, and vernal pools with protective cover. It may occasionally be present in chaparral or other habitats far from water; coastal California near the Monterey Bay area south through northern Baja California, Mexico.	Moderate likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station (MCAS Miramar 2006).
BIRDS			
Aimophila ruficeps canescens Southern California rufous-crowned sparrow	-/CSC	Common in mixed grassland and coastal sage scrub habitats.	Moderate likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station (MCAS Miramar 2006).
Amphiza belli belli Bell's sage sparrow	-/CSA	Coastal sage scrub; California coastal plain and Central Valley.	Moderate likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station (MCAS Miramar 2006).
BIRDS (CONTINUED)			
Athene cunicularia hypugaea western burrowing owl	-/CSC	Open grassland areas, commonly within fields, farmlands, and airfields.	Moderate likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station adjacent to the project area (MCAS Miramar 2006).
Aquila chrysaetos golden eagle	-/CSC	Large, open spaces; desert scrub, grassland, rolling foothills, mountains, and sage scrub. Nest sites typically require large buffers from development.	Low likelihood of occurrence due to the presence of a small amount of potentially suitable habitat, lack of nesting habitat, and limited records of occasional foraging in other parts of the air station (MCAS Miramar 2006).

Table 3.14-3. Sensitive Wildlife with the Potential to Occur in the Vicinity of MCAS Miramar

Scientific Name Common Name	Regulatory Status (Federal/ State)	Habitat Association	Occurrence in the Study Area
Buteo regalis ferruginous hawk	-/CSC	Grassland, sagebrush flats, desert scrub, valleys, and agricultural areas; eastern Washington and southeastern Canada south to eastern Oregon, Nevada, northern and southeastern Arizona, northern New Mexico, north-central Texas, western Oklahoma, and western Texas.	Low likelihood of occurrence due to the presence of a small amount of potentially suitable habitat, lack of nesting habitat, and limited records of occasional foraging in other parts of the air station (MCAS Miramar 2006).
Circus cyaneus northern harrier	-/CSC	Marshes and grasslands, fields, and open coastal sage scrub; widespread throughout temperate regions of North America and Eurasia.	Moderate likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station (MCAS Miramar 2006).
Empidonas traillii extimus southwestern willow flycatcher	FE/SE (nesting)	Breeds in dense riparian vegetation along rivers, streams, or other wetlands.	Possible transient during migration, no suitable breeding habitat present within MCAS Miramar.
E*remophila alpestris actia* California horned lark	-/CSA	Grasslands and open fields; cismontane southern California.	Moderate likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station (MCAS Miramar 2006).
Lanius ludovicianus loggerhead shrike	-/CSC	Most common in scattered brush and trees in open areas throughout the western U.S.	Moderate likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station (MCAS Miramar 2006).
Polioptila californica californica coastal California gnatcatcher	FT/CSC	Occurs primarily in the coastal sage community, but can also be found in chaparral and riparian habitats.	This species is surveyed at MCAS Miramar on a recurring basis and has been recorded associated with Rose and San Clemente Canyons. Mapped occupied breeding habitat for this species is associated with San Clemente Canyon (MCAS Miramar 2008b; MCAS Miramar 2006).
MAMMALS			
Antrozous pallidus pallid bat	-/CSC	Desert areas with rocky outcrops below about 6,000 feet elevation. Colonies are usually located in caves, rock crevices, mines, or hollow trees; southern British Columbia and Montana to central Mexico and Cuba (MCAS Miramar 2006).	Moderate likelihood of occurrence due to the presence of potentially suitable habitat and its known distribution in the region (MCAS Miramar 2006).
Chaetopidus californicus femoralis dulzura California pocket mouse	-/CSC	Coastal sage scrub, chaparral, oak woodland, and montane hardwood habitats from sea level to 7,900 feet; coastal slope and mountains of northern San Diego County southward into the mountains of Baja California.	Moderate likelihood of occurrence due to the presence of potentially suitable habitat and a record of its existence on the air station (MCAS Miramar 2006).

Table 3.14-3. Sensitive Wildlife with the Potential to Occur in the Vicinity of MCAS Miramar

Scientific Name Common Name	Regulatory Status (Federal/ State)	Habitat Association	Occurrence in the Study Area
Chaetopidus fallax fallax Northwestern San Diego pocket mouse	-/CSC	Open, arid habitats including coastal sage scrub, annual grassland, and desert habitat; coastal slope of southern California from southwest San Bernardino, western Riverside, eastern Los Angeles, and San Diego Counties to northern Baja California.	High likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station (MCAS Miramar 2006).
Lepus californicus bennettii San Diego black-tailed jackrabbit	-/CSC	Open grassland or shrubland adjacent to coastal sage scrub or chaparral habitats and disturbed areas.	High likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station (MCAS Miramar 2006).
Myotis yumanensis Yuma myotis	-/CSA	Grassland, woodland, and riparian communities throughout the state (MCAS Miramar 2006); roost sites are typically in buildings or bridges and hollow trees; central Mexico and Baja California north to British Columbia and east to Colorado and Texas.	Moderate likelihood of foraging in the project areas due to the presence of potentially suitable habitat and records of roosting and foraging on the air station (MCAS Miramar 2006).
Neotoma lepida intermedia San Diego desert woodrat	-/CSC	Xeric and coastal habitats; chaparral and coastal sage scrub, especially in rock outcrops; coastal slope of southern California.	High likelihood of occurrence due to the presence of potentially suitable habitat and records of its existence on the air station (MCAS Miramar 2006).
Nyctinomops femorosaccus pocketed free-tailed bat	-/CSC	Piñon-juniper woodlands, desert scrub, mixed cacti, riparian woodland, and palm oasis; found in rocky areas with high cliffs, crevices, or rock outcrops; artificial structures are also used for day and night roosts; southern California, Arizona, and New Mexico; and south into northern and western Mexico.	Moderate likelihood of foraging in the project areas but not roosting due to the presence of potentially suitable habitat and records of foraging only on the air station (MCAS Miramar 2006).
Onychomys torridus ramona southern grasshopper mouse	-/CSC	Arid, open country with sandy or gravely soil; it is associated with grasslands, open sagebrush and chaparral; northern Los Angeles County along the coastal slope to extreme northwest Baja California, Mexico.	Low likelihood of occurrence due to the limited amount of suitable habitat and the lack of records from the air station (MCAS Miramar 2006).
MAMMALS (CONTINUED)			
Tadarida brasiliensis Brazilian free-tailed bat	-/CSC	Buildings, mine shafts, caves, and undersides of bridges from sea level up to 5,000 feet in mountainous areas; northern South America and the Caribbean, northward through the southwestern and southeastern U.S.	Moderate likelihood of foraging in the project areas due to the presence of potentially suitable habitat and records of roosting and foraging on the air station (MCAS Miramar 2006).

Notes:

Federal ESA
FE: Federally Listed as Endangered
FT: Federally Listed as Threatened
-: No listing

California ESA
CE: State of California Endangered
CT: State of California Threatened
CSC: California Species of Concern
CSA: California "Special Animal" (CNDDB Conservation Status)
-: No listing

Several non-listed sensitive species may occur in the vicinity of the project area including the orange-throated whiptail (*Cnemidophorus hyperythrus beldingi*), San Diego horned lizard (*Phrynosoma coronatum blainvillei*), burrowing owl (*Athene cunicularia hypugaea*), southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*), loggerhead shrike (*Lanius ludovicianus*), San Diego desert woodrat (*Neotoma lepida intermedia*), and the San Diego black-tailed jackrabbit (*Lepus californicus bennettii*). These species are not expected to occur in large numbers within the project area due to the limited amount and relatively low quality of available habitat. Federally listed species are discussed in detail below.

Federally Listed Species

Six federally listed wildlife species might be thought to potentially occur in the project vicinity based on suitable habitat and/or known range, as identified in Table 3.14-3, including Riverside fairy shrimp, San Diego fairy shrimp, coastal California gnatcatcher, Quino checkerspot butterfly, southwestern willow flycatcher, and least Bell's vireo. Four federally listed species (Quino checkerspot butterfly, southwestern willow flycatcher, Riverside fairy shrimp, and least Bell's vireo) are not expected to occur within the project area due to the lack of suitable habitat or positive survey results as discussed previously under the sensitive wildlife discussion. Two species (San Diego fairy shrimp and coastal California gnatcatcher) either occur or may potentially occur within the immediate vicinity of the project area (Table 3.14-3). The remainder of this section provides summaries of the basic biology and distribution of the remaining two listed species. Each summary concludes with a discussion of the potential occurrence within the project area.

SAN DIEGO FAIRY SHRIMP

The San Diego fairy shrimp (*Branchinecta sandiegonensis*) is a small freshwater crustacean in the family Branchinectidae of the Order Anostraca. This species is a vernal pool habitat specialist, found in small, shallow vernal pools and other seasonally ponded features. San Diego fairy shrimp may be present in seasonally astatic vernal pools in coastal areas within grassland, agriculture, coastal sage scrub, and chaparral habitats. The species often occurs in ditches, puddles, minor impoundments, and road ruts that can support suitable conditions, including these features on MCAS Miramar (USFWS 1994b). No individuals have been found in riverine waters, marine waters, or other permanent bodies of water. The genetic characteristics of the San Diego fairy shrimp, as well as ecological conditions such as watershed contiguity, indicate that populations of these animals are defined by pool complexes rather than by individual vernal pools (Simovich et al. 1992). Individual vernal pools occupied by the San Diego fairy shrimp are most appropriately referred to as subpopulations.

The largest number of vernal pools inhabited by the San Diego fairy shrimp a located in San Diego County. The San Diego fairy shrimp is found from MCB Camp Pendleton, inland to Ramona, and south through Del Mar Mesa, Kearney Mesa, Proctor Valley, and Otay Mesa, and into northwestern Baja California, Mexico. In Baja California, it has been recorded at two localities, Valle de las Palmas south of Tecate and Baja Mar north of Ensenada (Brown et al. 1993). Small populations occur in Orange County, and a single isolated female was reported from a vernal pool in Isla Vista, Santa Barbara County, California (USFWS 1994b).

This species was listed as endangered on 3 February 1997 (USFWS 1997a). The USFWS determined that the continued survival of the species was threatened by habitat destruction from agricultural and urban development, alteration of wetland hydrology by draining, off-road vehicle activity,

cattle grazing, and replacement by other fairy shrimp species that are habitat generalists. The animal has a USFWS recovery priority of 2C, indicating that it is a species facing a high degree of threat but having a high potential for recovery. Final critical habitat for this species was designated in 2000 (USFWS 2000a) and did not include portions of MCAS Miramar due to the conservation benefits afforded by MCAS Miramar INRMP. This designation was subsequently remanded, but remains in effect until new proposed critical habitat becomes final. The re-designation of critical habitat was proposed in April 2003 and does not include MCAS Miramar due to the management measures for this species already active within the INRMP. The San Diego fairy shrimp is included in the approved recovery plan for the listed species of southern California vernal pools (USFWS 1998a).

On MCAS Miramar, the San Diego fairy shrimp has been recorded in each of the ten vernal pool management units (MCAS Miramar 2008b). Most of the mapped vernal pools in the vicinity of the air station support San Diego fairy shrimp, including within complexes south of the runway in the vicinity of proposed project components (MCAS Miramar 2008b).

COASTAL CALIFORNIA GNATCATCHER

The USFWS designated the coastal California gnatcatcher (*Polioptila californica californica*) as threatened on 30 March 1993 (USFWS 1993b). Most recently, the USFWS designated revised final critical habitat for the coastal California gnatcatcher in the southern California ecoregion on 19 December 2007. As part of the listing, the USFWS proposed to exclude critical habitat designation for the California gnatcatcher on MCAS Miramar in accordance with Section 4(a)(3)(B)(i) of the ESA. The installation has prepared and maintains a current INRMP, and critical habitat designation is exempted for military installations where the USFWS determines that the approved INRMP for the installation provides a benefit to the species. As a result, there is no critical habitat designated for gnatcatcher on MCAS Miramar. Currently, there is no recovery plan for the California gnatcatcher.

The coastal California gnatcatcher is a non-migratory bird with a range restricted to California and Baja California, Mexico and inhabits coastal sage scrub community. This subspecies is found from Ventura County south to San Diego County and east to San Bernardino County. Basewide protocol surveys for California gnatcatcher were completed in 2007 (Recon 2008). California gnatcatcher is locally abundant on MCAS Miramar (MCAS Miramar 2006), and occurrences have been recorded on both eastern and western lands of MCAS Miramar, almost always associated with Rose and San Clemente Canyons. The proposed bridge construction south of the runway would be located immediately adjacent to historically occupied breeding habitat (prior to severe burning by the Cedar Fire); however, no gnatcatcher observations exist in those areas post-Cedar fire. Post-Cedar fire occurrences are also known approximately 1,000 feet (305 meters) west and north of proposed project components at the west end of the flightline. Effects from the Cedar Fire reduced the distribution and quantity of occupied habitat and the number of breeding pairs throughout MCAS Miramar (Figure 3.14-2).

Sensitive Habitats

Vernal Pools

Vernal pools are small, usually isolated wetlands consisting of seasonally ponded, shallow depressions underlain by a relatively impervious hardpan. Vernal pool habitat can be protected under the Federal Water Pollution Control Act and subsequent amendments, collectively known as

the Clean Water Act (33 USC § 1251 et seq.), Executive Order 11990, and/or Section 7 of the ESA. In addition to those features protected under the Clean Water Act, Executive Order 11990 also protects other wetland features such as vernal marshes, fresh water marshes, portions of some riparian vegetation types, and edges of open water ponds to ensure an overall no net loss of these features. Vernal pools and other features that seasonally pond water (road ruts, ditches, or small impoundments) can support a distinctive assemblage of plants and animals, including numerous rare, federally listed, and special concern species, that are adapted to relatively brief periods of inundation during the winter-spring rainy season, followed by a prolonged dry period during which no surface water remains. The extent of vernal pools has been greatly reduced throughout California by urban and agricultural development. Vernal pools are of special concern on MCAS Miramar, where they are numerous due to protection from development. The pools are defined as San Diego Mesa Hardpan type (MCAS Miramar 2006) and although the usual vegetation association is chaparral or coastal sage scrub, past land use has disturbed many areas and converted the vegetation to non-native grasslands (MCAS Miramar 2006, 2008b). Vernal pools and other seasonally ponded features that may support sensitive resources are managed and inventoried by the Natural Resources Division at MCAS Miramar. Mapping efforts have occurred throughout the last decade with concentrated efforts in 2001 and 2005 (MCAS Miramar 2006), which included most of the Main Station area. A comprehensive installation-wide mapping effort continues to map those areas away from the Main Station. Vernal pools and other seasonally ponded features are present in the vicinity of project components, primarily south of the flightline area. The distribution of these features in the vicinity of the proposed action alternatives is shown in Figures 3.14-2 through 3.14-4.

Wetlands and Other Clean Water Act Regulated Waters

Under the Clean Water Act (33 USC § 1251 et seq.), wetlands are defined as those "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions". Executive Order 11990, dated 24 May 1977 and amended by Executive Order 12608 on 9 September 1987, requires federal agencies to minimize the destruction, loss, or degradation of wetlands and to enhance their natural and beneficial values. Vernal pools, described in more detail above, are also subject to the Clean Water Act if they are adjacent or connected to tributaries to Traditional Navigable Waters. Wetlands are delineated and defined using the Arid West Supplement of Wetland Delineation Manual (USACE 2008a).

Wetlands and other Clean Water Act regulated waters were mapped throughout the MCAS Miramar flightline and Main Station areas in 2007 (USACE 2008b), which represented an update to a 1999 wetland delineation resulting from revised Supreme Court and USACE guidance. Additional mapping occurred north of the flightline in the western part of the air station in 2009 (URS 2009 in prep.). In the vicinity of the Main Station, wetlands and other Clean Water Act regulated waters are generally associated with the Rose Canyon and San Clemente Canyon drainages as seen in Figure 3.14-5. Wetlands, jurisdictional vernal pool wetlands, and non-wetland Clean Water Act regulated waters, such as ephemeral streams, are present in the flightline area. Specifically, jurisdictional stream channels are intersected by the proposed fuel pits area and proposed apron expansion south of the runway. Additionally, non-wetland Clean Water Act regulated waters are also present within the footprint of the proposed bridge connecting Johnson Road and Miramar Gun Club Road south of the runways. Clean Water Act permitting would be required and completed as part of any modifications to regulated wetlands and waters.

Critical Habitat

No critical habitat is present in the vicinity of proposed project components.

Established Plans, Measures, and Procedures Applicable to All Training on MCAS Miramar

All project components, as well as all activities that occur on MCAS Miramar, would be conducted in compliance with the MBTA and Executive Order 13186. The MBTA affirms and implements the United States' commitment to international conventions for the protection of shared migratory bird resources, and prohibits the take, possession, import, export, transport, selling, purchase, barter, or offering for sale, purchase or barter, any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit. Executive Order 13186 directs Federal agencies to avoid or minimize the negative impact of their actions on migratory birds, and to take active steps to protect birds and their habitat. On December 2, 2003, the President signed the 2003 National Defense Authorization Act. The Act provides that the Secretary of the Interior shall exercise his/her authority under the MBTA to prescribe regulations to exempt the Armed Forces from the incidental taking of migratory birds during military readiness activities authorized by the Secretary of Defense. Congress defined military readiness activities as all training and operations of the Armed Forces that relate to combat and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use. Congress further provided that military readiness activities do not include: (A) the routine operation of installation operating support functions, such as administrative offices, military exchanges, commissaries, water treatment facilities, storage facilities, schools, housing, motor pools, laundries, morale, welfare, and recreation activities, shops, and mess halls; (B) the operation of industrial activities; or (C) the construction or demolition of facilities used for a purpose described in (A) or (B).

On July 31, 2006, the DoD and the USFWS entered into a Memorandum of Understanding (MOU) to Promote the Conservation of Migratory Birds, in accordance with Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds." MCAS Miramar developed an INRMP (2006) to identify and provide management tools for native and protected species and habitats on the installation, including those species protected under the MBTA. The training component of the proposed action is a "Military Readiness" activity and therefore incidental take is authorized unless the action jeopardizes bird populations; however, as part of the MOU between USFWS and DoD, all Military Readiness activities shall include conservation measures as part of the NEPA process to minimize and avoid impacts on species protected under the MBTA. These measures are identified at the end of this section and include the avoidance, restoration, and/or enhancement of all sensitive native plant communities that could be affected by proposed projects, seasonal avoidance of nesting birds, avoidance of riparian and wetland habitats, and fuel and fire management.

In addition, DoN and USMC commands develop Bird Air Strike Hazard (BASH) plans to reduce hazardous bird/animal activity relative to airport flight operations. At MCAS Miramar, BASH issues are considered along with animal air strike hazards and are sometimes referred to as BAASH (Bird Animal Air Strike Hazard). The Station Safety Department has recently completed a BASH assessment in coordination with USDA and USFWS personnel (MCAS Miramar 2006). The MCAS Miramar INRMP (MCAS Miramar 2006) also discusses BASH issues such as the flightline mowing program, the advantages and disadvantages of owls inhabiting hangars, and the improved City of San Diego landfill operations with regard to bird abatement.

Projects implemented at MCAS Miramar, including the proposed action, must also comply with various existing regulatory requirements to protect biological resources. The MCAS Miramar

INRMP (MCAS Miramar 2006) describes ongoing natural resource management programs as well as long-term goals, objectives, and planned actions. Such regulatory requirements would be implemented as part of the proposed action. Specifically, all areas of MCAS Miramar have been given a Management Area (MA) designation based on the presence and quality of various natural resources and/or habitat types (MCAS Miramar 2006). Management Area designations defined in detail in Chapter 5 of the MCAS Miramar INRMP (2006) reflect the priorities for conservation, and serve as a basis for planning natural resource management actions.

3.14.2 Environmental Consequences

A 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, legal protection of the resource, and local/regional management. The results of this impact assessment are discussed below. Potential temporary and permanent impacts on species federally listed as threatened or endangered are considered significant and would require formal consultation with the USFWS under Section 7 of the ESA prior to project implementation; a biological assessment for the project has been completed and formal consultation has been initiated. Conservation and minimization measures provided to reduce impacts to federally listed species would be implemented in addition to guidance and measures issued by the consultation process with USFWS. Additionally, potential impacts to Clean Water Act regulated features identified in this impact assessment would be subject to guidance contained in Executive Order 11990 and permitting requirements under Sections 401 and 404 of the Clean Water Act.

The Full Basing Alternative (introduction of ten squadrons at MCAS Miramar) represents the proposed basing alternative with greatest environmental consequences at this installation. As part of this alternative, five squadrons would be placed north of the existing runway and four would be placed south of the runway (the other 12 aircraft are estimated deployed off-base). The environmental consequences of the Maximum Partial Basing (eight squadrons) and Minimum Partial Basing (two squadrons) at MCAS Miramar are less than that of the Full Basing Alternative, with the Minimum Partial Basing Alternative having the least adverse impacts on biological resources. No new construction is proposed for the Minimum Partial Basing Alternative or the non-MCAS Miramar Basing alternatives. Figures 2.3-1 through 2.3-4 and Figures 3.14-2 through 3.14-5 provide the details regarding proposed new construction under the various alternatives.

Full Basing Alternative

Vegetation

For the purposes of native and non-native plant communities, direct impacts were calculated based on an identification of communities that occur within the proposed project footprint as well as a 50-foot (15.2 meter) buffer around infrastructure improvements such as the fuel pits, compass rose area, taxiway connections, parking aprons, and new roads. No new infrastructure or direct removal of plant communities is proposed within the buffer; however, because temporary construction-related impacts, operational impacts, and other indirect impacts are difficult to assess, this analysis conservatively estimates that all resources within the buffer area would have at least some potential to be degraded by ongoing activity associated with the proposed action. While the buffer areas will not be developed, this analysis assumes no sensitive resources or habitat would remain within the buffer areas. As a result, the assessment considers the "worst case scenario" to adequately evaluate and compensate for potential impacts. For the purposes of compensation, all

impacts to native plant communities within the buffer areas are considered permanent, although these areas would continue to provide some limited wildlife habitat even if conversion to "disturbed habitat" category occurs.

Figure 3.14-1 and Table 3.14-4 provide an overview of the plant communities that would be affected by the conversion from undeveloped to developed land as part of this alternative. Under this alternative, new construction to accommodate basing ten squadrons at MCAS Miramar would require the direct removal and permanent loss of approximately 111.2 acres (45.0 ha) of undeveloped areas, most of which occurs south of the runways and north of Harris Plant Road. Habitat affected by new construction under this alternative includes approximately 32.9 acres (13.3 ha) of mostly disturbed Diegan coastal sage scrub (with an additional 10.2 acres [4.2 ha] likely disturbed or degraded within the buffer area). Construction under this alternative would also result in the direct removal of 47.1 acres (19.1 ha) of chaparral (mapped as disturbed and undisturbed) south of the runway (15.1 acres [6.1 ha] within buffer) and 0.7 acre (0.3 ha) of disturbed chamise chaparral, mostly within Management Area I (0.4 acres [0.2 ha] within the buffer) and loss of a small amount of common and disturbed communities such as eucalyptus woodland and non-native grassland (Table 3.14-4).

Although only a small area of undisturbed Diegan coastal sage scrub habitat is proposed for removal, this community is rare in the region and has limited distribution on MCAS Miramar. This vegetation type can provide habitat for the California gnatcatcher. However, California gnatcatcher surveys conducted in 2007 and all previous surveys did not find California sage scrub vegetation to be occupied by this species. None of the other communities proposed for removal support California gnatcatcher or other threatened or endangered upland species; however, recent (post-Cedar fire) gnatcatcher observations have been recorded in San Clemente Canyon within 500 feet (152 meters) of project components (threatened and endangered species are described in detail under the Sensitive Wildlife Species section). Although specific functions and values vary, these native plant communities provide value to the overall ecosystem and biodiversity of a region. The loss or degradation of native and non-native plant communities, both temporary and permanent, reduces the natural species diversity and availability of breeding, foraging, and resting habitat for both common and sensitive wildlife species. Additionally, the loss of native plant communities can limit regional migration patterns and create favorable conditions for invasive species. Diegan coastal sage scrub is rare and declining in the region, limited in distribution, and can provide unique habitat for both common and other sensitive upland wildlife species. Although 99 percent of the Diegan coastal sage scrub community that would be permanently removed under this alternative is mapped as disturbed (defined as less than 50 percent of the native community exists where mapped), the reduced habitat quality still provides important value to wildlife and further degradation would reduce the availability of this community. As a result, because Diegan coastal sage scrub is limited in distribution, the temporary and permanent loss of this community under this alternative would be significant.

Table 3.14-4. Plant Communities Impacts within the MCAS Miramar Project Area

Community Type[2]	Full Basing Alternative Acres (Hectares)[1]	Maximum Partial Basing Acres (Hectares)	Minimum Partial Basing Acres (Hectares)	Non-MCAS Miramar Basing Alternatives Acres (Hectares)
Diegan Coastal Sage Scrub				
Permanent-Footprint	0.5 (0.2)	-	-	-
Potentially Permanent- Buffer	0.4 (0.2)	0.1 (<0.1)	-	-
Diegan Coastal Sage Scrub-D				
Permanent-Footprint	32.4 (13.1)	2.3 (0.9)	-	-
Potentially Permanent- Buffer	9.8 (4.0)	1.9 (0.8)	-	-
Chaparral (several types)				
Permanent-Footprint	20.7 (8.4)	0.9 (0.4)	-	-
Potentially Permanent- Buffer	2.1 (0.9)	0.6 (0.2)	-	-
Chaparral (several types)-D				
Permanent-Footprint	27.1 (11.0)	-	-	-
Potentially Permanent- Buffer	8.0 (3.3)	-	-	-
Native and Non-Native Grassland				
Permanent-Footprint	9.9 (4.0)	-	-	-
Potentially Permanent- Buffer	1.9 (0.8)	-	-	-
Native and Non-Native Grassland-D				
Permanent-Footprint	13.1 (5.3)	5.1 (2.1)	-	-
Potentially Permanent- Buffer	7.7 (3.1)	3.3 (1.3)	-	-
Coastal and Valley Freshwater Marsh, Vernal Marsh				
Permanent-Footprint	0.1 (<0.1)	-	-	-
Potentially Permanent- Buffer	0.2 (0.1)	-	-	-
Eucalyptus Woodland-D				
Permanent-Footprint	0.7 (0.3)	0.7 (0.3)	-	-
Potentially Permanent- Buffer	0.6 (0.3)	0.6 (0.3)	-	-
Disturbed Habitat[3]				
Permanent-Footprint	6.8 (2.7)	2.0 (0.8)	-	-
Potentially Permanent- Buffer	6.0 (2.4)	1.7 (0.7)	-	-
Developed[4]	33.9 (13.7)	78.6 (31.8)	-	-
Total[5]				
Permanent-Footprint	**111.2 (45.0)**	**11.1 (4.5)**	**-**	**-**
Potentially Permanent- Buffer	**36.8 (14.9)**	**8.3 (3.4)**		

Notes:
1. Values provided in this table are limited to the extent of plant communities within the construction footprint.
2. –D refers to a disturbed form of this community where more than half the typical vegetation that would be present otherwise has been cleared, resulting in bare ground and/or weedy species that are characteristic of disturbed areas.
- This analysis estimates a 50-foot buffer for the proposed fuel pits and compass rose components where temporary impacts and indirect effects from subsequent use could extend beyond the project footprint. A 20-foot buffer was used for taxiway and infrastructure improvements south of the runway.
3. Areas classified as "disturbed habitat" are essentially barren but are of concern where the habitat includes vernal pools and/or their surrounding drainage areas.
4. These areas are developed and void of vegetation. Therefore, this category would not contribute to any impacts on vegetation and is not included in the "total".
5. This totals all listed communities except developed.

Source: MCAS Miramar 2006

The temporary and permanent removal of chaparral under this alternative represents a permanent loss of a declining native community in southern California and the associated habitat value for both common and sensitive wildlife species. South coast chaparral occurs principally on coastal mesas (e.g., Kearney Mesa) and is typically stunted as a result of very shallow, nutrient poor soils. It is of very limited distribution in the region and much of the land formerly vegetated by south coastal chaparral has been removed by development in surrounding areas. Although south coastal chaparral is well represented on MCAS Miramar, where over 9,000 acres (3,642 ha) are present, it is threatened also by type conversion and invasion of non-native species as a result of repeated fires with short

return intervals and other disturbances. The permanent loss of 47.1 acres (19.1 ha) with an additional 15.3 acres (6.1 ha) potentially degraded or lost, of which approximately 60 percent is classified as disturbed, would represent less than one percent of the total acreage of this community type on MCAS Miramar. Because of the incremental loss of this community on MCAS Miramar and the availability of comparable habitats on MCAS Miramar in the vicinity of those areas proposed for removal, impacts on chaparral would be adverse but less than significant.

Finally, the loss of a small amount of more common and disturbed communities such as eucalyptus woodland and non-native grassland is not expected to affect the regional distribution of these communities or the wildlife they support and impacts resulting from this alternative on eucalyptus woodland and non-native grassland would be less than significant.

Implementation of the mitigation measures provided at the end if this analysis would reduce the impact of the Full Basing Alternative on Diegan coastal sage scrub. Additionally, measures are proposed to manage the temporary impacts to all plant communities temporarily affected under this alternative. These measures follow compensation ratios presented in the MCAS Miramar INRMP (2006), including restoration of permanently lost sensitive native plant communities. Implementation of these measures would reduce the impact of the Full Basing Alternative on sensitive native plant communities to a less than significant impact (Measures 2, 3, 7).

Wildlife

The variety of plant communities within the project area and on adjacent lands forms a mosaic that is likely to support a diversity of common wildlife both within and surrounding the project area. The loss of habitat associated with construction and the operational use of this alternative would lead to temporary and permanent impacts on wildlife within the project area and surrounding areas. The loss of native and non-native plant communities within the project area would cause wildlife to disperse into nearby areas and would permanently remove the habitat for future use, resulting in a decreased ability to forage, shelter, and rest. Additionally, construction activities associated with the vegetation grubbing and earth moving would likely result in the direct loss of individuals.

Nonetheless, the removal of the native and non-native plant communities is not likely to significantly reduce the regional population numbers and distribution of common wildlife. Because most of the areas proposed for development are disturbed or degraded the functions of these affected communities are further reduced, and common wildlife would be expected to scatter and utilize comparable habitat types both on and off of MCAS Miramar. However, although common wildlife would be likely to utilize adjacent habitats following project development, the direct loss of nests and individual species protected under the MBTA would be an adverse impact. Measures are provided at the end of this section to limit impacts on nesting birds protected under the MBTA (Measures 1, 2, 7). In conjunction with ongoing management associated with the MCAS Miramar INRMP (2006), the successful completion of these measures would reduce impacts on common wildlife and bird species to less than significant.

Noise associated with construction would also likely cause wildlife to temporarily avoid the area, including those that are protected under the MBTA. Noise associated with grubbing, as well as an increase in general activity and presence, could mask bird calls and invoke stress in birds. Disturbed nests in the immediate vicinity of construction activity would be susceptible to

abandonment and depredation. However, bird and wildlife populations in the vicinity of the air station where project components would occur are likely accustomed to elevated noise associated with aircraft and general military industrial use. As a result, indirect impacts from construction such as dust and noise are expected to be minimal because the ambient noise levels within the air station are high under existing conditions and would be unlikely to substantially increase by the relatively minor and temporary nature of the proposed construction and modifications.

Although little is known about the effects of MV-22 operations on wildlife species, this aircraft can be presumed to have effects somewhat similar to those of a helicopter, such as the CH-46E. Under this alternative, the total number of airfield operations would increase by approximately 31 percent, which would result in more frequent operational noise. However, this increase falls within historic use parameters for the airfield (1996-2003), which have fluctuated between approximately 90,000 and 167,000 annual operations (MCAS Miramar 2005). Even with the introduction of more aircraft and a corresponding increase in operation levels over current levels, the MV-22 would operate in an airfield environment similar to the current operational environment as well as follow established local approach and departure patterns. Wildlife in the vicinity of the airfield are accustomed to a noisy military aircraft operational environment and are not expected to react or modify behavior as a result of the proposed project. As a result, noise impacts to wildlife from airfield operations under this alternative are expected to be less than significant.

Bird air strikes are also an inevitable hazard associated with military aircraft training. Under the Full Basing Alternative, the MV-22 would operate in the same airfield environment as the current aircraft. Even with the introduction of more aircraft than current levels, the overall potential for bird-aircraft or wildlife strikes is not anticipated to be significantly greater than current levels. MV-22 aircrews operating in MCAS Miramar airspace would be required to follow applicable procedures outlined in the MCAS Miramar BASH plan (MCAS Miramar 2008b). MCAS Miramar has developed aggressive procedures designed to minimize the occurrence of bird/wildlife-aircraft strikes, and has documented detailed procedures to monitor and react to heightened risk of bird-strikes (MCAS Miramar 2006). When risk increases, limits are placed on low altitude flight and some types of training (e.g., multiple approaches, closed pattern work) in the airport environment. Special briefings are provided to pilots whenever the potential exists for greater bird-strike sightings within the airspace. MV-22 pilots would be subject to these procedures. Therefore, no significant impact would occur related to BASH issues.

Sensitive Plant Species

For the purposes of vernal pool associated sensitive plant and wildlife species, direct impacts were calculated based on an identification of vernal pools that occur within the proposed project footprint as well as a 50-foot (15.2 meter) buffer. No construction is proposed within this identified buffer; however, this analysis estimates that all vernal pools and associated species within the prescribed buffer would be permanently impacted by the proposed action.

San Diego button-celery, a species federally listed as endangered, is predominantly associated with vernal pools and other seasonally ponded features south of the runway in the flightline area, but has also been identified west of the proposed fuel pit area, and near Hangar 0 to the east (MCAS Miramar 2008a). This alternative would result in a permanent loss of 60 percent of mapped vernal pool habitat south of the runway that supports San Diego button-celery. Impacts on this species from the Full Basing Alternative include the direct loss of potentially thousands of individuals

associated with approximately five acres of vernal pools and other seasonally ponded features, and potential reduction in water quality within mapped features that are directly affected by new construction. Because construction under this alternative would result in a substantial direct permanent loss of a federally listed species, impacts would be significant.

Similar to San Diego button-celery, San Diego mesa mint occurs throughout the vernal pool complex south of the runway. No individuals have been mapped north of the runway in the vicinity of other proposed project components. Approximately 14 percent of the mapped vernal pool habitat that would be lost through implementation of this alternative support San Diego mesa mint, all south of the runway. Impacts on this species include direct loss of potentially hundreds of individuals and loss or degradation of nearby vernal pool habitat. Because construction under this alternative would result in a substantial direct permanent loss of a federally listed species, impacts would be significant.

Any permanent or temporary effects on species federally listed as threatened or endangered, including San Diego button-celery and San Diego mesa mint, requires formal consultation with the USFWS under Section 7 of the ESA prior to implementation of the proposed action. Implementation of mitigation measures provided at the end of the analysis would reduce the impact of the Full Basing Alternative on San Diego button-celery and San Diego mesa mint populations. However, because of the substantial loss of known occupied habitat for this species, these measures would not fully mitigate potential impacts to these species. Thus, impacts to the San Diego button-celery and San Diego mesa mint would remain significant under this alternative (Measures 2, 5, 6, 7).

Spreading navarretia and California Orcutt grass have also been mapped in the vicinity of the Main Station area. However, neither of these species has been identified within the vernal pool complex south of the runway or in the vicinity of the proposed fuel pits west of the flightline, based on comprehensive surveys in 2005. There are no mapped populations of California Orcutt grass in the vicinity of proposed project components, and as a result, no impacts on these species would occur.

Willowy monardella predominately occurs on east MCAS Miramar lands associated with canyons. A few segmented populations occur on west MCAS Miramar near the Main Station; however, populations are strongly correlated with Rose and San Clement Canyons. At its closest point, the nearest recorded occurrence for this species is approximately 0.75 mile (1.2 km) east. No known populations or suitable habitat occurs in the vicinity of proposed project components and as a result, no impacts on this species would occur.

Other sensitive species that are not federally or state listed that occur or may occur in the project area include Palmer's sagewort, Orcutt's brodiaea, wart-stemmed ceanothus, long-spined spineflower, summer holly, variegated dudleya, San Diego barrel cactus, Palmer's grappling hook, San Diego goldenstar, little mousetail, California adder's tongue fern, Nuttall's scrub oak, and pygmy spike moss. Based on known occurrences and/or requisite habitat, these species have the potential to occur within the project are and thus would be potentially impacted by the Full Basing Alternative. However, these plant species are not protected by state or federal law and the limited amount of habitat proposed for removal would result in a corresponding low number of individuals that may occupy the project area. As a result, project implementation under this alternative is unlikely to jeopardize the regional population and continued existence of these species and, therefore, no significant impacts would occur.

Sensitive Wildlife Species

San Diego fairy shrimp are known to occur in association with vernal pool complexes and other seasonally ponded features located to the south and west of the flightline within the project area (MCAS Miramar 2006, 2008a). Impacts on this species from the Full Basing Alternative include the direct loss of potentially thousands of individuals associated with hundreds of vernal pools, and potential reduction in water quality within mapped vernal pool basins and watersheds in the vicinity of proposed project components. The loss of this many individuals has the potential to affect the regional distribution of this species and could lead to the continued loss and degradation of a limited habitat for this federally protected species. As a result, the direct loss of individuals and potentially suitable habitat for the San Diego fairy shrimp would represent a significant impact on biological resources. Any permanent or temporary effects on species federally listed as threatened or endangered, including San Diego fairy shrimp, requires formal consultation with the USFWS under Section 7 of the ESA prior to implementation of the proposed action.

Implementation of mitigation measures provided at the end of the analysis would reduce the impact of the Full Basing Alternative on San Diego fairy shrimp populations (Measure 2); however, because of the substantial loss of known occupied habitat for this species, impacts would remain significant (Measures 2, 5, 6, 7).

No known occupied California gnatcatcher habitat would be removed as part of this alternative. Records for this species are generally associated with Rose and San Clemente Canyons and, under this alternative, construction of project components would not result in the loss of any known occupied habitat. Project components would occur within the immediate vicinity of occupied habitat within San Clemente Canyon, likely within a few hundred feet of gnatcatcher records (Figure 3.14-2). Project components would result in increased human activity, noise, and general disturbance in the area while construction is occurring. However, the proposed construction of the fuel pits and the nearest gnatcatcher observations are within the departure corridor of current F-18 operations and any additional noise associated with temporary construction would be negligible compared to the existing noise environment. Moreover, the construction site would likely not be visible from the occupied California gnatcatcher habitat because of physical and topographic separation between construction activities and occupied habitat. These factors make it unlikely that there would be any effects of construction activity on California gnatcatcher behavior (e.g., by masking calls, causing stress, or disturbing food gathering or nesting activities). However, because California gnatcatcher is a federally listed species, impacts from construction noise and increased activity would be significant. Successful implementation of conservation measures provided at the end of this analysis, including seasonal restrictions on construction activities, would reduce impacts on California gnatcatcher populations to a less than significant level (Measures 1, 2).

The proposed action would also result in a change to the noise environment in the vicinity of the airfield associated with ongoing military training and use of the MV22. The frequency of noise producing operations would increase with the replacement of the CH-46 by the MV-22; however, the MV-22 would operate in an airfield environment similar to the current operational environment, follow established local approach and departure patterns, and the total number of operations and aircraft would be within recent historic levels. Studies to measures the effects of rotary wing noise on gnatcatcher populations were conducted as part of the Base Realignment and Closure action at Miramar in 1997 (transition from NAS Miramar to MCAS Miramar). Completed in 2006, the study concluded that rotary wing aircraft noise was not correlated with reproductive success of individuals

of this species at MCAS Miramar (Hubbs-SeaWorld Research Institute 2006), and gnatcatchers find and inhabit suitable nesting habitat independent of the noise environment (Hubbs-SeaWorld Research Institute 2006). The study suggests that habitat structure and composition and other physical components are statistically correlated to nesting success, but operational noise at MCAS Miramar is not a factor. Because the MV-22 would operate in a similar fashion as the CH-46, has comparable noise characteristics, and changes in operational frequency are within recent historic levels, impacts resulting from an increase in operations would not be significant.

Other sensitive wildlife species that are not state or federally listed might also occur in the project area. Project-specific presence/absence studies have not been conducted for these species within the project area. However, based on requisite habitat, these species have the potential to occur in the vicinity of proposed project components and thus would be impacted by the Full Basing Alternative. Non-federally listed bird species, including those species fully protected by the MBTA, are addressed above under the Common Wildlife Section. Although these wildlife species are not protected by state or federal law (except those covered under the MBTA), they are recognized as rare in the region. Due to the limited amount of habitat proposed for removal and the corresponding low number of individuals that may occupy the project area, project implementation is unlikely to jeopardize the regional population or continued existence of these species. Therefore, no significant impacts to these sensitive wildlife species would occur.

Sensitive Habitats

No USFWS critical habitat has been designated on MCAS Miramar and as a result, no impacts on designated critical habitat would occur.

As noted above, for the purposes of Clean Water Act regulated features and vernal pools, direct impacts were calculated based on an identification of features that occur within the proposed project footprint as well as a 50-foot (15.2 meter) buffer around fuel pits, compass rose areas, proposed parking apron, hangars, and other infrastructure improvements. No construction is proposed within this identified buffer; however, because temporary construction-related impacts, indirect, and operational impacts are difficult to assess, this analysis conservatively estimates that all features within the prescribed buffer have at least some unknown potential to be permanently impacted by the proposed action. As a result, the assessment considers the "worst case scenario" to adequately evaluate and compensate for potential impacts. As a result, for Clean Water Act regulated features, the specific total area affected is likely to be less than anticipated here because of implementation of avoidance and minimization measures, where feasible.

Based on the 2007 and 2009 delineations (USACE 2008b; URS 2009 in prep.) wetlands, jurisdictional vernal pools, and non-wetland Clean Water Act regulated waters would be affected by the project components proposed under this alternative. Wetlands, jurisdictional vernal pools, and other Clean Water regulated waters are administered under Sections 401 and 404 of the Clean Water Act. Approximately 0.16 acres (0.06 ha) of Clean Water Act regulated wetlands and vernal pools, and approximately 2,819 linear feet (859 linear meters) of non-wetland Clean Water Act regulated waters (ephemeral stream channel) would be impacted by project components. These features occur both north and south of the runway complex, including the new fuel pit area, and taxiway and infrastructure improvements south of the runway (Figure 3.14-5). These are ecologically important features that support wildlife by providing breeding and foraging habitat, protection from predators, and migration corridors. As a result, removal or degradation reduces the functions and values of

these regulated features and removes or reduces the suitable habitat available. Because there would be a direct loss of jurisdictional features as well as likely indirect impacts from sedimentation and degradation of water quality, impacts to Clean Water Act regulated waters would be significant.

Successful implementation of the mitigation measures provided at the end of this analysis, including seasonal restriction of vegetation removal for the new bridge, new apron areas, parking areas, and fuel pits; avoidance of permanent loss to the maximum extent feasible; and restoration of temporarily disturbed areas to pre-construction conditions, would reduce effects from the Full Basing Alternative on Clean Water Act regulated waters to a less than significant impact (Measures 2, 3, 4, 5). In addition, any permanent or temporary impacts to Clean Water Act regulated waters as a result of the project components under this alternative would require a Water Quality Certification from the RWQCB and an Individual Permit from the USACE under Sections 401 and 404 of the Clean Water Act.

Jurisdictional and non-jurisdictional (isolated) vernal pools and other features that may provide similar conditions are also present within the project area, primarily south of the runway. Vernal pool complexes support unique and habitat-specific plant and wildlife species including San Diego fairy shrimp, San Diego button-celery, and San Diego mesa mint. Vernal pools are conserved because of the presence or potential presence of federally listed plant and wildlife species, and regional rarity as outlined in the MCAS Miramar INRMP. As noted above, vernal pools are sometimes regulated under the Clean Water Act if they are hydrologically connected or adjacent to a jurisdictional stream channel or other feature that provides a nexus to a "traditional navigable waters". Direct effects to vernal pools from the Full Basing Alternative would be the permanent loss of vernal pool features, including the removal of vernal pool soils, plant communities, and associated wildlife habitats. Under this alternative, approximately 5.50 acres (2.23 ha) of vernal pool resources would be removed as part of construction south of the runway associated with apron expansion and north of the runway associated with the fuel pits (Table 3.14-5). Of this, 4.95 acres (2.00 ha) support at least one species federally listed as threatened or endangered and 0.57 acres (0.23 ha) do not. Indirect effects on adjacent pools that are not directly subject to removal include degradation of water quality by construction runoff or change in local runoff regime. The proposed action would include a 50-foot buffer area around the project footprint. No construction is proposed within the buffer; however, because temporary and indirect impacts are difficult to assess, the impact analysis assumed that resources within the prescribed buffers would be permanently impacted by the proposed action. As such, the impact analysis accounted for the indirect impacts mentioned above. Because of the unique habitat that vernal pools provide to federally protected species and the quality of vernal pools that would be affected by the proposed project activities, impacts on vernal pools would be significant.

Implementation of mitigation measures provided at the end of this analysis would reduce the impact of the Full Basing Alternative on vernal pool habitats (Measures 2, 5, 6, 7); however, because of the substantial loss of known occupied vernal pool habitats and associated species, impacts would remain significant.

Mitigation Measures

The following avoidance, minimization, and mitigation measures are proposed for the Full Basing Alternative to reduce construction-related impacts on biological resources. For some resources, successful implementation of the mitigation measures would reduce the impact to a less than significant level, including project-related impacts to Diegan coastal sage scrub and temporary impacts to native communities; Clean Water Act regulated waters, indirect impacts on vernal pool habitat and associated sensitive species; migratory birds; and California gnatcatcher. Direct impacts on vernal

pools and associated species that are federally listed as threatened or endangered could be reduced through mitigation; however, resulting impacts after mitigation would remain significant under the Full Basing Alternative. Mitigation measures for plant communities and common wildlife species, including migratory birds, are discussed together because proposed measures would provide comparable benefits. Similarly, mitigation measures for vernal pool species and habitats are grouped together.

Table 3.14-5. Vernal Pool Impacts within the MCAS Miramar Project Area[1*]

Community Type	Full Basing Alternative-Acres (sq. ft.)	Maximum Partial Basing-Acres (sq. ft.)	Minimum Partial Basing-Acres (sq. ft.)	Non-MCAS Miramar Basing Alternatives-Acres (sq. ft.)
CWA Regulated Vernal Pool Habitat[2]	0.137 (5,968)	0.078 (3,409)	-	-
CWA Regulated Wetlands[2]	0.02 (871)	0.02 (871)		
CWA Regulated Non-wetland Waters[2*]	2,819 linear feet (859 linear meters)	0.11 (4,792)		
Non-CWA Regulated Vernal Pool Basin (occupied)	4.953(215,759)	0.006 (272)	-	-
Non-CWA Regulated Vernal Pool Basin (not occupied)	0.566 (24,655)	0.029 (1,265)	-	-
Seasonally Ponded Features (occupied)[3]	3.127 (136,212)	0.016 (691)	-	-

Notes:
1. Values provided in this table are limited to the extent of vernal pool communities within the construction footprint and buffer. This table represents approximate values. Specific restoration needs, such as for Clean Water Act regulated waters, may be reduced based on avoidance and on-site protection measures, and therefore restoration needs would be reduced.
* Data obtained from the Natural Resources Database for MCAS Miramar (2007); data collected in 2005 and are considered final vernal pool survey data. 2005 was a very wet year, so basins may not support wet features each year.
2. These features are mapped wetlands (both jurisdictional wetlands and jurisdictional vernal pools) that have nexus connections to Traditional Navigable Waters. This row does not include non-wetland but jurisdictional ephemeral streambed. Values are derived from Delineation of Wetland, Other Waters of the U.S., and Nexus Determinations at MCAS Miramar, California (USACE 2008a) and Jurisdictional Delineation for MV-22 Project, MCAS Miramar, CA (URS 2009 in prep.).
* This row includes CWA Regulated non-wetland but jurisdictional ephemeral streambed. For the Full Basing Alternative, the delineation only provided enough detail to develop a linear estimate of impacts (USACE 2008). For the Maximum Partial Basing Alternative, values (in acres) were developed from a follow-on delineation completed by URS for the areas north of the flightline (URS 2009).
3. This row includes non-vernal pool type features (ditches, road ruts, impoundments) that support federally listed species.
CWA = Clean Water Act
Source: MCAS Miramar 2006

Measure 1. Restrict clearing and grubbing of vegetation known to support or have the potential to support migratory birds or other sensitive resources. Removal of vegetation for the new bridge, new apron areas, parking areas, and fuel pits, will be restricted to outside of the breeding season for most migratory birds (15 February to 31 August) to the extent feasible. In areas, such as in the vicinity of vernal pools, where clearing and grubbing cannot be conducted outside of the breeding season to avoid work in wet pool conditions, biological monitors will conduct nest searches prior to clearing and grubbing and identify nests to be avoided. Implementation of this measure would reduce impacts on breeding behavior.

Measure 2. Monitor biological resources during construction within native habitats and other sensitive environments. A biological resource monitor will be onsite at all times during clearing and grubbing of vegetation. The monitor will identify work areas, monitor work activity, and provide "tailgate" sessions for construction contractors. The monitor will also be responsible for ensuring that all minimization and conservation measures are implemented.

Measure 3. Restoration/enhancement of disturbed areas supporting sensitive plant communities consistent with the MCAS Miramar INRMP (2006). Avoidance and/or on-site mitigation would not be feasible under this alternative. Therefore, consistent with the INRMP, the

removal of 43.1 acres (17.9 ha) of Diegan coastal sage scrub (32.9 acres [13.3 ha] permanently lost and 10.2 acres [4.2 ha] assumed lost within buffer) will be compensated for through habitat restoration/creation of a like-kind community either on MCAS Miramar or off-station (Table 3.14-6). Compensation will occur at a ratio of 1:1 for undisturbed sensitive native plant communities and 0.5:1 for disturbed, sensitive, native plant communities (coastal sage scrub). The specific location/locations for restoration will be coordinated and approved by the USMC. This measure will also include the preparation of a habitat restoration plan by the USMC to be completed prior to any project-related construction. The proposed bridge construction will avoid removal of riparian vegetation to the maximum extent feasible. The USMC will compensate any permanent loss of riparian vegetation at 2:1 ratio. Planning and compensation guidance will follow direction outlined in Chapter 6 of the MCAS Miramar INRMP (2006).

Table 3.14-6. Full Basing Alternative- Restoration/Enhancement of Disturbed Areas Supporting Sensitive Plant Communities and Unavoidable Permanent Effects on Vernal Pool Basins (Occupied And Unoccupied) and Associated Federally Listed Species[1*]

Community Type/Feature	Area Impacted- Acres	Compensation Ratio	Total Area to be Compensated- Acres
Diegan Coastal Sage Scrub	0.9 (0.4 ha)	1:1	0.9 (0.4 ha)
Diegan Coastal Sage Scrub-D	42.2 (17.1 ha)	0.5:1	21.1 (8.55 ha)
CWA Regulated Vernal Pools[2*]	0.137 (5,968 sq. ft.)	1:1	0.137 (5,968 sq. ft.)
CWA Regulated Wetlands[2]	0.02 (871 sq. ft.)	2:1	0.04 (1,742 sq. ft.)
CWA Regulated Non-wetland Waters[3]	2,819 linear feet (859 linear meters)	1:1	2,819 linear feet (859 linear meters)
Non-CWA Vernal Pool Basin (occupied)	4.953(215,759 sq. ft.)	3:1	14.859 (647,277 sq. ft.)
Non-CWA Vernal Pool Basin (not occupied)	0.566 (24,655 sq. ft)	1:1	0.566 (24,655 sq. ft)
Seasonally Ponded Features (occupied) [4]	3.127 (136,212 sq. ft)	1.5:1	4.691 (204318 sq. ft.)

Notes:

1. This table represents approximate values. Specific restoration needs, such as for Clean Water Act regulated waters, may be reduced based on avoidance and on-site protection measures, and therefore restoration needs would be reduced.

* Data obtained from the Natural Resources Database for MCAS Miramar (2007); data collected in 2005 and are considered final vernal pool survey data. 2005 was a very wet year, so basins may not support wet features each year.

2. These features are mapped wetlands (both jurisdictional wetlands and jurisdictional vernal pools) that have nexus connections to Traditional Navigable Waters. This row does not include non-wetland but jurisdictional ephemeral streambed. Values are derived from Delineation of Wetland, Other Waters of the U.S., and Nexus Determinations at MCAS Miramar, California (USACE 2008a).

* Compensation ratios presented here relate to regulation under CWA; if pools also support federally listed species, the compensation ratios increase to 3:1 as presented under 'Vernal Pool Basin (occupied)'.

3. This row includes CWA Regulated non-wetland but jurisdictional ephemeral streambed. For the Full Basing Alternative, the delineation only provided enough detail to develop a linear estimate of impacts (USACE 2008).

4. This row includes non-vernal pool type features (ditches, road ruts, impoundments) that support federally listed species.

CWA = Clean Water Act

Measure 4. Compensate for unavoidable temporary and permanent effects on Clean Water Act regulated waters by implementing restoration/enhancement on MCAS Miramar or off-station preservation. Clean Water Act regulated waters have been mapped associated with San Clemente Canyon in the vicinity of the proposed bridge construction and new fuel pit areas, and apron and infrastructure expansion south of the runway. As part of finalized construction plans, wetlands delineations will be reviewed and plans will be prepared to reduce permanent removal of wetland areas to the maximum extent feasible. Where impacts to Clean Water Act regulated features cannot be avoided, the USMC will compensate for losses at 1:1 or as required by the permitting agency as a condition of the permit, consistent with the MCAS Miramar INRMP. Specific mitigation sites will be coordinated as part of the Clean Water Act permitting process. At a minimum, compensation will occur at areas identified and approved by the

regulating agency in a wetland restoration and compensation plan, and specifically address success criteria, monitoring frequency and duration requirements, plant proposed for restoration, and invasive weed control. These requirements would be in addition to any required by the regulating agency as part of the permitting process although compensation for Clean Water Act purposes will not be additive to other proposed compensation.

Measure 5. Implement a water quality management program at construction areas within the watersheds of vernal pools outside the project boundary and in the vicinity of San Clemente Canyon. Before construction, the construction contractor will prepare a water quality management plan, which addresses the type, placement, and monitoring of erosion and water quality control features to be used during and following construction to reduce indirect impacts to biological resources due to construction runoff. Specifically, the plan will include:

- PLACEMENT AND IMPLEMENTATION OF EROSION CONTROL MEASURES. Placement and maintenance of jute netting, geotextiles and other materials will be performed to minimize the effects from stormwater and soil erosion.
- MINIMIZE BLADING AND GRADING OF TEMPORARY CONSTRUCTION WORK AREAS. When feasible, vegetation within the disturbance area will be cut or crushed vegetation at the surface rather than completely remove.
- POST-CONSTRUCTION WATER QUALITY MONITORING AT VERNAL POOL LOCATIONS. The USMC will monitor water quality during and after project construction at vernal pool locations. A monitoring plan will be prepared by a biologist with extensive experience with vernal pools. The plan will include sampling and measurements of dissolved oxygen, turbidity, suspended solids, lead, copper, and zinc. Additionally, the plan will include action protocols to be followed if water quality is below pre-construction standards. If water quality standards are met, monitoring will cease after two years post construction.
- RESTRICT CONSTRUCTION IN WATERSHED OF VERNAL POOL TO OUTSIDE OF THE WET SEASON. Consistent with the INRMP, any construction that could affect habitat for sensitive species associated with vernal pools and seasonally ponded features and watersheds will occur outside of the rainy season (1 November to 1 June) and in dry conditions only. Following the initial clearing of features, ongoing construction activities can occur into the wet season with implementation of erosion control BMPs.

Measure 6. Compensate for unavoidable permanent effects on vernal pool basins (occupied and unoccupied by listed species) by implementing restoration/enhancement on MCAS Miramar or off-station preservation. Consistent with the INRMP, the USMC will compensate for losses of occupied vernal pool basins at a ratio of 3:1. Unoccupied vernal pools will be compensated for at a 1:1 ratio, and occupied seasonally ponded features (road ruts, ditches, and puddles) will be compensated for at 1.5:1. Tables 3.14-5 and 3.14-6 provide a breakdown of occupied and unoccupied features. For use in compensating restoration sites, surface soil from basins supporting endangered species will be salvaged during the "dry season" prior to the start of construction.

As part of this measure, a restoration/enhancement plan will be prepared for USFWS concurrence. The USMC has identified potential restoration areas for vernal pools based on pool re-establishment surveys (south of Harris Plant Road, Johnson Road, west of Interstate-15) completed during the 2004-2005 rainfall season (Figure 3.14-6). Based on the alternative selected,

the plan will include restoration/enhancement locations, restoration/enhancement components, monitoring requirements and time periods, success criteria, and follow-on measures as appropriate. Any additional requirements that result from Section 7 ESA consultation with the USFWS will be implemented as well.

Measure 7. Restoration/enhancement of areas temporarily disturbed by project-related construction activities to reduce indirect impacts to biological resources. For the purposes of the impact analysis, all potential effects within a 50-foot (15-meter) buffer around proposed new facilities are conservatively considered permanent; however, no new construction is proposed within the buffer. While this buffer zone is not proposed to have new facilities constructed on it, it will be recontoured to prevent water ponding and subsequent establishment of vernal pool habitat. The USMC will avoid and minimize temporary impacts to areas adjacent to project-related construction activities (but outside of the 50-foot buffer zone). Specifically, the USMC will take action to minimize the area of impact, soil loss, and sediment laden stormwater runoff, and implement passive restoration of temporary disturbance areas including recontouring and reseeding with native herbaceous species that will withstand frequent disturbance, as identified in the MCAS Miramar INRMP (MCAS Miramar 2006).

ADDITIONAL EFFECTS POTENTIALLY OCCURRING AS A RESULT OF COMPENSATION MEASURES

As a result of implementation of compensation measures as identified in the MCAS Miramar INRMP, existing degraded areas that are not specifically associated with this alternative under the proposed action might be included as part of a vernal pools or jurisdictional features restoration program. As noted under **Measure 6**, USMC has identified potential restoration areas for vernal pools, including areas in the vicinity of the proposed action, based on pool re-establishment surveys (Figure 3.14-6; south of Harris Plant Road, Johnson Road, west of Interstate-15). Under the Full Basing Alternative, all areas identified as potential vernal pool restoration areas would likely be required to satisfy compensation requirements. Only a very small area of identified proposed restoration site options would be required for the Maximum Partial Basing Alternative and no restoration would be required under the Minimum Partial Basing Alternative. Impacts resulting from restoration of these areas would represent a beneficial impact on biological resources (converting degraded non-native plant communities and habitat to restored native habitats).

However, because restoration would require minor construction and a potential change in land use, other resource areas such as Cultural Resources, Hazardous Materials Management, and Land Use could be affected as a result of implementation of mitigation measures.

Maximum Partial Basing Alternative (8 Squadrons)

Under the Maximum Partial Basing Alternative, construction of new facilities would be limited to areas north of the runway. New construction would occur in undeveloped areas west and north of the existing runway as part of the siting of the proposed fuel pits, resulting in the direct loss of a small area of chaparral, disturbed Diegan coastal sage scrub and disturbed non-native grassland (Table 3.14-4). The permanent loss of chaparral and disturbed non-native grassland represents only a small fraction of the total acreage that occurs on MCAS Miramar. Although only a small area of Diegan coastal sage scrub habitat is proposed for removal, this community is rare in the region and has limited distribution on MCAS Miramar. This vegetation type can provide habitat for the California gnatcatcher. However, California gnatcatcher surveys conducted in 2007 and all previous surveys did not find California sage scrub vegetation to be occupied by this species. All

construction associated with this alternative would occur more than 500 feet (152.4 meters) from any suitable California gnatcatcher habitat. These communities are not considered sensitive in the region and the small area proposed for removal does not represent a significant impact.

Although only a small area of Diegan coastal sage scrub habitat is proposed for removal, this community is rare in the region and limited in distribution on MCAS Miramar. As noted above, all construction associated with this alternative would occur more than 500 feet (152.4 meters) from any suitable California gnatcatcher habitat; however, any loss to sensitive communities represents a significant impact. Avoidance would not be feasible under this alternative. Therefore, consistent with the INRMP, the removal of 4.3 acres (1.8 ha) of mostly disturbed Diegan coastal sage scrub will be compensated for through habitat restoration/creation of a like-kind community (Table 3.14-7). See **Measure 3** under the Full Basing Alternative for details.

Table 3.14-7. Maximum Partial Basing Alternative- Restoration/Enhancement Of Disturbed Areas Supporting Sensitive Plant Communities Consistent And Unavoidable Permanent Effects On Vernal Pool Basins (Occupied And Unoccupied) And Associated Federally Listed Species[1*]

Community Type/Feature	Area Impacted- Acres	Compensation Ratio	Total Area to be Restored- Acres
Diegan Coastal Sage Scrub	0.1 (<0.1 ha)	1:1	0.1 (<0.1 ha)
Diegan Coastal Sage Scrub-D	4.2 (1.7 ha)	0.5:1	2.1 (0.85 ha)
CWA Regulated Vernal Pool Habitat (occupied- Seasonally Ponded Feature)[2*]	0.078 (3,409 sq. ft.)	3:1	0.236 (10,277 sq. ft.)
CWA Regulated Wetlands[2]	0.02 (871.2 sq. ft.)	2:1	0.04 (1,742 sq. ft.)
CWA Regulated Non-wetland Waters[3]	0.11 (4,792 sq. ft.)	1:1	0.11 (4,792 sq. ft.)
Non-CWA Regulated Vernal Pool Basin (occupied)	0.006 (272 sq. ft.)	3:1	0.019 (815 sq. ft.)
Non-CWA Vernal Pool Basin (not occupied)	0.029 (1,265 sq. ft.)	1:1	0.029 (1,265 sq. ft.)
Seasonally Ponded Features (occupied)[4]	0.016 (691 sq. ft.)	1.5:1	0.024 (1,036 sq. ft.)

Notes:

1. This table represents approximate values. Specific restoration needs, such as for Clean Water Act regulated waters, may be reduced based on avoidance and on-site protection measures, and therefore restoration needs would be reduced.

* Data obtained from the Natural Resources Database for MCAS Miramar (2007); data collected in 2005 and are considered final vernal pool survey data. 2005 was a very wet year, so basins may not support wet features each year.

2. These features are mapped wetlands (both jurisdictional wetlands and jurisdictional vernal pools) that have nexus connections to Traditional Navigable Waters. This row does not include non-wetland but jurisdictional ephemeral streambed. Values are derived from Delineation of Wetland, Other Waters of the U.S., and Nexus Determinations at MCAS Miramar, California (USACE 2008a).

* Compensation ratios presented here relate to regulation under the Clean Water Act; however, the pool also supports federally listed species and the compensation ratios increase to 3:1.

3. This row includes CWA Regulated non-wetland but jurisdictional ephemeral streambed. For the Maximum Partial Basing Alternative, values (in acres) were developed from a follow-on delineation completed by URS for the areas north of the flightline (URS 2009 in prep.).

4. This row includes non-vernal pool type features (ditches, road ruts, impoundments) that support federally listed species.

CWA = Clean Water Act

Successful implementation of **Measures 2, 3,** and **7**, discussed under the Full Basing Alternative would reduce the impact of the Maximum Partial Basing Alternative on Diegan coastal sage scrub to a less than significant impact**.**

Under this alternative, approximately 0.098 acre (0.04 hectare) of jurisdictional wetlands and vernal pools, and approximately 0.11 acre (0.04 hectare) of non-wetland Clean Water Act regulated waters (stream channel) would be impacted by project components (Figure 3.14-5). These features are ecologically important and support wildlife by providing breeding and foraging habitat, protection from predators, and migration corridors. As a result, removal or degradation reduces the functions and values of these regulated features and removes or reduces the suitable habitat available. Because there would be a direct loss of jurisdictional features as well as likely indirect impacts from sedimentation and degradation of water quality, impacts to Clean Water Act regulated waters would be significant.

Successful implementation of the mitigation measures listed under the Full Basing Alternative, including seasonal restriction of vegetation removal; avoidance of permanent loss to the maximum extent feasible; and restoration or compensation of disturbed/permanently removed areas, would reduce effects from the Maximum Partial Basing Alternative on Clean Water Act regulated waters to a less than significant impact (**Measures 2, 3, 4, 5**). In addition, any permanent or temporary impacts to Clean Water Act regulated waters as a result of the project components under this alternative would require a Water Quality Certification from the RWQCB and an Individual Permit from the USACE under Sections 401 and 404 of the Clean Water Act.

Vernal pools and their associated watershed are present within the proposed fuel pits area, north of the runway. As noted under the Full Basing Alternative, pool complexes support unique and habitat-specific plant and wildlife species including San Diego fairy shrimp, San Diego button-celery, and San Diego mesa mint. Vernal pools are conserved because of the presence or potential presence of federally listed plant and/or wildlife species, regional rarity as outlined in the MCAS INRMP, and sometimes due to the need to comply with Clean Water Act regulations administered by the USACE for those pools identified as Clean Water Act regulated waters. Direct impacts to vernal pools from siting the fuel pits under this alternative include permanent loss of true vernal pool features, including the removal of vernal pool soils, plant communities, and associated wildlife habitats. Under this alternative, approximately 0.04 acre (0.02 ha) of vernal pool resources would be removed as part of construction of the fuel pits area (Table 3.14-5). Of this, 0.006 acre (272 square feet) support at least one species federally listed as threatened or endangered and 0.029 acre (1,265 square feet) do not. Approximately 0.094 acre (<0.038 hectare) of seasonally ponded habitat (non-vernal pools) that support fairy shrimp would also be impacted. Indirect effects on adjacent pools that are not directly subject to removal would include degradation of water quality by construction runoff or change in local runoff regime. Because of the unique habitat that vernal pools provide to federally protected species and the quality of vernal pools that would be affected by the proposed project activities, impacts on vernal pools would be significant. The USMC has also initiated Section 7 consultation with the USFWS over impacts of this alternative to federally listed threatened and/or endangered species.

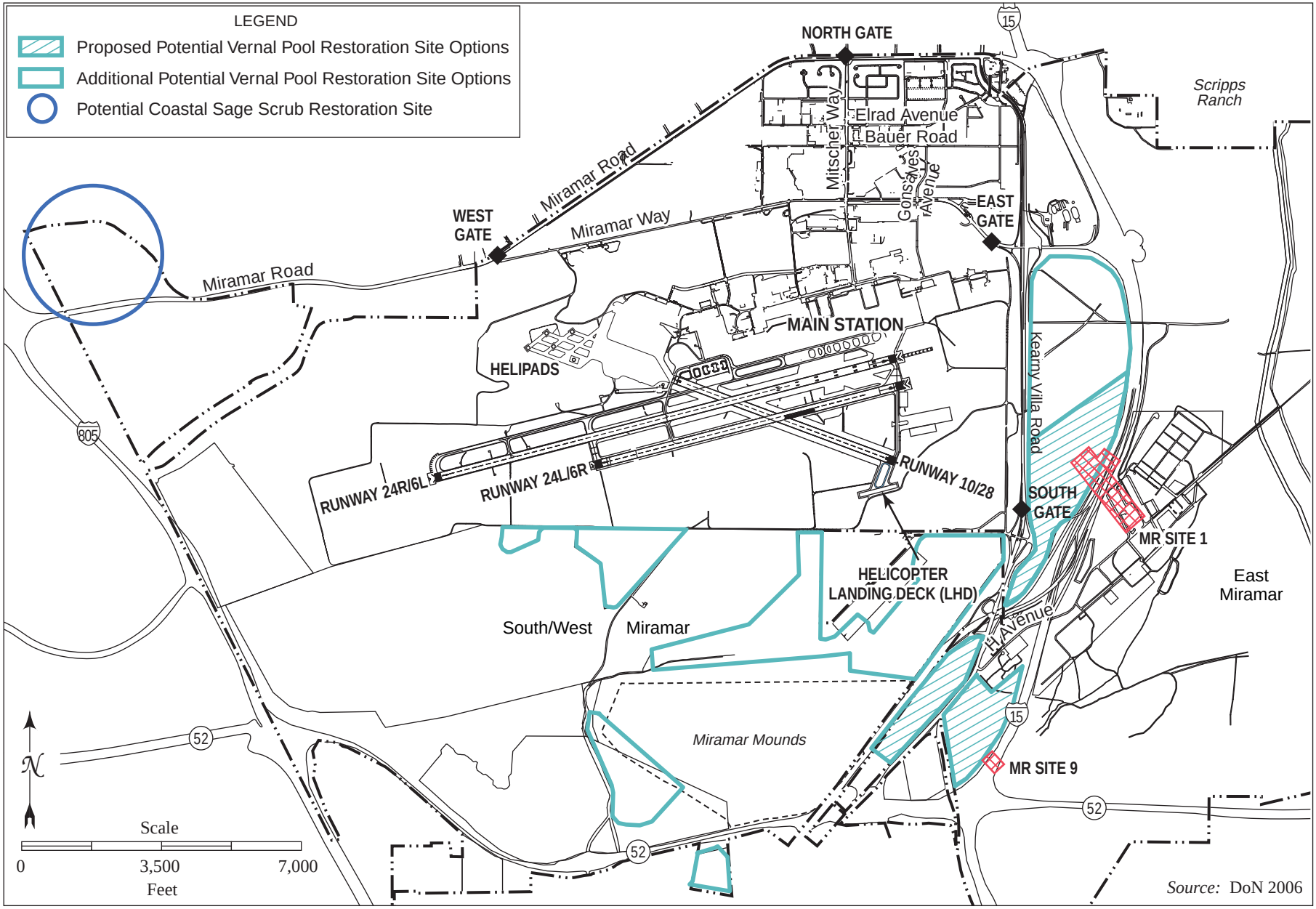
Measures 2, 5, 6, and **7** under the Full Basing Alternative would reduce the impact on vernal pool basins and occupied seasonally ponded features and watersheds. These measures include avoidance of permanent loss to the maximum extent feasible; salvage of vernal pool soils containing cysts (topsoil) and vernal plants; and compensation for temporary and permanent loss (Table 3.14-7; consistent with the INRMP). Because of the small area that would be affected, successful implementation of mitigation measures would reduce impacts to less than significant.

Mitigation Measures

Measures identified under the Full Basing Alternative are applicable to the Maximum Partial Basing Alternative, as noted above.

ADDITIONAL EFFECTS POTENTIALLY OCCURRING AS A RESULT OF COMPENSATION MEASURES

As noted under the Full Basing Alternative, implementation of compensation measures as identified in the MCAS Miramar INRMP could result in additional impacts to resources not specifically identified as part of the proposed action. USMC has identified potential restoration areas for vernal



Habitat Restoration Sites at MCAS Miramar

FIGURE

3.14-6

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pools, including areas in the vicinity of the proposed action, based on pool re-establishment surveys (Figure 3.14-6; south of Harris Plant Road, Johnson Road, west of Interstate-15). Impacts resulting from restoration of these areas would represent a beneficial impact on biological resources (converting degraded non-native plant communities and habitat to restored native habitats).

However, because restoration would require minor construction and a potential change in land use, other resource areas such as Cultural Resources, Hazardous Materials Management, and Land Use may be adversely affected as a result of implementation of mitigation measures.

Minimum Partial Basing Alternative (2 Squadrons)

Under the Minimum Partial Basing Alterative, no construction of new facilities would occur. This alternative would avoid all native plant communities, and would therefore avoid impacts on sensitive vernal pool habitat occupied by San Diego button-celery and San Diego mesa mint, Clean Water Act regulated waters, and occupied California gnatcatcher habitat. Because no new construction or other ground-disturbing activities would occur, impacts on native plant communities, San Diego button-celery, San Diego mesa mint, California gnatcatcher, and Clean Water Act regulated waters would be less than significant.

Mitigation Measures

Because there would be no significant impacts on biological resources, no mitigation measures are proposed.

Non-MCAS Miramar Basing Alternatives

Under a non-MCAS Miramar basing alternative, MV-22 aircraft would be based elsewhere and the existing squadrons of CH-46E at MCAS Miramar would be removed. This alternative would avoid all native plant communities, and would therefore avoid impacts on sensitive vernal pool habitat occupied by San Diego button-celery and San Diego mesa mint, Clean Water Act regulated waters, and occupied California gnatcatcher habitat. Because no new construction or other ground-disturbing activities would occur, impacts on native plant communities, San Diego button-celery, San Diego mesa mint, California gnatcatcher, and Clean Water Act regulated waters would be less than significant.

Mitigation Measures

Because there would be no significant impacts on biological resources, no mitigation measures are proposed.

No Action Alternative

Under the No Action Alternative, the existing MCAS Miramar facilities would not be modified and new facilities would not be constructed. The West Coast fielding of the MV-22 would not occur and the existing CH-46E squadrons would not be replaced. Due to lack of changes to existing conditions, no impacts on biological resources would occur.

3.15 CULTURAL RESOURCES

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 any 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 (National Historic Preservation Act [NHPA], as amended [16 USC 470 et seq.]). Additionally, cultural resources are protected under the Archeological Resource Protection Act (ARPA) (16 USC 470aa-470mm; Public Law 96-95 and amendments), the Native American Graves Protection and Repatriation Act (NAGPRA) (Public Law 101-601; 25 USC 3001-3013), and the American Indian Religious Freedom Act (Public Law 95-341; 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 includes guidance for Native American consultation regarding cultural significance of potential religious and sacred artifacts (16 USC 470a [a][6][A] and [B]).

Cultural resources located within the jurisdiction of MCAS Miramar are managed in accordance with the laws, regulations and guidance summarized above as well as DoD Instruction 4715.16 (Cultural Resources Management) and MCO P5090.2A, Change 2 (Environmental Compliance and Protection Manual). In addition, the MCAS Miramar Integrated Cultural Resource Management Plan (ICRMP) (MCAS Miramar 2004) provides specific guidance for the air station.

3.15.1 Affected Environment

Cultural Setting

The local prehistoric chronology is divided into three major periods -- Paleoindian, Archaic Period, and Late Prehistoric Period. The Paleoindian period, also known as the San Dieguito complex, dates from ca. 12,000 to 8,000 years before present (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). The San Dieguito people were hunter-gatherers that appear to have been organized into small mobile groups. The climate was cooler and wetter than the present and the expansion of piñon-juniper forests and riparian communities would have provided the San Dieguito with a wide variety of plants and animals. 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.

Although no consensus has been reached among archaeologists, recent information suggests that San Dieguito complex may have evolved into what has been termed the La Jolla complex between about 9,000 and 8,000 years B.P. (Koerper et al. 1991). The La Jolla complex lasted until approximately 2,000 years before present. 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 (primarily shellfish and fish). 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, cobble tools, discoidals, a small number of Pinto and Elko series points, and flexed burials

The Late Prehistoric period (known as the San Luis Rey complex in the northern part of San Diego County) is characterized by the introduction of ceramics and changes in burial traditions and lithic technology. Flexed inhumations are replaced with cremation burials, and small pressure-flaked projectile points make an appearance. 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. and Shoshonean speakers after 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. These Yuman-speaking people were the ancestors of the Tipai and Ipai, the Native Americans who occupied the area when the Spanish arrived in 1769.

The Ipai and Tipai, along with the Kumeyaay, are three groups subsumed under the name Digueño because they are linguistically and culturally similar to each other. The Digueño territory covers most of the extreme southern part of California, from the mouth of the San Luis Rey River in the north, to the Todos Santos Bay near Ensenada, Mexico, in the south, and to the Sand Hills bordering the Imperial Valley in the east (Luomala 1978). The Digueño used various types of wild plants and supplemented their diet with small game, some large game, and fish (Luomala 1978).

The historic occupation of the project vicinity can be divided into three settlement periods: the Mission Period (A.D. 1769-1830), the Rancho Period (ca. A.D. 1830-1865), and the American Period (ca. A.D. 1865-1915). First contact between the Europeans and the Tipai and Ipai came in 1769 with the arrival of Gaspar de Portola's expedition. The expedition was traveling between San Diego and Monterey in order to investigate possible Mission sites. Mission San Diego de Alcalá, founded in 1769, was the first of the twenty-one California missions. During the early years of Spanish Missionization, the Digueño violently resisted Mission control and several attacks on the Mission San Diego de Alcalá ended with fatalities (Luomala 1978). Despite strong resistance, the Mission had 1,405 Native Americans living within the Mission system by 1779 (Luomala 1978).

In 1834, the missions were secularized and Governor Pico granted large ranchos (tracts of lands) to various individuals for services rendered to the Mexican government. One of these tracts, the Rancho Mission San Diego, was granted to Santiago Arguello in 1846 and its holdings encompassed lands now known as MCAS Miramar. The land was used for cattle grazing until the late 1800s when the rancho was subdivided to create small farms and orchards for American newcomers and Mexican residents. As American influx continued, small farming communities developed, flourished for a time, and then declined. Two of these, Miramar and Linda Vista, are located within the boundaries of MCAS Miramar.

Military use of the area began in 1917 when the Army built Camp Kearny on Linda Vista Mesa. Camp Kearny served as the U.S. Army Infantry Training Center until it was largely dismantled in 1922. The facility was almost totally rebuilt by the DoN and USMC during World War II and the Cold War-era. The facility saw many name changes and mission changes over the decades, but for many years it was designated NAS Miramar and was the home of the Pacific Fleet's fighter and early warning and reconnaissance squadrons. As a result of the Defense Base Closure and Realignment Act, NAS Miramar was converted to MCAS Miramar in 1997. This conversion was accompanied by the reconfiguration and expansion of existing aircraft aprons and pavements, flightline facilities, and associated support facilities.

Definition of the Area of Potential Effects

The area of potential effects (APE) of an undertaking is defined at 36 CFR 800.16(d) as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist." The APE for MCAS Miramar consists of all areas of ground disturbance associated with proposed construction activities, as shown in Figures 2.3-1 through 2.3-4. Construction vehicle parking and staging activities would occur within designated areas paved with gravel near the construction zones (shown on Figures 2.3-1 and 2.3-3). The construction footprint ranges from about 90 to 180 acres (depending on alternative), and the staging areas cover an additional 7.5 acres.

As noted in section 3.14, compensatory restoration efforts (i.e., habitat restoration on other areas of MCAS Miramar) are associated with both the Full Basing and Maximum Partial Basing alternatives at MCAS Miramar. The APE includes habitat restoration areas because ground disturbance would be associated with restoration efforts. Potential habitat restoration areas shown on Figure 3.14-6 range from less than 50 acres to over 300 acres in size.

For historic architectural resources, the APE includes any buildings/structures that would be altered or demolished, as well as any viewsheds of historic buildings that may be affected by construction. For Native American resources, the APE includes the construction footprint and the viewsheds of any traditional cultural resources that could be affected by construction.

Known and Predicted Resources

A site record and literature search of the California Historical Resources Information System was conducted at the South Coastal Information Center (SCIC), San Diego State University on 9 March 2006 and 5 May 2006 to identify recorded cultural resources within and adjacent to the APE for the proposed construction area. Up-to-date electronic databases and GIS layers provided by MCAS Miramar in 2006 and 2008 were used to confirm the data from the SCIC and provide additional information on the habitat restoration areas (see Marine Corps Installations West [MCIWEST] 2009 for full details of cultural resources review). The following provides a summary of those findings.

Archaeological Survey Coverage. At least 30 archaeological investigations have been conducted within one mile of the APE for the proposed construction area. However, several of these investigations overlapped, covering the same locations. The investigations ranged from linear surveys for transmission lines to monitoring for base realignment construction to data recovery (see SAIC 2008 for full listing).

The APE has been completely surveyed for archaeological resources, except for a small portion south of the runway for the relocated training pit related to the Full Basing Alternative. Four archaeological surveys cover the APE for the proposed construction area and staging areas (SAIC 2008; Cooley et al.1996; Underwood et al. 2006; Becker et al. 2009). One survey conducted in December 2006 (SAIC 2008) was in support of this MV-22 proposed action and covered portions of the construction areas north and south of the runway. A more recent survey in December 2008 (Becker et al. 2009) covered the staging areas.

The habitat restoration areas also have been surveyed for archaeological resources (Becker et al. 2009; Bishoff et al. 1995; Carrillo 1981, 1982; Carrillo and Crottaeu 1981; Cheever 1992; City of San Diego 1991; Corum 1977, 1981, 1982; Gallegos and Strudwick 1992; Giacomini and Caudell 2004;

Kaldenberg 1973; Lloyd 1981; Loughlin 1973; Price 1981; Schroth & Gallegos 1996; Shaver and York 2006; Smith 1991; Snyder 1978; Strudwick and Gallegos 1994; Strudwick, Gallegos & Vanwormer 1993; Underwood et al. 2006).

Archaeological Resources. Including the nine newly recorded archaeological sites identified by ASM (Becker et al. 2009), 32 recorded archaeological sites are located within one mile of the APE. The recorded archaeological sites consist of 23 historic sites, ranging from historic artifact scatters to a series of foundations and structures known as Camp Elliott, and nine prehistoric sites, ranging from a sparse lithic scatter to a minor temporary camp.

Nine archaeological sites have been recorded in the APE (CA-SDI-9128H, CA-SDI-9129H, CA-SDI-12408, CA-SDI-12605H, CA-SDI-12927, CA-SDI-13817H, CA-SDI-14275, CA-SDI-14737, and recently recorded KM-7 [Becker et al. 2009]). These include two prehistoric sites (lithic scatter and minor temporary camp) and six historic sites (primarily related to early military activities, especially those associated with what was known as Camp Elliott). One other site, CA-SDI-14275, was interpreted as a non-archaeological site (cobbles were broken by natural processes, not cultural). Four of the sites (CA-SDI-9129H, CA-SDI-12408, CA-SDI-13817H, and CA-SDI-14737) were recommended ineligible for listing on the National Register, and the California SHPO agreed with these determinations. Four sites (CA-SDI-9128H, CA-SDI-12605H, CA-SDI-12927, and CA-SDI-14275) have been recommended as ineligible for listing on the National Register (pending SHPO agreement). The recently recorded site, KM-7, appears to be a World War II rock quarrying site located within a habitat restoration area only associated with the Full Basing Alternative. Although the recorder believes the site is likely ineligible for listing on the National Register, KM-7 needs formal testing to make that determination (Becker et al. 2009). Therefore, with SHPO's agreement on the ineligibility of the four sites noted above, it is likely that no resources within the APE meet the definition of historic property; however, formal testing of KM-7 will be needed to substantiate that statement.

Historic Buildings and Structures. There are 310 buildings and structures constructed between 1942 and 1989 at MCAS Miramar (Popovich et al. 2006). An extensive inventory and evaluation of historic structures at the station (Popovich et al. 2006) was conducted, including evaluation of Cold War era buildings. Buildings constructed prior to 1964 were evaluated based on National Register Criteria A (which would include Cold War significance), B, C, and D. Buildings from 1964 through 1989 were evaluated using Criterion Consideration G (Popovich et al. 2006). The study concluded that none of the structures at MCAS Miramar were eligible for listing in the National Register, either individually or as components of a historic district, due to a loss of integrity (extensive modifications and removal of key elements). As a result, all were considered ineligible for listing on the National Register either individually or as a historic district. The California SHPO agreed with these findings (Donaldson 2008).

Native American Consultation. MCIWEST initiated consultation in November and December 2008 with non-federally recognized Indian tribes subject to 36 CFR 800.3(f) (consulting parties) and federally recognized Indian tribes affiliated with lands currently under Marine Corps jurisdiction and involved in this proposed action. MCAS Miramar has completed numerous Section 106 NHPA consultations that have included contact with the following tribal Nations: Campo Band of Mission Indians, Barona Band of Mission Indians, Ewiiaapaayp Band of Kumeyaay Indians, Viejas Band of Mission Indians, Sycuan Band of the Mission Indians, Jamul Indian Village, Inaja Band of Diegueno

Indians, La Posta Band of Mission Indians, Manzanita Band of the Kumeyaay, Mesa Grande Band of Mission Indians, San Pasqual Band of Indians, and Santa Ysabel Band of Mission Indians.

MCIWEST is in the process of consulting with these tribal Nations regarding any concerns with the proposed action (see Appendix H). All tribal Nations identified above received a consultation letter by early December 2008. Tribal representatives were contacted by phone and email, and also invited to attend a meeting (briefing) at MCB Camp Pendleton to discuss the proposed action. During the meeting, representatives were encouraged to provide any comments or identify their respective concerns. None of the tribal Nations identified above were represented at the meeting. Additionally, no comments were provided by representatives from these Nations.

No traditional cultural resources have been identified at MCAS Miramar during past consultations.

3.15.2 Environmental Consequences

Full Basing (10-Squadron) Alternative

Ground disturbance associated with the Full Basing Alternative would result from construction activities on both the north and south side of the runway. On the north side of the runway, ground disturbance would result from the expansion of the parking apron, removal of the Octagon Fueling Facility, construction of new fuel pits and wash racks, and installation of new hangar modules (see Figure 2.3-1). South of the runway, ground disturbance would result from the construction of new apron and associated taxiways, new wash racks, a new parking lot, and road upgrades (see Figure 2.3-2). Ground disturbance from habitat restoration may occur within all of the restoration sites shown on Figure 3.14-6. Archaeological investigations indicate that nine archaeological sites area recorded within the APE for the Full Basing Alterative. Four sites have been determined ineligible of listing on the National Register, and four sites are pending SHPO agreement on their ineligibility. One site (KM-7), however, has not been formally tested for eligibility. Even though it is likely ineligible, it requires formal testing to determine whether or not it is considered a historic property. Any disturbance from habitat restoration on a site that is eligible for listing on the National Register would result in an adverse impact on a historic property. This would be a significant impact under the NEPA.

Previous evaluation of historic structures indicated that no structures at MCAS Miramar are eligible for listing on the National Register either individually or as a historic district. Additionally, the introduction of some new visual elements within the viewshed of existing buildings under the proposed action would be visually consistent with existing architecture and functions, and would not adversely affect the setting of existing buildings and structures within the APE. Therefore, there would be no effect on a historic property, and no impacts would occur under the NEPA.

MV-22 operations at the airfield under the Full Basing Alternative would not result in ground disturbance or modifications to existing buildings or structures. Therefore, there would be no effect on a historic property, and no impacts would occur under the NEPA.

There are no identified traditional cultural resources within the MCAS Miramar APE. However, consultations with tribal Nations are on-going. MCIWEST is entering into a Programmatic Agreement with the California SHPO, the Advisory Council of Historic Preservation, and other consulting parties to resolve adverse effects from the proposed action. If a traditional cultural resource is identified based on continuing dialogue with identified tribal Nations, MCIWEST will

follow the procedures outlined in the Programmatic Agreement. Additionally, the measures described below take into account impacts on archaeological sites that may or may not be considered a traditional cultural resource.

Avoidance, Minimization, and Mitigation Measures

With the following measures, archaeological sites that are eligible for listing on the National Register, sites that require further evaluation, and/or sites that are of concern to the Native American community would be avoided or impacts minimized, and impacts would be reduced to less than significant:

- Habitat restoration efforts will be designed to avoid all impact on newly recorded archaeological site, KM-7. The site will be fenced during active restoration efforts to ensure avoidance of all ground disturbance.
- Preconstruction meetings will be conducted in order to inform construction personnel about common types of artifacts that may be uncovered during construction, the importance of cultural resources to archaeologists and Native Americans, and the reporting requirements and responsibilities of construction personnel.

Maximum Partial Basing (8-Squadron) Alternative

Ground disturbance associated with the Maximum Partial Basing Alternative would result from the expansion of the parking apron, removal of the Octagon Fueling Facility, construction of new fuel pits and wash racks, and installation of new hangar modules (see Figure 2.3-1). Ground disturbance from habitat restoration may occur within the areas listed as "Proposed Potential Vernal Pool Restoration Site Options" and the "Potential Coastal Sage Scrub Restoration Site" on Figure 3.14-6. Archaeological investigations indicate that there are no archaeological resources meeting the definition of a historic property (pending SHPO agreement on the ineligibility for listing on the National Register of three archaeological sites) within the APE for the Maximum Partial Basing Alternative. Therefore, no significant impacts would occur under the NEPA.

Previous evaluation of historic structures indicated that no structures at MCAS Miramar are eligible for listing on the National Register either individually or as a historic district. Additionally, the introduction of some new visual elements within the viewshed of existing buildings under the proposed action would be visually consistent with existing architecture and functions, and would not adversely affect the setting of existing buildings and structures within the APE. Therefore, there would be no effect on a historic property, and no impacts would occur under the NEPA.

MV-22 operations at the airfield under the Maximum Partial Basing Alternative would not result in ground disturbance or modifications to existing buildings or structures. Therefore, there would be no effect on a historic property, and no impacts would occur under the NEPA.

There are no identified traditional cultural resources within the MCAS Miramar APE. However, consultations with tribal Nations are on-going. MCIWEST is entering into a Programmatic Agreement with the California SHPO, the Advisory Council of Historic Preservation, and other consulting parties to resolve adverse effects from the proposed action. If a traditional cultural resource is identified based on continuing dialogue with identified tribal Nations, MCIWEST will follow the procedures outlined in the Programmatic Agreement.

Mitigation Measures

Implementation of the Maximum Partial Basing Alternative at MCAS Miramar would not result in significant impacts on cultural resources; therefore, no mitigation measures would be required.

Minimum Partial Basing (2-Squadron) Alternative

No new construction, demolition, or habitat restoration at MCAS Miramar would occur under the Minimum Partial Basing Alternative. Therefore, there would be no effect on a historic property, and no impacts would occur under the NEPA.

MV-22 operations at the airfield under the Minimum Basing Alternative would not result in ground disturbance or modifications to existing buildings or structures. Therefore, there would be no effect on a historic property, and no impacts would occur under the NEPA.

Mitigation Measures

Implementation of the Minimum Partial Basing Alternative at MCAS Miramar would result in no impacts on cultural resources; therefore, no mitigation measures would be required.

Non-MCAS Miramar Basing Alternatives

Under a non-MCAS Miramar basing alternative, MV-22 aircraft would be based elsewhere and the existing squadrons of CH-46E at MCAS Miramar would be removed. There would be no construction, ground disturbing activities, or modification to existing structures at MCAS Miramar. Therefore, there would be no effect on a historic property at MCAS Miramar, and no impacts would occur under the NEPA.

Mitigation Measures

Basing aircraft at installations other than MCAS Miramar would result in no impacts on cultural resources at MCAS Miramar; therefore, no mitigation measures would be required.

No Action Alternative

There would be no construction, ground disturbing activities, or modification to existing structures associated with the No Action Alternative. Therefore, there would be no effect on a historic property, and no impacts would occur under the NEPA.

3.16 SAFETY AND ENVIRONMENTAL HEALTH

The USMC practices Operational Risk Management as outlined in OPNAV 3500.39A and MCO 3500.27A. Requirements outlined in these documents provide for a process to maintain readiness in peacetime and achieving success in combat while safeguarding people and resources. The safety and environmental health analysis contained in the following sections addresses issues related to the health and well being of both military personnel and civilians living on or in the vicinity of MCAS Miramar. Specifically, this section provides information on hazards associated with aircraft mishaps, APZs, explosives safety, and electromagnetic emissions.

3.16.1 Affected Environment

Aircraft Mishaps

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. In order 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 3.16-1). Class A mishaps are the most severe with total property damage of $1 million or more and a fatality and/or permanent total disability. Calculating Class A mishaps can be used for comparing mishap rates for various aircraft types, as shown below.

Table 3.16-1. Aircraft Class Mishaps

Mishap Class	Total Property Damage	Fatality/Injury
A	$1,000,000 or more and/or aircraft destroyed	Fatality or permanent total disability
B	$200,000 or more but less than $1,000,000	Permanent partial disability or three or more persons hospitalized as inpatients
C	$20,000 or more but less than $200,000	Nonfatal injury resulting in loss of time from work beyond day/shift when injury occurred

Class A Mishap Rates for MV-22

During the development and testing phase, the V-22 recorded two Class A mishaps. All MV-22s were grounded for 17 months after the second mishap (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 (FY 2002). Since that time, additional safety, reliability and maintainability improvements along with additional capabilities have been implemented in the modified MV-22's flown by the Marines and Naval Air Systems Command's test squadron. These aircraft have logged more than 26,000 flight hours combined without a serious mishap and has recently been deployed to Southwest Asia in the first combat theater mission.

In order 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 (prior to reaching operational status) versus the number of mishaps after reaching operational status is broken out in Table 3.16-2. Adjusting the flight hours to account for the periods in which the aircraft was not operational, the accident rate for the MV-22 is 11.43 for 26,245 hours.

Table 3.16-2. Class A Flight Mishaps for MV-22

FY	Flight Hours	Mishaps
PRIOR TO REACHING OPERATIONAL STATUS		
1999	416	0
2000	221	1
2001	470	1
2002[1]	Unavailable	0
2003[1]	Unavailable	0
OPERATIONAL STATUS		
2004[2]	2,238	0
2005	5,405	0
2006	6,989	0
2007	9,745	0

Notes:
1. Aircraft Grounded
2. Aircraft Returns to Flight Status

Source: Navy Safety Center 2007

Class A Mishap Rates for the AV-8B, CH-46, and CH-53

To provide a broader perspective on the potential mishap rate for a new technology like the MV-22, the following discusses mishap rates for the introduction of the AV-8B (Harrier). The AV-8B was introduced in 1984, and provided the USMC with jet powered vertical take-off and landing capability. This new technology is similar to the MV-22 in that it was a new airframe with new vertical take-off capability. With that in mind, it is possible that projected mishap rates for the MV-22 may be similar to the historical rates of the AV-8B. The Class A mishap rates for the AV-8B from fleet inception through 30 September 2007 is provided in Table 3.16-3. Data from Calendar Year (CY) 1979 to FY 1984 relates to the testing and evaluation phase of the AV-8B, while data from FY 1985 to present represents its full introduction to the fleet. Note the highest mishap rate occurred during the testing phase of the aircraft, and that mishap rates during the operational phase of the aircraft fluctuated between 2.80 and 23.00.

Mishap data for the CH-46 and CH-53 are included in Table 3.16-3 since they represent the type of aircraft operations and some similar flight profiles expected for the MV-22. One pattern to note in Table 3.16-3 is the fluctuation of mishap rates from year to year for all three aircraft types.

Emergency and Mishap Response at MCAS Miramar

MCAS Miramar 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-base. Response would normally occur in two phases. The initial response focuses on rescue, evacuation, fire suppression, safety, elimination of explosive devices, ensuring security of the area, and other actions immediately necessary to prevent loss of life or further property damage. The initial response element usually consists of the Fire Chief, who would normally be the first On-scene Commander, fire-fighting and crash-rescue personnel, medical personnel, security police, and crash-recovery personnel. The second phase is the mishap investigation, which includes an array of organizations whose participation would be governed by the circumstances associated with the mishap and actions required to be performed (DoD 2000).

Table 3.16-3. Historic Class A Flight Mishaps for U.S. Navy/USMC

	H-46 (all types)			CH-53E			AV-8B		
Year	Class A Mishaps	Flight Hours	Mishap Rate	Class A Mishaps	Flight Hours	Mishap Rate	Class A Mishaps	Flight Hours	Mishap Rate
FY 64	0	147	0	-	-	-	-	-	-
FY 65	1	9,034	11.07	-	-	-	-	-	-
FY 66	2	33,442	5.98	-	-	-	-	-	-
FY 67	17	75,236	22.60	-	-	-	-	-	-
FY 68	24	92,108	26.06	-	-	-	-	-	-
FY 69	29	161,595	17.95	-	-	-	-	-	-
FY70	21	140,406	14.96	-	-	-	-	-	-
FY 71	9	132,350	6.80	-	-	-	-	-	-
FY 72	9	96,042	9.37	-	-	-	-	-	-
FY 73	6	93,971	6.38	-	-	-	-	-	-
FY 74	6	68,509	8.76	-	-	-	-	-	-
Jul-Dec 74	4	41,170	9.72	-	-	-	-	-	-
CY 75	5	86,428	5.79	0	105	0	-	-	-
CY 76	5	87,319	5.73	0	27	0	-	-	-
CY 77	3	93,500	3.21	0	249	0	-	-	-
CY 78	5	97,307	5.14	1	0	0	-	-	-
CY 79	3	92,390	3.25	0	88	0	1	248	403.23
Jan-Sep 80	4	66,689	6.00	0	0	0	0	93	0
FY 81	8	88,951	8.99	0	160	0	0	70	0
FY 82	5	92,300	5.42	0	4,629	0	0	431	0
FY 83	3	99,406	3.02	0	10,629	0	0	821	0
FY 84	3	106,039	2.83	1	16,259	6.15	0	1,573	0
FY 85	2	106,883	1.87	4	19,152	20.89	1	8,195	12.20
FY 86	7	110,743	6.32	1	22,748	4.40	2	18,467	10.83
FY 87	5	118,331	4.23	1	16,081	6.22	5	22,212	22.51
FY 88	4	112,606	3.55	0	21,075	0	3	37,415	8.02
FY 89	4	112,365	3.56	0	25,431	0	5	43,570	11.48
FY 90	4	98,775	4.05	1	27,385	3.65	11	48,644	22.61
FY 91	3	110,122	2.72	1	30,269	3.30	6	55,590	10.79
FY 92	4	96,834	4.13	1	28,598	3.50	7	56,873	12.31
FY 93	5	106,743	4.68	1	31,903	3.13	4	55,488	7.21
FY 94	2	98,796	2.02	0	33,779	0	5	51,603	9.69
FY 95	1	96,115	1.04	0	34,345	0	5	51,128	9.78
FY 96	5	90,401	5.53	0	24,867	0	6	50,232	11.94
FY 97	3	81,816	3.67	0	26,439	0	4	39,060	10.24
FY 98	1	87,321	1.15	0	30,327	0	4	33,209	12.04
FY 99	1	84,346	1.19	1	29,408	3.40	7	30,441	23.00
FY 00	1	92,849	1.08	0	32,739	0	2	22,088	9.05
FY 01	2	91,708	2.18	0	28,660	0	1	32,372	3.09
FY 02	2	90,287	2.22	1	36,144	2.77	3	43,078	6.96
FY 03	2	79,390	2.52	0	37,340	0	3	47,103	6.37
FY 04	1	57,893	1.73	2	35,010	5.71	2	40,775	4.91
FY 05	1	70,901	1.41	1	34,595	2.89	5	37,969	13.17
FY 06	0	58,763	0	1	33,321	3.00	3	40,467	7.41
FY 07	1	55,038	1.82	1	33,325	3.00	1	35,718	2.80
Total	**233**	**3,963,365**	**5.87**	**19**	**705,087**	**2.69**	**96**	**904,933**	**10.6**

Source: Navy Safety Center 2007

Bird Aircraft Strike Hazards

Bird-aircraft strikes and the hazards they present form another safety concern for aircraft operations. Over 97 percent of bird-aircraft strikes occur below 3,000 feet (915 meters) above ground level, and approximately 30 percent of bird strikes happen at airfields. Since the

introduction of the MV-22 on the East Coast at MCAS New River, there have been six reported bird strikes, with minor damage to the aircraft occurring with two of the strikes.

DoN and USMC commands develop BASH plans to reduce hazardous bird/animal activity relative to airport flight operations. The Station Safety Department recently completed a BASH assessment in coordination with USDA and USFWS personnel (MCAS Miramar 2006), and MCAS Miramar developed an active BASH prevention program as per Station Order 3750.2 (MCAS Miramar 2008a). The MCAS Miramar INRMP (MCAS Miramar 2006) also discusses BASH issues such as the flightline mowing program, the advantages and disadvantages of owls inhabiting hangars, and the improved City of San Diego landfill operations with regard to bird abatement.

Accident Potential Zones

APZs are established to delineate recommended surrounding land uses for the protection of people and property on the ground. APZs define the areas in the vicinity of an airfield that would have the highest potential to be affected if an aircraft mishap were to occur. AICUZ guidelines identify three types of APZs for airfields based on aircraft mishap patterns: the Clear Zone, APZ I, and APZ II. The standard Clear Zone is a trapezoidal area that extends 3,000 feet from the end of a runway and has the highest probability of being impacted by a mishap. APZ I, which typically extends 5,000 feet from the end of the Clear Zone, has a lower mishap probability. APZ II, which typically extends 7,000 feet from the end of APZ I, has the lowest mishap probability of the three zones. To minimize the results of a potential accident involving aircraft operating from MCAS Miramar, APZs have been established for the airfield, as depicted in Figure 3.16-1.

Explosives Safety

Siting requirements for explosive materials storage (e.g., munitions) and handling facilities are based on safety and security criteria established by the DoD Explosive Safety Board. Explosive Safety Quantity Distance (ESQDs) arcs determine the distance between ordnance storage and handling facilities and inhabitable areas. Ammunition and bulk explosives are stored in magazines specifically designed, sited, and designated for this purpose. A magazine's ESQD arc is calculated by the type and amount of ordnance stored in that magazine. ESQD requirements and permissible storage capacities are established by Naval Sea Systems Command (NAVSEASYSCOM) and approved by the DoD Explosives Safety Board.

The nearest ESQD arc to the proposed project area is associated with the CALA located southeast of the runway (DoN 2007). This ESQD arc overlaps some of the proposed project area south of the runway (see Figure 2.3-2).

Electromagnetic Emissions

Radar and other high-energy electromagnetic emissions can constitute a hazard to persons exposed to radiation above a threshold power density. Electromagnetic signals emanating from communication and other radar equipment can also interfere with and adversely affect stored ordnance and fuel. Electromagnetic radiation hazards occur when transmitting equipment generates sufficient field intensity to cause harmful or injurious effects to humans or wildlife; induce or couple currents and/or voltages of magnitudes sufficient to initiate electro-explosive devices in ordnance; or create sparks or sufficient magnitude to ignite flammable materials.

FIGURE 3.16-1

MCAS Miramar Accident Potential Zones

The hazards of electromagnetic radiation to personnel, ordnance, and fuel have been evaluated by a survey conducted at MCAS Miramar (USMC 2001a). The results of this survey indicate that all measured electromagnetic field strengths are below allowable exposure limits and hence, no hazards to air station personnel, ordnance, or fuels exists at MCAS Miramar.

3.16.2 Environmental Consequences

Full Basing (10-Squadron) Alternative

Aircraft Mishaps and Mishap Response

Although the MV-22 is a relatively new type of aircraft, historical trends show that mishaps of all types decrease the longer an aircraft is operational as flight crews and maintenance personnel learn more about the aircraft's capabilities and limitations. Mishap rates generally level out approximately five years after introduction of a new airframe (GAO 2001; Navy Safety Center 2007). Although it is difficult to predict the mishap rate of a new airframe like the MV-22, mishap rates will likely stabilize to levels similar to those shown in Table 3.16-3 soon after its introduction on the West Coast. Therefore, as the MV-22 becomes more operationally mature, the aircraft mishap rate is expected to become comparable with a similarly sized helicopter aircraft with a similar mission.

The basing of ten squadrons of MV-22 aircraft at MCAS Miramar would replace existing CH-46E currently based at MCAS Miramar. Even with the introduction of more aircraft than current levels, the MV-22 would operate in an airfield environment similar to the current operational environment. Since the MV-22 is a new airframe and would require response actions specific to the MV-22, the emergency and mishap response plans would be updated to include procedures and response actions necessary to address a mishap involving the MV-22 and associated equipment. With this update, the MCAS Miramar airfield safety conditions would be similar to existing conditions. Therefore, no significant impact would occur from aircraft mishaps or mishap response.

Bird Aircraft Strike Hazards

Under the Full Basing Alternative, the MV-22 would operate in the same airfield environment as the current aircraft. Even with the introduction of more aircraft than current levels, the overall potential for bird-aircraft or wildlife strikes is not anticipated to be significantly greater than current levels. MV-22 aircrews operating in MCAS Miramar airspace would be required to follow applicable procedures outlined in the MCAS Miramar BASH plan. MCAS Miramar has developed aggressive procedures designed to minimize the occurrence of bird/wildlife-aircraft strikes, and has documented detailed procedures to monitor and react to heightened risk of bird-strikes (MCAS Miramar 2006). When risk increases, limits are placed on low altitude flight and some types of training (e.g., multiple approaches, closed pattern work) in the airport environment. Special briefings are provided to pilots whenever the potential exists for greater bird-strike sightings within the airspace. MV-22 pilots would be subject to these procedures. Therefore, no significant impact would occur related to BASH issues.

Accident Potential Zones

Proposed construction, renovation, and infrastructure improvement projects related to the Full Basing Alternative would be consistent with established APZs. Therefore, construction activity would not result in any greater safety risk, and no significant impact related to APZs would occur.

There would be a 31 percent increase in operations over existing conditions under the Full Basing Alternative. This increase falls within historic use of the airfield, which has fluctuated between approximately 90,000 and 167,000 annual operations between 1996 and 2003 (MCAS Miramar 2005). Even with the introduction of more aircraft and a corresponding increase in operation levels over current levels, the MV-22 would operate in an airfield environment similar to the current operational environment. For example, the MV-22 would follow established local approach and departure patterns, and no new flight tracks would be established. Proposed MV-22 operations at MCAS Miramar would not affect or create a need to change the existing APZs (Czech, personal communication 2008). Therefore, flight activity and subsequent operations would not result in any greater safety risk, and no significant impact related to APZs would occur.

Explosives Safety

Proposed construction, renovation, and infrastructure improvement projects related to the Full Basing Alternative would be consistent with established ESQD arcs. Although a small portion of the new taxiway and apron pavement falls under the CALA ESQD arc located south of the runway, no aircraft parking would occur within the ESQD arc. Additionally, the Full Basing Alternative includes a 1,500-foot bridge construction so that traffic to the proposed project area south of the runway would avoid driving near the CALA (see Figure 2.3-2). Therefore, construction activity and subsequent operations would not result in any greater safety risk.

The only munitions used by the MV-22 would be associated with its one machine gun. Ordnance is handled and stored in accordance with USMC explosive safety directives (MCO P8020.10A, 3 April 2002, Marine Corps Ammunition Management and Explosives Safety Policy Manual), and all munitions handling is carried out by trained, qualified personnel. Therefore, munitions handling would not result in any greater safety risk, and no significant impact related to explosives safety would occur.

Electromagnetic Emissions

Proposed construction, renovation, and infrastructure improvement projects related to the Full Basing Alternative would be consistent with established electromagnetic radiation hazard zones. Therefore, construction activity and subsequent operations within new or renovated structures would not result in any greater safety risk, and no significant impact related to electromagnetic emissions would occur.

Mitigation Measures

Because there would be no significant impact on safety and environmental health, no mitigation measures are proposed.

Maximum Partial Basing (8-Squadron) Alternative

Aircraft Mishaps and Mishap Response

As described from the Full Basing Alternative, it is expected that, as the MV-22 becomes more operationally mature, the aircraft mishap rate would become comparable with a similarly sized helicopter aircraft with a similar mission. The Maximum Partial Basing Alternative would result in an increase in airfield operations compared to current levels, but the MV-22 would operate in an airfield environment similar to the current operational environment. To ensure effective mishap response, the emergency and mishap response plans would be updated to include those actions necessary to address a mishap involving the MV-22 and associated equipment. With this update, the MCAS Miramar airfield safety conditions would be similar to existing conditions. Therefore, no significant impact would occur from aircraft mishaps or mishap response.

Bird Aircraft Strike Hazards

Similar to the Full Basing Alternative, the overall potential for bird-aircraft or wildlife strikes is not anticipated to be significantly greater under the Maximum Partial Basing Alternative than current levels. MV-22 pilots would be subject to all BASH procedures, as described above. Therefore, no significant impact would occur related to BASH issues.

Accident Potential Zones

Proposed construction, renovation, and infrastructure improvement projects related to the Maximum Partial Basing Alternative would be consistent with established APZs. Therefore, construction activity would not result in any greater safety risk, and no significant impact related to APZs would occur.

There would be a 20 percent increase in operations over existing conditions under the Maximum Partial Basing Alternative. This increase falls within historic use of the airfield, which has fluctuated between approximately 90,000 and 167,000 annual operations between 1996 and 2003 (MCAS Miramar 2005). Even with the introduction of more aircraft and a corresponding increase in operation levels over current levels, the MV-22 would operate in an airfield environment similar to the current operational environment. For example, the MV-22 would follow established local approach and departure patterns, and no new flight tracks would be established. Proposed MV-22 operations at MCAS Miramar would not affect or create a need to change the existing APZs (Czech, personal communication 2008). Therefore, flight activity and subsequent operations would not result in any greater safety risk, and no significant impact related to APZs would occur.

Explosives Safety

Proposed construction, renovation, and infrastructure improvement projects related to the Maximum Partial Basing Alternative would be consistent with established ESQD arcs. Under this alternative, all construction activities would occur north of the runway and would not fall under any established ESQD arc. Therefore, construction activity and subsequent operations would not result in any greater safety risk.

The only munitions used by the MV-22 would be associated with its one machine gun. Ordnance is handled and stored in accordance with USMC explosive safety directives (MCO P8020.10A, 3 April

2002, Marine Corps Ammunition Management and Explosives Safety Policy Manual), and all munitions handling is carried out by trained, qualified personnel. Therefore, munitions handling would not result in any greater safety risk, and no significant impact related to explosives safety would occur.

Electromagnetic Emissions

Proposed construction, renovation, and infrastructure improvement projects related to the Maximum Partial Basing Alternative would be consistent with established electromagnetic radiation hazard zones. Therefore, construction activity and subsequent operations within new or renovated structures would not result in any greater safety risk, and no significant impact related to electromagnetic emissions would occur.

Mitigation Measures

Because there would be no significant impact on safety and environmental health, no mitigation measures are proposed.

Minimum Partial Basing (2-Squadron) Alternative

No construction or demolition is associated with the implementation of the Minimum Partial Basing Alternative at MCAS Miramar. Therefore, no construction-related impacts would occur. Potential operations-related impacts are discussed below.

Aircraft Mishaps and Mishap Response

As described for the Full Basing Alternative, it is expected that, as the MV-22 becomes more operationally mature, the aircraft mishap rate would become comparable with a similarly sized helicopter aircraft with a similar mission. The Minimum Partial Basing Alternative would result in a decrease in airfield operations compared to current levels. To ensure effective mishap response, the emergency and mishap response plans would be updated to include those actions necessary to address a mishap involving the MV-22 and associated equipment. With this update, the MCAS Miramar airfield safety conditions would be similar to existing conditions. Therefore, no significant impact would occur from aircraft mishaps or mishap response.

Bird Aircraft Strike Hazards

Similar to the Full Basing Alternative, the overall potential for bird-aircraft or wildlife strikes is not anticipated to be significantly greater under the Minimum Partial Basing Alternative than current levels. MV-22 pilots would be subject to all BASH procedures, as described above. Therefore, no significant impact would occur related to BASH issues.

Accident Potential Zones

There would be a seven percent decrease in operations over existing conditions under the Minimum Partial Basing Alternative. Additionally, the MV-22 would follow established local approach and departure patterns, and no new flight tracks would be established. Proposed MV-22 operations at MCAS Miramar would not affect or create a need to change the existing APZs (Czech,

personal communication 2008). Therefore, flight activity and subsequent operations would not result in any greater safety risk, and no significant impact related to APZs would occur.

Explosives Safety

The only munitions used by the MV-22 would be associated with its one machine gun. Ordnance is handled and stored in accordance with USMC explosive safety directives (MCO P8020.10A, 3 April 2002, Marine Corps Ammunition Management and Explosives Safety Policy Manual), and all munitions handling is carried out by trained, qualified personnel. Therefore, munitions handling would not result in any greater safety risk, and no significant impact related to explosives safety would occur.

Mitigation Measures

Because there would be no significant impact on safety and environmental health, no mitigation measures are proposed.

Non-MCAS Miramar Basing Alternatives

No construction or demolition is associated with the implementation of a non-MCAS Miramar basing alternative (i.e., MV-22 aircraft are split between MCAS Camp Pendleton and MCAS Yuma). Therefore, no construction-related impacts would occur. Potential operations-related impacts are discussed below.

Aircraft Mishaps and Mishap Response

Under a non-MCAS Miramar basing alternative, MCAS Miramar operations would decrease by 15 percent compared to current operating levels due to the elimination of four squadrons of CH-46E helicopter assets currently based at MCAS Miramar. Although no MV-22 squadrons would be based at MCAS Miramar, it is possible that transient MV-22 aircraft (aircraft based at other stations) would occasionally utilize the MCAS Miramar airfield. To ensure effective mishap response, the emergency and mishap response plans would be updated to include those actions necessary to address a mishap involving the MV-22 and associated equipment. With this update, the MCAS Miramar airfield safety conditions would be similar to existing conditions. Additionally, the overall decrease in airfield operations may slightly lower the overall potential for aircraft mishaps, which may be a beneficial impact. Therefore, no significant adverse impact would occur from aircraft mishaps or mishap response.

Bird Aircraft Strike Hazards

Under a non-MCAS Miramar basing alternative, MCAS Miramar operations would decrease by 15 percent compared to current operating levels. This may slightly lower the overall potential for bird-aircraft or wildlife strikes, which may be a beneficial impact. All flight safety actions that are in place for existing aircraft training would continue to be in place. Therefore, no significant adverse impact would occur related to BASH issues.

Accident Potential Zones

Under a non-MCAS Miramar basing alternative, there would be a 15 percent decrease in operations compared to current operating levels due to the elimination of four squadrons of CH-46E helicopter assets currently based at MCAS Miramar. Therefore, flight activity and subsequent operations would not result in any greater safety risk, and no significant impact related to APZs would occur.

Explosives Safety

Although no MV-22 squadrons would be based at MCAS Miramar, it is possible that transient MV-22 aircraft (aircraft based at other stations) would occasionally utilize the MCAS Miramar airfield. The only munitions used by the MV-22 would be associated with its one machine gun. Ordnance is handled and stored in accordance with USMC explosive safety directives (MCO P8020.10A, 3 April 2002, Marine Corps Ammunition Management and Explosives Safety Policy Manual), and all munitions handling is carried out by trained, qualified personnel. Therefore, munitions handling would not result in any greater safety risk, and no significant impact related to explosives safety would occur.

Mitigation Measures

Because there would be no significant impact on safety and environmental health, no mitigation measures are proposed.

No Action Alternative

Under the No Action Alternative, MCAS Miramar operations would continue at the current level, and no construction or demolition would occur. The existing CH-46 aircraft would continue to be based at MCAS Miramar, and safety conditions around the airfield would remain as is. Therefore, no impact on safety and environmental health would occur.

3.17 ENVIRONMENTAL JUSTICE

In 1994, Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations (Environmental Justice)*, was issued to focus the attention of federal agencies on human health and environmental conditions in minority populations and low-income populations. This Executive Order was also established to ensure that, if there were a disproportionately high and adverse human health or environmental effects of federal actions on these populations, those effects would be identified and addressed. The environmental justice analysis addresses the characteristics of race, ethnicity and poverty status for populations residing in areas potentially affected by implementation of the proposed action.

In 1997, Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (*Protection of Children*), was issued to identify and address issues that affect the protection of children. Socioeconomic data specific to the distribution of population by age are presented below.

3.17.1 Affected Environment

Minority and Low-Income Populations

For the purpose of this analysis, minority and low-income populations are defined as:

- *Minority Populations*: All persons identified by the Census of Population and Housing to be of Hispanic or Latino origin, regardless of race, plus non-Hispanic persons who are Black or African American, American Indian and Alaskan Native, Asian, Native Hawaiian and Other Pacific Islander, Some Other (i.e., non-white) Race or Two or More Races. For purposes of the EIS analysis, the minority population is calculated by subtracting the number of persons who are White but not Hispanic, from the total population.
- *Low-Income Populations*: All persons that fall within the statistical poverty thresholds published by the U. S. Census Bureau in the Current Population Survey are considered to be low-income. For the purposes of this analysis, low-income populations are defined as persons living below the poverty level ($16,895 for a family of four with two children, adjusted based on household size and number of children), as reported in the 2000 Census. The 2000 Census asked people about their income in the previous calendar year. Therefore, poverty estimates reported in the 2000 Census compare family income in 1999 with the corresponding 1999 poverty thresholds. If the total income for a family or unrelated individual falls below the relevant poverty threshold, then the family or unrelated individual is classified as being below the poverty level. The percentage of low-income persons is calculated as the percentage of all persons for whom the Census Bureau determines poverty status, which is generally a slightly lower number than the total population since it excludes institutionalized persons, persons in military group quarters and college dormitories, and unrelated individuals under 15 years old.
- *Children*: All persons identified by the Census of Population and Housing to be under the age of 18 years. For the purposes of this EIS, the number of children is calculated by subtracting the number of persons 18 years and over from the total population.

Environmental Justice

Census data on minority populations, low-income populations and children in the MCAS Miramar region of influence (including San Diego County and the cities of Poway, San Diego and Santee) and in the State of California are shown in Table 3.17-1. Poway and Santee have considerably lower minority population percentages (22.8 and 19.2 percent, respectively) than the State of California (53.3 percent). The minority population percentages for the City of San Diego (50.6 percent) and San Diego County, as a whole (45.0 percent), are more similar but still lower than the state's minority percentage. The number of persons living below poverty level in Poway and Santee (4.3 percent and 5.4 percent, respectively) is considerably less than the state (14.2 percent), whereas San Diego County's percentage (12.4 percent) is more similar but lower than that of the state. The percent of persons living below poverty level in the City of San Diego (14.6 percent) is slightly higher than the state. In 2000, children under the age of 18 living in the MCAS Miramar region of influence comprised approximately 25.7 percent of the total population.

Table 3.17-1 Environmental Justice Data for the MCAS Miramar Region of Influence and the State of California (2000)

Geographic Area	Total Population	Minority Population	Percent Minority	Low-Income Population	Percent Low-Income[1]	Children Under Age 18	Percent Children
City of Poway	48,044	10,952	22.8	2,044	4.3	14,741	30.7
City of San Diego	1,223,400	619,508	50.6	172,527	14.6	293,908	24.0
City of Santee	52,975	10,172	19.2	2,823	5.4	14,964	28.2
San Diego County	2,813,833	1,265,000	45.0	338,399	12.4	723,661	25.7
State of California	33,871,648	18,054,858	53.3	4,706,130	14.2	9,249,829	27.3

Notes:
1: The percentage of low-income persons is calculated as a percentage of all persons for whom the Bureau of the Census determines poverty status, which is generally a lower number than the total population because it excludes institutionalized persons, persons in military group quarters and college dormitories, and unrelated individuals under 15 years old.
Source: U.S. Census Bureau 2004

Protection of Children

No children would be expected at or in the vicinity of the proposed project area, which is located on the Main Station in the vicinity of the flightline. The Main Station at MCAS Miramar is the primary developed area on the installation, and contains facilities that support the installation's overall functions as well as community support and family housing (DoN 2006). However, no facilities frequently used by children, such as childcare centers, are located in the proposed project area. The places where children would normally be present at MCAS Miramar are the family housing units and recreation facilities, which are located outside of the MCAS Miramar flightline boundaries. There are no schools located on base.

3.17.2 Environmental Consequences

Environmental justice analysis applies to adverse environmental impacts. Consequently, potential disproportionate impacts to minority or low-income populations are assessed only when adverse environmental consequences to the general human population are anticipated. The same is true for analysis of health and safety risks to children, as the potential for such risks would be driven by adverse environmental impacts.

In order to address the possibility of environmental justice concerns, health and safety factors were analyzed to determine the potential for adverse human health or environmental impacts of the proposed alternatives that could affect the human population. In addition, potential environmental health or safety hazards were examined to assess potential special risks to children. The analyses conducted for Air Quality (section 3.7), Noise (section 3.8), Hazardous Materials Management (section 3.11), and Safety and Environmental Health (section 3.16) indicate that less than significant environmental impacts to the human population are anticipated under all alternatives.

Full Basing (10-Squadron) Alternative

Construction

Environmental justice concerns related to construction activity typically include air quality, noise, hazardous materials, and safety. Specific issues of concern involve potential accidents at construction sites, exposure to asbestos, lead-based paint, and combustive emissions, and noise from construction activity. Safety precautions in areas surrounding the work sites would include adequate measures to restrict access, minimization of hazards associated with construction activities, and proper handling and disposal of hazardous materials. Such measures, particularly the restricted access to the study area, would preclude the potential for adverse impacts to human populations. Noise associated with construction would be intermittent and short in duration, not contributing any appreciable effect to the existing acoustic environment in the area. No significant environmental or human health effects are anticipated related to construction or demolition under the Full Basing Alternative. Consequently, no disproportionate or adverse impacts related to environmental justice are anticipated, nor would there be any special health or safety risks to children.

Operations

Operations under the Full Basing Alternative would involve an increase of 31 percent in the number of aircraft operations at MCAS Miramar. Although the proposed airfield environment would be similar to the current operational environment, and would follow established local approach and departure patterns, the substantial increase in operations was evaluated for potential environmental effects. Environmental justice concerns related to aircraft operations may include air quality, noise, and safety. Specific issues of concern involve aircraft emissions, aircraft noise, and safety concerns related to flight mishaps and explosives handling. The analyses conducted for these resources indicate that no significant impacts are anticipated under the Full Basing Alternative.

Although no significant off-base noise impacts would occur, the population within the 65 CNEL contour would increase slightly. Noise impacts associated with the Full Basing Alternative were determined by comparing the CNEL contours for annual average daily aircraft operations under current CH-46 operations and future proposed MV-22 operations within the MCAS Miramar region. The Full Basing Alternative contours are similar in shape and size to the existing conditions contours, with the major differences in the lengths of the lobes (see Figure 3.8-2). Estimates of the population residing within each CNEL contour band were developed based on census data, excluding MCAS Miramar itself and bodies of water. Relative to existing conditions, Noise Zone II (65-75 dB CNEL) would increase by 98 people, and there would be no increase in people within Noise Zone III (75 dB CNEL and greater).

As shown in Table 3.17-2, the estimated increase of 98 people in Noise Zone II includes 39 minority persons and seven low-income persons, representing 39.7 percent and 7.2 percent of the affected population, respectively.

The geographic area included in Noise Zones II and III is situated in unincorporated San Diego County. When compared with the demographic patterns of the county and state, the percentage of minority and low-income persons in the affected area is moderately lower (see Table 3.17-1). Although minority and low-income persons are represented in the population that would be affected by noise impacts under the Full Basing Alternative, these populations would not

experience disproportionate effects compared to the general population. Consequently, no significant environmental justice impacts are anticipated under the Full Basing Alternative.

Table 3.17-2. Environmental Justice Data for Noise Contours under the Full Basing Alternative and Maximum Partial Basing Alternative

Noise Zones (1)	Full Basing Alternative			Maximum Partial Basing Alternative		
	Population Change (2)	Minority Change (2)	Low-Income Change(2)	Population Change (2)	Minority Change(2)	Low-Income Change(2)
Noise Zone II (65-75 dB CNEL)	+98 (3)	+39 (3)	+7 (3)	+56 (3)	+22 (3)	+4 (3)
Noise Zone III (75+ dB CENL)	-	-	-	-	-	-

Notes:
1. Exclusive of upper bound for all bands; excludes MCAS Miramar itself and bodies of water.
2. Estimated based on 2000 Census with population density methodology.
3. Based on counting actual housing using airphoto analysis, total population within the 65-75 db CNEL contour would increase by an estimated 156 people (62 minorities/ 11 low income) under the Full Basing Alternative and 129 people (51 minorities/ 8 low income) under the Maximum Basing Alternative.

Mitigation Measures

Because there would be no disproportionate effects to minority or low-income populations, no specific mitigation measures related to environmental justice are proposed.

Maximum Partial Basing (8-Squadron) Alternative

Construction

Similar to the Full Basing Alternative, safety precautions in areas surrounding the work sites would include adequate measures to restrict access, minimization of hazards associated with construction activities, and proper handling and disposal of hazardous materials. Such measures, particularly the restricted access to the study area, would preclude the potential for adverse impacts to human populations. Noise associated with construction would be intermittent and short in duration, not contributing any appreciable effect to the existing acoustic environment in the area. No significant environmental or human health effects are anticipated related to construction or demolition under the Maximum Partial Basing Alternative. Consequently, no disproportionate or adverse impacts related to environmental justice are anticipated, nor would there be any special health or safety risks to children.

Operations

Operations under the Maximum Partial Basing Alternative would involve an increase of 20 percent in the number of aircraft operations at MCAS Miramar. Although the proposed airfield environment would be similar to the current operational environment, and would follow established local approach and departure patterns, the substantial increase in operations was evaluated for potential environmental effects. Environmental justice concerns related to aircraft operations may include air quality, noise, and safety. Specific issues of concern involve aircraft emissions, aircraft noise, and safety concerns related to flight mishaps and explosives handling. The analyses conducted for these resources indicate that no significant impacts are anticipated under the Maximum Partial Basing Alternative.

Although no significant off-base noise impacts would occur, the population within the 65 CNEL contour would increase slightly. Noise impacts associated with the Maximum Partial Basing Alternative were determined by comparing the CNEL contours for annual average daily aircraft operations under current CH-46 operations and future proposed MV-22 operations within the MCAS Miramar region. The Maximum Partial Basing Alternative contours are similar in shape and size to the existing conditions contours, with the major differences in the lengths of the lobes (see Figure 3.8-3). Estimates of the population residing within each CNEL contour band were developed, excluding MCAS Miramar itself and bodies of water. Relative to existing conditions, Noise Zone II (65-75 dB CNEL) would increase by 56 people, and there would be no increase in people within Noise Zone III (75 dB CNEL and greater).

As shown in Table 3.17-2, the estimated increase of 56 people in Noise Zone II includes 22 minority persons and four low-income persons, representing 39.4 percent and 6.1 percent of the affected population, respectively.

The geographic area included in Noise Zones II and III is situated in unincorporated San Diego County. When compared with the demographic patterns of the county and state, the percentage of minority and low-income persons in the affected area is moderately lower (see Table 3.17-1). Although minority and low-income persons are represented in the population that would be adversely affected by noise impacts under the Maximum Partial Basing Alternative, these populations would not experience disproportionate effects compared to the general population. Consequently, no significant environmental justice impacts are anticipated under the Maximum Partial Basing Alternative.

Mitigation Measures

Because there would be no disproportionate effects to minority or low-income populations, no specific mitigation measures related to environmental justice are proposed.

Minimum Partial Basing (2-Squadron) Alternative

Construction

No construction or demolition is associated with the implementation of the Minimum Partial Basing Alternative at MCAS Miramar. Therefore, no construction-related impacts would occur.

Operations

Operations under the Minimum Partial Basing Alternative would involve a decrease in the number of aircraft based at MCAS Miramar, and a corresponding decrease in the number of aircraft operations. The proposed airfield environment would be similar to the current operational environment, and would follow established local approach and departure patterns. Environmental justice concerns related to aircraft operations may include air quality, noise, and safety. Specific issues of concern involve aircraft emissions, aircraft noise, and safety concerns related to flight mishaps and explosives handling. The analyses conducted for these resources areas indicate that no significant environmental or human health impacts are anticipated under the Minimum Partial Basing Alternative. Consequently, no disproportionate or adverse impacts related to environmental justice are anticipated, nor would there be any special health or safety risks to children.

Mitigation Measures

Because there would be no disproportionate or adverse impacts anticipated related to environmental justice, no mitigation measures are proposed.

Non-MCAS Miramar Basing Alternatives

Under a non-MCAS Miramar basing alternative, the number of aircraft and personnel at MCAS Miramar would decline as a result of the elimination of the CH-46E aircraft, and no construction or demolition activities would occur. No significant environmental or human health impacts would occur; consequently, no disproportionate or adverse impacts related to environmental justice are anticipated, nor are any special health or safety risks to children.

Mitigation Measures

Because there would be no disproportionate or adverse impacts anticipated related to environmental justice, no mitigation measures are proposed.

No Action Alternative

Under the No Action Alternative, there would be no personnel changes, new construction, demolition, or change in training activities. Therefore, existing conditions would remain unchanged, and no impacts to environmental justice would occur.

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Chapter 4

Marine Corps Air Station Camp Pendleton

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4.0 MARINE CORPS AIR STATION CAMP PENDLETON

4.1 INTRODUCTION

The focus of Chapter 4 is on airfield construction and operations at MCAS Camp Pendleton. MCAS Camp Pendleton could accommodate up to two squadrons of MV-22 aircraft (Partial Basing Alternative). This chapter provides baseline and impact assessment for the Partial Basing Alternative and the No Action Alternative. This chapter also provides analysis for a "non-MCAS Camp Pendleton basing alternative" because, if the MV-22 were based elsewhere, there would be a loss of personnel and aircraft at MCAS Camp Pendleton due to the removal of three CH-46E squadrons.

Because MCAS Camp Pendleton is surrounded by MCB Camp Pendleton, baseline sections often provide information on both installations to demonstrate existing conditions for the air station and its general vicinity. Impacts related to training activities at MCB Camp Pendleton can be found in Chapter 6.

4.2 AIRFIELDS AND AIRSPACE

This section provides an analysis of airfield use at MCAS Camp Pendleton. Aircraft from MCAS Camp Pendleton also train within Special Use Airspace under the authority of other military installations (e.g., MCB Camp Pendleton, Bob Stump Training Range Complex, MCAGCC). Information regarding off-station training is discussed in Chapter 6, even though such operations may originate from MCAS Camp Pendleton.

4.2.1 Affected Environment

MCAS Camp Pendleton (Munn Field) is located in the southern part of MCB Camp Pendleton, approximately 40 miles north of San Diego, California. The primary mission of MCAS Camp Pendleton is to provide services and support operations for Marine Aircraft Group-39, which is an element of the 3D MAW. The station has one runway (3/21), which is approximately 6,000 feet long and 200 feet wide (see Figure 4.3-2). There is also an adjacent helicopter practice landing area, 2,500 long by 400 feet wide, located north-northwest of the runway. The station currently supports both rotary and fixed wing aircraft, and has approximately 128,000 flight operations annually on a single runway (Table 4.2-1).

Table 4.2-1. Existing Annual Aircraft Flight Operations at MCAS Camp Pendleton

Aircraft Type	Departure	Arrival	Closed Pattern		Total
			TGO	GCA	
CH-46	3,418	3,416	9,509	1,652	17,995
CH-53	505	504	172	103	1,284
AH-1W	5,699	5,700	49,086	3,526	64,011
UH-1N	3,798	3,799	32,724	2,352	42,673
Other Transient Aircraft	N/A	N/A	N/A	N/A	2,570
Total Operations	**13,420**	**13,419**	**91,491**	**7,633**	**128,533**

Notes:
An airfield flight operation is defined as a single event that occurs at the air station, such as a departure, arrival, or touch-down. For example, aircraft departing and returning would represent two airfield flight operations.
TGO = Touch-and-Go; GCA = Ground-Controlled Approach.
Arrivals do not equal departures due to mission schedules.
GCA and TGO are counted as 2 operations.
N/A = not available
See Appendix C for details.

Flight operations by rotary wing aircraft at MCAS Camp Pendleton include the Huey (UH-1), Cobra (AH-1W), Sea Knight (CH-46E), Super Stallion (CH-53E), and Sea Stallion (CH/RH-53). Some of these aircraft, such as the CH-53E, only transit to MCAS Camp Pendleton and are not based at the station. Additionally, no fixed wing aircraft are permanently stationed at MCAS Camp Pendleton. Besides departures and arrivals from the airfield, helicopter pilots also perform Touch-and-Go and Ground-Controlled Approach patterns to ensure proficiency in these areas. A breakdown of existing rotary wing operations at MCAS Camp Pendleton is shown in Table 4.2-1.

There are six general flight routes used by aircraft transiting to and from MCAS Camp Pendleton: MCAS Camp Pendleton to NAS North Island; MCAS Camp Pendleton to NOLF Imperial Beach; MCAS Camp Pendleton to MCAS Miramar; Seaside Bravo (MCAS Camp Pendleton to MCAS Yuma); Mountain Bravo (MCAS Camp Pendleton to MCAS Yuma); and Desert Bravo (MCAS Camp Pendleton to the MCAGCC). These flight routes provide access to the expansive Bob Stump Training Range Complex, MCAGCC, as well as aviation facilities at NAS North Island, MCAS Miramar and NOLF Imperial Beach.

4.2.2 Environmental Consequences

Partial Basing (2-Squadron) Alternative

The basing of two squadrons (24 aircraft) of MV-22 aircraft at MCAS Camp Pendleton would replace three CH-46E squadrons (42 aircraft) currently based at MCAS Camp Pendleton. This would result in a decrease of 18 aircraft based at MCAS Camp Pendleton, with a corresponding decrease of an estimated 5,898 airfield operations per year (Table 4.2-2) or a five percent decrease in operations compared to existing conditions. The MV-22 would operate in an airfield environment similar to the current operational environment, and would follow established local approach and departure patterns; however, the total number of airfield operations at MCAS Camp Pendleton would be reduced. No new flight tracks would be established. Therefore, MCAS Camp Pendleton airspace management around the airfield and aircraft ground safety conditions would not change as a result of the new aircraft (see section 4.16 [Safety and Environmental Health] for information regarding aircraft mishap response). No significant impact would occur.

Table 4.2-2. Proposed Change in Annual Airfield Flight Operations at MCAS Camp Pendleton under the Partial Basing Alternative

Operation Type	Addition of MV-22 Operations	Reduction of CH-46 Operation	Change in Operation over Existing Conditions
Departure	5,005	-3,418	+1,587
Arrival	5,005	-3,416	+1,589
Touch-and-Go	928	-9,509	-8,581
GCA Box	1,159	-1,652	-493
Total	**12,097**	**-17,995**	**-5,898**

Notes:
An airfield flight operation is defined as a single event that occurs at the air station, such as a departure, arrival, or touch-down. For example, aircraft departing and returning would represent two airfield flight operations. Touch-and-Go, GCA Box, and Low Work are counted as two operations each.
The proposed MV-22 FCLPs would occur at MCB Camp Pendleton instead of the airfield.

Mitigation Measures

Because there would be no significant impact on airfield operations, no mitigation measures are proposed.

Non-MCAS Camp Pendleton Basing Alternatives

Under a non-MCAS Camp Pendleton basing alternative, MCAS Camp Pendleton operations would decrease by approximately 17,995 operations (14 percent decrease) compared to current operating levels due to the elimination of three squadrons (42 aircraft) of CH-46E helicopter assets currently based at MCAS Camp Pendleton. Although no MV-22 squadrons would be based at MCAS Camp Pendleton, it is possible that transient MV-22 aircraft (aircraft based at other stations) would occasionally utilize the MCAS Camp Pendleton airfield. Any transient MV-22 aircraft would follow established local approach and departure patterns. Therefore, MCAS Camp Pendleton airspace management around the airfield and aircraft ground safety conditions would not change as a result of the new aircraft (see section 4.16 [Safety and Environmental Health] for information regarding aircraft mishap response). No significant impact would occur.

Mitigation Measures

Because there would be no significant impact on airfield operations, no mitigation measures are proposed.

No Action Alternative

Under the No Action Alternative, MCAS Camp Pendleton operations would continue at the current level, and no construction or demolition would occur. The existing aircraft would continue to be based at MCAS Camp Pendleton, and airspace management around the airfield would remain as is. Therefore, no impact would occur.

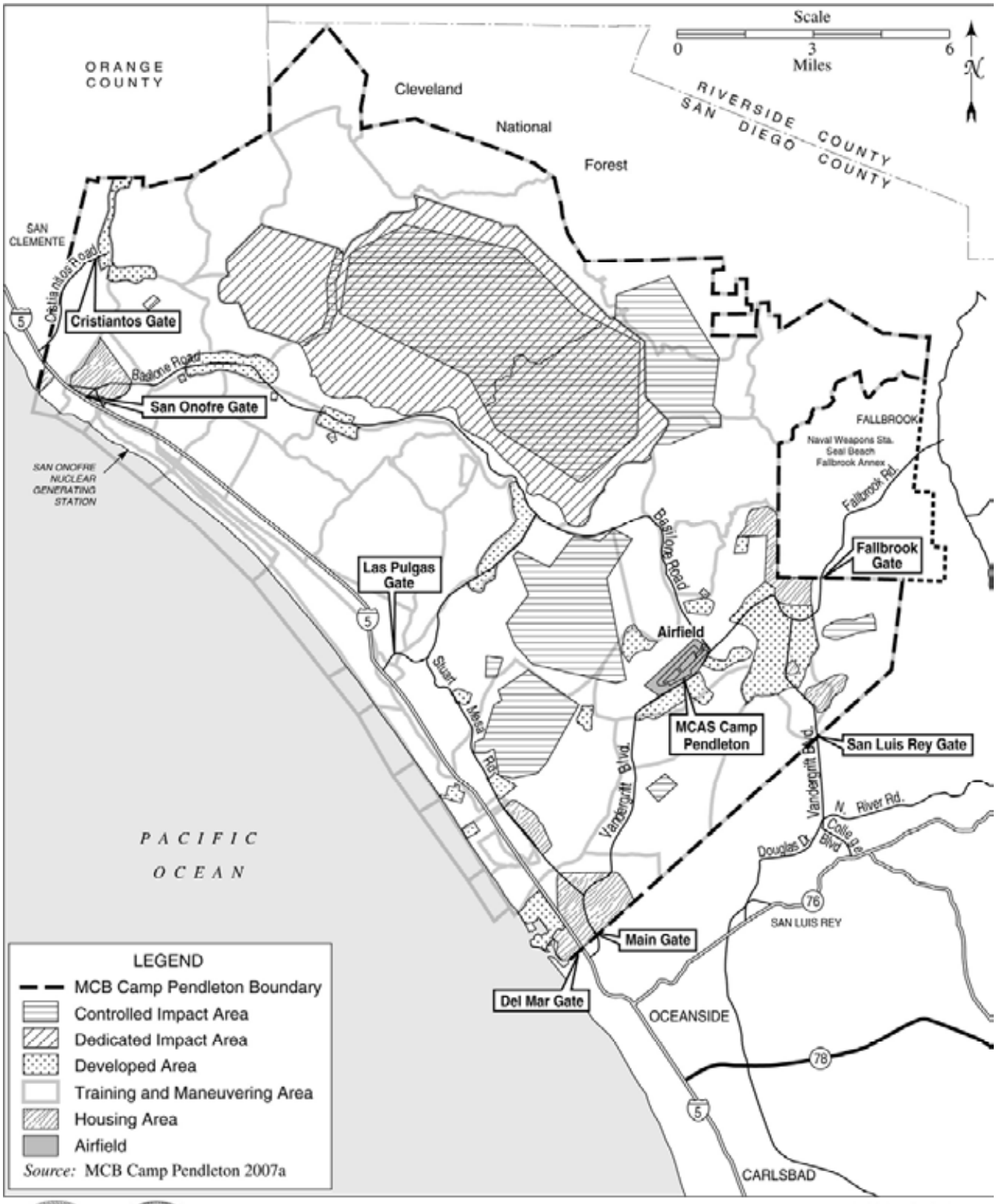
4.3 LAND USE

Land use is the description of developed and undeveloped land occurring at a particular location. Land use categories typically include residential; commercial; manufacturing; transportation, communication, and utilities; recreation; institutional; mining and extraction; and agriculture and forestry. On military installations, land use is often divided into operational and support functions. Management plans and zoning regulations determine the type and extent of land use allowable in specific areas and are often intended to protect specially designated or environmentally sensitive areas.

4.3.1 Affected Environment

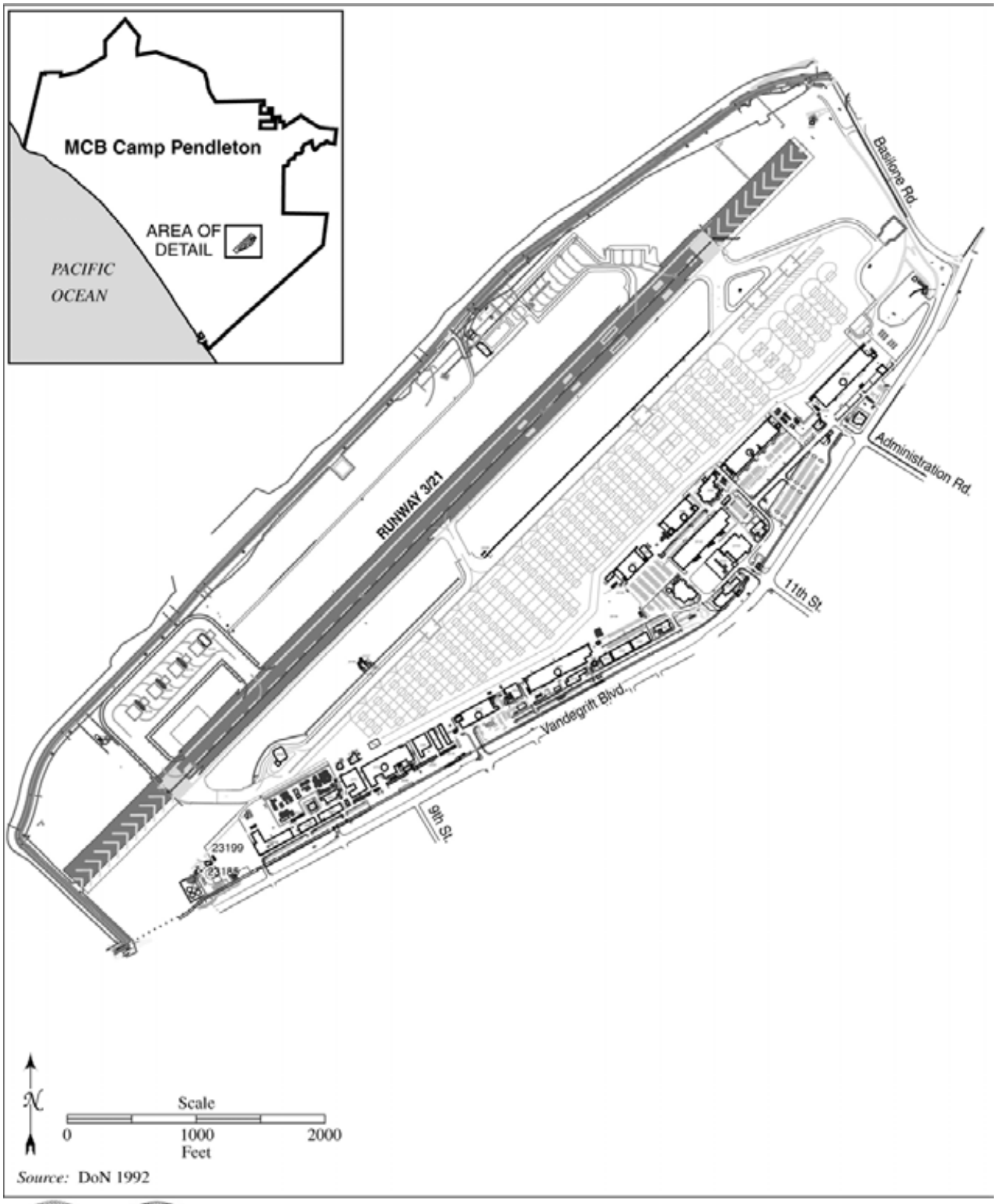
Regional and Local Land Use

MCAS Camp Pendleton (Figures 4.3-1 and 4.3-2) is located within the boundaries of MCB Camp Pendleton and occupies 488 acres (198 ha) of largely developed floodplain (MCAS Camp Pendleton 2006). Although the air station is fully enclosed within MCB Camp Pendleton, it is a separate installation and is not considered a tenant organization (MCAS Camp Pendleton 2006). MCAS Camp Pendleton supports flight operations (Marine Aircraft Wing, Marine Reserve Aircraft Wing,



Land Use Categories at MCB Camp Pendleton

FIGURE 4.3-1



Source: DoN 1992

Overview of MCAS Camp Pendleton

FIGURE 4.3-2

Marine Expeditionary Force component), air-ground training activities, aircraft storage/ maintenance, administrative services, rescue services, and supply/storage areas. The air station consists of over 70 structures, a 6,000-foot (1,829-meter) runway, taxiways, parking aprons, and other related facilities and structures (DoN 1989). The proposed project area is located at MCAS Camp Pendleton.

The predominant types of land uses at MCB Camp Pendleton (Figure 4.3-1) include military training and training support facilities (controlled impact areas, dedicated impact areas, training and maneuvering areas), base infrastructure and mission support (developed areas, housing areas, airfield), and real estate agreements and leaseholders. Developed areas of MCB Camp Pendleton are isolated by relatively large undeveloped areas devoted to training activities. Development on the base, not including roads, is estimated to total 9,800 acres (3,966 ha) (MCB Camp Pendleton 2007a). The largest concentration of development is in the southeastern corner of the base, where major community support facilities and military family housing communities are located. The second largest concentration of development occurs in the southern corner of the base. This area contains numerous housing developments and shopping centers. The central portion of MCB Camp Pendleton is composed of relatively undeveloped land for impact areas and training ranges. In addition, portions of the base are leased to private parties and public agencies for agricultural, recreational, and industrial purposes. Approximately 300 acres (121 ha) of land on the base are leased for farming (MCB Camp Pendleton 2009a).

MCB Camp Pendleton is located between Orange County and metropolitan San Diego. The northern border of MCB Camp Pendleton is adjacent to communities in Orange County (San Clemente), while the eastern border is protected by the rough topography of the Cleveland National Forest and the Fallbrook Naval Weapons Station (Figure 4.3-1). Compatible civilian residential development borders the southern boundary of MCB Camp Pendleton (DoN 1992).

The southwestern boundary of MCB Camp Pendleton is shared entirely with the City of Oceanside. The western portion of Oceanside, its commercial district, has grown along with the development of MCB Camp Pendleton. The residential, commercial, and light industrial land uses in this area are common to both the northern and southern borders of MCB Camp Pendleton. Recent development in Oceanside, which consists mainly of housing, has shifted to the east on previously vacant land and now constitutes a large percentage of the common boundary with MCB Camp Pendleton. This development is consistent with the City of Oceanside General Plan (City of Oceanside Planning Department 2000).

Land Use and the Noise Environment

Land use activities most sensitive to noise typically include residential and commercial areas, public services, and areas associated with cultural and recreational uses. Noise measurements related to aircraft operations to define the area of noise impact are expressed in terms of a Community Noise Equivalent (CNEL). The CNEL represents the average annual day community noise exposure from aircraft operations during a 24 hour period over a year. The DoD has established noise compatibility criteria for various land uses. According to these criteria, sound levels up to 65 decibel (dB) CNEL are compatible with land uses such as residences, transient lodging, and medical facilities.

Noise measurements for MCAS Camp Pendleton are expressed as 60, 65, 70, 75, and 80 dB CNEL contours. Both existing noise contours and those associated with each alternative are presented in section 4.8 (Noise). For MCAS Camp Pendleton, there are no identified noise-sensitive receptors or land use compatibility issues because the relevant noise exposure from the airfield is entirely contained within MCB Camp Pendleton boundaries.

4.3.2 Environmental Consequences

Partial Basing (2-Squadron) Alternative

Implementation of the Partial Basing Alternative would not change existing land use designations and would be compatible with surrounding land uses. Facility construction would be designed and sited to be compatible with the existing base master plan and airfield safety guidelines. Airfield operations associated with the MV-22 aircraft would comply with the Air Installations Compatible Use Zones (AICUZ) compatible land use guidelines (OPNAVINST 11010.36B). Furthermore, no significant impacts to surrounding communities would occur since proposed development would be contained within existing military designations at MCAS Camp Pendleton, and there would be no change to the existing airfield-related APZs and clear zones (see section 4.16, Safety and Environmental Health). Moreover, safety guidelines and land use plans would be updated to address MV-22 operations. Additionally, there would be no increased noise exposure greater than 65 dB CNEL to neighboring land uses, and noise levels would be consistent with land use compatibility guidelines for the installation (see section 4.8, Noise). Therefore, no significant impacts to land use would occur with implementation of the Partial Basing Alternative.

Mitigation Measures

Implementation of the Partial Basing Alternative at MCAS Camp Pendleton would not result in significant impacts to land use; therefore, no mitigation measures would be required.

Non-MCAS Camp Pendleton Basing Alternatives

Under a non-MCAS Camp Pendleton basing alternative, the amount of aircraft and personnel at MCAS Camp Pendleton would be reduced due to the loss of three CH-46E squadrons and no new construction or demolition would occur. Although there would be an overall reduction in military aircraft operations, ground-based activity, and personnel associated with the three CH-46E squadrons, the overall land use designations at MCAS Camp Pendleton would not change. Furthermore, there would be no increased noise exposure greater than 65 dB CNEL to neighboring land uses, and noise levels would be consistent with land use compatibility guidelines for the installation (see Figure 4.8-3). Therefore, no significant impacts to land use would occur with implementation of a non-MCAS Camp Pendleton basing alternative.

Mitigation Measures

Implementation of a non-MCAS Camp Pendleton basing alternative would not result in significant impacts to land use; therefore, no mitigation measures would be required.

No Action Alternative

Under the No Action Alternative, there would be no West Coast-based MV-22 personnel changes, new construction, demolition, or training activities. Therefore, existing conditions would remain unchanged, and no impacts to land use would occur.

4.4 SOCIOECONOMICS

Socioeconomics describes the basic attributes and resources associated with the human environment, particularly population and economic activity. Economic activity typically encompasses employment, personal income, and industrial growth. The project area for socioeconomics is defined as the area in which the principal effects arising from implementation of the proposed action are likely to occur. The proposed action has the potential to cause socioeconomic impacts to the communities around the stations through changes or relocation of personnel.

MCAS Camp Pendleton is located within the boundaries of MCB Camp Pendleton, and MCB Camp Pendleton is bordered by the City of San Clemente to the north, the City of Oceanside to the south, the community of Fallbrook to the east, and the Pacific Ocean to the west. Developed areas to the north and south of MCB Camp Pendleton, particularly Oceanside, San Clemente, Carlsbad, and Vista, are the urban centers most influenced by station and base activities. Therefore, the region of influence includes these four communities and San Diego County. This analysis also presents socioeconomic data for the state of California as a general comparison.

4.4.1 Affected Environment

Demographics

As shown in Table 4.4-1, the cities within the region of influence experienced growth exceeding 20 percent between 1990 and 2000. This growth substantially exceeded both San Diego County (12.6 percent) and the State of California (13.8 percent). Recent population estimates by the U.S. Census Bureau (U.S. Census) and the California Department of Finance (DOF) vary. While the actual growth since 2000 is uncertain, Carlsbad and San Clemente appear to maintain high growth rates, exceeding both county and state levels. Growth in Oceanside and Vista appear to be substantially lower than the previous decade. Oceanside's growth appears to be comparable to the county and state, while Vista appears to have grown slower than both comparison populations.

Table 4.4-1. Population Trends

Geographic Area	1990	2000	% Change (1990 to 2000)	July 2006 Census Estimate	January 2007 DOF Estimate	% Change (2000 to 2006/2007)
Oceanside	128,398	160,905	25.3	165,803	176,644	3 to 9.8
Carlsbad	63,126	77,998	23.6	92,928	101,337	19.1 to 29.9
Vista	71,872	90,131	25.4	89,891	94,962	-0.3 to 5.4
San Clemente	41,100	49,861	21.3	61,050	67,373	22.4 to 35.1
San Diego County	2,498,016	2,813,833	12.6	2,941,454	3,098,269	4.5 to 10.1
California	29,760,021	33,871,648	13.8	36,457,549	37,662,518	7.6 to 11.2
Sources: U.S. Census 2007a, U.S. Census 2007b, U.S. Census 2005, DOF 2007.						

As of November 2007, MCAS Camp Pendleton supported a workforce population of 4,567 personnel including 580 officers, 3,675 enlisted personnel, 54 civilian employees, and 258 contractors (Jones 2007). Comparatively, the daytime population of MCB Camp Pendleton is approximately 60,000 (MCB Camp Pendleton 2007b).

Income and Employment

Median household and family incomes reported from the 2000 Census for 1999 are shown in Table 4.4-2. Median household and family incomes for Oceanside and Vista (where most military personnel living off-base reside) are slightly lower than for San Diego County and the state of California as a whole. Median household and family incomes for Carlsbad and San Clemente are substantially higher than for San Diego County and the State of California.

Table 4.4-2. Income Levels (1999)

Geographic Area	Median Household Income ($)	Median Family Income ($)
Oceanside	46,301	52,232
Carlsbad	65,145	77,151
Vista	42,594	45,649
San Clemente	63,507	76,261
San Diego County	47,067	53,438
California	47,493	53,025
Source: U.S. Census 2007a.		

Table 4.4-3 shows employment and compensation by (nonfarm) industry throughout San Diego County for 2001 and 2005. In 2005, the three largest industries in San Diego County with respect to employment were government (18.0 percent), retail trade (10.2 percent), and professional and technical services (9.6 percent). With respect to compensation, the three largest industries were government (26.1 percent), professional and technical services (11.1 percent), and manufacturing (9.9 percent). Employment increased by 133,108 (7.7 percent) in San Diego County between 2001 and 2005. As shown in Table 4.4-3, between 2001 and 2005 the percent growth in employment within the construction industry was 19.1 percent in San Diego County.

The California Employment Development Department (EDD) also gathers and reports data on employment. This data varies in magnitude from the Bureau of Economic Analysis (BEA) data. For example, EDD estimated the employment in the construction industry in San Diego County to be 75,100 and 90,800 in 2001 and 2005; respectively, resulting in a growth of 20.9 percent (EDD 2007a). EDD labor market data indicates that growth in the construction industry slowed down during 2005 (3.5 percent) and 2006 (2.0 percent) compared to the growth in 2004 (9.4 percent). Between October 2006 and October 2007 the construction industry shed 4,700 jobs, declining by 5.1 percent over the year (EDD 2007b). Jobs lost in specialty trade contractors accounted for almost half of the decline. EDD also developed industry forecasts for San Diego County between 2004 and 2014 and estimated employment in the construction industry will grow 12.1 percent (10,600 jobs) (EDD 2007c).

The unemployment rate for Oceanside, Carlsbad, Vista, and San Clemente in 2006 was 3.8, 2.6, 4.5, and 2.7 percent, respectively. In comparison, the unemployment rate for San Diego County and the State of California was 4.0 and 4.9 percent, respectively (Bureau of Labor Statistics [BLS] 2007).

Table 4.4-3. Nonfarm Employment and Earnings by Industry Sector for San Diego County (2001 and 2005)

Industry	Employment			Compensation ($000s)	
	2001	2005	% Change	2001	2005
Private employment	1,408,111	1,532,751	8.9%	$48,424,257	$60,977,009
Forestry, fishing, related activities, and other	4,298	3,479	-19.1%	$78,631	$74,915
Mining	1,661	1,677	1.0%	$21,956	$34,236
Utilities	5,569	6,739	21.0%	$435,762	$693,384
Construction	100,900	120,194	19.1%	$3,794,918	$5,496,129
Manufacturing	129,802	114,176	-12.0%	$7,445,344	$8,144,911
Wholesale trade	48,673	54,620	12.2%	$2,509,642	$3,230,378
Retail trade	176,001	190,126	8.0%	$4,433,897	$5,417,157
Transportation and warehousing	29,847	30,384	1.8%	$856,104	$1,034,261
Information	47,044	44,747	-4.9%	$3,637,767	$4,458,055
Finance and insurance	74,102	82,252	11.0%	$3,351,057	$4,767,179
Real estate and rental and leasing	82,313	107,078	30.1%	$1,142,666	$1,537,113
Professional and technical services	163,663	178,488	9.1%	$7,650,189	$9,174,778
Management of companies and enterprises	19,108	18,907	-1.1%	$1,281,911	$1,416,733
Administrative and waste services	110,984	124,009	11.7%	$2,613,212	$3,341,875
Educational services	25,049	33,200	32.5%	$569,758	$888,375
Health care and social assistance	127,614	133,678	4.8%	$4,139,084	$5,327,929
Arts, entertainment, and recreation	39,515	43,318	9.6%	$730,511	$955,006
Accommodation and food services	123,870	137,304	10.8%	$2,126,580	$2,872,066
Other services, except public administration	98,098	108,375	10.5%	$1,605,268	$2,112,529
Government and government enterprises	327,356	335,824	2.6%	$16,772,015	$21,548,767
Federal, civilian	39,169	41,067	4.8%	$3,010,674	$3,714,682
Military	112,374	108,748	-3.2%	$5,693,853	$7,546,556
State and local	35,969	41,965	16.7%	$8,067,488	$10,287,529
Total (Nonfarm)	1,735,467	1,868,575	7.7%	$65,196,272	$82,525,776

Source: Bureau of Economic Analysis (BEA) 2007

Housing

Table 4.4-4 shows the distribution of housing in January 1999 for cities surrounding MCAS Camp Pendleton, San Diego County, and the State of California. The total number of housing units, percentages of owners and renters in occupied units, and percent vacant are shown.

Table 4.4-4. Housing (2000 U.S. Census)

Geographic Area	Housing Units	% Vacant	Occupied Housing Units		
			Total	% Owner	% Renter
Oceanside	59,498	5.2	56,396	62.1	37.9
Carlsbad	33,717	6.6	31,486	67.3	32.7
Vista	29,937	3.2	28,993	53.9	46.1
San Clemente	20,651	6.1	19,391	62.5	37.5
San Diego County	1,040,149	4.4	994,677	55.4	44.6
California	12,214,549	5.8	11,502,870	56.9	43.1

Source: U.S. Census 2007

As shown above, housing availability is fairly consistent throughout cities surrounding MCAS Camp Pendleton and San Diego County. In 2000, there were 1,040,149 housing units in San Diego County, 95.6 percent of which were occupied. Housing occupancy rates varied between 93.4 percent for Carlsbad and 96.8 percent for Vista. Of the occupied housing units, Carlsbad had the

highest percentage of owner-occupied units (67.3 percent), while Vista had the lowest percentage of owner-occupied units at 53.9 percent.

Housing facilities for MCAS Camp Pendleton military personnel is provided by MCB Camp Pendleton. As of July 2007, military family housing at MCB Camp Pendleton consisted of 7,300 units and 18,000 permanent billeting spaces (MCB Camp Pendleton 2007b). More than 38,000 military family members occupy base housing complexes. Construction of additional on-base housing units is currently being investigated. For example, the DoN is reviewing the possible construction of approximately 475 additional housing units intended for junior- and mid-level enlisted personnel (DoN 2006).

4.4.2 Environmental Consequences

The basing alternative proposed at MCAS Camp Pendleton involves personnel and mission realignments, including facility modification and construction. The economic effects of these actions can be separated into non-recurring and recurring components. Economic effects related to construction activities are considered temporary, occurring only for the duration of the construction period; therefore, they are considered non-recurring impacts. Economic effects related to operations, which involve long-term changes in personnel levels, are considered long-term, recurring impacts.

Estimated economic effects of the basing alternatives were calculated based on proposed construction spending and personnel changes. End-state economic impacts were calculated, as opposed to annual or temporal impacts, due to uncertainties in the timing of the relevant project events. The exact magnitude of project spending and personnel changes, as well as the timing of the construction schedules and personnel transfers, may alter the estimated economic effects.

The factors driving potential economic impacts of the proposed alternatives at MCAS Pendleton include construction costs and personnel changes, presented in Table 4.4-5. Personnel changes represent the net change in personnel, following replacement of existing CH-46E aircraft by the MV-22, and include both military and civilian employees. The anticipated change in civilian support personnel is based on a typical ratio of 0.07 per military personnel. For example, under the Partial Basing Alternative, there would be a decrease of 257 military personnel and an estimated decrease of 18 (257 x 0.07) civilian support personnel.

Table 4.4-5. Proposed Construction Costs and Net Change in Personnel at MCAS Camp Pendleton

	Construction Costs	Net Personnel Change		
		Military	Civilian	Total
Partial Basing Alternative	$ 56,036,512	-257	-18	-275
Non-MCAS Camp Pendleton Basing Alternatives	0	-674	-47	-721

The economic factors presented in Table 4.4-5 represent the direct impacts of the proposed action alternative. The economic activity associated with these factors generates regional output, income and employment through the multiplier effect of regional purchases (indirect effects) and payroll spending (induced effects). The total economic impact is equal to the sum of the direct, indirect and induced effects. Economic impacts were calculated for the region encompassed by San Diego County using IMPLAN impact analysis software.

Partial Basing (2-Squadron) Alternative

Construction

Under the Partial Basing Alternative at MCAS Camp Pendleton, construction, renovation, or infrastructure projects would be implemented sometime between FY 2010 and FY 2014. Estimated spending for the proposed projects is $56 million, which is defined as the direct output impact in Table 4.4-6. Potential direct impacts associated with this spending would include an estimated 544 construction jobs and $28 million in direct income. The total socioeconomic impact of proposed construction and associated secondary economic activity would amount to an estimated $100 million in total output (spending), 983 jobs and personal earnings of $45 million.

Table 4.4-6. Economic Impact of the Partial Basing Alternative at MCAS Camp Pendleton

	Direct Impact	Indirect Impact	Induced Impact	Total Impact
CONSTRUCTION-RELATED (NON-RECURRING)				
Output	$ 56,036,512	$ 18,421,530	$ 25,815,693	$ 100,273,735
Income	$ 27,933,240	$ 8,009,022	$ 9,070,518	$ 45,012,78
Employment	544	177	262	983
OPERATIONS-RELATED (RECURRING)				
Output	-$13,791,279	$0	-$9,672,531	-$23,463,810
Income	-$13,791,219	$0	-$3,398,575	-$17,189,794
Employment	-275	0	-98	-373
Source: IMPLAN				

Compared to existing industry data discussed in the *Income and Employment* section, anticipated construction employment associated with the Partial Basing Alternative would represent less than one percent of total industry employment of about 100,000 jobs. Employment demand related to proposed construction would be easily met by existing industry resources; therefore, in-migration of workers to the region would not be anticipated.

The construction-related economic effects would be temporary, only occurring for the duration of the construction period. No permanent or long-lasting socioeconomic impacts are associated with construction under the Partial Basing Alternative.

Operations

The number of incoming personnel under the Partial Basing Alternative would not be sufficient to offset the number of departing personnel associated with the replaced CH-46E aircraft. The net change in personnel would be a decrease of 275 positions, comprising of 257 military and 18 civilian personnel. This change would amount to a decline of six percent to the existing MCAS Camp Pendleton employment of 4,567personnel. Payroll associated with these personnel would amount to an estimated $14 million. The decrease in payroll and household spending by departing station personnel would have secondary effects amounting to a loss of 98 regional jobs, $3 million in personal income, and $10 million in total regional spending. The loss of induced jobs and income would comprise less than 0.1 percent of the total number of San Diego County non-farm jobs and non-farm earnings as shown in Table 4.4-3. Since the operations-related impacts of the Partial Basing Alternative are recurring, these would be long-term, annual effects in the region.

Military dependent ratios for MCAS Camp Pendleton were not available at the time of this analysis, so similar ratios for nearby MCAS Miramar were employed to determine station population

changes. An estimated 481 family members would depart, for a total anticipated population decrease of 756 persons. A decrease of this size would amount to six percent of the estimated station population and less than 0.1 percent of the San Diego population. When viewed in the context of the large, dynamic San Diego community, the proposed change in station employment and the secondary economic effects generated are not likely to be noticeable within the region. In terms of effects at the station level, MCAS Camp Pendleton is a dynamic installation, accommodating regular changes in missions and personnel. Additionally, this change would have only a small impact on on-base housing at MCB Camp Pendleton, which currently houses more than 38,000 military family members. It is very unlikely that such a small relative change in population would be consequential.

Mitigation Measures

No significant socioeconomic impacts are anticipated under the Partial Basing Alternative; therefore, no mitigation measures are proposed.

Non-MCAS Camp Pendleton Basing Alternatives

Under a non-MCAS Camp Pendleton basing alternative, there would be no incoming MV-22 personnel to offset the loss of the CH-46E squadrons. Since no construction projects are proposed, there would be no construction-related consequences. Personnel changes associated with this alternative are comprised entirely of the 721 departing positions, composed of 674 military and 47 civilian personnel. This loss would amount to a decrease of 15.8 percent to the existing MCAS Camp Pendleton employment of 4,567 personnel, but just 1.3 percent of the overall MCB Camp Pendleton manpower. Payroll associated with the anticipated loss in personnel would amount to an estimated $36 million (Table 4.4-7). The decrease in payroll and household spending by departing station personnel would have a secondary effect of a loss of 258 regional jobs, $9 million in personal income, and $35 million in regional spending. The loss of induced jobs and income would comprise less than 0.1 percent of the total number of San Diego County non-farm jobs and non-farm earnings as shown in Table 4.4-3. Since the operations-related impacts of a non-MCAS Camp Pendleton basing alternative are recurring, these would be long-term, annual effects in the region.

Table 4.4-7. Economic Impact at MCAS Camp Pendleton of a Non-MCAS Camp Pendleton Basing Alternative

	Direct Impact	Indirect Impact	Induced Impact	Total Impact
OPERATIONS-RELATED (RECURRING)				
Output	-$36,158,224	$0	-$25,359,615	-$61,517,839
Income	-$36,158,224	$0	-$8,910,446	-$45,068,670
Employment	-721	0	-258	-979
Source: IMPLAN				

Military dependent ratios for MCAS Camp Pendleton were not available at the time of this analysis, so similar ratios for nearby MCAS Miramar were employed to determine station population changes. An estimated 1,262 family members would depart, for a total anticipated population decrease of 1,983 persons. A decrease of this size would amount to 16 percent of the estimated station population and 0.2 percent of the San Diego population. When viewed in the context of the large, dynamic San Diego community, the proposed change in station employment and the secondary economic effects generated are not likely to be noticeable within the region. In terms of effects at the station level, MCAS Camp Pendleton is a dynamic installation, accommodating

regular changes in missions and personnel. Additionally, this change would have a relatively small impact on on-base housing at MCB Camp Pendleton, which currently houses more than 38,000 military family members. It is unlikely the anticipated change in population would generate significant socioeconomic impacts.

Mitigation Measures

No significant socioeconomic impacts are anticipated under a non-MCAS Camp Pendleton basing alternative; therefore, no mitigation measures are proposed.

No Action Alternative

No construction projects or personnel changes at MCAS Camp Pendleton are associated with the No Action Alternative; consequently, no socioeconomic impacts would be anticipated.

4.5 COMMUNITY FACILITIES AND SERVICES

Community facilities and services include medical, security, fire and other emergency support services, education, and recreational services. Housing is discussed under section 4.4 (Socioeconomics). This section describes the range of community facilities within the vicinity of MCAS Camp Pendleton potentially affected by implementation of the proposed action or alternatives. It also describes the availability of fire and emergency services at the airfields where aircraft landings and take-offs occur.

4.5.1 Affected Environment

Health Services

There are a variety of medical facilities located near MCAS Camp Pendleton, including Tri-City Medical Center in Oceanside, Palomar Medical Center in Escondido, Scripps Memorial in Encinitas, and the San Clemente Hospital and Medical Center in San Clemente. The Naval Hospital at MCB Camp Pendleton provides primary medical and dental services to active duty personnel and dependents from MCAS Camp Pendleton (DoN 1992). Dental care is also provided to military personnel through United Concordia.

Security Services

Regional security and law enforcement services are provided by San Clemente, Oceanside and Carlsbad police departments and the San Diego County Sheriff's office. The San Clemente Police Department has 58 personnel, the Oceanside Police Department has 174 personnel, and the Carlsbad Police Department has 148 personnel.

Security services at MCAS Camp Pendleton and MCB Camp Pendleton are provided by the Provost Marshal's Office (PMO). The PMO advises the Commanding Officer on all activities involving physical security, law enforcement, and crime prevention at the base, and coordinates with the Naval Criminal Investigative Service in all cases involving security and counterintelligence matters. In addition, a physical security system (including perimeter fenceline and access gates) has been implemented at MCB Camp Pendleton (DoN 1992).

Fire Protection

The San Clemente Fire Department, the Carlsbad City Fire Department, the City of Oceanside Fire Department, and the North County Fire Protection District provide fire protection to the communities adjacent to MCB Camp Pendleton. The San Clemente Fire Department maintains two fire stations. The Carlsbad City Fire Department has 77 personnel and maintains six fire stations. The City of Oceanside Fire Department has 128 personnel and maintains seven fire stations. The North County Fire Protection District serves the City of Fallbrook and currently has six fire stations, five of which are staffed with paid personnel supplemented by reserve Fire Fighters and one of which are all volunteer. The District consists of 60 full time emergency services personnel, 14 support personnel, 20 reserve firefighters, and 33 volunteer firefighters.

MCB Camp Pendleton provides firefighting services for MCAS Camp Pendleton, although MCAS Camp Pendleton provides its own crash crew services through Aviation Rescue and Fire Fighting. The MCB Camp Pendleton Fire Department has 11 fire stations located throughout the base. These stations house nine engine companies, a truck company, two heavy rescue companies and a seasonal wildland station (MCB Camp Pendleton 2003a). The MCB Camp Pendleton Fire Department is composed of 135 personnel who are trained in compliance with DoD standards.

Education

Students residing at MCAS Camp Pendleton attend schools within the Oceanside Unified School District and the Fallbrook Unified School District (DoN 1992). Five public elementary schools are located within MCB Camp Pendleton boundaries; three belong to Oceanside Unified School District and two are associated with Fallbrook Unified School District (MCB Camp Pendleton 2009b). Junior and senior high school students attend schools either in Oceanside, Fallbrook, or San Clemente, depending on the base housing in which they live. Three community colleges are located in the vicinity of MCAS Camp Pendleton: Mira Costa in Oceanside, Palomar in San Marcos, and Saddleback College in Mission Viejo, Orange County. Major universities located in San Diego County include San Diego State University, University of California, San Diego, and the University of San Diego.

Park and Recreation Facilities

San Diego County has many parks and recreation opportunities including water sports facilities; professional sporting events; theaters; museums; gardens; local, state, and national parks; national monuments; golf courses; hiking trails; and theme parks such as Sea World, Legoland, and the San Diego Wild Animal Park.

There are no recreational facilities at MCAS Camp Pendleton (MCAS Camp Pendleton 2006). However, recreation facilities at MCB Camp Pendleton include a golf course, stables, rodeo grounds, bowling alley, two recreational beaches, Lake O'Neil (which provides fishing and boating opportunities), 13 gyms and fitness centers, and a Commissioned Officer's Club (MCB Camp Pendleton 2003b).

4.5.2 Environmental Consequences

Partial Basing (2-Squadron) Alternative

Under the Partial Basing Alternative, the amount of aircraft and personnel at MCAS Camp Pendleton would decrease. There would be a net reduction of about 275 personnel under this alternative (see Table 4.4-5).

Health Services

Existing health services would not be adversely affected by the proposed minimal decrease of personnel with implementation of the Partial Basing Alternative. Therefore, no significant impacts would occur.

Security Services

Existing security services would not be adversely affected by the proposed minimal decrease of aircraft and personnel with implementation of the Partial Basing Alternative. Therefore, no significant impacts would occur.

Fire Protection

Existing fire protection services would not be adversely affected by the proposed minimal decrease of aircraft and personnel or by the new construction associated with the implementation of the Partial Basing Alternative. Therefore, no significant impacts would occur. See section 4.16 (Safety and Environmental Health) for additional information regarding response to aircraft mishaps at the airfield.

Education

Based on the decrease in base personnel (see Table 4.4-5), the school districts that serve MCAS Camp Pendleton families (e.g., Oceanside, San Clemente, or Fallbrook school districts) would not be significantly affected by the associated decrease in school-aged children. Based on a net decrease of 275 military and civilian positions for the Partial Basing Alternative, 756 persons would be expected to depart; this includes 481 family members (section 4.4.2). A portion of the military dependents comprise school-age children enrolled in on- and off-base public schools. Enrollment at the five MCB Camp Pendleton elementary schools in 2008-2009 was 3,288 students. By comparison, 2008-2009 enrollments at the two districts that operate these schools were 5,617 students at Fallbrook Union Elementary School District 7 and 21,517 students at Oceanside Union School District. Assuming that approximately half of the 481 family members are elementary school students (i.e., some would represent spouses and older students), this would comprise approximately 8 percent of the on-base elementary students. Reductions in enrollments at off-base schools would generally represent lower percentages, although some loss of enrollments related to decreases in indirect and induced employment could also occur if households with school-age students moved to other school districts. In terms of effects at the station level, MCAS Camp Pendleton is a dynamic installation, accommodating regular changes in missions and personnel levels; schools serving these dependents periodically experience related enrollment changes. It is unlikely that the change in on-base enrollments at the five public elementary schools would be significant. When viewed in the context of the large, dynamic San Diego community and number

of schools, the change in off-base enrollments generated is not likely to be significant within the districts affected. Therefore, no significant impacts would occur.

Park and Recreation Facilities

Existing parks and recreation facilities would not be adversely affected by the proposed minimal decrease of personnel and their dependents with implementation of the Partial Basing Alternative. Therefore, no significant impacts would occur.

Mitigation Measures

Implementation of the Partial Basing Alternative at MCAS Camp Pendleton would not result in significant impacts to community facilities and services; therefore, no mitigation measures would be required.

Non-MCAS Camp Pendleton Basing Alternatives

Under a non-MCAS Camp Pendleton basing alternative, the amount of aircraft and personnel at MCAS Camp Pendleton would be reduced due to the loss of three CH-46E squadrons, and no new construction or demolition would occur. There would be a net reduction of 721 personnel under this alternative (see Table 4.4-5). Although there would be an overall reduction in military aircraft operations, ground-based activity, and personnel associated with the three CH-46E squadrons, the overall community facilities and services would not significantly change. Therefore, no significant impacts to community facilities and services would occur with implementation of a non-MCAS Camp Pendleton basing alternative.

Mitigation Measures

Implementation of a non-MCAS Camp Pendleton basing alternative would not result in significant impacts to community facilities and services; therefore, no mitigation measures would be required.

No Action Alternative

Under the No Action Alternative, there would be no West Coast-based MV-22 personnel changes, new construction, demolition, or training activities. Therefore, existing conditions would remain unchanged, and no impacts to community facilities and services would occur.

4.6 GROUND TRAFFIC AND TRANSPORTATION

Ground traffic and transportation refer to the movement of vehicles throughout a road and highway network. Roadways are classified into one of three types according to the function they serve in moving traffic: arterial highways, collector roadways, and local streets. Arterial highways and interstates serve the movement of traffic regionally and between population and activity centers with a minimal level of access to adjacent properties. Collector roadways serve the movement of traffic from population and activity centers and funnel them onto arterial highways with a moderate level of access to adjacent properties. Local roadways provide access to adjacent properties and move traffic onto collector and arterial roadways.

Roadways are evaluated by comparing the average daily traffic (ADT) that is carried on the roadway segment to the design capacity of the roadway. Each roadway segment is then given a

corresponding Level of Service (LOS) designation. LOS designation is a professional industry standard by which the operating conditions of a given roadway segment or intersections are measured. LOS is defined on a scale of A to F, where LOS A represents the best operating conditions and LOS F represents the worst operating conditions. LOS A facilities are characterized as having free flowing traffic conditions with no restrictions on maneuvering or operating speeds; traffic volumes are low and travel speeds are high. LOS F facilities are characterized as having forced flow with many stoppages and low operating speeds.

4.6.1 Affected Environment

Regional and Local Circulation

The regional routes that provide access to MCAS Camp Pendleton are Interstate-5 and Interstate-15 from the north and south, and State Route (SR)-74, SR-76, and SR-78 from the east and west. Access to MCB Camp Pendleton, which surrounds MCAS Camp Pendleton, is accomplished through one of seven gates: (1) Oceanside Gate, also known as the Main Gate; (2) Del Mar Gate; (3) Las Pulgas Gate; (4) San Onofre Gate; (5) Cristiantos Gate; (6) San Luis Rey Gate; and (7) Fallbrook Gate (see Figure 4.3-1). The Oceanside, Del Mar, Las Pulgas, San Onofre, and Cristiantos Gates are located on the western edge of the base and connect MCB Camp Pendleton directly to Interstate-5. The San Luis Rey Gate connects the headquarters of MCB Camp Pendleton to the residential areas of Oceanside. The Fallbrook Gate connects MCB Camp Pendleton with the Fallbrook Naval Ammunition Depot, the community of Fallbrook, and Interstate-15 to the east. Access to the southern portion of MCB Camp Pendleton, including MCAS Camp Pendleton, is provided primarily through the Oceanside and San Luis Rey Gates. The northern sub-bases are accessed primarily through the Cristiantos and San Onofre Gates.

The following provides more detail regarding the principal roadways that may be utilized to gain access to MCAS Camp Pendleton (see Figure 4.3-1):

- Interstate-5 is an eight-lane freeway running in a north/south direction through the western portion of the base. Freeway on-ramps and off-ramps are located at Cristiantos Road, Basilone Road, Las Pulgas Road, and Harbor Drive/Vandergrift Boulevard. The existing ADT volume between Harbor Drive/Vandegrift Boulevard and the Basilone Road interchanges range from 138,000 to 140,000 ADT (Caltrans 2006).
- SR-76 is a four-lane divided expressway from Interstate-5 east to College Boulevard with a capacity of 48,000 ADT at LOS C. East of College Boulevard, SR-76 is a six-lane divided expressway with a capacity of 72,000 ADT at LOS C. Existing ADT volumes on SR-76 range from 31,000 to 47,000 ADT between Interstate-5 and College Boulevard. Immediately east of College Boulevard, the existing volume on SR-76 is 37,000 ADT (Caltrans 2006).
- Vandergrift Boulevard is a four-lane major arterial that runs in a north/south direction mostly inside the limits of the base providing the primary access route to MCAS Camp Pendleton. The off-base portion of Vandergrift Boulevard runs from North River Road to the San Luis Rey Gate; this road terminates off-base at North River Road, north of SR-76. The roadway provides two lanes in each direction, with a posted speed limit of 55 mph north of Douglas Drive and a daily capacity of approximately 40,000 vehicles. Existing ADT volumes are 17,700 vehicles between the base boundary and Douglas Drive, and 21,400 vehicles between Douglas Drive and North River Road (San Diego Association of Governments [SANDAG] 2006). On-base (Table 4.6-1), the existing ADT volumes are 21,881

vehicles at the Main Gate, 17,218 west of MCAS Camp Pendleton, 11,523 vehicles east of Basilone Road, and 18,841 vehicles at the San Luis Rey Gate (Gannett Fleming 2001).

- Basilone Road (Table 4.6-1) is a major east/west arterial running from the San Onofre Gate to Vandergrift Boulevard, terminating in a T-intersection with Vandergrift Boulevard at the northeast end of MCAS Camp Pendleton. Basilone Road has one lane in each direction and a capacity of approximately 10,000 ADT. Basilone Road has a posted speed limit of 50 mph, except at intersections with Camp Horno and Camp Las Pulgas, where it is reduced to 25 to 35 mph. The existing ADT volumes are 7,596 ADT between the beach access and Las Pulgas Road and 11,661 ADT west of Vandergrift Boulevard (Gannett Fleming 2001).
- Stuart Mesa Road (Table 4.6-1) is a north/south arterial with one lane in each direction and a capacity of approximately 10,000 ADT. It starts at Las Pulgas Road and becomes Ash Street at Vandergrift Boulevard. Stuart Mesa Road currently carries 14,495 ADT west of Vandergrift Boulevard and 4,515 ADT south of Las Pulgas Road (Gannett Fleming 2001). The speed limit on Stuart Mesa Road is 50 mph.
- Las Pulgas Road (Table 4.6-1) is an east/west arterial with one lane in each direction and a capacity of approximately 10,000 ADT. It begins at Interstate-5 and runs east/west until it terminates at Basilone Road. The current volumes at the Las Pulgas Gate are approximately 5,369 ADT and the current volume just west of Basilone Road is 4,918 ADT (Gannett Fleming 2001). The speed limit on Las Pulgas Road is 50 mph.

Table 4.6-1. Existing Roadway Segment Daily Level of Service for MCAS Camp Pendleton

Roadway Segment	Classification	Capacity[1]	ADT	LOS
INTERSTATE-5				
Cristianitos Rd. to Basilone Rd.	8-Lane Freeway	(1)	141,000	D
Basilone Rd. to Las Pulgas Rd.	8-Lane Freeway	(1)	138,000	C
Las Pulgas Rd. to Harbor Dr.	8-Lane Freeway	(1)	143,000	C
South of Harbor Dr.	8-Lane Freeway	(1)	164,000	C
VANDERGRIFT BOULEVARD				
At Main Gate	4-Ln Collector	30,000	21,881	D
West of Wire Mountain Rd.	4-Ln Collector	30,000	20,654	D
West of MCAS Camp Pendleton	4-Ln Collector	30,000	17,218	C
West of 19th St.	4-Ln Collector	30,000	10,290	B
South of 19th St.	4-Ln Collector	30,000	9,760	A
At San Luis Rey Gate	4-Ln Collector	30,000	18,481	C
BASILONE ROAD				
At San Onofre Gate	2-Ln Collector	10,000	7,596	D
East of Basilone Road	2-Ln Collector	10,000	7,253	D
East of San Mateo Rd.	2-Ln Collector	10,000	5,974	D
East of 52 Area	2-Ln Collector	10,000	4,775	B
North of Las Pulgas Rd.	2-Ln Collector	10,000	6,931	C
South of Las Pulgas Rd.	2-Ln Collector	10,000	8,150	D
Between Stagecoach Ln. & Vandergrift Blvd	2-Ln Collector w/ TWLTL	15,000	11,661	D
STUART MESA ROAD				
South of Las Pulgas Rd.	2-Ln Collector	10,000	4,515	B
West of Vandergrift Blvd	2-Ln Collector	10,000	**14,495**	**F**
LAS PULGAS ROAD				
At Las Pulgas Gate	2-Ln Collector	10,000	5,369	B
West of Basilone Rd.	2-Ln Collector	10,000	4,918	B

Notes:
1. Capacity is based on the upper limit of LOS E per the City of San Diego LOS Thresholds.
ADT = Average Daily Traffic, LOS = Level of Service, TWLTL=Two-way Left-turn Lane

Source: Gannett Fleming 2001

Circulation at MCAS Camp Pendleton

Access to MCAS Camp Pendleton is provided via three gates off Vandegrift Boulevard located at 9th Street, 11th Street, and Administration Road. There is only one main road within the MCAS Camp Pendleton; therefore, internal traffic circulation is limited. A person can walk from one end of the station to the other (personal communication, Provost Marshall 2004). The only traffic problem that currently exists on the station is at the three gates. Due to the close spacing of the gates and the intersections with Vandegrift Boulevard, there are some queuing issues as vehicles try to enter and exit the gates (personal communication, Provost Marshall 2004).

There is adequate parking on MCAS Camp Pendleton to accommodate current demands (personal communication, Provost Marshall 2004).

Daily Hours of Operation at MCAS Camp Pendleton

Regular hours of operation at MCAS Camp Pendleton are 0800 to 1700 Pacific Standard Time (PST) Monday and Friday and 0800 to 2400 PST Tuesday, Wednesday and Thursday.

4.6.2 Environmental Consequences

Partial Basing (2-Squadron) Alternative

Construction

Construction hours of operation at MCAS Camp Pendleton would occur between 0800 to 1700 Monday through Friday. During the construction phase at MCAS Camp Pendleton for the Partial Basing Alternative, it is estimated that 2,411 truck trips would be required to haul demolished material off-site and provide the needed construction materials. Estimating that each truck would make one inbound and one outbound trip, and that the construction traffic would be evenly distributed over a one year period (51 work weeks)[1], there would be approximately 19 daily two-way truck trips added to the adjacent roadway network. Estimating that each truck is equivalent to two passenger cars, a net of 38 daily two-way passenger car equivalent (PCE) trips would be added to the existing roadway network during construction. It should be noted that the construction traffic would likely enter/exit through the San Onofre Gate on Basilone Road. If the 38 daily PCE trips are added to Basilone Road at the San Onofre Gate, Basilone Road would continue to operate at an acceptable LOS D. Additionally, proposed construction would not significantly affect traffic on or in the vicinity of Interstate-5 (Table 4.6-2). Thus, during the construction phase, no significant impacts would occur to the existing roadway conditions.

Operations

The MCAS Camp Pendleton Partial Basing Alternative would have a reduction of 257 military personnel and a reduction of 18 civilian employees. Estimating that each employee makes two trips per day and that all employees would be on the base at the same time, the implementation of the Partial Basing Alternative would reduce the existing roadway conditions by 550 trips per day after the construction phase is completed. Thus there would be a decrease in traffic associated with this alternative resulting in a beneficial impact on the traveled roadway systems. As such, no significant adverse impacts would occur.

[1] To be conservative, total construction-related truck traffic was estimated to occur within a one-year time frame instead of a two or more-year time frame for all alternatives. This means that the daily truck trips are likely an overestimate of what would actually occur.

Mitigation Measures

Because there would be no significant impact on ground traffic and transportation, no mitigation measures are proposed.

Table 4.6-2 MCAS Camp Pendleton Partial Basing Alternative Construction Traffic Roadway Segment Daily Level of Service

Roadway Segment	Capacity	Existing			Existing + Project			Impact?		
		ADT	V/C	LOS	ADT	V/C	LOS	Δ ADT(3)	Δ V/C(4)	Sig.? (5)
INTERSTATE-5										
Cristianitos Rd. to Basilone Rd.	(1)	141,000	0.886	D	141,008	0.886	D	8	0.000	No
Basilone Rd. to Las Pulgas Rd.	(1)	138,000	0.776	C	138,030	0.776	C	30	0.000	No
Las Pulgas Rd. to Harbor Dr.	(1)	143,000	0.701	C	143,030	0.701	C	30	0.000	No
South of Harbor Dr.	(1)	164,000	0.801	C	164,030	0.801	C	30	0.000	No

Notes:
1. The levels of service for Interstate-15 were determined based on the Caltrans District 11 procedures (Caltrans 2002).
2. Capacity is based on the upper limit of LOS E per the City of San Diego (City of San Diego 1998).
3. The incremental change in conditions associated with the proposed action (i.e., the difference between existing with project and existing without project conditions).
4. Using the City of San Diego guidelines as a reference point for significance, LOS E has a threshold of 0.02 and LOS F has a threshold of 0.01 (City of San Diego 2007b).
5. Significant impacts assess whether the project traffic, itself, is a considerable portion of the total direct impacts.

ADT = Average Daily Traffic; LOS = Level of Service; v/c = volume-to-capacity; Δ = Change In; Sig.? = Significant

Non-MCAS Camp Pendleton Basing Alternatives

Construction

Under these alternatives, the MV-22 would be based at MCAS Miramar or would be split between MCAS Miramar and MCAS Yuma. No construction would occur at MCAS Camp Pendleton under these alternatives; therefore, no construction-related traffic impacts would occur on the traveled roadway system on or within the vicinity of MCAS Camp Pendleton.

Operations

If no MV-22 are based at MCAS Camp Pendleton, there would be a reduction of 674 military personnel and a reduction of 47 civilian employees due to the removal of the existing squadrons of CH-46E at MCAS Camp Pendleton. Estimating that each employee makes two trips per day and that all employees would be on the base at the same time, this would reduce the existing roadway conditions by 1,442 trips per day. Thus there would be a decrease in traffic associated with these alternatives resulting in a beneficial impact on the traveled roadway systems. As such, no significant adverse impacts would occur.

Mitigation Measures

Because there would be no significant impact on ground traffic and transportation, no mitigation measures are proposed.

No Action Alternative

No construction would occur under this alternative, and ground traffic and transportation would operate as described above under the existing conditions. Therefore, there would not be an

increase or decrease in traffic associated with the project, and no impacts would occur on the traveled roadway system.

4.7 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 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 maximum acceptable pollutant concentrations that are not to be equaled or exceeded. The national and state ambient air quality standards are shown in Table 4.7-1. In California, the ARB is responsible for enforcing both the federal and state air pollution standards.

Table 4.7-1. National and California Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	National Standards [a]	
			Primary [b,c]	Secondary [b,d]
Ozone (O3)	8-hour	0.07 ppm (140 μg/m^3)	0.075 ppm (147 μg/m^3)	Same as primary
	1-hour	0.09 ppm (180 μg/m^3)	---	---
Carbon monoxide (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)	---
Nitrogen dioxide (NO2)	Annual	0.03 ppm (56 μg/m^3)	0.053 ppm (100 μg/m^3)	Same as primary
	1-hour	0.18 ppm (338 μg/m^3)	---	---
Sulfur dioxide (SO2)	Annual	---	0.03 ppm (80 μg/m^3)	---
	24-hour	0.04 ppm (105 μg/m^3)	0.14 ppm (365 μg/m^3)	---
	3-hour	---	---	0.5 ppm (1,300 μg/m^3)
	1-hour	0.25 ppm (655 μg/m^3)	---	---
PM10	Annual	20 μg/m^3	---	---
	24-hour	50 μg/m^3	150 μg/m^3	Same as primary
PM2.5	Annual	12 μg/m^3	15 μg/m^3	---
	24-hour	---	35 μg/m^3	---
Lead	Rolling 3-month period	---	0.15 μg/m^3	Same as primary
	30-day average	1.5 μg/m^3	---	---

Notes:
- a Standards other than the 1-hour ozone, 24-hour PM10, 24-hour PM2.5, and those based on annual averages are not to be exceeded more than once a year. The 8-hour ozone national standard has replaced the 1-hour ozone national standard.
- b Concentrations are expressed first in units in which they were promulgated. Equivalent units given in parenthesis.
- c Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. Each state must attain the primary standards no later than 3 years after that states implementation plan is approved by the USEPA.
- d Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

Toxic compounds are toxic air pollutants (TACs) that have been determined to present some level of acute or chronic health risk (cancer or non-cancer) to the general public. Units of concentration for both of these types of pollutants are generally expressed in parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). 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) have no established ambient standards, they are important as precursors to O_3 formation.

4.7.1 Affected Environment

Region of Influence

The general project region for the proposed action includes MCAS Camp Pendleton, proposed training areas, and aircraft flight routes between these locations. 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 and particulates in the form of dust), 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 VOCs. In the presence of solar radiation, the maximum effect of precursor emissions on ozone levels usually occurs several hours after they are emitted and many miles from the source. Therefore, depending on the wind conditions, the region of influence for O_3 could include much of the San Diego Air Basin (SDAB), which includes all of San Diego County.

The analysis of aircraft emissions associated with the proposed action is limited to operations that occur below 3,000 feet (914 meters) above ground level, as this is the average depth of the 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.

Existing Air Quality

In regard to the NAAQS, the USEPA designates all areas of the U.S. in terms of having air quality better (attainment) or worse than (nonattainment) the NAAQS. An area generally is in nonattainment for a pollutant if its NAAQS has been exceeded more than once per year. Former nonattainment areas that have attained the NAAQS are designated as maintenance areas. Presently, the SDAB is in attainment of the NAAQS for all pollutants except O_3.

Additionally, the western portion of the SDAB (the portion of the County generally west of the interior desert region) was historically in nonattainment of the NAAQS for CO. Due to a reduction in emissions caused by national emission standards for new vehicles and a state vehicle emissions testing program, the region has attained the CO standards since 1991. As a result, the region was re-designated to attainment of the CO NAAQS by the USEPA in June 1998, and it is now considered a maintenance area for CO.

The ARB also designates areas of the state that are in attainment or nonattainment of the CAAQS. An area is in nonattainment for a pollutant if its CAAQS has been exceeded more than once in 3 years. Presently, the SDAB is in attainment of the CAAQS for all air pollutants except O_3, PM_{10}, and $PM_{2.5}$. The county is considered a severe ozone nonattainment area by the ARB.

Ozone concentrations are the highest during the warmer months of the year and coincide with the period of maximum insolation. Maximum O_3 concentrations tend to be homogeneously spread throughout a region, since it often takes several hours to convert precursor emissions to O_3 in the atmosphere. Inert pollutants, such as CO, tend to have the highest concentrations during the colder months of the year, when light winds and nighttime/early morning surface-based temperature inversions inhibit atmospheric dispersion. Maximum inert pollutant concentrations are usually found near an emission source.

MCAS Camp Pendleton Emissions

Table 4.7-2 presents an estimation of current annual operational emissions associated with the current basing of 41 CH-46E aircraft at MCAS Camp Pendleton (URS 2003b). These data represent emissions that the proposed alternatives would replace at MCAS Camp Pendleton. These data show that the main sources of existing emissions at MCAS Camp Pendleton occur from aircraft, personally owned vehicles, and ground/tactical support equipment. Emissions presented for CH-46 aircraft occurred from operations below 3,000 feet (914 meters) above ground level in proximity to MCAS Camp Pendleton and include departure and arrival, Touch-and-Go, Ground-Controlled Approach box pattern, and engine maintenance and testing activities.

Table 4.7-2. Annual Emissions from Current CH-46E Operations at MCAS Camp Pendleton

Activity Type	Air Pollutant Emissions (tons/year)					
	VOC	CO	NOx	SOx	PM10	PM2.5
CH-46E Aircraft	44.00	171.00	20.00	2.80	25.40	25.40
Personal-Owned Vehicles	5.00	37.00	4.00	0.02	0.14	0.14
Government-Owned Vehicles	1.00	4.00	1.00	0.01	0.04	0.04
Ground/Tactical Support Equipment	7.00	69.00	6.00	0.03	0.66	0.65
Construction	1.00	3.00	5.00	0.03	0.55	0.54
Other Sources	---	---	1.00	0.07	0.56	0.16
Stationary Sources (1)	0.70	3.90	4.90	0.23	5.59	3.58
Total Existing Emissions	**58.70**	**287.90**	**41.90**	**3.18**	**32.94**	**30.49**

Notes:
1 Data estimated by multiplying the stationary source emissions category in Table 4.2-3, FEIS for Realignment to MCAS/MCB Camp Pendleton (DoN and USMC 1996) by the MCAS Camp Pendleton population associated with the current CH-46E basing (908)/total MCAS Camp Pendleton population responsible for the emissions in Table 4.2-3 (3983).
2 The above data represent conformity-related emissions and do not include emissions from sources that require SDCAPCD air permits (excluding stationary sources line item).
Source: URS 2003b

Greenhouse Gas Emissions

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. These emissions occur from natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the earth's temperature. 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 negative environmental, economic and social consequences across the globe.

Recent observed changes due to global warming include shrinking glaciers, thawing permafrost, a lengthened growing season, and shifts in plant and animal ranges (Intergovernmental Panel on Climate Change 2007). 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, damage to marine and terrestrial ecosystems, and an increase in the incidence of infectious diseases, asthma, and other human health problems (California Environmental Protection Agency 2006).

The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Examples of GHGs created and emitted primarily through human activities include fluorinated gases (hydro fluorocarbons and per fluorocarbons) and sulfur hexafluoride. Each GHG is assigned a global warming potential (GWP). The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. The GWP rating system is standardized to CO_2, which has a value of one. For example, CH_4 has a GWP of 21, which means that it has a global warming effect 21 times greater than CO_2 on an equal-mass basis. To simplify 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 emission of each GHG by its GWP and adding the results together to produce a single, combined emission rate representing all GHGs.

Federal agencies are, on a national scale, addressing emissions of GHGs by reductions mandated in federal laws and Executive Orders, most recently, Executive Order 13423. Several states have promulgated laws as a means to reduce statewide levels of GHG emissions. In particular, the California Global Warming Solutions Act of 2006 directs the State of California to reduce statewide GHG emissions to 1990 levels by the year 2020. In addition, groups of states (such as the Western Climate Initiative) have formed regionally-based collectives 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 Executive Order 13123 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 continues to promote and install new renewable energy projects within the NAVFAC Southwest region.

The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Therefore, the impact of proposed GHG emissions to climate change is discussed in the context of cumulative impacts in Chapter 8 of this EIS. Appendix B presents estimates of GHG emissions generated by each proposed action alternative.

Regional Climate

The climate of San Diego County is classified as Mediterranean, characterized by dry summers and wet winters. The major influences on the regional climate are the Eastern Pacific high pressure

system, topography, and the moderating effects of the Pacific Ocean. Seasonal variations in the position and strength of the high pressure system are a key factor in area weather changes.

Precipitation

Precipitation within the project area occurs as rainfall. However, snowfalls do occur in the higher elevations of the Laguna Mountains to the east of the project region and on rare occasions in the highest peaks of the Santa Margarita Mountains within MCB Camp Pendleton. Over 90 percent of the total annual precipitation in the project area occurs from November through April. Annual precipitation increases from about 10 inches (25 cm) per year along the coast to as much as 40 inches (101 cm) in the Laguna Mountains. The annual average precipitation for MCAS Camp Pendleton is 11.8 inches (30.0 cm). Although most of the precipitation in the project region is produced by winter storm systems from the north Pacific, summer rainfall can occur on occasion. This precipitation occurs from the influx of tropical moisture from Mexico into the region. However, thunderstorms and showers from these tropical air masses are infrequent within the project region and mainly affect the interior mountain and desert regions to the east.

Temperature

Due to the moderating effect of the Pacific Ocean and lower elevation, temperatures are less extreme along the coastal sections of the project region compared to more inland locations. Maximum temperatures during the summer months average in the 70s (degrees Fahrenheit [°F]) along the coast to the low 90s in the interior foothills. Minimum summer temperatures average in the 60s over most of the project region. Maximum temperatures during winter months average in the 60s throughout most of the project region. Minimum winter temperatures are usually in the upper 40s along the coast to the mid 30s in the inland foothills.

Prevailing Winds

Concurrent with the presence of the Eastern Pacific high west of California, a thermal low pressure system persists in the interior desert region due to intense solar heating. The resulting pressure gradient between these two systems produces an onshore air flow in San Diego County for most of the year. Sea breezes usually occur during the daytime and disperse air pollutants toward the interior regions. During the evening hours and colder months of the year, land breezes often replace sea breezes and blow in the opposite direction toward the offshore areas. These weak offshore flows may continue until daytime heating reverses the flow back onshore.

During the colder months, the Eastern Pacific high often combines with high pressure over the continent to produce extended periods of light winds and low-level inversion conditions in the region. These atmospheric conditions limit dispersion and can produce adverse air quality. Excessive build-up of high pressure over the continent can produce a "Santa Ana" condition, characterized by warm, dry, northeast winds. Santa Ana winds help to ventilate the air basin of locally generated emissions. However, Santa Ana conditions can also transport air pollutants from the Los Angeles metropolitan area into the project region. When stagnant atmospheric conditions occur during a weak Santa Ana, local emissions, combined with pollutants transported from the Los Angeles area, can lead to significant O_3 impacts in the project region.

Surface winds at MCAS Camp Pendleton prevail from the southwest quadrant for every month of the year, except December, when drainage winds that flow down the Santa Margarita River Valley

produce a prevailing northeast wind during this period (National Weather Service 2001). Average daily wind speeds for the entire year range from 6 to 8 knots.

Applicable Regulations and Standards

The Federal Clean Air Act of 1970 and its subsequent amendments (the CAA) 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 project actions.

Federal Regulations

Section 176(c) of the CAA, as articulated in the USEPA General Conformity Rule, states that a federal agency cannot issue a permit for 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 must not (1) cause or contribute to any new violation of a NAAQS, (2) increase the frequency or severity of any existing violation, or (3) delay the timely attainment of any standard, interim emission reduction, or other milestone. SDCAPCD Rule 1501 implements the USEPA's General Conformity Rule. Within the SDAB, if net annual emissions of VOCs, CO, or NO_x increase by less than 100 tons each, a CAA conformity determination is not required. If emissions of one or more of these compounds exceed the 100-ton *de minimis* threshold, the DoN must demonstrate conformity under one of the methods prescribed by SDCAPCD Rule 1501.

The *Ozone Redesignation Request and Maintenance Plan for San Diego County* (*1-Hour Ozone Maintenance Plan)* is the most recent federally-approved O_3 SIP for the SDAB (SDCAPCD 2002). This plan includes an annual NO_x emissions growth budget for military programs within the SDAB that allows for an emissions growth of 4,161 tons between 2005 and 2014, including over 3,285 tons for MCAS Miramar and MCB Camp Pendleton (USMC 2004b). The air quality analysis in this EIS estimates that the maximum net change in annual VOC/NO_x emissions for any proposed action alternative within the SDAB is -89/+225 tons in year 2017. These emissions would fit within the military programs emissions budget allowed in the SIP. Therefore, pursuant to SDCAPCD Rule 1501, Section 1551.858(a)(1), any proposed action alternative within the SDAB would conform to the most recent federally-approved SIP. The project conformity determination for the MV-22 proposed action within the SDAB is summarized in section 7.3.2 and is presented in complete form in Appendix B of this EIS.

State Regulations

TACs include air pollutants that can cause serious illnesses or increased mortality, even in low concentrations. TACs are compounds that generally have no established ambient standards, but are known or suspected to cause short-term (acute) and/or long-term (chronic non-carcinogenic or carcinogenic) adverse health effects. The ARB designates diesel particulate matter (DPM) from the combustion of diesel fuel as a TAC, and they have identified DPM as a substance that can cause

cancer and chronic non-cancer health risks. Since the proposed action includes a variety of diesel-powered emission sources, this EIS includes an analysis of the impact of proposed DPM emissions to public health.

Local Regulations

MCAS Camp Pendleton is located within San Diego County, which is within the SDAB. The SDCAPCD is responsible for regulating stationary sources of air emissions in the SDAB. The 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 2008).

As part of the O_3 attainment planning process in the SDAB, the SDCAPCD developed the *1-Hour Ozone Maintenance Plan*. In 2003, the USEPA approved this plan and re-designated the SDAB from nonattainment to attainment of the one-hour national O_3 standard (USEPA 2003). In May 2007, the SDCAPCD submitted the *Eight-Hour Ozone Attainment Plan for San Diego County* (8-*Hour Ozone Attainment Plan)* to the USEPA (SDCAPCD 2007). Emissions associated with the MV-22 and F-35 proposed actions were provided by the USMC to the SDCAPCD for inclusion in this plan. The *8-Hour Ozone Attainment Plan* demonstrates that the County will attain this standard by the required date of June 2009. However, a recent court ruling will require areas designated as in "basic" nonattainment of the O_3 standard, such as the SDAB, to comply with requirements for "moderate" nonattainment areas. The USEPA will finalize these requirements in 2009 and the SDCAPCD will have a year from then to submit a new 8-*Hour Ozone Attainment Plan*. Final USEPA approval of a new 8-Hour O_3 SIP for the SDAB is not expected until 2011 or 2012.

4.7.2 Environmental Consequences

Air quality impacts were reviewed for significance in light of federal, state, and local air pollution standards and regulations. For the purposes of the present analysis, if project emissions were projected to exceed a threshold requiring a conformity determination in the SDAB (i.e., 100 tons per year of VOC, NO_x, or CO), further analysis was conducted 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 criteria pollutants for which the SDAB is in attainment of NAAQS, the analysis looked at whether the magnitude and location of project emissions reasonably would be expected to cause a significant adverse impact to air quality.

Partial Basing (2-Squadron) Alternative

Construction

Air quality impacts from construction of the Partial Basing Alternative would occur from (1) combustive emissions due to the use of fossil fuel-powered equipment and (2) fugitive dust emissions during demolition activities, earth-moving activities, and the operation of equipment on bare soil. Equipment usage estimated for proposed construction activities were used to estimate project combustive and fugitive dust emissions (DoN 2007).

Factors needed to derive construction source emission rates were obtained from *Compilation of Air Pollution Emission Factors, AP-42, Volume I* (USEPA 1995), *EMFAC2007 Model* for on-road vehicles (ARB 2006a), and *OFFROAD2007 Model* for off-road construction equipment (ARB 2006b). The analysis estimates that construction equipment equates to a SCAB average fleet of year 2010. The analysis also reduced PM_{10} emissions from earth-moving activities by 75 percent from uncontrolled levels to simulate implementation of best management practices (BMPs) for fugitive dust control. Appendix B includes data and assumptions used to calculate proposed construction emissions.

Table 4.7-3 summarizes the annual and total construction emissions associated with the Partial Basing Alternative. These data show that annual VOC, CO, and NO_x emissions for construction of this alternative would not exceed the conformity *de minimis* thresholds. The SDAB is in attainment for SO_x, PM_{10}, and $PM_{2.5}$ and the nominal construction emissions of these criteria pollutants are only a small fraction of their conformity *de minimis* levels in a nonattainment area (100 tons per year). Air quality impacts associated with these emissions would not be significant. The main sources of PM_{10}/$PM_{2.5}$ emissions would occur as fugitive dust from earth-moving and demolition activities.

Table 4.7-3. Annual and Total Emissions Due to Construction of the Partial Basing Alternative at MCAS Camp Pendleton

Construction Activity	Air Pollutant Emissions (tons)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
2010						
Demolition – Building Facilities	0.00	0.00	0.01	0.00	0.00	0.00
Demolition – Airfield Facilities	---	---	---	---	---	---
Construction – Building Facilities	0.17	0.57	0.85	0.00	0.21	0.09
Construction – Airfield Facilities	0.37	1.18	1.81	0.00	0.48	0.19
Annual Emissions (1)	**0.54**	**1.75**	**2.67**	**0.00**	**0.69**	**0.28**
Conformity *De Minimis* Level	**100**	**100**	**100**	**NA**	**NA**	**NA**
Total Emissions	**1.07**	**3.51**	**5.33**	**0.01**	**1.38**	**0.57**

Note:
1. Year 2010 emissions equal to 50% of total emissions.

Project construction equipment would emit TACs that could potentially impact public health. The main source of TACs would occur in the form of particulates from the combustion of diesel fuel. Due to the mobile and intermittent operation of proposed diesel-powered construction equipment over a large construction area, they would produce minimal ambient impacts of TACs in a localized area. As a result, construction of the Partial Basing Alternative would produce less than significant impacts to public health.

Operations

Air quality impacts associated with the Partial Basing Alternative were determined by comparing the net change in emissions between current operations of 41 CH-46 aircraft and future proposed operations of 24 MV-22 aircraft within the SDAB. Existing and proposed sources affected by the replacement action would include (1) operations and engine maintenance/testing of CH-46 and MV-22 aircraft, (2) personal- and government-owned vehicles (POVs and GOVs), (3) ground/tactical support equipment (G/TSE), (4) construction activities performed by each detachment as part of routine operations, and (5) stationary and other sources.

Operational data used to calculate proposed MV-22 emissions were obtained from the USMC (USMC 2007 and Wyle Laboratories 1999). Factors used to calculate combustive emissions for the MV-22 aircraft were obtained from the DoN (Aircraft Environmental Support Office [AESO] 2001a

and 2001b). Emissions from source categories other than G/TSE were estimated by multiplying emissions from current CH-46 operations at MCAS Camp Pendleton (Table 4.7-2) by the ratio of the proposed MV-22 and current CH-46 basing populations (712/908). Emissions from G/TSE were estimated by multiplying emissions from current CH-46 operations at MCAS Camp Pendleton (Table 4.7-2) by the ratio of proposed MV-22 and current CH-46 aircraft numbers (24/41). It is expected that this technique overestimates proposed ground/tactical support equipment emissions, as it does not consider the replacement of newer and cleaner emitting equipment into the proposed fleet. However, emissions of POVs/GOVs were factored by the ratio of 2012/2000 San Diego County average emission factors obtained from the *EMFAC2007 Model* Burden output to take this effect into consideration. Details of emission source data and calculations used to estimate operational emissions are included in Appendix B of this EIS.

Table 4.7-4 presents a summary of the annual operational emissions that would occur from the Partial Basing Alternative at MCAS Camp Pendleton. These data show that replacement of the current CH-46 operations at MCAS Camp Pendleton with the Partial Basing Alternative would reduce annual emissions of VOC, CO, SO_x, PM_{10}, and $PM_{2.5}$, and produce only a nominal increase in NO_x emissions that is well below the conformity *de minimis* threshold of 100 tons per year. Therefore, operation of the Partial Basing Alternative would not produce significant adverse impacts to air quality, and impacts for some pollutants would be beneficial.

Table 4.7-4. Annual Emissions Due to Operation of the Partial Basing Alternative at MCAS Camp Pendleton

Activity	Air Pollutant Emissions (tons) [1,2]					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
MV-22 Operations	0.21	13.52	26.40	1.39	4.73	4.73
MV-22 Engine Maintenance/Testing	0.04	2.66	4.73	0.23	0.79	0.79
Personal-Owned Vehicles	3.92	29.01	3.14	0.02	0.11	0.11
Government-Owned Vehicles	0.78	3.14	0.78	0.00	0.03	0.03
Ground/Tactical Support Equipment	4.10	40.39	3.51	0.02	0.39	0.38
Construction	0.78	1.68	2.81	0.01	0.31	0.30
Other Sources	---	---	0.78	0.05	0.44	0.12
Stationary Sources	0.55	3.06	3.84	0.18	4.38	2.80
Annual Emissions	**10.38**	**93.47**	**46.00**	**1.91**	**11.17**	**9.26**
Net Change from Existing Conditions	**-48.32**	**-194.43**	**4.10**	**-1.27**	**-21.77**	**-21.24**
Conformity *De Minimis* Level	**100**	**100**	**100**	**NA**	**NA**	**NA**

Note:
1. Represents the net change in emissions between current operations of 41 CH-46 aircraft and proposed operations of 24 MV-22 aircraft.
2. Year 2017 emissions.
3. – indicates reduction in pollutant

Operation of the Partial Basing Alternative would emit TACs that could potentially impact public health. The main sources of TACs from this alternative would include aircraft and G/TSE. TACs generally are subsets of VOC and PM_{10} emissions. The data in Table 4.7-4 show that the alternative would reduce combined VOC and PM_{10} emissions by 69.2 tons compared to current CH-46 operations. Additionally, the main sources of proposed TACs are mostly mobile and intermittent in nature and, therefore, they would produce minimal impacts of TACs in a localized area. As a result, operation of the Partial Basing Alternative would produce less than significant and net beneficial impacts to public health.

Mitigation Measures

Since the Partial Basing Alternative would produce less than significant air quality impacts, no mitigation measures are required. However, to minimize fugitive dust and equipment combustive emissions during proposed construction activities, the project construction contractor shall implement the following measures as part of a Construction Emissions Mitigation Plan.

Measure 1. Fugitive dust control measures. The construction contractor shall implement the following measures during all proposed ground disturbance activities.

1. Use water trucks or sprinkler systems to keep all areas of vehicle movement damp enough to prevent dust from leaving the construction area.
2. Minimize the amount of disturbed ground area at a given time.
3. Minimize traffic speeds on all unpaved roads.
4. Install gravel pads at construction area access points to prevent tracking of soil onto paved roads.
5. Provide temporary wind fencing around sites being graded or cleared.
6. Suspend all soil disturbance activities when winds exceed 25 mph or when visible dust plumes emanate from the site. Stabilize all disturbed areas at this time.
7. Cover truck loads that haul dirt, sand, or gravel or maintain at least two feet of freeboard in accordance with Section 23114 of the California Vehicle Code.
8. After completion of clearing, grading, earthmoving, or excavation, treat the disturbed areas by watering, re-vegetation, or by spreading non-toxic soil binders until they are paved or otherwise developed to prevent dust generation.
9. Designate personnel to monitor the dust control program and to order increased watering, as necessary, to prevent the transport of dust off-site. Their duties shall include holiday and weekend periods when work may not be in progress.

Measure 2. Construction equipment emission control measures. The construction contractor shall implement the following measures during all proposed construction activities, where feasible.

1. Maintain equipment according to manufacturer specifications.
2. Restrict idling of equipment and trucks to a maximum of five minutes at any location.
3. Use diesel oxidation catalysts and/or catalyzed diesel particulate traps.
4. Use electricity from power poles rather than temporary diesel- or gasoline-powered generators.
5. Provide temporary traffic control, such as flag person, during all phases of construction to maintain smooth traffic flow.
6. Keep construction equipment and equipment staging areas away from sensitive receptor areas (such as day care centers).
7. Re-route construction trucks away from congested streets or sensitive receptor areas.

8. Use construction equipment with engines that meet EPA Tier 3 and 4 nonroad standards.
9. Use alternatively-fueled construction equipment, such as compressed natural gas (CNG), liquefied natural gas (LNG), or electric.

Conformity Analysis

The conformity applicability analysis for the proposed action is summarized in section 7.3.6 and presented in complete form in Appendix B of this EIS.

Non-MCAS Camp Pendleton Basing Alternatives

Construction

No new construction or demolition would occur at MCAS Camp Pendleton due to implementation of a non-MCAS Camp Pendleton basing alternative. Therefore, the alternative would not produce any air quality impacts from construction activities.

Operations

Implementation of a non-MCAS Camp Pendleton basing alternative would eliminate all CH-46 aircraft operations and associated emissions. The data in Table 4.7-2 show the annual operational emissions that the alternative would eliminate from MCAS Camp Pendleton. Therefore, implementation of a non-MCAS Camp Pendleton basing alternative would produce less than significant and beneficial air quality and public health impacts.

Mitigation Measures

Since implementation of a non-MCAS Camp Pendleton basing alternative would produce less than significant air quality impacts, no mitigation measures are required.

No Action Alternative

No new construction, demolition, or operational activities would occur at MCAS Camp Pendleton due to the No Action Alternative. Therefore, the No Action Alternative would not produce any new air quality impacts compared to existing conditions.

4.8 NOISE

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air or water, and are sensed by the human ear. Sound is all around us. Noise is defined as unwanted or annoying sound that interferes with or disrupts normal human activities. Although exposure to very high noise levels can cause hearing loss, the principal human response to noise is annoyance. 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.

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.

4.8.1 Noise Metrics

Noise and sound are expressed in logarithmic units of decibels (dB). A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB; sound levels above 120 dB begin to be felt inside the human ear as discomfort. Sound levels between 130 to 140 dB are felt as pain (Berglund and Lindvall 1995). The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. On average, a person perceives a doubling (or halving) of the sound's loudness when there is a 10 dB change in sound level.

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

In accordance with DoD guidelines and standard practice for environmental impact analysis documents, the noise analysis herein utilizes the following (A-weighted) noise descriptors or metrics: Maximum Sound Level (ALM), Sound Exposure Level (SEL), Day-Night Average Sound Level (DNL) and Community Noise Equivalent Level (CNEL). ALM and SEL describe single noise events whereas DNL and CNEL are time-averaged metrics describing the cumulative noise environment of individual noise events over longer periods, usually up to 24 hours. DNL and CNEL account for single-event noise levels and also weight or penalize those levels depending on the time period in which they occur, weighting evening and nighttime sounds up to 10 dB. CNEL is specific to California and DNL is applicable to the remaining 49 states. The Onset-Rate Adjusted Monthly variant of DNL and CNEL, denoted L_{dnmr} and CNELmr, respectively, are specifically utilized for describing aircraft noise exposure from Special Use Airspace operations. Each descriptor, along with other noise metrics, is described in more detail in Appendix C.

4.8.2 Noise Modeling

In accordance with DoN AICUZ guidelines (DoN 2002a), the noise exposure area is divided into three noise zones. Noise Zone I (less than 65 dB DNL/CNEL) is essentially an area of low or no impact. Noise Zone II (65 dB DNL/CNEL to less than 75 dB DNL/CNEL) is an area of moderate impact where some land use controls are needed. Noise Zone III (greater than or equal to 75 dB DNL/CNEL) is the most severely impacted area and requires the greatest degree of compatible land use controls.

As noise from future aircraft operations cannot be physically measured in the present, this EIS computes and estimates the noise generated by aircraft operations and compares exposures from

operational alternatives. Analysis of aircraft noise exposure and compatible land use around DoD airfields and airspace areas are typically accomplished using the following computer programs: NOISEMAP (Wyle 1998), the Rotorcraft Noise Model (RNM) (Wyle 2007a), and MOA-Range NOISEMAP (MR_NMAP) (Wyle 1997). These programs are described in detail in Appendix C, and it is important to note that their computations draw from a spectral database of actual aircraft noise measurements. These programs are most appropriate for comparing "before-and-after" noise impacts, which would result from proposed changes or alternative actions, when the calculations are made in a consistent manner. The model allows noise predictions for such proposed actions without the actual implementation or noise monitoring for those actions.

For airfield environments, lines of equal noise level (i.e., contours of DNL or CNEL) associated with the aforementioned Noise Zones are typically plotted from the output of NOISEMAP and RNM. For airspace environments, L_{dnmr}/CNELmr contours are plotted and/or tabulated from the MR_NMAP program, depending on the magnitude of the exposure. This EIS shows contours and tabulated levels.

Noise levels from flight operations exceeding ambient 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 ambient. This EIS focuses only on aircraft noise levels (not the non-aircraft ambient) and their change due to operational alternatives.

4.8.3 Affected Environment

The existing aircraft noise environment at MCAS Camp Pendleton is initially based on a 1995 aircraft noise study (Wyle 1995b). The existing condition from WR 95-2 (Wyle 1995b) was updated to calendar year (CY) 2005 conditions (County of San Diego 2006) and serves as the baseline for MCAS Camp Pendleton for this EIS.

The following factors were considered in the analysis of noise levels from existing aircraft operations at the air station: flight operations, runway utilization, flight tracks, flight track utilization, flight profiles, climatological data, pre-flight run-ups, maintenance run-up operations, and low work operations. These factors are described in detail in Appendix C. Modeled flight operations are summarized below.

Due to MCAS Camp Pendleton's remote location within MCB Camp Pendleton, no noise-sensitive receptors outside of the military boundaries were identified. Therefore, no indoor speech interference and sleep disturbance analysis was conducted.

Flight Operations

The baseline condition for MCAS Camp Pendleton considered approximately 129,000 flight operations annually (see Table 4.2-1). Approximately 126,000 annual flight operations were modeled for the affected environment (Table 4.8-1; see Appendix C for details). All of the based aircraft flight operations and the transient CH-53E flight operations were modeled. The baseline modeling regarding types of aircraft is consistent with WR 95-2 (Wyle 1995b). Nearly half of the modeled flight operations are by AH-1W Super Cobra (single engine attack helicopter). At approximately 18,000 annual flight operations, the CH-46E Sea Knight (twin engine, twin rotor

helicopter) accounts for 14 percent of the total modeled flight operations. Of the total modeled flight operations, CNEL evening and nighttime flight operations account for 23 percent and 3 percent, respectively (see Appendix C).

Table 4.8-1. Modeled Annual Aircraft Flight Operations for Existing Conditions at MCAS Camp Pendleton

Aircraft Type	Departure	Arrival	Closed Patterns		Total
			TGO	GCA Box	
CH-46	3,418	3,416	9,509	1,652	17,995
CH-53	505	504	172	103	1,284
AH-1W	5,699	5,700	49,086	3,526	64,011
UH-1N	3,798	3,799	32,724	2,352	42,673
Total Operations	**13,420**	**13,419**	**91,491**	**7,633**	**125,963**

Notes:
TGO = Touch-and-Go; GCA = Ground-Controlled Approach.
Arrivals do not equal departures due to mission schedules.
GCA Box and TGO are counted as two operations.
See Appendix C for details.

All rotary wing flight operations were modeled to depart/arrive Runway 03/21. Runway utilization is nearly identical to WR 95-2 (Wyle 1995b) with updates provided by MCAS Camp Pendleton (County of San Diego 2006). Many flight tracks were modeled to support the flight operations listed in Table 4.8-1 with utilization nearly identical to WR 95-2 (Wyle 1995b). North Initial departure flight tracks and Point Canyon arrival flight tracks were added to the modeling, relative to WR 95-2 (Wyle 1995b), per MCAS Camp Pendleton input (County of San Diego 2006). Other flight tracks from WR 95-2 (Wyle 1995b) were updated in 2005 to reflect a 2004 capacity study for the air station (ATAC 2004).

CH-46E and CH-53E aircraft and their modeled flight profiles were converted from being modeled with NOISEMAP to being modeled with RNM, maintaining the previously modeled altitudes and speeds, and implementing roll angles where practicable, based on roll angles modeled at MCAS Miramar (see section 3.8). Take-off roll altitudes were raised 20 feet, and arrival threshold crossing altitudes were raised 50 feet for terrain considerations. The aircraft source and flight profiles were converted to RNM to be more consistent with the MCAS Miramar modeling and to take advantage of more accurate modeling technology not available for WR 95-2 (Wyle 1995b).

Modeled run-up operations and profiles were identical to those modeled for the existing condition of WR 95-2 (Wyle 1995b), except that run-ups for CH-46E aircraft were added. AH-1W, UH-1N and CH-46E run-ups were modeled with the following respective surrogates: UH-1M, UH-1M and UH-60A.

Noise Exposure

Using the data described above and in Appendix C, the NOISEMAP and RNM computer models were used to calculate and plot the CNEL contours for annual average daily aircraft operations. Figure 4.8-1 shows the 60 to 85 dB CNEL contours, in 5 dB increments, for the existing condition. The contours primarily follow the path of the arrivals and right-traffic closed patterns on Runway 21. The Northeast lobe of the 60 dB contour extends approximately 3.5 nm past the northeast boundary of the airfield. The main body of the 60 dB contour is approximately 2 nm wide. The contours do not extend beyond the boundary of MCB Camp Pendleton. Because the CNEL

contours are wholly contained within the MCB Camp Pendleton boundary, there are no off-base people or housing units within the CNEL contours.

Noise due to construction and maintenance equipment, as well as general vehicle traffic is a common ongoing occurrence in the station environment. Trucks, as well as heavy equipment, are usually found in the station environment on a daily basis to support existing facility operations and infrastructure upgrades.

4.8.4 Environmental Consequences

Prior to discussing the potential impacts due to each alternative, the following information provides modeling parameters common to all alternatives involving the MV-22 aircraft at MCAS Camp Pendleton.

- Detailed flight operations by type of operation, CNEL period and general airfield routing were derived from data provided by the USMC (NAVFAC 2007), and is based on best estimates by MV-22 operators for this new aircraft.
- All FCLP flight operations would be conducted at HOLF at MCB Camp Pendleton. These are discussed further in section 6.1.8.
- USMC personnel provided runway and initial flight track utilization (NAVFAC 2007). No new tracks/routes would be necessary for the MV-22 basing. MV-22 aircraft would use runways, pads and tracks historically modeled for fixed and rotary wing aircraft at the air station. The MV-22 flight tracks were modeled to/from Runway 03/21. Further detail regarding runway/pad and flight track utilization percentages is contained in Appendix C.
- MV-22 flight profiles for each modeled track were created based on MV-22 flight profiles for MCOLF Oak Grove in North Carolina (Wyle 2007b) and flight simulator data provided by the USMC (Bianca 2007). Appendix C contains maps of representative modeled flight profiles for each type of flight operation.
- Low Work flight operations were not modeled due to insufficient space at the airfield (NAVFAC 2007).
- Most maintenance activity on MV-22 engines would occur off-site at the engine manufacturer (Moye and Aitchison 2007). However, for the purposes of the EIS, the MV-22 maintenance run-ups were estimated to be identical to those modeled for the East Coast basing EIS noise study (Wyle 1999) and were estimated to be located at the South Grass area, the same location as maintenance run-ups for other rotary wing aircraft at MCAS Camp Pendleton. MV-22 run-ups were modeled with in-frame CH-53E aircraft source data as the noise model's database does not yet contain source acoustic data for the MV-22. Appendix C provides further modeling details.
- Due to the station's remote location within MCB Camp Pendleton, no representative noise-sensitive receptors were identified.

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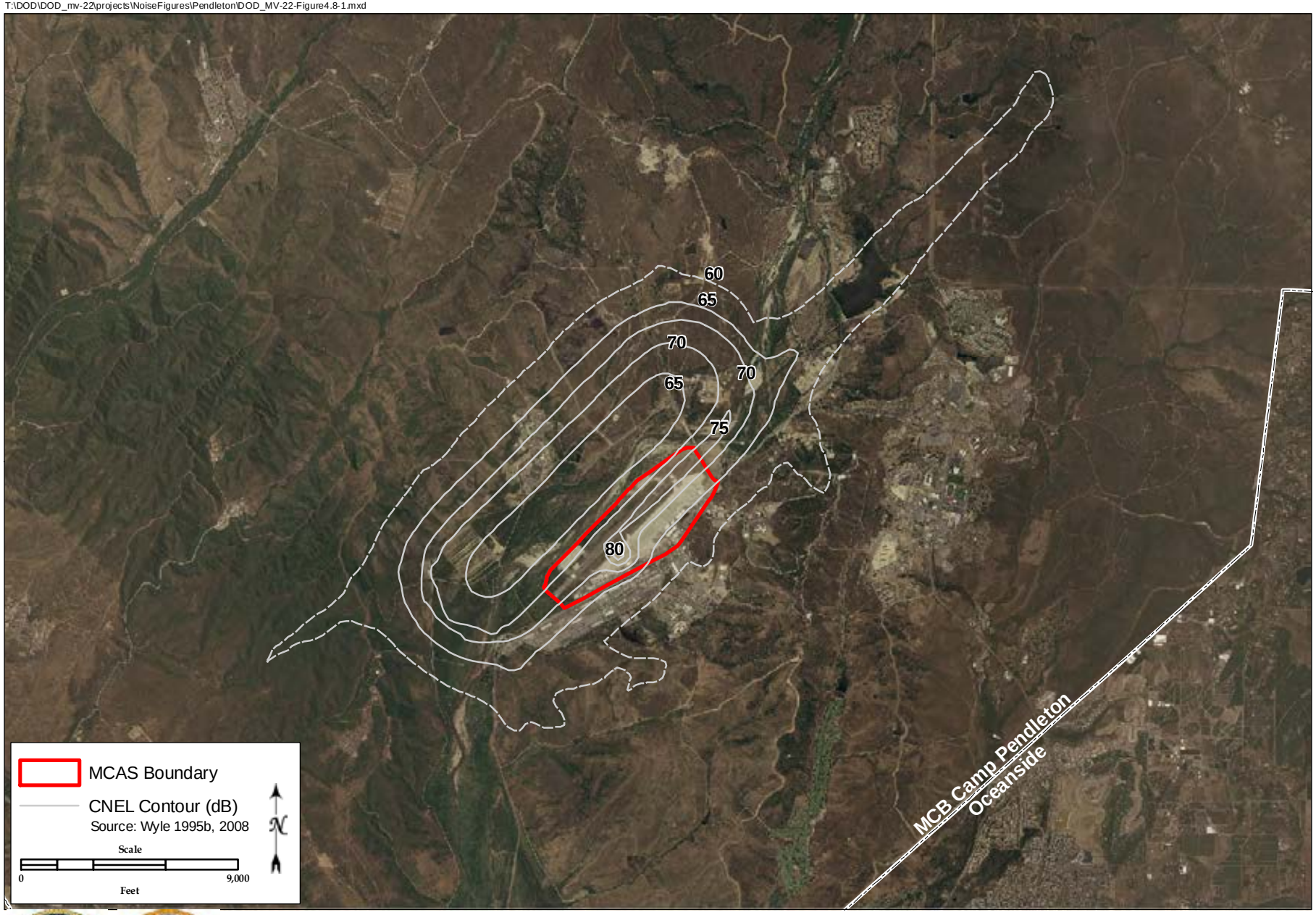

Aircraft Noise Contours from Operations at MCAS Camp Pendleton for Existing Conditions

FIGURE

4.8-1

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Partial Basing (2-Squadron) Alternative

The Partial Basing Alternative involves the addition of two active duty squadrons of MV-22 aircraft at MCAS Camp Pendleton and the removal of CH-46E aircraft currently based at the air station. Table 4.8-2 shows the numbers of proposed annual MV-22 flight operations for the Partial Basing Alternative. Proposed MV-22 flight operations would total approximately 12,000 annually, with 29 percent during the CNEL evening period and six percent during the CNEL nighttime period.

Table 4.8-2. Proposed Annual MV-22 Flight Operations for the Partial Basing Alternative at MCAS Camp Pendleton

Operation Type	Day	Evening	Night	Total
Departure	2,976	1,662	367	5,005
Arrival (no break)	2,976	1,662	367	5,005
Touch-and-Go	835	93	-	928
GCA Box	1,043	116	-	1,159
Total	**7,830**	**3,533**	**734**	**12,097**

Notes:
Day = 0700-1859, Evening = 1900-2159, Night = 2200-0659
Touch-and-Go and Ground-Control Approach (GCA) Box are counted as two operations each.
100% of FCLP operations would be conducted at HOLF at MCB Camp Pendleton; departures and arrival operations account for off-site FCLP missions.
See Appendix C for details.

Approximately 83 percent of the MV-22 flight operations at the air station would consist of departures and arrivals to/from other places and approximately 17 percent would consist of closed-pattern operations in the vicinity of the air station.

Additionally, approximately 18,000 modeled flight operations by CH-46E aircraft would be removed from the air station along with run-ups associated with the CH-46E. The modeled flight and run-up operations for the AH-1W, UH-1N, and CH-53E aircraft would remain unchanged relative to existing conditions.

Using the data described above and in Appendix C, the NOISEMAP and RNM computer models were used to calculate and plot the CNEL contours for annual average daily aircraft operations. Figure 4.8-2 shows the 60 to 85 dB CNEL contours, in 5 dB increments, for the Partial Basing Alternative. The contours would be very similar to the existing conditions contours, and the arrivals lobe to the northeast would be up to 0.4 miles shorter than in the baseline case.

The CNEL contours for the Partial Basing Alternative would be wholly contained within the MCB Camp Pendleton boundary. Therefore, there would be no off-base people or housing units within the CNEL contours, and no off-base noise impact from airfield operations at MCAS Camp Pendleton.

The Partial Basing Alternative would cause short-term noise increases due to construction. Construction would include the use of trucks, bulldozers, and other heavy construction equipment for the major construction projects (e.g., hangars, aircraft parking facilities, and apron). Construction associated with this alternative would be undertaken adjacent to the flightline and occupy industrial areas, and would be isolated from any off-base communities. In addition, construction would take place during daylight hours and would follow BMPs to minimize noise levels. Construction noise would be contained within the station environment because most of the

heavy construction would occur near the flightline, where noise would be compatible with current and ongoing activities.

Therefore, there would be no significant noise impact from construction or operations at MCAS Camp Pendleton from the Partial Basing Alternative.

Mitigation Measures

Because there would be no significant impacts, no mitigation measures would be required.

Non-MCAS Camp Pendleton Basing Alternatives

Implementation of a non-MCAS Camp Pendleton basing alternative only involves the removal of CH-46E aircraft currently based at MCAS Camp Pendleton. As listed in Table 4.8-1, approximately 18,000 modeled flight operations by CH-46E aircraft would be removed from the air station, along with associated CH-46E run-ups. The modeled flight and run-up operations for the AH-1W, UH-1N and CH-53E aircraft would remain unchanged relative to existing conditions.

Using the data described above and in Appendix C, the NOISEMAP and RNM computer models were used to calculate and plot the CNEL contours for annual average daily aircraft operations. Figure 4.8-3 shows the 60 to 85 dB CNEL contours, in 5 dB increments, for a non-MCAS Camp Pendleton basing alternative. The contours would be approximately 1 dB smaller than the baseline contours, and the arrivals lobe to the northeast would be approximately 0.5 nm shorter than in the baseline case.

The CNEL contours for a non-MCAS Camp Pendleton basing alternative would be wholly contained within the MCB Camp Pendleton boundary. Therefore, there would be no off-base people or housing units within the CNEL contours, and no off-base noise impact from airfield operations at MCAS Camp Pendleton. Additionally, no construction at MCAS Camp Pendleton is associated with implementation of a non-MCAS Camp Pendleton basing alternative.

Therefore, there would be no significant noise impact at MCAS Camp Pendleton from the implementation of a non-MCAS Camp Pendleton basing alternative.

Mitigation Measures

Because there would be no significant impacts, no mitigation measures would be required.

No Action Alternative

There would be no change in current airfield operations under the No Action Alternative. Therefore, the noise exposure for the No Action Alternative would be identical to the noise exposure for the baseline condition, and no noise impact would occur.

4.9 INFRASTRUCTURE AND UTILITIES

Infrastructure and utilities include water supply, wastewater treatment and disposal facilities, electrical supply facilities, solid waste management facilities, natural gas, and stormwater drainage facilities.

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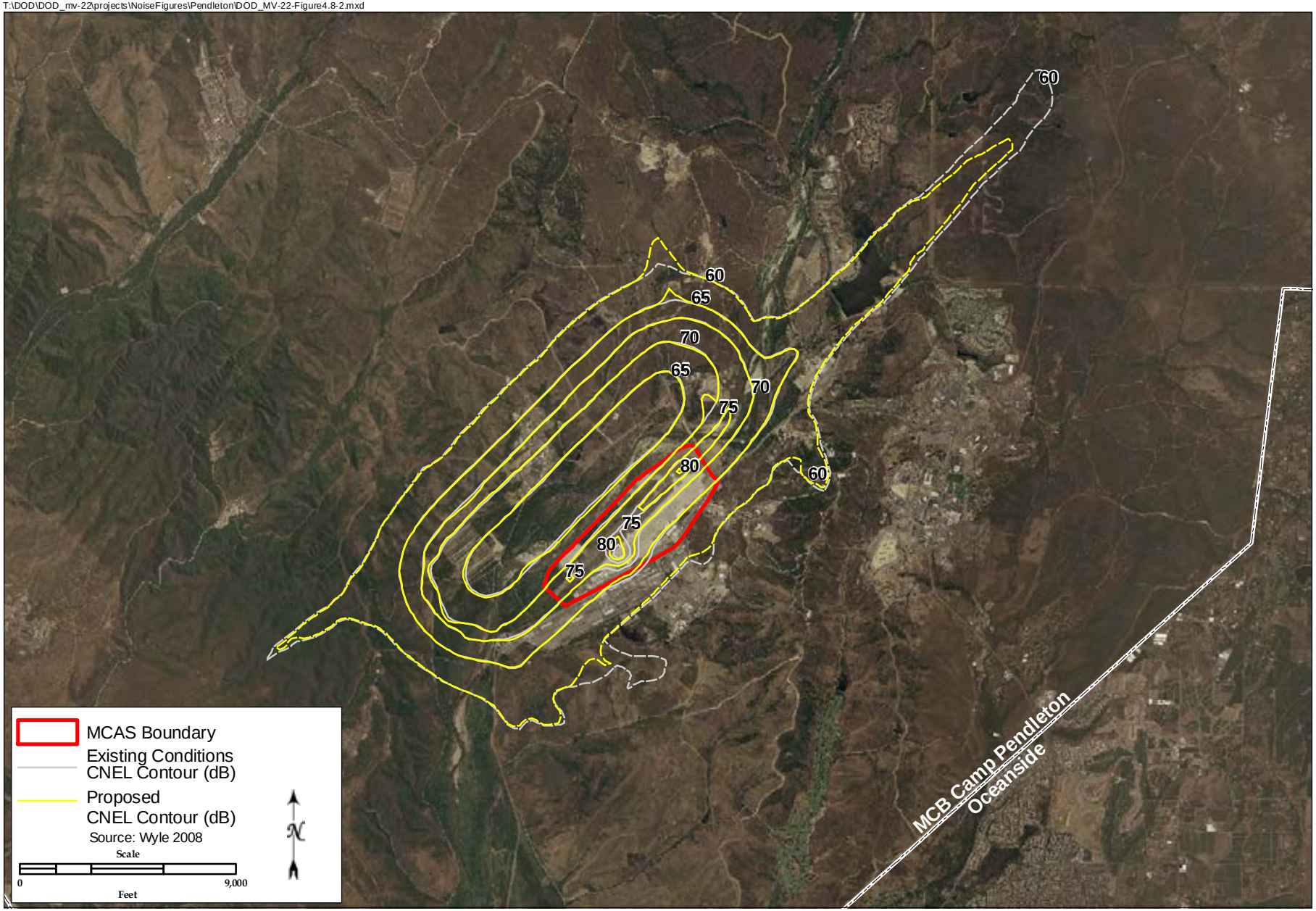

Aircraft Noise Contours from Operations at MCAS Camp Pendleton for 2-Squadron Alternative

FIGURE

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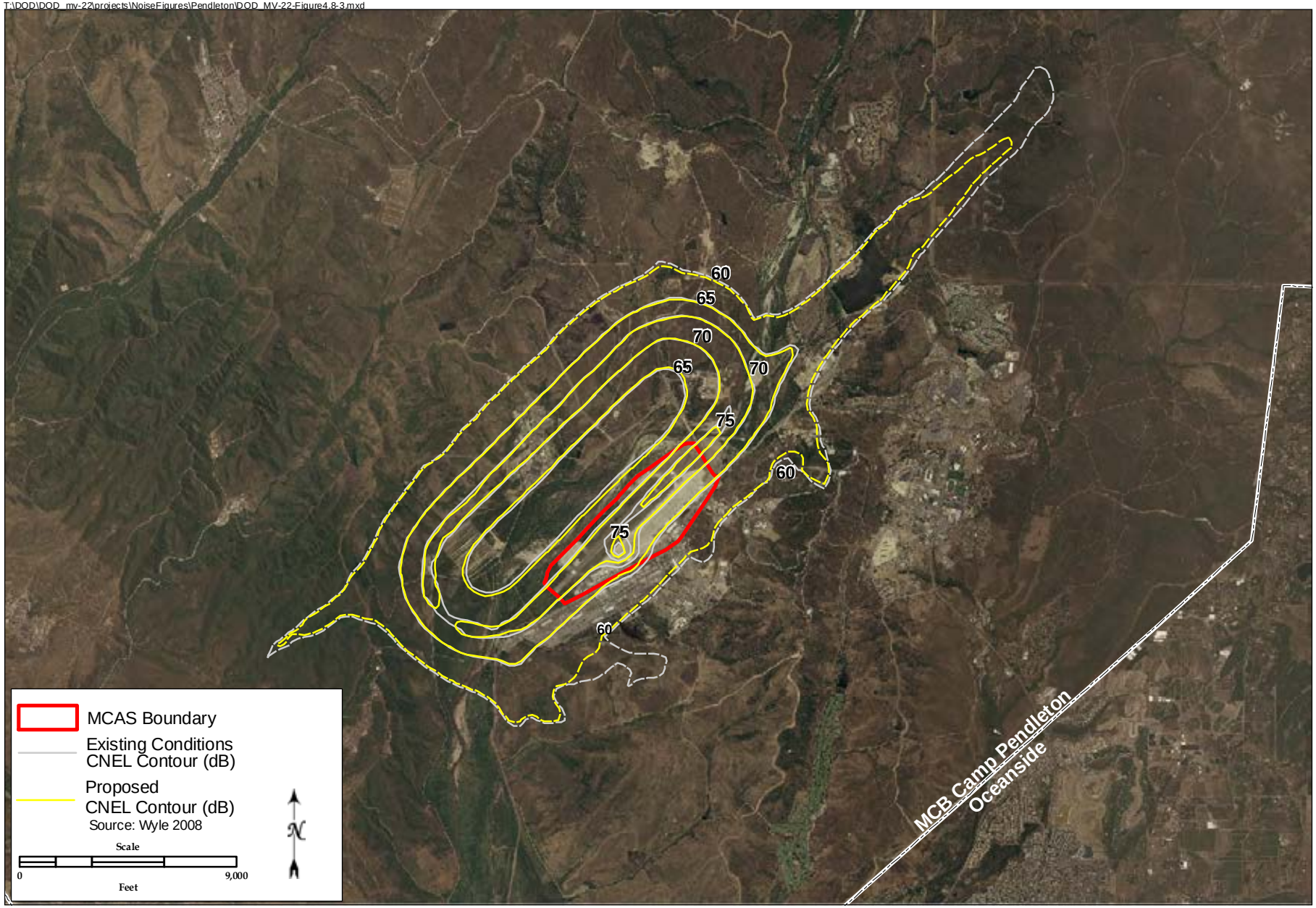

Aircraft Noise Contours from Operations at MCAS Camp Pendleton for Non - MCAS Camp Pendleton Basing Alternatives

FIGURE

4.8-3

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4.9.1 Affected Environment

This section discusses the infrastructure and utilities supplied to the San Diego region as well as to MCAS Camp Pendleton.

Water Supply

The San Diego County Water Authority (SDCWA) supplies over 90 percent of the regional water supply through its 23 member agencies. This water is imported from the Colorado River and Northern California by a single supplier, the Metropolitan Water District of Southern California. The rest comes from local water sources including groundwater, local surface water, recycled water, seawater desalination and conservation. The SDCWA has five major pipelines with the maximum capacity to carry 925 million gallons a day of treated or untreated water into San Diego County. These pipelines bring either treated or untreated water into San Diego County from the Metropolitan Water District. Delivery points from the Metropolitan Water District are located south of the Riverside/San Diego county line (SDCWA 2009).

The potable water supply for MCAS Camp Pendleton is derived from underground aquifers that are recharged by percolation from the Santa Margarita River basin. Potable water pumped from the wells in the Santa Margarita River basin is stored in a series of reservoirs and conveyed to the potable water treatment/distribution system at the Haybarn Canyon Iron/Manganese Removal Treatment Facility. Potable water is then conveyed via a series of conveyance pipelines throughout MCAS Camp Pendleton. The water system consists of wells, water mains, booster pumps, and storage reservoirs with a total capacity of 21.5 million gallons (81.4 million liters) (DoN 1992). A backup water supply is also available through two separate water lines that connect the Santa Margarita and the Las Flores systems in the south and the San Mateo and San Onofre systems in the north. MCAS Camp Pendleton is a member of the Santa Margarita Watershed Planning Team and the Water Steering Committee for MCB Camp Pendleton (MCAS Camp Pendleton 2006).

Wastewater Treatment and Disposal Facilities

Regional wastewater is treated by the City of San Diego's Metropolitan Wastewater Department's Point Loma Wastewater Treatment Plant, serving the Greater San Diego population of 2.2 million from 16 cities and districts generating approximately 180 million gallons of wastewater per day. Planned improvements will increase wastewater treatment capacity to serve an estimated population of 2.9 million through the year 2050. It is estimated that nearly 340 million gallons of wastewater will be generated each day by that year. The Metropolitan Wastewater Department treats the wastewater in a 450-square-mile area (stretching from Del Mar and Poway to the north, Alpine and Lakeside to the east, and south to the Mexican border) and has a capacity of 240 million gallons per day (City of San Diego 2007a).

Wastewater from MCAS Camp Pendleton is collected through a series of pipes and conveyance lines directed to the MCB Camp Pendleton tertiary treatment plant. MCB Camp Pendleton collects, performs secondary and tertiary treatment of, and disposes treated wastewater through a system of treatment plants, pump stations, and conveyance lines. The base also performs advanced sewage treatment at secondary treatment plant 9. The tertiary treated water is used for irrigation, landscaping, and groundwater recharge.

Electrical Supply Facilities

Regional electricity is supplied by San Diego Gas and Electric (SDG&E). SDG&E is a regulated public utility that provides safe and reliable energy service to 3.3 million consumers through 1.3 million electric meters and more than 800,000 natural gas meters in San Diego and southern Orange counties. The utility's area spans 4,100 square miles.

The electrical power provided to MCAS Camp Pendleton and MCB Camp Pendleton is purchased from SDG&E. Power is distributed to the base via two major tower lines that run from Oceanside north to the San Mateo Substation and from Fallbrook onto the base. The base electrical system consists of mostly aboveground lines, with a limited number of underground lines that serve certain housing areas. The main base substation, the Haybarn Substation, is located near the junction of Basilone Road and Vandegrift Boulevard. This substation is supplied 69 kilovolt (kv) of power from a branch of the Oceanside line and another 69 kv from the Fallbrook alternative feed line. Several SDG&E high voltage regional power lines (approximately 138 kv) also transit MCB Camp Pendleton. SDG&E has obtained easements from the base for these transmission lines and others throughout the base (USMC 1997b). In addition, SDG&E has acquired an easement of a 200-foot (61-meter) right-of-way and installed power lines adjacent to the north and northeastern base boundaries.

Solid Waste Management Facilities

The San Diego region hosts seven operating landfills. These include the Las Pulgas and San Onofre Landfills in MCB Camp Pendleton, the Borrego Springs, Ramona, and Otay/Otay Annex Landfills in the unincorporated areas of San Diego County, and the Sycamore and Miramar Landfills in the City of San Diego. The Las Pulgas and San Onofre Landfills are owned and operated by the USMC and accept military waste only. All of the other landfills, except for the Miramar Landfill, are owned and operated by Allied Waste Industries, a private waste management firm that purchased the County of San Diego's solid waste system in late 1997. The Miramar Landfill in the City of San Diego is owned by MCAS Miramar, but leased and operated by the City of San Diego. Like the Allied Landfills, the Miramar Landfill accepts waste from jurisdictions throughout the region in addition to the waste it receives from the military (for which, as part of the terms of the lease, there is no charge). The Miramar Landfill primarily serves the City of San Diego.

The solid waste produced on MCAS Camp Pendleton is disposed of at the Las Pulgas and San Onofre landfills located in MCB Camp Pendleton. The Las Pulgas Landfill accepts eligible biosolids for disposal, while the San Onofre Landfill accepts USMC construction debris only. The Las Pulgas Landfill currently has a capacity of 5,422,895 tons (4,919,568 metric tons), while the San Onofre Landfill has a capacity of 563,677 tons (511,359 metric tons). The first phase of a 6-phase expansion program has been completed on both landfills. With completion of Phase 6, the Las Pulgas Landfill is not expected to reach capacity until 2188, while the San Onofre Landfill is not expected to reach capacity until 2267. A recycling program is currently present on-base and is managed by the Assistant Chief of Staff, Environmental Security through the Defense Reutilization and Marketing Office (DoN 1992).

Natural Gas

The regional supply of natural gas is supplied by SDG&E (see *Electrical Supply Facilities* above) and the Southern California Gas Company, both subsidiaries of Sempra Energy Co. The Southern

California Gas Company, the nation's largest natural gas distribution utility, serves 19.2 million people through 5.4 million meters. The company's service territory covers 23,000 square miles.

Gas and petroleum products are supplied on MCAS Camp Pendleton from two regional lines running from Long Beach to San Diego: the Southern California Gas Company line and the San Diego Pipeline Company petroleum product line. The Southern California Gas Company line is approximately 12 inches (30 cm) in diameter and runs through MCB Camp Pendleton along the coastline following the railroad easement. The other line, a 10-inch (25-cm) San Diego Pipeline Company petroleum product line, enters the base in the Talega area, follows Basilone Road, and exits the base southwest of Chappo (USMC 1997b). JP-5 fuel is also delivered by truck to MCAS Camp Pendleton. MCB Camp Pendleton purchases liquefied natural gas (LNG) from SDG&E, and the LNG is distributed throughout the base via various gas mains. Liquefied petroleum gas and heating fuel oil are purchased from sources in the San Diego area and obtained from tanker trucks, which deliver to holding facilities throughout the base (DoN 1992).

Stormwater Drainage Facilities

The San Diego Regional Water Quality Control Board (RWQCB) regulates surface and ground water quality within the area stretching along 85 miles of coastline from Laguna Beach in Orange County to the Mexican border, and extending 50 miles inland to the crest of the coastal mountain range. The region has eleven watersheds: San Juan, Santa Margarita, San Luis Rey, Carlsbad, San Dieguito, Peñasquitos, San Diego, Pueblo, Sweetwater, Otay, and Tijuana. Jurisdictions within the eleven watersheds have collaborated on the development of a Watershed Urban Runoff Management Plan (WURMP) for each watershed, which addresses high priority stormwater quality issues found within the various watersheds (Project Clean Water 2007).

Stormwater drainage at MCAS Camp Pendleton is achieved through a complex and innovative stormwater management system that provides protection from flooding while addressing water quality issues. Drainage improvements were completed in 2006 throughout the station and consist of a desiltation basin, improvements to dirt roads, and new conveyances on both Vandegrift Boulevard and Basilone Road. Additionally, a floodwall was completed along the western edge of the station in 2000.

4.9.2 Environmental Consequences

Partial Basing (2-Squadron) Alternative

There would be a net reduction of 275 personnel (see Table 4.4-5) as well as the construction of new facilities under the Partial Basing Alternative. For the range of infrastructure and utilities discussed below, the installation has planned for infrastructure and utility needs to ensure that new facilities would be accommodated under the Partial Basing Alternative. Therefore, no significant impacts to infrastructure and utilities would occur with implementation of the Full Basing Alternative.

Water Supply

MCAS Camp Pendleton maintains adequate water supply to meet the needs of all its users. Additionally, the Partial Basing Alternative would result in a decrease in aircraft and personnel stationed at MCAS Camp Pendleton and is not expected to increase the water supply needs of the

air station. Therefore, no significant impacts would occur. See also section 4.13 (Water Resources) for additional information.

Wastewater Treatment and Disposal Facilities

The wastewater treatment system on MCB Camp Pendleton, which provides wastewater treatment for MCAS Camp Pendleton, has recently been upgraded in response to Waste Discharge Requirements. Additionally, the Partial Basing Alternative would result in a decrease in aircraft and personnel stationed at MCAS Camp Pendleton and would not increase the wastewater treatment and disposal needs for the air station. Therefore, no significant impacts would occur.

Electrical Supply Facilities

Sufficient electricity capacity exists to adequately accommodate the proposed construction project and associated electrical needs of the new buildings under the Partial Basing Alternative. Therefore, no significant impacts would occur.

Solid Waste Management Facilities

Construction, demolition, and operational activities associated with implementation of the Partial Basing Alternative would contribute to an overall short-term increase in solid waste generation, requiring landfill disposal. Sufficient capacity exists within the landfills at MCB Camp Pendleton to accommodate the small increase in solid waste generation and materials would be recycled whenever possible. In addition, the Partial Basing Alternative would comply with established waste reduction and recycling programs. Therefore, no significant impacts would occur.

Natural Gas

Sufficient natural gas supply exists to adequately accommodate the proposed construction project and associated natural gas needs of the new buildings under the Partial Basing Alternative. Therefore, no significant impacts would occur.

Stormwater Drainage Facilities

Implementation of the Partial Basing Alternative would not significantly contribute to additional demands on the existing stormwater drainage system. The existing stormwater drainage system has sufficient capacity to handle surface runoff associated with the Partial Basing Alternative. In addition, the Partial Basing Alternative would comply with National Pollutant Discharge Elimination System (NPDES) Permit requirements and stormwater management guidelines for the base. Therefore, no significant impacts would occur.

Mitigation Measures

Implementation of the Partial Basing Alternative at MCAS Camp Pendleton would not result in significant impacts to infrastructure and utilities; therefore, no mitigation measures would be required.

Non-MCAS Camp Pendleton Basing Alternatives

Under a non-MCAS Camp Pendleton basing alternative, the amount of aircraft and personnel at MCAS Camp Pendleton would be reduced due to the loss of three CH-46E squadrons and no new construction or demolition would occur. There would be a net reduction of 721 personnel under this alternative (see Table 4.4-5). Although there would be an overall reduction in military aircraft operations, ground-based activity, and personnel associated with the three CH-46E squadrons, the overall use of infrastructure and utilities would not significantly change. Therefore, no significant impacts to infrastructure and utilities would occur with implementation of a non-MCAS Camp Pendleton basing alternative.

Mitigation Measures

Implementation of a non-MCAS Camp Pendleton basing alternative would not result in significant impacts to infrastructure and utilities; therefore, no mitigation measures would be required.

No Action Alternative

Under the No Action Alternative, there would be no West Coast-based MV-22 personnel changes, new construction, demolition, or training activities. Therefore, existing conditions would remain unchanged, and no impacts to infrastructure and utilities would occur.

4.10 AESTHETICS AND VISUAL RESOURCES

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 effect 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. These social considerations equate to visual sensitivity and are defined as the degree of public interest in a visual resource and concern over potential adverse changes in the quality of that resource.

4.10.1 Affected Environment

MCAS Camp Pendleton is located within the boundaries of MCB Camp Pendleton and occupies approximately 488 acres (244 ha). The station is visible from Vandegrift Boulevard (the main four-lane highway that runs through MCB Camp Pendleton) and Basilone Road (a two-lane highway that runs east/west through the base). The visual characteristics of the station include sparsely vegetated developed areas consisting of runways, aircrafts, and buildings (DoN 1992). The distant views from the station are of rolling hillsides with native coastal chaparral vegetation. The most identifiable landmark at MCAS Camp Pendleton is the air control tower in the administration area of the flightline district. This tower is visible from nearly every point within the station (DoN 1992). In the general vicinity of the air station, the visual environment at MCB Camp Pendleton consists of

developed areas characteristic of a military installation (e.g., buildings and training areas) and open undeveloped space.

4.10.2 Environmental Consequences

Partial Basing (2-Squadron) Alternative

Implementation of the Partial Basing Alternative would not affect the overall visual environment at MCAS Camp Pendleton. Proposed construction would be visually consistent with existing structures. In addition, the visual environment of MCAS Camp Pendleton is already characteristic of a military airfield, and local visual sensitivity is low. There would also be a 5 percent decrease in airfield operations over existing conditions, and the MV-22 would follow established local approach and departure patterns. Therefore, no significant impacts to aesthetics and visual resources would occur with implementation of the Partial Basing Alternative.

Mitigation Measures

Implementation of the Partial Basing Alternative at MCAS Camp Pendleton would not result in significant impacts to aesthetics and visual resources; therefore, no mitigation measures would be required.

Non-MCAS Camp Pendleton Basing Alternatives

Under a non-MCAS Camp Pendleton basing alternative, the amount of aircraft and personnel at MCAS Camp Pendleton would be reduced due to the loss of three CH-46E squadrons and no new construction or demolition would occur. Although there would be an overall reduction in military aircraft operations, ground-based activity, and personnel associated with the three CH-46E squadrons, the overall visual environment at MCAS Camp Pendleton would not change. Therefore, no impact to aesthetics and visual resources would occur with implementation of a non-MCAS Camp Pendleton basing alternative.

Mitigation Measures

Implementation of a non-MCAS Camp Pendleton basing alternative would not result in impacts to aesthetics and visual resources; therefore, no mitigation measures would be required.

No Action Alternative

Under the No Action Alternative, there would be no West Coast-based MV-22 personnel changes, new construction, demolition, or training activities. Therefore, existing conditions would remain unchanged, and no impacts to aesthetics and visual resources would occur.

4.11 HAZARDOUS MATERIALS MANAGEMENT

Hazardous materials are chemical substances that pose a substantial hazard to human health or the environment. Hazardous materials include hazardous substances, extremely hazardous substances, hazardous chemicals, and toxic chemicals. In general, these materials pose hazards because of their quantity, concentration, physical, chemical, or infectious characteristics. A hazardous waste may be a solid, liquid, semi-solid, or contained gaseous material that alone or in

combination may: 1) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; or 2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

This section describes hazardous materials/waste management at MCAS Camp Pendleton, and provides background information on potential hazardous waste contamination areas being investigated as part of the Defense Environmental Restoration Program (DERP). As part of DERP, the DoD has created the Installation Restoration Program (IRP). This program was instituted to satisfy the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), for former and current hazardous waste sites.

The CERCLA definitions of hazardous substances (42 USC § 9601[14]) and pollutants or contaminants (42 USC § 9601[33]) specifically exclude petroleum unless specifically listed. The USEPA interprets the term petroleum to include hazardous substances found naturally in crude oil and crude oil fractions, such as benzene, and hazardous substances normally added to crude oil during refining. Petroleum additives or contaminants that increase in concentration in petroleum during use are not excluded from CERCLA regulations.

Hazardous waste at active sites at MCAS Camp Pendleton is regulated under the Resource Conservation and Recovery Act (RCRA), which gave the USEPA the authority to control hazardous waste from the "cradle-to-grave", including the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also sets forth a framework for the management of non-hazardous waste, including Petroleum, Oil, and Lubricants (POL) sites, which are regulated under the Underground Storage Tank/Aboveground Storage Tank (UST/AST) program at MCAS Camp Pendleton.

4.11.1 Affected Environment

Hazardous Materials/Waste Management

Activities at MCAS Camp Pendleton require the use and storage of a variety of hazardous materials and wastes, including flammable and combustible liquids, acids, corrosives, caustics, compressed gases, solvents, paints, paint thinners, and various other petroleum oils and lubricants.

Four underground storage tanks are located at MCAS Camp Pendleton. The active tanks range in capacity from 1,000 to 10,000 gallons and contain diesel fuel. In addition, three operable oil/water separators are present at MCAS Camp Pendleton (Figure 4.11-1).

JP-5 fuel is currently transported to MCAS Camp Pendleton by tanker truck. Under normal operating conditions, fuel is unloaded at a fixed fuel facility. The jet fuel is stored in four 30,000-gallon aboveground storage tanks (ASTs), and the JP-5 is stored in two 1,000-gallon ASTs (Mason, personal communication 2001). These auxiliary fuel farms are shown on Figure 4.11-1.

One main Hazardous Waste Storage Site is located at MCAS Camp Pendleton in Building 23171, where hazardous waste is stored for up to 180 days (Walsh, personal communication 2005). Eight Satellite Accumulation Areas (SAAs), located in Buildings 23108, 23110, 23111, 23143, 23168, 23169, 23172, and 23198 (see Figure 4.11-1), serve as interim accumulation areas for small quantities of hazardous waste prior to transfer to the designated Storage Site (Walsh, personal communication

2004, 2009). Additionally, there is only one main hazardous materials storage area that is located at Building 23171; however, each squadron and department is permitted to keep a 10-day supply in numerous locations, as depicted on Figure 4.11-1. DRMO holds the contract for waste removal for all of the USMC bases and stations in Southern California. Hazardous waste at MCAS Camp Pendleton is not tracked through USEPA Identification numbers, under Cradle-to-Grave. The responsible party is whoever generated the waste (Walsh, personal communication 2009).

Asbestos-containing materials (ACMs) may be present in buildings or other facilities that would be demolished as part of the proposed action. ACMs have been classified as a hazardous air pollutant by the USEPA, in accordance with Section 112 of the CAA (USEPA 2002). Surveys for ACMs have been conducted for the entire air station (National Econ Corporation 2003). The survey concluded that there is no friable asbestos on the station, but some older buildings contain non-friable asbestos. Proposed building demolition activities that include the removal and/or handling of regulated asbestos-containing material (RACM) would comply with requirements of SDCAPCD Rule 361.145. Included in this rule are requirements for facility surveys, notification of intent to disturb RACM, control measures, RACM removal, and handling and disposal techniques.

Surveys for lead-based paint have been conducted for the entire air station, and determined that there are small amounts of lead-based paint in the older buildings (National Econ Corporation 2003). Proposed building demolition activities that include the removal and/or handling of lead-based paint would comply with California Code of Regulations, Title 8 – Section 1532.1 and Title 17 – Sections 35022 and 35038, pertaining to lead-based paint at construction sites and in the work place. In addition, 15 USC Section 2601, of the Federal Toxic Substances Control Act, would apply to analysis of lead-based paint in on-site structures. Included in these regulations are requirements for facility surveys, notification of intent to disturb lead-based paint, control measures, removal measures, and handling and disposal techniques.

Hazardous Waste Release Sites

In accordance with the IRP, a preliminary assessment/site inspection was conducted at MCAS Camp Pendleton to identify and assess potentially hazardous disposal sites and contaminated areas caused by past hazardous waste storage, handling, or disposal practices. The Naval Energy and Environmental Support Activity (NEESA) performed the preliminary assessment to address problems resulting from past operations. Several IRP sites have been identified at MCAS Camp Pendleton; however, these IRP sites have been closed with respect to regulatory compliance (i.e., no further action is required) (Walsh, personal communication 2007).

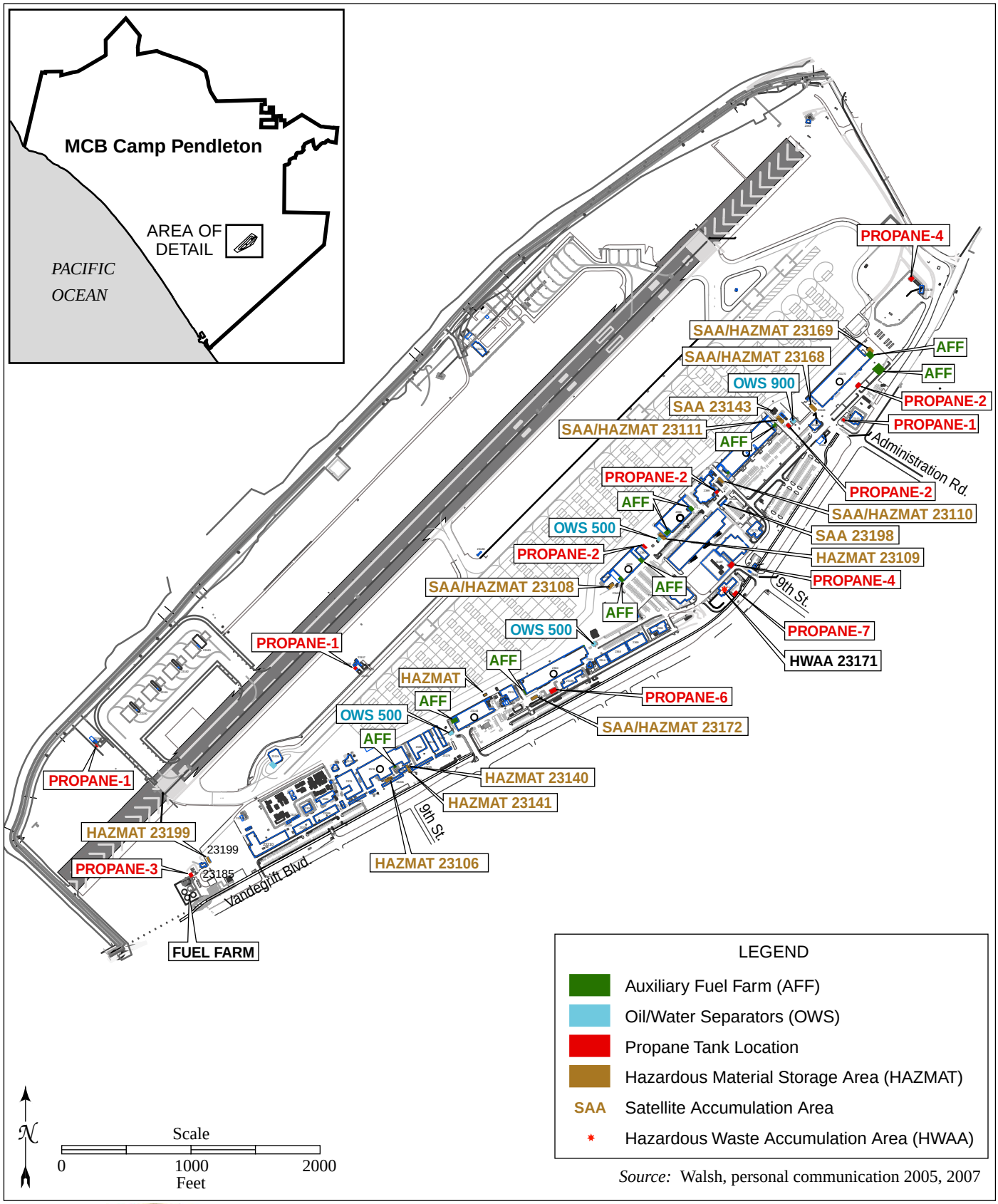
4.11.2 Environmental Consequences

Partial Basing (2-Squadron) Alternative

Construction

ASBESTOS-CONTAINING MATERIAL

Surveys for ACMs have already been conducted for the entire air station. Based on these survey results, a California licensed asbestos abatement contractor would determine the proper technique for removing the ACMs, if present, and demolishing the facilities. ACMs would be removed, characterized, managed, transported, and disposed according to applicable state and federal



Source: Walsh, personal communication 2005, 2007

Hazardous Substance and Petroleum Product Storage Sites at MCAS Camp Pendleton

FIGURE 4.11-1

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requirements for protecting human health and safety and the environment. Therefore, significant impacts associated with ACMs would not occur.

LEAD-BASED PAINT

Similar to ACMs, surveys for lead-based paint have already been conducted for the entire air station. Based on the results of this survey, lead-based paint would be characterized, managed, transported, and disposed according to applicable state and federal requirements for protecting human health and safety and the environment. Therefore, significant impacts associated with lead-based paint would not occur.

INSTALLATION RESTORATION PROGRAM (IRP) SITES

Under this alternative, new support facilities would include a new hangar module, modifications to an existing hangar, new wash rack, new parking apron, and an upgrade to the fuel farm. The construction projects would be located in the vicinity of existing parking aprons, hangars, and support facilities. Former IRP sites at MCAS Camp Pendleton have been closed with respect to regulatory compliance (i.e., no further action is required) and a Record of Decision was issued in association with these IRP site closures. Therefore, health and safety impacts during construction would likely not occur in association with these former IRP sites. However, it is possible that unknown residual contamination remains in the subsurface locally outside of designated IRP sites, which may be excavated or disturbed during construction.

If contaminated soil or groundwater is encountered or disturbed during construction-related activities, potentially significant impacts on surface water, groundwater, or the health and safety of on-site workers could occur. However, these potential impacts would be reduced to below a level of significance by implementation of the following actions proposed as part of project planning and design:

- Prior to any excavation or construction activities, known utilities (including fuel, sewer, steam, and electrical) would be identified by the demolition and construction contractor.
- The USMC will conduct remedial actions, pursuant to CERCLA, to remove hazardous substances, pollutants, or contaminants present at these sites, prior to or in conjunction with the commencement of grading and construction activities, in coordination with the California Department of Toxic Substances Control (DTSC), RWQCB, or San Diego County Department of Environmental Health, as appropriate. Remedial actions and excavations would be conducted in compliance with federal and state statutes and regulations pertaining to soil and groundwater contamination.

Construction personnel current with respect to Occupational Safety and Health Administration (OSHA) 40-hour training for hazardous materials would complete excavations in areas of potentially contaminated soil. An OSHA 40-hour trained monitor, with experience in identification of contaminated soil, would also be present during grading and excavations to determine whether petroleum-based contaminated soil and/or groundwater are encountered. Contaminated soils would be segregated from clean soils prior to offsite disposal.

The contractor would also prepare and implement a Health and Safety Plan prior to the start of grading/excavating to establish policies and procedures to protect workers and the public from

potential hazards posed by potentially contaminated soil. The plan would identify all contaminants, appropriate OSHA 40-hour trained workers, public health and environmental protection equipment and procedures; emergency response procedures, route to the hospital, etc. The plan would be reviewed and signed off by all workers that may be in contact with potentially contaminated soil.

These actions would be subject to the requirements of CERCLA. DoN would coordinate with CERCLA program managers before executing the proposed action to ensure conformance with CERCLA requirements for this location. As appropriate, construction in contaminated areas would also be conducted in accordance with the National Contingency Plan (NCP) (40 CFR 300, CERCLA Section 105) and the following regulations and guidance manuals.

- 29 CFR 1910.120 (addresses hazardous waste releases and health and safety of workers);
- Department of the Navy Environmental Restoration Program Manual, August 2006 (protocol to evaluate, characterize, and control the potential migration of possible contaminants resulting from past operations and disposal practices at DoD facilities);
- EM 385-1-1 U.S. Army Corps of Engineers Safety and Health Requirement Manual, September 1996 (addresses health and safety issues for workers handling potentially hazardous materials or waste); and
- OPNAVINST 5090.1C, Environmental and Natural Resources Program Manual.

INCIDENTAL SPILLS AND CONSTRUCTION WASTE

Construction would include the use of heavy equipment that would be subject to potential spills of fuel, oil, lubricants, coolant, transmission fluid, hydraulic oil, or other miscellaneous fluids. Servicing these vehicles could similarly result in spills of such petroleum products. In addition, the project may generate small quantities of hazardous waste, such as solvents, adhesives, and paint. Spills of petroleum products or hazardous waste could potentially penetrate into on-site soils resulting in soil and/or groundwater contamination. However, through implementation of the following actions proposed as part of project planning and design, significant impacts would not occur:

- Contractors would be adequately prepared to respond and clean up accidental spills and releases of hazardous materials used or contained in equipment and heavy machinery. Spill response equipment, such as sorbent pads and containment booms, would be available in fueling and maintenance areas.
- Construction-generated petroleum and hazardous waste (e.g., gasoline, solvents, adhesives, and paint) would be properly managed and disposed.
- Contractors would identify, manage, transport, and dispose of regulated wastes (solid waste, hazardous waste, recyclable waste, etc.) in accordance with Title 22 California Code of Regulations and the California Health and Safety Code.
- Shipping paperwork (hazardous waste manifests, special waste manifests, bills of lading, etc) used to transport waste from the station would be reviewed and signed by the Waste Management Division.
- Cleared construction and demolition materials would be recycled in accordance with the Navy Affirmative Procurement Instruction.

- Contractors would remove excess hazardous materials from the site once work is completed.

In addition, construction, repair, modifications, and maintenance activities that involve the storage of oils in quantities equal or greater than 55 gallons would be required to implement Spill Prevention, Control, and Countermeasure (SPCC) requirements, as presented in 40 CFR 112 and MCO P5090.2A, Chapter 7. These requirements include any container used for standby storage, seasonal storage, temporary storage, or storage not otherwise considered "permanently closed". Additionally, spill containment structures would be provided to prevent spills, leaks, and unauthorized discharges.

The aforementioned statutes and regulations pertaining to IRP sites, incidental spills, and construction waste are aimed at protecting human health and the environment. These statutes and regulations address worker safety, regulatory notification, clean-up requirements, and handling, storage, treatment, and disposal requirements for hazardous materials and waste. Compliance with applicable federal, state, and local regulations would reduce the potential for significant adverse impacts from contaminants, if encountered, to below a level of significance. Also, see section 4.13 (Water Resources) regarding implementation of a site-specific Stormwater Pollutions Prevention Plan (SWPPP) to control potentially contaminated surface runoff during construction-related activities.

Operations

Potential impacts to surface or groundwater quality through the accidental release of chemicals during MV-22 operations (e.g., refueling) would be reduced to below a level of significance by implementation of an NPDES-mandated SWPPP and compliance with federal, state, and local statutes and regulations regarding stormwater retention and treatment and soil and groundwater contamination (described above). As indicated in section 4.13 (Water Resources), the SWPPP includes an SPCC plan, which provides protective and corrective measures for accidental releases of hazardous substances or petroleum products. Therefore, operational impacts would not be significant.

Mitigation Measures

Significant impacts would not occur; therefore, no mitigation measures are proposed.

Non-MCAS Camp Pendleton Basing Alternatives

A non-MCAS Camp Pendleton basing alternative would represent a reduction of aircraft being stationed at MCAS Camp Pendleton, with respect to existing conditions. Three existing CH-46E squadrons would be removed and MV-22 squadrons would be located at other installations. As a result, no new construction would occur and the net effect would represent a decrease in operational activity at MCAS Camp Pendleton. Therefore, no hazardous materials impacts would occur at MCAS Camp Pendleton.

Mitigation Measures

Because there would be no hazardous materials impacts, no mitigation measures are proposed.

No Action Alternative

Under the No Action Alternative, the existing MCAS Camp Pendleton facilities would not be modified and new facilities would not be constructed. The West Coast fielding of the MV-22 would not occur and the existing CH-46 and CH-53 squadrons would not be replaced. Due to lack of changes to existing conditions, no hazardous materials impacts would occur.

4.12 TOPOGRAPHY, GEOLOGY, AND SOILS

This section describes the general geology, topography, soils, and seismicity at MCAS Camp Pendleton. The geologic resources of an area consist of soil and bedrock materials. For the purpose of this study, the terms soil and rock refer to unconsolidated and consolidated earth materials, respectively, regardless of depth.

4.12.1 Affected Environment

General Geology and Topography

MCAS Camp Pendleton is located in the alluvial-filled Santa Margarita River Valley. The installation is located within the valley at the transition between the coastal San Onofre Hills and the adjoining Santa Margarita Mountains. The valley includes a broad floodplain that has formed as a result of deposition of sediment from numerous tributary channels. The valley floor is bound by river terraces and terrace remnants composed of older alluvium. The elevation of the site is approximately 100 feet (30 meters) above mean sea level. Drainage is primarily to the southwest (DoN and USMC 1996).

The project site is predominantly underlain by younger and older alluvium consisting of interbedded sequences of gravels, silts, and clays. These alluvial soils, which may be up to 185 feet (56 meters) thick, are typically poorly-consolidated at and near the surface and become relatively dense with depth. The alluvial soils are overlain by fill soils, which are associated with the development of the various facilities within the installation (DoN and USMC 1996).

Soils

The soils in the vicinity of MCAS Camp Pendleton have been mapped as Visalia-Tujunga/Riverwash. These soils have a low to moderate susceptibility to settlement; a low expansion potential; and a moderate to severe potential for erosion (U.S. Department of Agriculture [USDA] Soil Conservation Services 1973, DoN and USMC 1996).

Seismicity

The California Division of Mines and Geology (CDMG) classifies faults as either active or potentially active, according to the Alquist-Priolo Special Studies Zone Act of 1972 (CDMG 1999). A fault that has exhibited surface displacement within the Holocene Epoch (the last 11,000 years) is defined as active by the CDMG. The CDMG suggests that this definition be used to evaluate faults located within a 60-mile (96-km) radius of a project site. A fault which has exhibited surface displacement during the Pleistocene Epoch (which began about 1.6 million years ago and ended about 11,000 years ago) is defined as potentially active. Pre-Pleistocene faults are considered inactive.

No faults are known to underlie MCAS Camp Pendleton. However, an unnamed suspected fault or lineament transects the station in a north-northeasterly direction. This fault, which is based primarily on photolineament analysis, has been classified as inactive (DoN 1992; CDMG 1994; DoN and USMC 1996).

MCAS Camp Pendleton is located in a seismically active region, which is subject to earthquake events along regional, major active faults. Major regional active faults include the San Andreas, San Jacinto, Elsinore, Rose Canyon, and Newport-Inglewood faults, as well as the Offshore Zone of Deformation (Figure 4.12-1). These faults trend parallel to the San Andreas Fault, east and west of MCAS Camp Pendleton. The Offshore Zone of Deformation, located approximately 13 miles (21 km) southwest of MCAS Camp Pendleton, is the closest major active fault to the base. The San Andreas Fault lies approximately 60 miles (96 km) to the northeast. The seismic parameters for active faults mostly likely to affect the project area are presented in Table 4.12-1.

Table 4.12-1. Seismic Parameters for Major Active Faults within 60 Miles (96 km) of MCAS Camp Pendleton

Fault	Distance to Project Area (miles/kilometers)	Maximum Credible Earthquake (Richter Magnitude)
Newport-Inglewood	39/62	7.0
Palos Verdes	40/64	7.0
Whittier/Elsinore	18/29	7.5
San Andreas (creep section)	60/96	7.0
Coronado Bank	30/48	6.75
Rose Canyon	16/26	7.0
Offshore Zone of Deformation	13/21	7.5
San Jacinto	42/67	7.5
Source: Greensfelder 1974; CDMG 1994		

The most notable credible seismic event likely to affect the project site would be a Richter magnitude 7.5 earthquake associated with movement on the Offshore Zone of Deformation. Such an earthquake would result in peak horizontal ground accelerations of 0.36 g, where "g" equals acceleration due to gravity. Maximum credible earthquakes on other regional active faults listed in Table 4.12-1 would result in peak horizontal ground accelerations of 0.05 to 0.30 g. Large earthquakes along extensive faults, such as the San Andreas, can produce ground accelerations with longer wavelengths and durations than smaller faults, even though the latter structures may be closer and thus generate greater peak acceleration values. The wavelength, amplitude, and duration of seismic shaking can contribute to the destructive potential of individual earthquake events (Seed and Idriss 1982; CDMG 1994, DoN and USMC 1996).

The majority of MCAS Camp Pendleton has a moderate to high potential for liquefaction (i.e., the process by which soils become liquid when subject to ground shaking) and compaction of soils during seismic events because of the unconsolidated alluvial deposits and shallow water table (DoN 1992; DoN and USMC 1996).

4.12.2 Environmental Consequences

Partial Basing (2-Squadron) Alternative

Topography

Under this alternative, new support facilities would include a new hangar module, modifications to an existing hangar, new wash rack, new parking apron, and fuel farm upgrades. The construction projects would be located in the vicinity of existing parking aprons, hangars, and support facilities. Minimal grading would be required since a majority of the area has been previously graded and is currently developed. Therefore, changes to the existing topography would be minimal. Grading/construction would be completed in accordance with Uniform Building Code and DoD Unified Facilities Criteria (UFC) requirements. In addition, a site-specific geotechnical report would be prepared for the proposed construction areas. Due to the limited changes to the existing topography and completion of grading in accordance with Uniform Building Code (Chapter 70) and UFC specifications and geotechnical consulting recommendations, topographic impacts would not occur as a result of the proposed action.

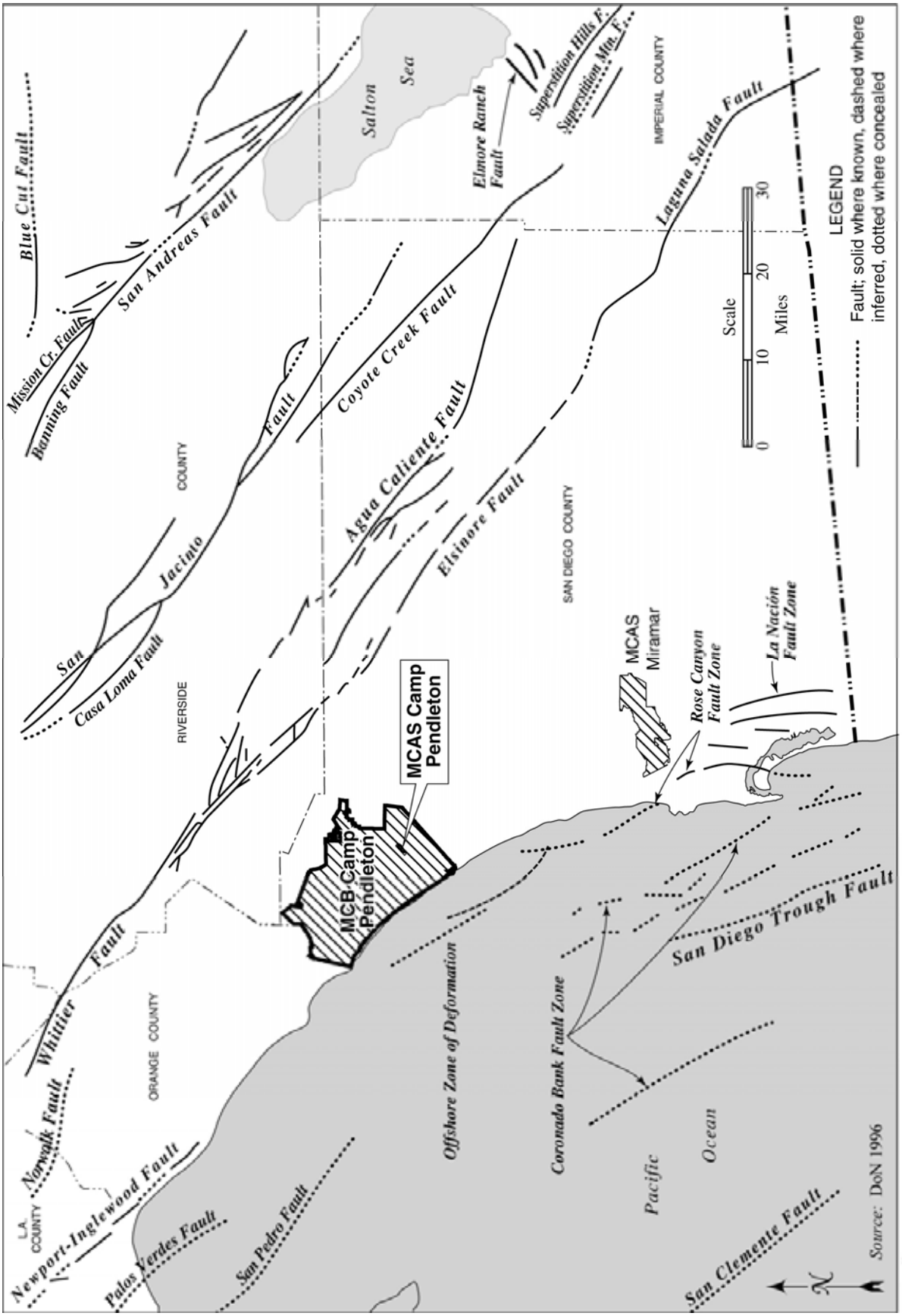

FIGURE 4.12-1

Regional Fault Map - MCB Camp Pendleton

Minimal grading would be required since a majority of the area has been previously graded and is currently developed. Therefore, changes to the existing topography would be minimal. Grading/construction would be completed in accordance with Uniform Building Code and DoD Unified Facilities Criteria (UFC) requirements. In addition, a site-specific geotechnical report would be prepared for the proposed construction areas. Due to the limited changes to the existing topography and completion of grading in accordance with Uniform Building Code (Chapter 70) and UFC specifications and geotechnical consulting recommendations, topographic impacts would not occur as a result of the proposed action.

Geology and Soils

Soils at MCAS Camp Pendleton have a low to moderate susceptibility to settlement; a low expansion potential; and a moderate to severe potential for erosion. Construction activities at MCAS Camp Pendleton would be completed in compliance with the geotechnical recommendations incorporated into the project design, which would include provisions for mitigating soils prone to settlement. Site grading and construction of the proposed facilities would result in temporary soil disturbance. The relatively flat topography in the construction areas would minimize the erosion potential during construction.

Construction activities would be completed in compliance with a project-specific NPDES General Construction Permit. As part of the permit, a SWPPP would be prepared. In addition, as outlined in the USEPA NPDES Phase II Stormwater Regulations (USEPA 1999a), BMPs would be implemented prior to, and during, the rainy season for erosion and sediment control to be effective. Provisions for both temporary and permanent erosion and sediment control measures would be implemented in accordance with the SWPPP prepared/designed specifically for the construction sites. Once implemented, these control measures would be monitored and maintained to ensure their effectiveness. Due to compliance with geotechnical recommendations and implementation of BMPs, including incorporation of standard erosion control measures, significant erosional and settlement-related soil impacts associated with project construction would be unlikely to occur.

Seismicity

Although no active faults are known to underlie MCAS Camp Pendleton, active faults located within 60 miles (97 km) of MCAS Camp Pendleton could result in strong seismically induced ground motion and associated ground shaking, and, therefore, proposed construction and operations could increase exposure of people and property to seismic hazards from a major or great earthquake. new facilities would be designed and constructed in accordance with a site-specific geotechnical investigation and would comply with the seismic design criteria identified in the Uniform Building Code, the Naval Facilities Engineering Command (NAVFAC) P-355 Seismic Design Manual, and the most stringent criteria identified in the latest design specifications of the Structural Engineering Association of California. As a result, significant impacts associated with seismically induced ground motion and ground shaking would not occur.

Mitigation Measures

Because there would be no geologic impacts, no mitigation measures are proposed.

Non-MCAS Camp Pendleton Basing Alternatives

A non-MCAS Camp Pendleton basing alternative would represent a reduction of aircraft being stationed at MCAS Camp Pendleton, with respect to existing conditions. Three existing CH-46E squadrons would be removed and MV-22 squadrons would be located at other installations. As a result, no new construction would occur and the net effect would represent a decrease in operational activity at MCAS Camp Pendleton. Therefore, no geologic impacts would occur at MCAS Camp Pendleton.

Mitigation Measures

Because there would be no geologic impacts, no mitigation measures are proposed.

No Action Alternative

Under the No Action Alternative, the existing MCAS Camp Pendleton facilities would not be modified and new facilities would not be constructed. The West Coast fielding of the MV-22 would not occur and the existing CH-46 and CH-53 squadrons would not be replaced. Due to lack of changes to existing conditions, no geologic impacts would occur.

4.13 WATER RESOURCES

This section describes the surface and groundwater hydrology at MCAS Camp Pendleton, including water quality, water supply, and flooding. Hydrology is the science that deals with global water, its properties, circulation, and distribution, on and under the surface of the earth and in the atmosphere, from the moment of precipitation until it returns to the atmosphere through evapotranspiration or is discharged into the ocean. Water quality describes the chemical and physical composition of water as affected by natural conditions (e.g., erosion) and human activities (e.g., hazardous waste spills). Water supply includes a general discussion of groundwater availability in the vicinity of the site.

Floodplains are generally located adjacent to rivers and other bodies of water and in low-lying areas near a water source. Floodplains are areas with a one percent chance of flooding in any given year. Floodways are more hazardous due to the anticipated velocities of the floodwaters and expected damage to life and property. Floodplains are identified with respect to project components to determine the likelihood of inundation following high intensity rainfall events.

4.13.1 Affected Environment

Surface Water

MCAS Camp Pendleton is located within the Santa Margarita River watershed, the largest and most important watershed on MCB Camp Pendleton with respect to water supply. Lake O'Neill, located northeast of MCAS Camp Pendleton along the Santa Margarita River, is a major surface water storage facility. Surface water flows on the Santa Margarita River consist of intermittent flood flows during the winter rainy season and baseflow sustained by groundwater during dry periods (RWQCB 1994; DoN and USMC 1996).

Most of the length of the Santa Margarita River exhibits moderate water quality during flows sustained by groundwater baseflow. High total dissolved solids (TDS) and nitrate levels are believed to be a result of upstream off-base agricultural activities. In general, levels of TDS typically range from 700 to 900 parts per million (ppm). During storm flows, water quality is higher, with TDS values as low as 200 ppm. On average, TDS concentrations range from 600 to 700 ppm along the Santa Margarita River. These values meet Basin Plan objectives and the recommended drinking water standards for TDS for the subbasin areas that supply potable water. Near the coast, TDS values can range above 20,000 ppm due to saltwater intrusion; however, this area is not included within the potable well system (DoN 1992; RWQCB 1994; DoN and USMC 1996).

Stormwater runoff during construction and operational phases of the project would be regulated under a NPDES Permit and associated SWPPP, prior to discharge into the Santa Margarita River. NPDES is the national program for issuing, modifying, revoking, etc., permits under Sections 307, 318, 402, and 405 of the Clean Water Act. The NPDES permit is an authorization issued by the USEPA, or an approved state, to discharge under certain specified conditions. The SWPPP is designed to minimize water quality degradation through establishment of project-specific BMPs, implementation of standard erosion control measures, and implementation of a SPCC plan. Currently, MCAS Camp Pendleton maintains an activity-wide (base-wide) SWPPP. New facilities construction would require a separate SWPPP for construction activities. This plan would override existing SWPPPs. Following construction, BMPs would be applied to new operational activities.

Flooding

Flooding is a geologic hazard within San Diego County. Floodplains are generally located adjacent to rivers and other bodies of water and in low-lying areas near a water source. Floodplains are areas with a one percent chance of flooding in any given year. Floodways are more hazardous due to the anticipated velocities of the floodwaters and expected damage to life and property.

MCAS Camp Pendleton is mapped within the 100-year floodplain boundary (Figure 4.13-1). Flood flows along this portion of the Santa Margarita River could equal approximately 100,000 cubic feet per second (300 cubic meters per second). However, a permanent levee was constructed along the northern boundary of MCAS Camp Pendleton to prevent damage to aircraft and infrastructure associated with the air station. Before construction of the levee, 11 major flood events have inflicted damage on facilities along the Santa Margarita River since 1916 (DoN and USMC 1996; DoN 1992). The most recent flood, which resulted in substantial damage to MCAS Camp Pendleton facilities, occurred in January 1998.

Groundwater

Wells located on MCAS Camp Pendleton provide over 70 percent of the water for MCB Camp Pendleton (Walsh, personal communication 2005). The entire water supply for MCB Camp Pendleton is extracted from groundwater basins within base boundaries. The most important of these basins is the Santa Margarita Basin. Groundwater within the Santa Margarita Basin is found primarily within the highly permeable deposits of Quaternary alluvium. These water-bearing alluvial deposits are characterized by interfingered, discontinuous lenses; therefore, the aquifer is largely unconfined. Groundwater depth within the Santa Margarita River valley in the vicinity of MCAS Camp Pendleton ranges from 3 to 10 feet (0.9 to 3 meters) below ground surface (DoN 1992; DoN and USMC 1996).

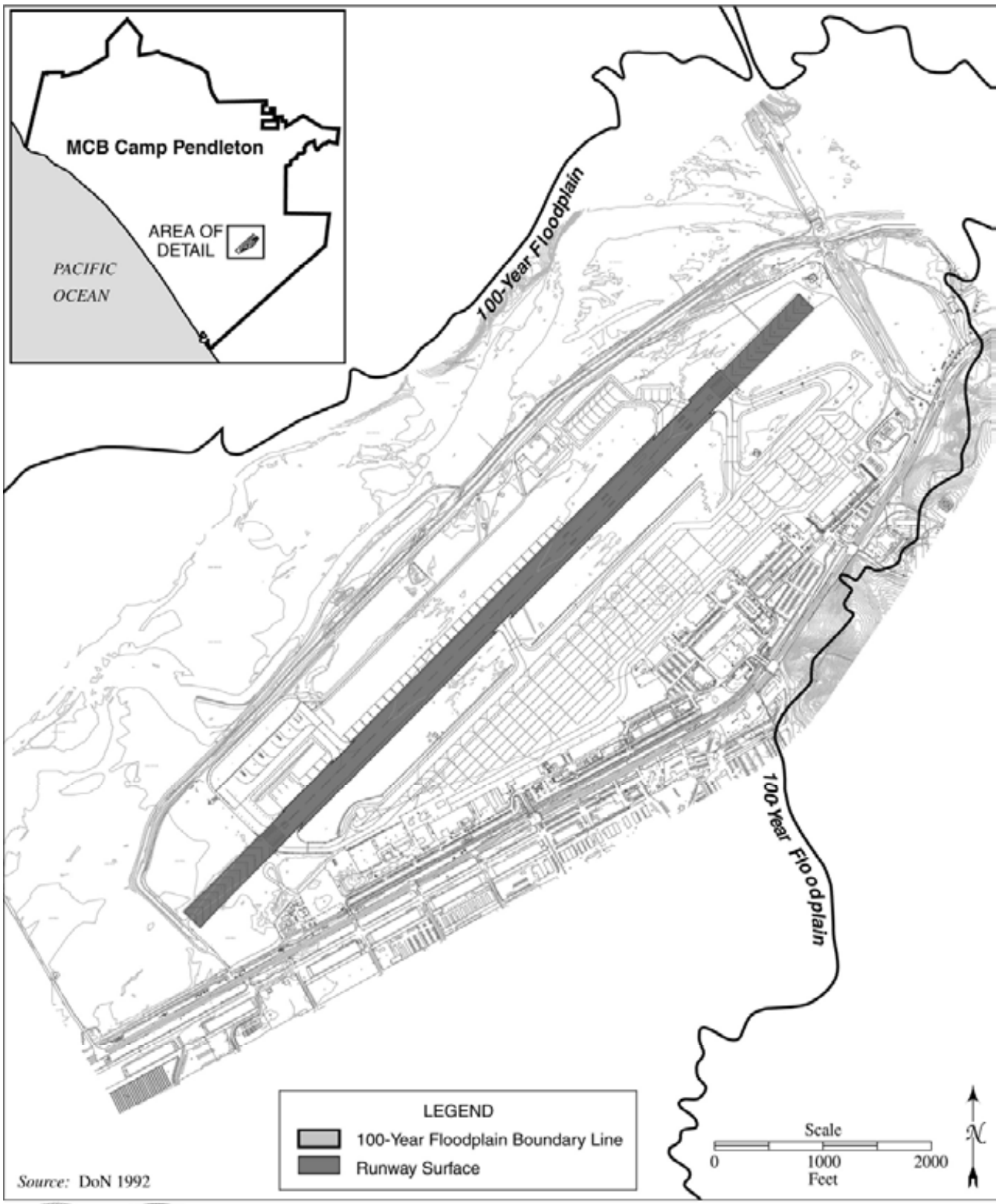

FIGURE 4.13-1

100-Year Floodplain Boundary at MCAS Camp Pendleton

Recharge to the alluvial aquifers underlying MCAS Camp Pendleton is mainly by percolation of winter flood flows along the Santa Margarita River and its associated tributaries. Recharge has also been accomplished by the recycling of secondary treated wastewater effluent into the alluvium, periodic draining of Lake O'Neill, and use of off-channel spreading structures. However, artificial recharge practices are anticipated to change in the future, allowing outflow to the ocean (DoN 1992; DoN and USMC 1996).

Groundwater flow is toward the Pacific Ocean, with relatively low gradients on the order of 11 feet (3.3 meters) per mile. Groundwater flow velocities are probably less than one foot (0.3 meters) per day.

Wells completed in this alluvium typically yield 600 to 1,800 gallons per minute (2,280 to 6,840 liters per minute) and hydraulic conductivities range from 2,300 to 5,000 gallons per day (8,740 to 19,000 liters per day) per square foot (DoN and USMC 1996).

4.13.2 Environmental Consequences

Partial Basing (2-Squadron) Alternative

Water Quality

Under this alternative, new support facilities would include a new hangar module, modifications to an existing hangar, new wash rack, new parking apron, and fuel farm upgrades. The construction projects would be located in the vicinity of existing parking aprons, hangars, and support facilities. Surface water quality of nearby drainages and the Santa Margarita River could potentially be impacted by fuel spills and surface water run-off associated with construction-related activities. However, stormwater runoff would be regulated under a NPDES permit and associated SWPPP prepared specifically for the construction activities associated with the proposed action. The SWPPP would be designed to minimize water quality degradation through establishment of project-specific BMPs, including implementation of a SPCC plan. Construction-related erosion control measures would include, but not be limited to, erosion control blankets, soil stabilizers, temporary seeding, silt fencing, hay bales, sand bags, and storm drain inlet protection devices. Due to implementation of BMPs, including incorporation of a SPCC plan, significant water quality impacts associated with project construction would not occur.

Flooding

MCAS Camp Pendleton is mapped within the 100-year floodplain boundary. However, a permanent levee was constructed along the northern boundary of MCAS Camp Pendleton to prevent damage to aircraft and infrastructure associated with the air station. Therefore, impacts due to flooding would be unlikely to occur.

Water Supply

Construction and operation activities associated with the proposed action would have no impact on water supply. Water would continue to be derived from pumping wells located on MCAS Camp Pendleton. Water usage for the MV-22 would not differ from existing conditions (Reed, personal communication 2005). Under this alternative, there would be 18 less aircraft and a reduction of 257 personnel than under existing conditions, but there would be a new wash rack. A wash rack

typically uses 23,000 gallons per day, washing 6 to 7 aircraft per day (Kruse, personal communication 2008). Estimating that personnel use an average of 100 gallons per day, per person (Kruse, personal communication 2008), daily water demand for a wash rack is equivalent to water demand associated with approximately 230 personnel. Therefore, the increase in water demand associated with the wash rack is mostly offset by the reduction of 257 personnel. Therefore, significant impacts to the existing water supply would not occur.

Mitigation Measures

Significant impacts would not occur; therefore, no mitigation measures are proposed.

Non-MCAS Camp Pendleton Basing Alternatives

A non-MCAS Camp Pendleton basing alternative would represent a reduction of aircraft being stationed at MCAS Camp Pendleton, with respect to existing conditions. Three existing CH-46E squadrons would be removed and MV-22 squadrons would be located at other installations. As a result, no new construction would occur and the net effect would represent a decrease in operational activity at MCAS Camp Pendleton. Therefore, no water resources impacts would occur at MCAS Camp Pendleton.

Mitigation Measures

Because there would be no water resources impacts, no mitigation measures are proposed.

No Action Alternative

Under the No Action Alternative, the existing MCAS Camp Pendleton facilities would not be modified and new facilities would not be constructed. The West Coast fielding of the MV-22 would not occur and the existing CH-46 and CH-53 squadrons would not be replaced. Due to lack of changes to existing conditions, no water resources impacts would occur.

4.14 BIOLOGICAL RESOURCES

This section describes biological resources which may directly or indirectly be affected by the proposed basing and operations of the MV-22 at MCAS Camp Pendleton. Biological resources represent the components of larger ecological communities and include all native and introduced plant and animal species and the habitats, including wetlands, within which they occur. The definition of specific resources and their distribution in the vicinity of the project area are discussed below under section 4.14.1 (Affected Environment).

This chapter evaluates the project area (MCAS Camp Pendleton) where the MV-22 aircraft would be stationed, take-off and land, and where support facilities would be located (to be constructed if necessary). The operational component of the proposed action within Special Use Airspace and training areas associated with MCB Camp Pendleton is presented in section 7.1.14. The proposed basing of the MV-22 at MCAS Camp Pendleton would occur within the developed and/or disturbed airfield area. MCAS Camp Pendleton is surrounded, in its entirety, by the larger MCB Camp Pendleton. To provide context and assure due consideration of species or habitats that are legally protected or otherwise of special concern, the geographical scope for some biological resources includes species and habitats that occur beyond MCAS Camp Pendleton.

Key sources of baseline information for this section include Integrated Natural Resource Management Plans (INRMPs) for MCB Camp Pendleton and MCAS Camp Pendleton (MCB Camp Pendleton 2007a; MCAS Camp Pendleton 2006), and references therein; natural resources data contained in the MCAS Camp Pendleton Geographic Information System (GIS) as of June 2008; MCAS Camp Pendleton natural resources staff; vegetation and rare plant inventories for MCAS Camp Pendleton (Tierra Data Systems 2001); and Environmental Assessments (EAs), Biological Assessments, and resulting U.S. Fish and Wildlife Service (USFWS) Biological Opinions (BOs) for recent actions, including the USFWS BO for the Habitat and Water Quality Enhancement Project (USFWS 2005a).

Installation-specific vegetation mapping and descriptions of plant communities are derived directly from the MCAS Camp Pendleton INRMP (MCAS Camp Pendleton 2006). As previously noted, MCAS Camp Pendleton initiated a Habitat and Water Quality Enhancement Project in 2003 (completed in 2006) for the purpose of improving flood protection and stormwater quality, reducing peak flows from individual storm events, and restoring existing degraded native plant communities and habitats. The distributions of sensitive species are well understood at MCAS Camp Pendleton based on known habitat associations and major survey efforts over the past several years. The most recent sensitive species surveys in the vicinity of MCAS Camp Pendleton have occurred from 2006 through 2008 (Griffith Wildlife Biology 2008).

4.14.1 Affected Environment

Vegetation Communities and Wildlife Habitats

MCAS Camp Pendleton is located in coastal southern California within the California Coastal Chaparral Forest Shrub province ecoregion as defined by Bailey (1995). This community type is dominated by sagebrush and grassland communities, oak woodlands, dense riparian corridors associated with streams, chamise and other intergraded communities (Bailey 1995; Omernik 1987). The installation, including the proposed project area, is a 488.1-acre (197.5-ha) mostly developed airfield located entirely within the 200-square mile (518-square km) MCB Camp Pendleton (Figure 4.14-1). No project-specific vegetation mapping occurred; however, vegetation communities and rare plant occurrences were mapped for the entire MCAS Camp Pendleton in June 2000 (Tierra Data Systems 2001), and remapped in 2006 following completion of the Habitat and Water Quality Enhancement Project, which restored several degraded areas, now dominated by native plants (MCAS Camp Pendleton 2006).

Because the installation is largely dominated by introduced species, large-scale primarily native vegetation classification schemes, such as Sawyer Keeler-Wolfe (1995), developed for more natural areas do not apply and were modified to more accurately define the existing communities. The plant communities occurring within the proposed basing alternative project area are listed in Table 4.14-1. Descriptions of plant communities are provided below and are derived from the MCAS Camp Pendleton INRMP (MCAS Camp Pendleton 2006).

Table 4.14-1. Plant Communities in the Vicinity of MCAS Camp Pendleton Project Activities

Community Type	Area Acres (Hectares)[1]	% of Mapped Area
Mowed Field	118.7 (48.0)	24.3
Willow Woodland	16.8 (6.8)	3.4
Vegetated Drainage Channel	2.1 (0.8)	0.4
Riparian Scrub	27.9 (11.3)	5.7
Bulrush	0.7 (0.3)	0.2
Ruderal	0.3 (0.1)	0.1
Developed	321.6 (130.1)	65.9
Total	**488.1 (197.5)**	**100.0**

Notes:
1. Values provided in this table are limited to the extent of plant communities located within the limits of mapping. Values are based on MCAS Camp Pendleton INRMP Table 1-3 (MCAS Camp Pendleton 2006) and represent plant communities post-2003 Habitat and Water Quality Enhancement Project.

Mowed Field

This community, which includes grassy and/or weedy areas used for helicopter landings, is located throughout the area both within and north of the project area. The community is mostly dominated by Bermuda grass (*Cynodon dactylon*), common mustard (*Hirschfeldia incana*), and filaree (*Erodium botrys*). These areas are regularly mowed. The project area contains 118.7 acres (48.0 ha) of mowed fields, which is the largest community type besides developed areas. Mowed grass dominates the areas immediately north, south, and east of the existing runway.

Willow Woodland

This community is characterized by willows (*Salix* spp.), mulefat (*Baccharis salicifolia*), mugwort (*Artemisia douglasiana*), and salt heliotrope (*Heliotropium curassavicum*). These areas are concentrated in the southwestern corner of MCAS Camp Pendleton and within a small area north of the runway, covering 16.8 acres (6.8 ha). This is a restored community previously co-dominated by *Arundo donax*, which was completely eradicated as of 2006.

Vegetated Drainage Channel

This community occurs along a restored feature created as part of the Habitat and Water Quality Enhancement Project. It is dominated by a mix of native riparian species appropriate to its role as a water transport, filtration, and distribution system (MCAS Camp Pendleton 2006).

Riparian Scrub

Riparian scrub on MCAS Camp Pendleton is a restored community limited to an area on the western end of the runway and along the northern border within a mosaic of riparian scrub/woodland. The community is dominated by sandbar willow (*Salix exigua*) and other native species, restored as part of the Habitat and Water Quality Enhancement Project in 2006.

Bulrush

This community occurs along a small manmade drainage in the southwest corner of MCAS Camp Pendleton and is dominated by bulrush (*Scirpus americanus,* in this case), cattails (*Typha* sp.) and other marsh plants. Bulrush also occurs associated with a jurisdictional wetland within riparian/scrub woodland north of and parallel to the runway, east of the hot fueling pad.

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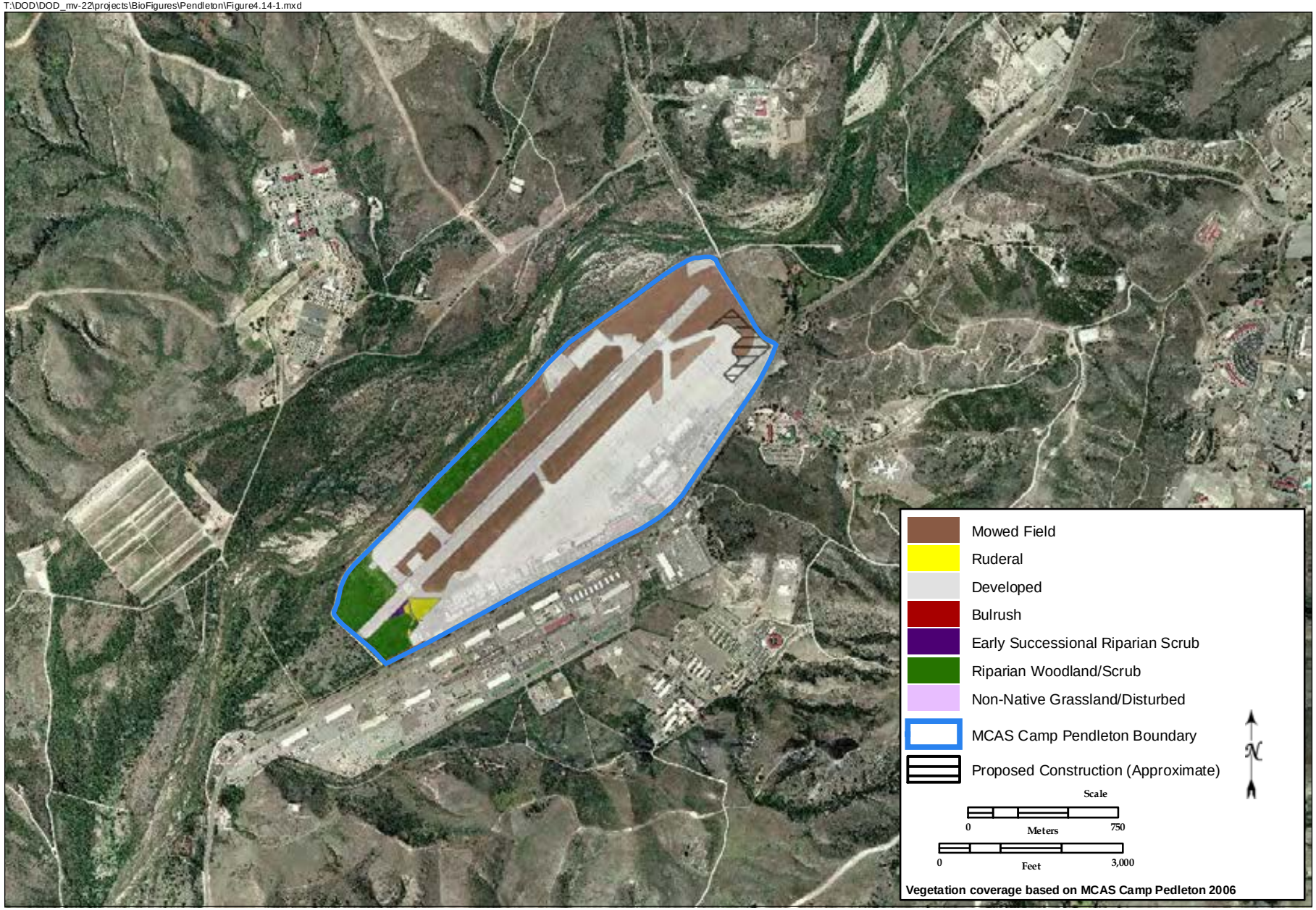

Plant Communities at MCAS Camp Pendleton

FIGURE

4.14-1

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This community is limited in extent within the project area (0.7 acre [0.4 ha]). It is subject to clearing as part of regular drainage maintenance and is not identified as a jurisdictional Clean Water Act regulated waters.

Ruderal

Patches of ruderal vegetation, dominated by weedy species such as field mustard (*Hirschfeldia incana*), telegraph weed (*Heterotheca grandifolia*), and filaree (*Erodium botrys*) that colonize recently disturbed areas, are found adjacent to the developed areas. This community is uncommon (0.3 acres [0.7 ha]) within the project area.

Developed

Most of MCAS Camp Pendleton is developed with runways, buildings, and facilities, associated with operation of the air station. This category does not support any vegetation other than limited landscaped areas, and provides minimal habitat for wildlife. This category encompasses approximately 321.6 acres (78.9 ha).

Wildlife

Although the project area is largely developed and provides limited wildlife habitat, it is surrounded by extensive undeveloped areas associated with the larger MCB Camp Pendleton. As a result, many wildlife species may occur within the project area on a transitory basis. Additionally, MCAS Camp Pendleton is located adjacent to the Santa Margarita River; however, levees installed in 2000 have largely isolated the riparian habitat from the installation (MCAS Camp Pendleton 2006). Common reptiles that are resident on MCAS Camp Pendleton include western fence lizard (*Sceloporus occidentalis*), side-blotched lizard (*Uta stansburiana*), southern alligator lizard (*Elgaria multicarinata*), Pacific rattlesnake (*Crotalus helleri*), common kingsnake (*Lampropeltis getulus*), western coachwhip (*Masticophiis flagellum*), and western skink (*Eumeces skiltonianus*). In addition, Pacific tree frog (*Pseudacris regilla*), a native amphibian, is a common resident of MCAS Camp Pendleton (see Appendix F, List of Non-Listed Vertebrate Species on MCAS Camp Pendleton 2002-2008, unpublished data provided by MCAS Camp Pendleton natural resources staff).

Most (96 percent) of the avian species on MCAS Camp Pendleton are included on the list of migratory birds (CFR, Title 50, Section 10.13) and protected by the Migratory Bird Treaty Act (MBTA) and Executive Order 13186. There are 53 species of native birds that have been observed at MCAS Camp Pendleton, not including the listed species discussed below. Some of the common resident birds observed at MCAS Pendleton include American kestrel (*Falco sparverius*), red-shouldered hawk (*Buteo lineatus*), American crow (*Corvus brachyrhynchos*), black phoebe (*Sayornis nigricans*), California quail (*Callipepla californica*), barn swallow (*Hirundo rustica*), white-crowned sparrow (*Zonotrichia leucophrys*), horned lark (*Eremophila alpestris*), Brewer's blackbird (*Euphagus cyanocephalus*), red-winged blackbird (*Agelaius phoeniceus*), killdeer (*Charadrius vociferous*), mourning dove (*Zenaida macroura*), and California towhee (*Piplio crissalis*). Common transient birds include red-tailed hawk (*Buteo jamaicensis*), common raven (*Corvus corax*), western kingbird (*Tyrannus verticalis*), violet-green swallow (*Tachycineta thalassina*), cliff swallow (*Hirundo pyrrhonota*), American coot (*Fulica americana*), and turkey vulture (*Cathartes aura*). European

starling (*Sturnus vulgaris*) and house sparrow (*Passer domesticus*) are non-native birds that are commonly observed at MCAS Camp Pendleton (Appendix F, List of Non-Listed Vertebrate Species on MCAS Camp Pendleton 2002-2008). Brown-headed cowbirds (*Molothrus ater*) have not been identified on MCAS Camp Pendleton since 2006 as a result of a brown-headed cowbird control program.

Commonly observed mammals include desert cottontail (*Sylvilagus audubonii*), deer mouse (*Peromyscus maniculatus*), western harvest mouse (*Reithrodontomys megalotis*), California vole (*Microtus californicus*), California ground squirrel (*Spermophilis beecheyi*), pocket gopher (*Thomomys bottae*), and ornate shrew (*Sorex ornatus*) (Appendix F, List of Non-Listed Vertebrate Species on MCAS Camp Pendleton 2002-2008).

Endangered, Threatened, and Sensitive Species

Endangered, threatened, and sensitive species include those that are listed, proposed, or candidates for listing as threatened or endangered under the federal Endangered Species Act (ESA); species that have similar status under the California ESA; and other species that are of regional concern due to rarity and potential vulnerability to extinction. Sensitive habitats include the formally designated critical habitats of federally listed endangered species; other habitats that support endangered and other special status species and are therefore important to the conservation of these species; and wetlands and other jurisdictional Clean Water Act regulated waters.

No special status plant species are known or expected to occur within the project area or the immediate vicinity (i.e., on MCAS Camp Pendleton) (MCAS Camp Pendleton 2006) because most of the station is developed and mowed grass fields (dominated by Bermuda grass), and non-native grasslands occupy most of the undeveloped portions of the installation. These conditions are generally unsuitable for most special status plant species.

Sensitive wildlife species that are associated with the Santa Margarita River occasionally occur within the project area, including four federally listed wildlife species and ten species of regional concern (Table 4.14-2 and Figure 4.14-2) (MCB Camp Pendleton 2007a). These species are generally associated with the riparian vegetation corridor of the Santa Margarita River, separated from the airfield by flood control levees. Although the riparian corridor is separated from the project area, several higher mobility species have the potential to occasionally traverse the project area including arroyo toad, western spadefoot toad (*Spea* [*Scaphiopus*] *hammondii)* and south coast garter snake (*Thamnophis sirtalis* ssp.). Expanded discussions of federally listed species are provided below under the Federally Listed Species section.

Provided below are summaries of the natural history and distribution of the four federally listed species occurring or potentially occurring in the vicinity of the project area. Each summary concludes with a discussion of the potential occurrence within the project area.

Table 4.14-2. Sensitive Wildlife with the Potential to Occur in the Vicinity of MCAS Camp Pendleton

Scientific Name Common Name	Regulatory Status (Federal/State)	Habitat Association	Occurrence in the Study Area
AMPHIBIANS			
Bufo californicus arroyo toad	FE/CSC	Gravelly or sandy washes, stream banks, riverbanks, and arroyos and their adjacent uplands.	Historic observations occur in the vicinity of new project-related construction; however, not expected as a resident due to lack of suitable habitat. Occasional and random presence may occur due to the proximity of the project area to occupied habitat in the Santa Margarita River.
Scaphiopus (=*Spea*) *hammondii* western spadefoot	FSC/CSC	Semiarid to arid grassy plains, sandy, gravelly areas, river floodplains.	Moderate likelihood of occasional occurrence in depressions with ponded water in the project vicinity and associated with the Santa Margarita River.
REPTILES			
Thamnophis hammondii two-striped garter snake	FSC/CSC	In or near fresh water, including wooded streams, marshes, ponds and lakes.	Not expected to occur in the vicinity of project activities due to lack of suitable habitat; however, there is a low likelihood of occurrence in the riparian habitat of the southwest corner due to its close proximity to suitable habitat along the Santa Margarita.
BIRDS			
Empidonax traillii extimus southwestern willow flycatcher	FE/CE	Riparian communities along the Santa Margarita.	Known to occur in the southwest corner of MCAS Camp Pendleton associated with a small section of riparian scrub. This species is not expected within one-quarter mile of project activities due to lack of suitable habitat.
Polioptila californica californica California gnatcatcher	FT/CSC	Coastal sage scrub community in southern California.	Although this species is known from surrounding areas to the east and west, it has not been observed and is not expected within MCAS Camp Pendleton due to lack of suitable habitat.
Vireo bellii pusillus least bell's vireo	FE/CE	Dense willow-dominated riparian habitats with lush understory vegetation.	This species has been observed in the southwest corner of the project area, in native habitats northwest of the runway, which includes recently restored habitat areas, and associated with the Santa Margarita River. No least Bell's vireos have been detected at any time within the project footprint due to lack of suitable habitat and vegetative cover; however, they are known to occur in nearby habitats associated with MCB Camp Pendleton.
Plegadis chihi white-faced ibis	FSC/CSC	Freshwater wetlands with emergent vegetation.	White-faced ibis occasionally forage in and around standing water in the study area following wet season rains, but are sporadic and non-breeding within the project area.
Accipiter cooperii Cooper's hawk	-/CSC	Deciduous and coniferous forests, especially those interrupted by meadows and clearings.	Occurs in riparian habitat of MCAS Camp Pendleton, within restored willow/ woodland scrub habitat, and associated with the Santa Margarita River. May also occasionally occur on a transitory basis in other nearby areas.
Accipiter striatus sharp-shinned hawk	-/CSC	Woodlands including boreal coniferous, mixed deciduous, bushy and riparian areas.	Occurs in riparian habitat of MCAS Camp Pendleton and within restored willow/ woodland scrub habitat, and associated with the Santa Margarita River. May also occasionally occur on a transitory basis in other nearby areas.

Table 4.14-2. Sensitive Wildlife with the Potential to Occur in the Vicinity of MCAS Camp Pendleton

Scientific Name Common Name	Regulatory Status (Federal/State)	Habitat Association	Occurrence in the Study Area
Circus cyaneus northern harrier	-/CSC	Freshwater marshes, saltwater marshes, wet meadows, sloughs, swamps, open fields.	Occasionally occurs on a transitory basis in open grassland areas of MCAS Camp Pendleton.
BIRDS (CONTINUED)			
Falco columbarius merlin	-/CSC	Open woodland, grassland and scrub communities.	Rare, but does occur annually as a wintering species in restored willow/ woodland scrub habitat areas.
Eremophila alpestris actia California horned lark	-/CSC	Marshes, grasslands, riparian and agricultural areas.	Present annually spring to fall in ruderal and mowed areas.
Athene cunicularia Burrowing owl	-/CSC	Open areas with mammal burrows, ruderal, mowed fields.	2008 record in ruderal and mowed areas. Visiting individual only; no known residents.

Notes:

Federal ESA	California ESA
FE: Federally Listed as Endangered	CE: State of California Endangered
FT: Federally Listed as Threatened	CT: State of California Threatened
FSC: Federal Special Concern Species	CSC: California Species of Concern
-: No listing	-: No listing

Arroyo Toad

The arroyo toad (*Anaxyrus* [*Bufo*] *californicus*) was federally listed as an endangered species on 16 December 1994 (USFWS 1994c). The USFWS re-issued a proposed rule to designate critical habitat for this species on 28 April 2004. Critical habitat has not been designated on MCAS Camp Pendleton because the installation has prepared and maintained a current INRMP, and critical habitat designation is exempted for military installations with an approved INRMP in place. A draft recovery plan has been issued for this species (USFWS 1999a).

Endemic to southern California, arroyo toads were historically found along the length of drainages from southern California south into northwestern Baja California, but now they survive only in the headwaters as small isolated populations (Sweet 1993). The recovery plan (USFWS 1999a) identifies 22 drainage basins with recorded arroyo toad sightings since the early part of the twentieth century. Two of the drainages had only single, unverified records, and arroyo toads are believed to be extirpated from a third drainage.

The arroyo toad is typically associated with gravelly or sandy washes, stream banks, riverbanks, and arroyos and their adjacent uplands. Breeding activity has been observed from February to June depending on temperature and precipitation (Sullivan 1992; Sweet 1993). Breeding occurs in quiet, clear backwaters of streams as waters recede from the floods of the wet season. Adult toads spend the fall and early winter months in burrows in upland habitats near washes and streams. Burrows are shallow, and are usually located in sandy soils on terraces adjacent to streams (USFWS 1994c). According to Holland and Sisk (2000) and the *Proceedings of the 2000 California Arroyo Toad Symposium* held at MCB Camp Pendleton, occupied upland habitat can extend 3,937 to 4,921 feet (1,200 to 1,500 meters) from the riparian-upland ecotone; however, upland habitat use is poorly understood. January to September is the most active period.

In the vicinity of the project area, the arroyo toad is known to occur predominately in the Santa Margarita drainage and within restored willow woodland/scrub parallel to the runway (Figure 4.14-2). Each toad buffer zone shown in Figure 4.14-2 represents a 3,281-foot (1,000-meter) diameter circle surrounding a recorded

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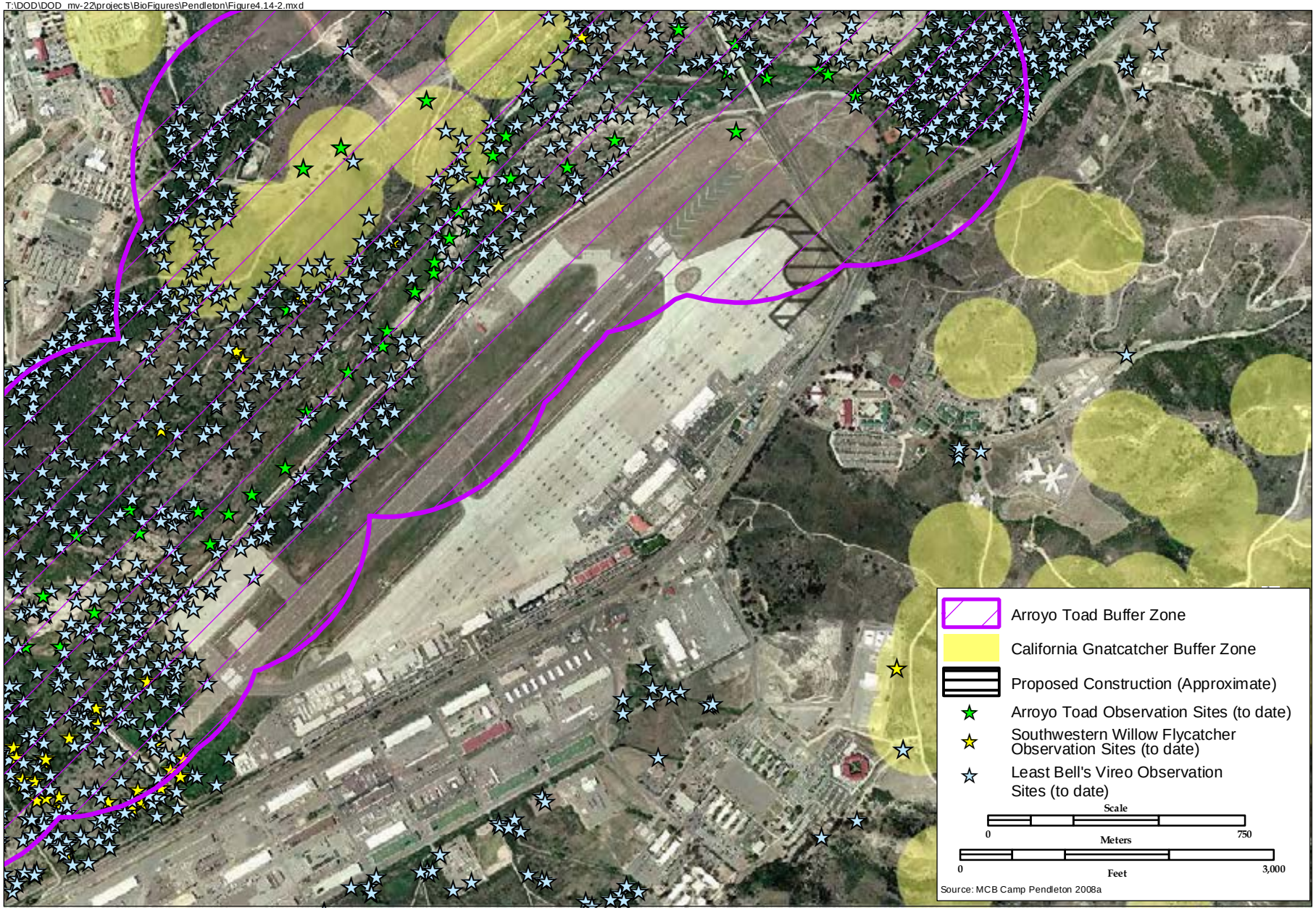

Sensitive Species and Habitats at MCAS Camp Pendleton

FIGURE

4.14-2

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observation point of an arroyo toad. No breeding habitat exists on MCAS Camp Pendleton since completion of the flood control levee in September 2000. However, arroyo toads have been documented in 2007 and 2008 in the willow woodland/scrub parallel to the runway and additional grass area on MCAS Camp Pendleton (Figure 4.14-2). This location is not within the project footprint.

Although the northeast corner of MCAS Camp Pendleton is within a mapped "buffer zone" (500-foot circle around historic observation sites), the presence of arroyo toad is not expected within the project area due to lack of suitable habitat and the existence of the Santa Margarita River levee, other than on an infrequent transitory basis as an occasional dispersing toad traverses the site in search of suitable habitat.

Coastal California Gnatcatcher

The California gnatcatcher does not occur on MCAS Camp Pendleton. The California gnatcatcher is presented here in the context of the larger MCB Camp Pendleton, which surrounds MCAS Camp Pendleton because of the potential for the species to occur adjacent to the proposed project area.

The USFWS designated the coastal California gnatcatcher (*Polioptila californica californica*) as threatened on 30 March 1993 (USFWS 1993b). Most recently, the USFWS designated revised final critical habitat for the coastal California gnatcatcher in the southern California ecoregion on 19 December 2007. As part of the listing, the USFWS proposed to exclude critical habitat designation for the California gnatcatcher on MCB Camp Pendleton in accordance with Section 4(a)(3)(B)(i) of the ESA. The installation has prepared and maintains a current INRMP, and critical habitat designation can be exempted for military installations where the USFWS determines that the approved INRMP for the installation provides a benefit to the species. As a result, there is no critical habitat designated for gnatcatcher on MCB Camp Pendleton or MCAS Camp Pendleton. Currently, there is no recovery plan for the California gnatcatcher.

The coastal California gnatcatcher is a non-migratory bird with a range restricted to California and Baja California, Mexico and inhabits coastal sage scrub community. This subspecies is found from Ventura County south to San Diego County and east to San Bernardino County. Peak nesting activity on the broader MCB Camp Pendleton occurs from mid-March to mid-May (Griffith Wildlife Biology 2008). The gnatcatcher's distribution is markedly clumped, with concentrations in the northern (State Park), coastal, and southern (inland) areas. The gnatcatcher occurs almost exclusively in the coastal sage community, but can also be found in adjacent chaparral and riparian habitats (Griffith Wildlife Biology 2008). All gnatcatchers were located at elevations below 820 feet (250 meters), with nearly all (90 percent) located at elevations less than 410 feet (125 meters) during the 2006 surveys. Additionally, gnatcatchers appear to prefer sites with slopes less than 15 percent (99 percent of locations). Over the years intensive survey efforts on MCB Camp Pendleton have identified a gradual increase in known gnatcatcher populations (Griffith Wildlife Biology 2008). Surveys in 1989 found 175 gnatcatcher pairs on MCB Camp Pendleton (MCB Camp Pendleton 2007b).

A base-wide survey (excluding the State Park lease areas) in 1994 found 554 coastal California gnatcatcher locations composed of 388 verified pairs, 47 single males, 14 single females, 30 birds of unknown sex (many were probably paired), and 75 juveniles not associated with family groups (MCB Camp Pendleton 2007b). A 1998 base-wide survey (including the State Park lease area) found 620 pairs of coastal California gnatcatcher (MCB Camp Pendleton 2007b). Surveys were

conducted in suitable scrub habitat within the defined study area of each effort. By placing a 500-foot (152-meter) radius buffer around each 1998 coastal California gnatcatcher GIS point, and removing overlapping buffers and off-base areas, approximately 8,260 acres (3,343 ha) are estimated to be occupied by coastal California gnatcatcher on MCB Camp Pendleton. Most recently, gnatcatcher populations on MCB Camp Pendleton were surveyed in 2006, which identified 642 pairs at 805 locations (Griffith Wildlife Biology 2008). Survey results represented increases in the total number of pairs (since 2003) in 24 historic locations, 10 new locations, and were no longer observed in one location (Griffith Wildlife Biology 2006).

In the vicinity of the project area, the California gnatcatcher is known to occupy locations to the east and west of MCAS Camp Pendleton (see Figure 4.14-2). However, this species has not been recorded and is not expected to occur within the project area due to lack of suitable sage scrub habitat.

Least Bell's Vireo

The USFWS listed the least Bell's vireo (*Vireo bellii pusillus*) as an endangered species on 2 May 1986 (USFWS 1986a). Critical habitat for the least Bell's vireo was designated in six southern California counties on 2 February 1994 (USFWS 1994d); however, the MCB Camp Pendleton area was excluded from this designation due to a Memorandum of Understanding (MOU) with the USFWS. A draft recovery plan has been prepared for this species (USFWS 1998c).

The least Bell's vireo arrives in the area from mid-March to early April and leaves for its wintering ground in southern Baja California in August (Franzreb 1989). Vireos primarily inhabit dense willow-dominated riparian habitats with lush understory vegetation, nesting three to four feet (1 to 1.2 meters) above the ground in understory and using taller trees for foraging and singing perches (Salata 1981). Vireos nesting on the edge of riparian habitat or in riparian corridors less than 150 feet (46 meters) wide have been observed foraging up to 180 feet (55 km) away from the willow-riparian edge in coastal sage scrub and chaparral (Kus and Miner 1989). Studies indicate that home ranges of vireos in the Santa Margarita River habitat varied from less than 0.5 acres (2 ha) to over 9 acres (3.6 ha) (mean 2.6 acres [1 ha]) in 1988; the majority were between 1 acre (0.4 ha) and 2.5 acres (10 ha) (MCB Camp Pendleton 2007b).

Recent and past base-wide surveys for the least Bell's vireo have documented occupied habitat throughout much of the riparian habitat within portions of Santa Margarita River adjacent to the project area. As of June 2008, a total of 17 least Bell's vireo territories have been identified and mapped on MCAS Camp Pendleton (unpublished data provided by MCAS Camp Pendleton natural resources staff). None of these territories are within, or close to, the project footprint. The closest mapped occurrences are approximately 1,500 feet (460 meters) north of MCAS Camp Pendleton on the north side of Basilone Road, associated with the Santa Margarita River. Least Bell's vireo are not expected elsewhere within the project area due to lack of suitable habitat.

Southwestern Willow Flycatcher

The southwestern willow flycatcher (*Empidonax traillii extimus*) was federally listed as an endangered species by the USFWS on 27 February 1995 (USFWS 1995b). On 22 July 1997, the USFWS designated critical habitat for this species (USFWS 1997b, 1997c), but this was later remanded and vacated. On 19 October 2005, the USFWS published the final rule for the

designation of critical habitat for the Southwestern Willow Flycatcher. MCB Camp Pendleton was exempt from critical habitat for this species. Protection and management of the Southwestern Willow Flycatcher at MCB Camp Pendleton is provided for in the INRMP and the Estuarine and Beach Conservation Plan, an attachment to the Riparian BO (1-6-95-F-02) signed on 30 October 1995. A final recovery plan has been published (USFWS 2002b).

The southwestern willow flycatcher is a neotropical migrant. It arrives in breeding habitat as early as mid-May and may be present until mid-August. The breeding range of this flycatcher extends from southern California, east to western Texas, north to extreme southern Utah and Nevada, and south to extreme northern Baja California del Norte and Sonora (Unitt 1984). This species inhabits riparian areas along rivers, streams, and other wetlands. It nests in typically even-aged, structurally homogeneous, dense stands of trees and shrubs approximately 13 to 23 feet (4 to 7 meters) tall with a high percentage of canopy cover and dense foliage from 0 to 13 feet (0 to 4 meters) above the ground (Brown 1988; Sedgewick and Knopf 1992) often near standing water (Zeiner et al. 1990). Nesting willow flycatchers in San Diego County prefer willow (*Salix* spp.) and mule fat (*Baccharis* spp.) thickets (Unitt 1987) and invariably nest near surface water or saturated soil (Philips et al. 1964). A much broader range of vegetation can be used during migration and outside of the breeding season (Unitt 1987).

Suitable habitat occurs throughout the riparian communities along the Santa Margarita River, adjacent to MCAS Camp Pendleton on MCB Camp Pendleton. The Santa Margarita River contains a key population of southwestern willow flycatcher, which is the largest population on MCB and MCAS Camp Pendleton. Within the project area, this species has been observed adjacent to the southwest corner of MCAS Camp Pendleton, and may occur within the project area in the small amount of suitable habitat in this same area. The southwestern willow flycatcher has not nested on MCAS Camp Pendleton since 2002. However, the restored willow woodland/scrub habitat can support this species and, in 2008, two southwestern willow flycatchers were detected in the southwestern corner of the air station. Ongoing monitoring is conducted to detect this species and identify occupied territories on an annual basis as part of the Habitat and Water Quality Enhancement project. It is not expected elsewhere within MCAS Camp Pendleton or in the vicinity of the proposed action components due to the lack of suitable habitat.

Sensitive Habitats

Vernal Pools

No vernal pools are present on MCAS Camp Pendleton. There are some isolated, seasonally flooded depressions; however, they do not support vernal pool indicator plant species (MCAS Camp Pendleton 2006). Sampling for federally listed fairy shrimp occurred in these seasonally ponded features in 2001. No evidence of any federally listed species was identified (MCAS Camp Pendleton 2006, Appendix 2).

Wetlands and Other Clean Water Act Regulated Waters

Under the Federal Water Pollution Control Act and subsequent amendments, collectively known as the Clean Water Act (33 USC § 1251 et seq.), wetlands are defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in

saturated soil conditions. Executive Order 11990, dated 24 May 1977 and amended by Executive Order 12608 on 9 September 1987, requires federal agencies to minimize the destruction, loss, or degradation of wetlands and to enhance their natural and beneficial values.

MCAS Camp Pendleton completed wetland delineations in 2003 and 2006 in association with the Habitat and Water Quality Enhancement Project, which identified 0.3 acre (0.12 ha) of jurisdictional wetland on MCAS Camp Pendleton as of 2006. This small feature occurs in the north-central corner of the installation, just west of Basilone Road (MCAS Camp Pendleton 2006).

Critical Habitat

No proposed or designated critical habitat currently occurs on MCAS Camp Pendleton in the vicinity of the airfield. Although important habitat and known populations of several listed species occur on the base, negotiations with the USFWS through other regulatory processes have resulted in species management on the base without USFWS critical habitat designation. Critical habitat designation is exempted for military installations with an approved INRMP in place. The 2006 MCAS Camp Pendleton INRMP has achieved concurrence from the USFWS (MCAS Camp Pendleton 2006, Appendix D), thus the installation is not subject to critical habitat designation within its boundaries.

Established Plans, Measures, and Procedures Applicable to All Training on MCAS Camp Pendleton

Numerous conservation measures are currently being implemented through the MCAS Camp Pendleton INRMP and its updated BO from 2005. The MCAS Camp Pendleton INRMP (MCAS Camp Pendleton 2006) describes ongoing natural resource management programs as well as long-term goals, objectives, and planned actions. The impact avoidance, minimization, and compensation measures that are contained in the Programmatic Instructions of the conservation plans are implemented on an ongoing basis and provide guidance on how to avoid and minimize the effects of training activities as well as construction activities.

All project components, as well as all activities that occur on MCAS Camp Pendleton, would be conducted in compliance with the MBTA and Executive Order 13186. The MBTA affirms and implements the United States' commitment to international conventions for the protection of shared migratory bird resources, and prohibits the take, possession, import, export, transport, selling, purchase, barter, or offering for sale, purchase or barter, any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit. Executive Order 13186 directs Federal agencies to avoid or minimize the negative impact of their actions on migratory birds, and to take active steps to protect birds and their habitat. On December 2, 2003, the President signed the 2003 National Defense Authorization Act. The Act provides that the Secretary of the Interior shall exercise his/her authority under the MBTA to prescribe regulations to exempt the Armed Forces from the incidental taking of migratory birds during military readiness activities authorized by the Secretary of Defense. Congress defined military readiness activities as all training and operations of the Armed Forces that relate to combat and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use. Congress further provided that military readiness activities do not include: (A) the routine operation of installation operating support functions, such as administrative offices, military exchanges, commissaries, water treatment facilities, storage facilities, schools, housing, motor

pools, laundries, morale, welfare, and recreation activities, shops, and mess halls; (B) the operation of industrial activities; or (C) the construction or demolition of facilities used for a purpose described in (A) or (B).

On July 31, 2006, the DoD and the USFWS entered into a Memorandum of Understanding (MOU) to Promote the Conservation of Migratory Birds, in accordance with Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds." MCAS Camp Pendleton developed an INRMP (2006) to identify and provide management tools for native and protected species and habitats on the installation, including those species projected under the MBTA. Only the training component of the proposed action is a "Military Readiness" activity and therefore incidental take is authorized unless the action jeopardizes bird populations; however, as part of the MOU between USFWS and DoD, all Military Readiness activities shall include conservation measures as part of the NEPA process to minimize and avoid impacts on species protected under the MBTA. These measures are identified at the end of this section and include the avoidance, restoration, and/or enhancement of all sensitive native plant communities that could be affected by proposed projects, seasonal avoidance of nesting birds, avoidance of riparian and wetland habitats, and fuel and fire management.

Finally, DoN and USMC commands develop Bird Air Strike Hazard (BASH) plans to reduce hazardous bird/animal activity relative to airport flight operations. MCAS Camp Pendleton has implemented a comprehensive BASH program to monitor wildlife activity as prescribed in the MCAS Camp Pendleton BASH Plan in cooperation with the USFWS. According to the MCAS Camp Pendleton INRMP (MCAS Camp Pendleton 2006), the station periodically evaluates possible improvements to the current plan to further reduce BASH incidents.

4.14.2 Environmental Consequences

A 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, legal protection of the resource, and local/regional management. This section discusses the results of the impact assessment. All of the sensitive biological resources within the action area (sphere of influence subject to effects caused by the proposed action) have been evaluated to determine their potential to be affected by the project components. Specifically, the action area corresponds to construction components of the proposed action. Although construction would occur only at limited specific locations within the action area, an expanded area could be affected by construction and aircraft related noise and is therefore included. Potential temporary and permanent impacts on species federally listed as threatened or endangered are considered significant and would require formal consultation with the USFWS under Section 7 of the ESA prior to project implementation; a biological assessment has been prepared to support consultation. Conservation and minimization measures provided to reduce impacts to federally listed species would be implemented in addition to guidance and measures issued by the consultation process with USFWS.

Partial Basing Alternative (2 Squadrons)

The introduction of two squadrons at MCAS Camp Pendleton is the only basing alternative that entails construction at MCAS Camp Pendleton, which is limited to a small area at the northeast

corner of the installation where Vandegrift and Basilone Roads intersect. Figure 2.3-5 provides the details regarding proposed new construction.

Vegetation

Basing two squadrons at MCAS Camp Pendleton would require the direct removal and permanent loss of 4.4 acres (1.8 ha) of mowed fields. The removal would occur at the northeastern end of the air station where the aircraft parking apron would be expanded. As described above, this community is overwhelmingly dominated by non-native herbs and grasses and is routinely mowed as part air station maintenance. Consequently, the ecological value of this plant community is low and is further reduced by the persistent disturbance as a result of air station activities. Due to its low biological resource value, no significant impacts from the permanent loss of this community would occur.

All other direct impacts of the proposed alternative would occur within the developed portion of the air station. No additional vegetation would be removed.

Wildlife

A variety of native habitats extend beyond the air station along its northwestern edge, to the southwest, and in smaller amounts to the southeast. This mosaic formed by these communities is likely to support a large diversity of wildlife nearby and along the edges of the air station. However, the location of the proposed activities would occur near the most developed portion of the air station. Most construction or modifications would occur at distances greater than one thousand feet from the nearest habitat having moderate wildlife value. As a result, direct impacts on wildlife are expected to be minimal and limited to ubiquitous species that routinely inhabit developed areas. Although rare, direct mortality of species may occur as wildlife randomly enter the construction area. Indirect impacts from construction such as dust and noise are similarly expected to be minimal due to the distance between the construction/modification area and nearby valuable wildlife habitat. Although the distance is shorter at a few locations, the ambient noise levels within the air station are high under existing conditions and would be unlikely to substantially increase by the relatively minor and temporary nature of the proposed construction and modifications. Therefore, no significant impacts on wildlife would occur.

Additionally, the total number of airfield operations would decrease by approximately six percent under this alternative, which would result in a decreased noise environment in the vicinity of MCAS Camp Pendleton. The MV-22 would operate in an airfield environment similar to the current operational environment as well as follow established local approach and departure patterns. Wildlife in the vicinity of the airfield are accustomed to a noisy military industrial environment, and because of the reduced frequency of noise producing activities and the similarity in use patterns, are not expected to react or modify behavior as a result of the proposed action. As a result, noise impacts to wildlife from airfield operations under this alternative are expected to be less than significant.

Bird-aircraft strikes and hazards (BASH) present another possible impact on wildlife that occur in the vicinity of airfield operations. Over 97 percent of bird-aircraft strikes occur below 3,000 feet (915 meters) above ground level, and approximately 30 percent of bird strikes happen at airfields. Since the introduction of the MV-22 on the East Coast at MCAS New River, there have been six reported bird strikes. Bird air strikes are an inevitable consequence associated with the use of

aircraft for training purposes. As noted above, airfield operations under this alternative would decrease slightly compared to current operating levels. The overall potential for bird-aircraft or wildlife strikes is not anticipated to change significantly from current levels. MCAS Camp Pendleton has developed aggressive procedures designed to minimize the occurrence of bird/wildlife-aircraft strikes. The station has documented detailed procedures to monitor and react to heightened risk of bird-strikes, and when risk increases, limits are placed on low altitude flight and some types of training (e.g., multiple approaches, closed pattern work, etc.) in the airport environment. MV-22 aircrews would be subject to these procedures. Therefore, no significant impact would occur related to BASH issues.

Endangered, Threatened, and Sensitive Plant Species

No endangered, threatened, or sensitive plant species are known to occur within the project area or the entire air station (MCAS Camp Pendleton 2006). Although no project specific rare plant surveys have been conducted, the potential for such species to occur is very low due to the disturbed and mostly non-native dominated plant communities in the project area. As a result, no impacts to special status plant species are expected.

Endangered, Threatened, and Sensitive Wildlife Species

Several sensitive but not state listed or federally listed species (formally recognized as becoming increasingly rare) are known to occur in the vicinity of the project area including the western spadefoot toad, two-striped garter snake, south coast garter snake, white-faced ibis (*Plegadis chihi*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipiter cooperii*), northern harrier (*Circus cyaneus*), merlin (*Falco columbarius*), burrowing owl (*Athene cunicularia*), and the California horned lark (*Eremophila alpestris actia*). These species, with the exception of burrowing owl which would occur within mowed ruderal areas associated with ground squirrel burrows, are expected to occur predominantly within the riparian areas and other native habitats on the Santa Margarita floodplain that skirts along the northwestern edge of the air station. Occasionally, individuals of these species would be expected to enter areas of the air station with little or no habitat value simply due to the close proximity. However, this occurrence would become increasingly unlikely moving closer to the developed portions of the air station and further away from native habitat. As a result, the frequency of such occurrences within the area proposed for construction and modification activities would be unlikely. The exception would be bird species intermittently flying over the air station to other areas or occasionally perching on posts. Although incidental mortality of a sensitive but unlisted wildlife species may occur during construction, the potential for such an event is very low. Consequently, direct impacts to non-listed wildlife species are expected to be minimal. Indirect impacts from construction and modifications are similarly expected to be minimal due to the minor change that would be expected in ambient noise levels in the project area and the temporary nature of the impact. Potential loss of migratory birds associated with the MV-22 basing alternative is expected to be low and infrequent and would not result in a significant impact to migratory bird populations and, therefore, the proposed action is in compliance with the MBTA.

MCAS Camp Pendleton monitors avian species by semiannual species counts, as required under the Habitat & Water Quality Enhancement Project BO.

Four sensitive wildlife species federally listed as threatened or endangered are known to occur in the vicinity of the project area, including the arroyo toad, southwestern willow flycatcher, least

Bell's vireo, and California gnatcatcher. Although these species are known to occupy habitats within or surrounding the air station, no suitable habitat occurs nor have any observations been recorded within the project area. On rare occasions, as described above, some wildlife species may be expected to occasionally enter the project area due to its close proximity. Three of the four listed species occurring nearby are bird species, which rarely leave the vicinity of the preferred breeding habitat types. Indirect impacts of construction and modification are expected to be minimal due to the minor change that would be expected in ambient noise levels in the project area and the temporary nature of the impact. As a result, significant impacts to the southwestern willow flycatcher, California gnatcatcher, and the least Bell's vireo would not occur due to the low likelihood of their presence during construction.

The one remaining species, arroyo toad, annually disperses great distances from its riparian breeding habitat into adjacent uplands. Due to the proximity of the project site to occupied breeding habitat of this species in the Santa Margarita River, there is a potential for it to occasionally reach the project area. In such events, injury or mortality of the individual toad may occur during construction activities. Although possible, it is unlikely that arroyo toads traverse the east/northeast portions of MCAS Camp Pendleton due to the impediment to free movement resulting from the flood control levee, dry, compacted soils unsuitable for burrowing, non-native vegetation, lack of appropriate prey base, and mowing regime. Although unlikely, due to the efforts of MCAS Camp Pendleton to adhere to the federal protections for the arroyo toad, direct impacts of the project are significant. As a result, an incidental take authorization will be required from the USFWS.

The USMC requested formal Section 7 Consultation under the ESA with USFWS on the proposed action (see Appendix G), which will include an analysis of potential project effects on arroyo toad. A biological assessment addressing the requirements of Section 7 is in preparation for submission to the USFWS in support of the Consultation. A USFWS BO is required prior to the final EIS. Mitigation measures provided at the end of the analysis, including seasonal restrictions on construction activities, would further reduce effects on arroyo toad populations.

Sensitive Habitats

Although jurisdictional wetlands are located within MCAS Camp Pendleton associated with the restored willow woodland/scrub habitat, no wetlands or other Clean Water Act regulated waters are present within the proposed action modification and construction areas, and no wetlands or other Clean Water Act regulated waters would be affected by this alternative at MCAS Camp Pendleton. Additionally, no USFWS designated Critical Habitat is present in the project area. Therefore, no impacts to sensitive habitats would occur from implementation of the Partial Basing Alternative at MCAS Camp Pendleton.

Mitigation Measures

The following mitigation measure is proposed for MCAS Camp Pendleton to reduce construction-related impacts to the federally listed as endangered arroyo toad to below a level of significance.

> **Restrict arroyo toad access to construction areas.** Although no suitable habitat occurs within the MCAS Camp Pendleton construction area, arroyo toads may inadvertently attempt to pass through the area. If construction is to occur when toads are still expected to be active, toad-proof silt fencing will be installed surrounding construction areas two weeks prior to construction, and monitored by a qualified toad biologist. For this assessment,

MCAS Camp Pendleton Environmental will conduct an assessment survey prior to any construction activities. The survey will check for the presence or absence of toads and evaluate the likelihood of this species to occur. If necessary, the qualified biologist will complete two arroyo toad surveys within the fence boundary prior to construction. This qualified biologist will inspect sites before daylight of each construction day and remove any toads. The qualified biologist will also inspect fencing on a daily basis and make repairs or direct others to make repairs as needed to maintain the integrity of the fencing. The USFWS will approve in writing those monitors who will be permitted to handle the toads (USFWS 2005a). MCAS Camp Pendleton Environmental will be consulted immediately if arroyo toads are found within the project area.

Non-MCAS Camp Pendleton Basing Alternatives

Under these alternatives, the MV-22 would be based at MCAS Miramar or would be split between MCAS Miramar and MCAS Yuma, but not at MCAS Camp Pendleton. These alternatives would represent a reduction of aircraft being stationed at MCAS Camp Pendleton, with respect to baseline conditions. As a result, no new construction would occur at MCAS Camp Pendleton and the net effect would represent a decrease in operational activity at the MCAS Camp Pendleton airfield. Therefore, no impacts to biological resources on MCAS Camp Pendleton would occur.

Mitigation Measures

Because there would be no impacts on biological resources, no mitigation measures are proposed.

No Action Alternative

Under the No Action Alternative, the existing MCAS Camp Pendleton facilities would not be modified and new facilities would not be constructed. The West Coast fielding of the MV-22 would not occur and the existing CH-46 and CH-53 squadrons would not be replaced. Due to lack of changes to existing conditions, no impacts on biological resources would occur. Implementation of the No Action Alternative would not change the current condition or extent of Migratory Birds on MCAS Camp Pendleton.

4.15 CULTURAL RESOURCES

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 any 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 (National Historic Preservation Act [NHPA], as amended [16 USC 470 et seq.]). Additionally, cultural resources are protected under the Archaeological Resource Protection Act (ARPA) (16 USC 470aa-470mm; Public Law 96-95 and amendments), the Native American Graves Protection and Repatriation Act (NAGPRA) (Public Law 101-601; 25 USC 3001-3013), and the American Indian Religious Freedom Act (Public Law 95-341; 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 includes guidance for Native American consultation regarding cultural significance of potential religious and sacred artifacts (16 USC 470a [a][6][A] and [B]).

Cultural resources located within the jurisdiction of MCAS Camp Pendleton are managed in accordance with the laws, regulations and guidance summarized above as well as DoD Instruction 4715.16 (Cultural Resources Management) and MCO P5090.2A, Change 2 (Environmental Compliance and Protection Manual). In addition, the MCAS Camp Pendleton Integrated Cultural Resource Management Plan (ICRMP) (MCAS Camp Pendleton 2005), the Standard Operating Procedure for Cultural Resources of MCAS Camp Pendleton (MCAS Camp Pendleton 2001a), the Cultural Resources Monitoring and Work Plan (MCAS Camp Pendleton 2001b), and a Programmatic Agreement with the Advisory Council of Historic Preservation Officer and the California SHPO provide specific guidance for the air station.

4.15.1 Affected Environment

Cultural Setting

The local prehistoric chronology in the MCAS Camp Pendleton region is divided into three major periods -- Paleoindian, Archaic Period, and Late Prehistoric Period. The Paleoindian period, also known as the San Dieguito complex, dates from ca. 12,000 to 8,000 years before present (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). The San Dieguito people were hunter-gatherers that appear to have been organized into small mobile groups. The climate was cooler and wetter than the present and the expansion of piñon-juniper forests and riparian communities would have provided the San Dieguito with a wide variety of plants and animals. 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.

Although no consensus has been reached among archaeologists, recent information suggests that San Dieguito complex may have evolved into what has been termed the La Jolla complex between about 9,000 and 8,000 years B.P. (Koerper et al., 1991). The La Jolla complex lasted until approximately 2,000 years before present. 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 (primarily shellfish and fish). 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, cobble tools, discoidals, a small number of Pinto and Elko series points, and flexed burials.

The Late Prehistoric period (known as the San Luis Rey complex in the northern part of San Diego County) is characterized by the introduction of ceramics and changes in burial traditions and lithic technology. Flexed inhumations are replaced with cremation burials, and small pressure-flaked projectile points make an appearance. 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 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.

Ethnographically, two Shoshonean groups, the Luiseño and Juaneño, occupied the area surrounding MCAS Camp Pendleton. Luiseño territory encompassed an area roughly from Agua Hedionda Creek north to Aliso Creek on the coast, and inland to Santiago Peak and Palomar Mountain. They were associated with the San Luis Rey Mission in the heart of Luiseño territory. Less is known about the Juaneño, whose name derives from an association with the Mission San Juan Capistrano. The territory ascribed to them by Kroeber extended from Aliso Creek on the north to the area between San Onofre and Las Pulgas drainages on the south, with the Pacific Ocean forming the western boundary and the crest of the Santa Ana Mountains forming the boundary on the east (Kroeber 1925). Acorns were an important food source to the Luiseño and Juaneño groups, but they also utilized various seeds, greens, bulbs, roots, and fruits. The Luiseño hunted large and small terrestrial game, including black-tailed deer, pronghorn, jackrabbits, various birds, grasshoppers, and rodents.

First contact between Europeans and Luiseño came in 1769 with the arrival of Gaspar de Portola's expedition, which was traveling between San Diego and Monterey to investigate possible Mission sites. Mission San Juan Capistrano was established in 1776, the seventh of California's twenty-one missions. Mission San Luis Rey was founded 22 years later as the 18th mission. In 1834, the missions were secularized, resulting in political imbalance and Native American revolts and uprisings against the Mexican *rancheros* that used the local populations as serfs. In theory, this secularization was supposed to act as a transition from mission-controlled to Indian-controlled pueblos (McCawley 1996). This would also allow the missions to continue developing new territories in more inland areas while leaving the "christianized" Native Americans in charge of their original holdings. In reality, the secularization movement allowed self-aggrandizing individuals, mostly Mexican citizens, to control the wealth of vast amounts of lands. By 1845, Pio Pico, temporary governor of California and last governor of Mexican California, and his family acquired over 133,000 acres of land, including much of the area that now encompasses MCB Camp Pendleton.

Through both the Mexican and early American periods, the land surrounding MCAS Camp Pendleton was an important ranching and agricultural area. The isolated coastline was also used to unload bootleg booze during Prohibition (1920-1933) (ASM Affiliates 2000). The construction of Camp Joseph H. Pendleton began in 1942, at the outbreak of World War II, and was capable of training and deploying a large number of Marines to the Pacific Theater. The base was declared a "permanent" installation in 1944, with the stated goal to be the center of all West Coast activities and the home of the 1st Marine Division. MCB Camp Pendleton served its role as a training and replacement command through both the Korean War and the Vietnam years. The USMC broadened its mission capabilities during the 1980s and 1990s by combining effective infantry, armor, supply and air power deployment in Grenada, Panama, Persian Gulf, Somalia, and during Operation Desert Shield and Desert Storm.

The air station, itself, started as a small, dirt airfield, when Marine aviation was in its infancy. During the 1940s and 1950s, one of the roles of the air station included the production of patriotic war films (MCAS Camp Pendleton 2006). With the development and implementation of rotary wing aircraft, the air station's mission became focused on helicopter operations, and subsequent development and modernization of the air station's facilities were primarily related to rotary wing activities.

Definition of the Area of Potential Effects

The area of potential effects (APE) of an undertaking is defined at 36 CFR 800.16(d) as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist." The APE for MCAS Camp Pendleton consists of all areas of ground disturbance associated with proposed construction activities, as shown in Figure 2.3-5, which covers about 10 acres of land, some of which is paved or under a building footprint. MCAS Camp Pendleton also has a designated construction staging/lay-down area in a paved parking lot outside of the flightline that has been used in the past for construction-related equipment and materials; no ground disturbance is associated with use of this staging area. For historic architectural resources, the APE includes any buildings/structures that would be altered or demolished, as well as any viewsheds of historic buildings that may be affected by construction. For Native American resources, the APE includes the construction footprint and the viewsheds of any traditional cultural resources that could be affected by construction.

Known and Predicted Resources

A review of records held by MCAS Camp Pendleton and MCB Camp Pendleton was conducted to determine previous survey coverage of the APE and identify all recorded resources within the APE (see MCIWEST 2009 for full details of the cultural resources review). The following provides a summary of those findings.

Archaeological Survey Coverage. The entire APE has been adequately surveyed for surface evidence of archaeological resources (Tartaglia 1984). In addition, Gallegos and Associates (1996) conducted a literature search for the Santa Margarita River Valley, which includes MCAS Camp Pendleton. This report references a 1994 survey that covered 30 acres of MCAS Camp Pendleton, but no survey report has been located describing this effort.

Archaeological Resources. One recorded archaeological site is located within the APE (CA-SDI-10156/12599/H), and is described below. Another recorded resource (CA-SDI-14005H) is located adjacent to the APE. CA- SDI-14005H is the historic route of the California Southern Railway (Gallegos and Associates 1996). The historic railway is located outside the air station and outside the APE. The closest physical remains of the railway are north of the Santa Margarita Ranch House. Therefore, it would not be affected by the proposed action and is not discussed further.

CA-SDI-10156/12599/H is known as *Topamai*, the largest Luiseño village ever established. It was originally recorded as two separate sites (CA-SDI-10156 and CA-SDI-12599/H) that were once thought to be separated by as much as 0.25 mile (0.40 km). Later archaeological excavations demonstrate the two areas are connected by a continuous archaeological deposit buried beneath alluvial deposits and man-made fill, and the two sites have now been combined into a single designation (Strudwick et al. 1996).

CA-SDI-10156/12599/H consists of the archaeological remains of *Topamai* as well as three historic adobe buildings (ranch house, bunk house, chapel) and additional structures that pre-date 1840. All three buildings are in excellent condition and are listed on the National Register as the Santa Margarita Ranch House property (CA-SDI-12599/H). The three buildings and associated structures are located outside the APE on lands belonging to MCB Camp Pendleton and would not be affected by the

proposed action. No viewshed of or from the buildings would be impacted because proposed construction would be consistent with current flightline views. Therefore, they are not discussed further.

The archaeological remains of *Topamai* contain an abundance of well-preserved archaeological materials spanning almost 8,000 years of prehistory and history, illustrate the effects of historic contact on the largest Luiseño community, and contain human remains (Strudwick et al. 1996). The site of *Topamai* is eligible for National Register listing (MCAS Camp Pendleton 2005). Previous investigations of the site have included an extensive series of shovel test pits, backhoe trenches and archaeological test units (Strudwick et al. 1996) as well as follow-on archaeological monitoring and data recovery investigations (Pigniolo et al. 1998; York et al. 2002). Current site boundaries include four main loci of archaeological material within the larger site boundary. One locus (Locus B) is located approximately 200 feet to the northeast of the APE. This area contains a buried archaeological deposit of prehistoric and historic remains over three feet (one meter) thick. Although the APE does not fall within a designated locus, a small portion falls within the general site boundary of CA-SDI-10156/CA-SDI-12599/H as shown in York et al. 2002[2]. However, previous excavations within or immediately adjacent to the APE have been negative (no archaeological material found) (Strudwick et al. 1996; York et al. 2002).

Ethnohistoric studies of *Topamai* (Johnson et al. 1998; Johnson and O'Neil 2001) have identified a number of living people who are direct lineal descendants of people known to have once lived at *Topamai*. These descendants include members of at least three federally recognized Luiseño tribes (La Jolla, Pauma, and Rincon) and members of other federally recognized tribes such as the Santa Ynez Chumash Band of Mission Indians. Additional research is likely to discover descendants in other modern Native American groups, including other Luiseño groups (e.g., Pechanga, Pala, and Soboba), the San Luis Rey Band of Mission Indians, and all three Juaneño groups (Johnson and O'Neil 2001). Given these direct links with *Topamai* and the fact that the village contains human remains (Strudwick et al. 1996), this village site is considered to be highly sensitive to local Native Americans.

Historic Buildings and Structures. A survey of architectural resources on the air station indicates that there are no National Register-eligible historic buildings or structure present at the air station, including those associated with the Cold War (MCAS Camp Pendleton 2005; USMC 1993). The only buildings that may be directly affected by the proposed action includes Building 23139 (EOD Building) built in 1992, and Hangar 23170 built in 1997. Neither is old enough to qualify for listing on the National Register.

Native American Consultation. MCIWEST initiated consultation in November and December 2008 with non-federally recognized Indian tribes subject to 36 CFR 800.3(f) (consulting parties) and federally recognized Indian tribes affiliated with lands currently under Marine Corps jurisdiction and involved in this proposed action. MCAS Camp Pendleton has completed extensive previous consultations with tribal Nations regarding *Topomai* and other issues on the air station and maintains consulting relationships with the following list of Native American tribes: Juaneño Band of Mission Indians, La Jolla Band of Mission Indians, Pala Band of Mission Indians, Pauma Band of Mission Indians, Pechanga Band of Mission Indians, Rincon Band of Luiseño Indians, San Luis Rey Band of Mission Indians, and Soboba Band of Mission Indians.

[2] Due to the sensitivity of archaeological site locations, the site boundary is not shown within this EIS.

MCIWEST is in the process of consulting with these tribal Nations regarding any concerns with the proposed action (see Appendix H). All tribal Nations identified above received a consultation letter by early December 2008. Tribal representatives were contacted by phone and email, and also invited to attend a meeting (briefing) at MCAS Camp Pendleton and MCB Camp Pendleton to discuss the proposed action. During the meeting, representatives were encouraged to provide any comments or identify their respective concerns. The following tribal Nations were represented at the meetings: Juaneño Band of Mission Indians, Pala Band of Mission Indians, Pauma Band of Mission Indians, Pechanga Band of Mission Indians, and Rincon Band of Luiseño Indians. No comments were provided by representatives from these Nations, as none had specific concerns following the briefing.

Topamai has been the only identified traditional cultural resource of concern at MCAS Camp Pendleton during past consultations.

4.15.2 Environmental Consequences

Partial Basing (2-Squadron) Alternative

Construction-related ground disturbance associated with the Partial Basing Alternative would result from the expansion of the parking apron, construction of a new wash rack, installation of a new hangar module, modification of existing Hangar 23170, and possible demolition of Building 23139 (see Figure 2.3-5). The Partial Basing Alternative APE falls within recorded site boundaries of CA-SDI-10156/CA-SDI-12599/H (*Topamai)*, and is located approximately 200 feet from a recorded locus of dense archaeological material. CA-SDI-10156/CA-SDI-12599/H is eligible for listing on the National Register, and is considered to be highly sensitive to local Native Americans. Therefore, any disturbance of intact archaeological material during the construction of the Partial Basing Alternative would result in an adverse impact on a historic property and would be considered a significant impact on cultural resources under the NEPA. However, previous excavations within or immediately adjacent to the APE have been negative, suggesting that the likelihood of encountering intact archaeological deposits within the APE is low, but this possibility cannot be dismissed completely.

There are no National Register-eligible historic buildings or structures present at the air station. The only buildings that may be affected by the proposed action include Building 23139 (EOD Building) and Hangar 23170, neither of which qualify for listing on the National Register. Additionally, the introduction of some new visual elements within the viewshed of existing buildings under the proposed action would be visually consistent with existing architecture and functions, and would not adversely affect the setting of existing buildings and structures within the APE. As such, the viewshed for the nearby Santa Margarita Ranch House property at MCB Camp Pendleton would not be impacted. Therefore, there would be no effect on a historic property, and no impacts would occur under the NEPA.

MV-22 operations at the airfield under the Partial Basing Alternative would not result in ground disturbance or modifications to existing buildings or structures. Therefore, there would be no effect on a historic property, and no impacts would occur under the NEPA.

Besides *Topamai*, there are no other identified traditional cultural resources at MCAS Camp Pendleton. However, consultations with tribal Nations are on-going. MCIWEST is entering into a

Programmatic Agreement with the California SHPO, the Advisory Council of Historic Preservation, and other consulting parties to resolve adverse effects from the proposed action. If a traditional cultural resource is identified based on continuing dialogue with identified tribal Nations, MCIWEST will follow the procedures outlined in the Programmatic Agreement. Additionally, the measures described below take into account potential impacts on *Topamai*.

Mitigation Measures

As noted above, MCIWEST is entering into a Programmatic Agreement with the California SHPO, the Advisory Council of Historic Preservation, and other consulting parties to resolve adverse effects from the proposed. Consistent with this agreement, the following measures would avoid or minimize impacts on archaeological sites that are eligible for listing on the National Register and/or sites that are of concern to the Native American community, and impacts would be reduced to less than significant:

- All ground disturbing activities that extend beneath 18 inches of undisturbed ground in the immediate vicinity of CA-SDI-10156/12599/H will be monitored by a qualified archaeologist and Native American observer.
- Preconstruction meetings will be conducted in order to inform construction personnel about common types of artifacts that may be uncovered during construction, the importance of cultural resources to archaeologists and Native Americans, and the reporting requirements of responsibilities of construction personnel.
- In the event that unexpected cultural remains are discovered, the MCAS Camp Pendleton environmental office will be notified of the discovery and construction activities will be temporarily halted until the significance of the discovery is determined. If the cultural remains are determined to be significant (i.e., eligible for listing on the National Register), then MCAS Camp Pendleton will follow the standard operating procedures outlined in the ICRMP, Programmatic Agreement with the California SHPO, and other applicable guidance documents.

Non-MCAS Camp Pendleton Basing Alternatives

Under a non-MCAS Camp Pendleton basing alternative, MV-22 aircraft would be based elsewhere and the existing squadrons of CH-46E at MCAS Camp Pendleton would be removed. There would be no construction, ground disturbing activities, or modification to existing structures at MCAS Camp Pendleton. Therefore, there would be no effect on a historic property at MCAS Camp Pendleton, and no impacts would occur under the NEPA.

Mitigation Measures

Basing aircraft at installations other than MCAS Camp Pendleton would result in no impacts on cultural resources at MCAS Camp Pendleton; therefore, no mitigation measures would be required.

No Action Alternative

There would be no construction, ground disturbing activities, or modification to existing structures associated with the No Action Alternative. Therefore, there would be no effect on a historic property, and no impacts would occur under the NEPA.

4.16 SAFETY AND ENVIRONMENTAL HEALTH

The USMC practices Operational Risk Management as outlined in OPNAV 3500.39A and Marine Corps Order (MCO) 3500.27A. Requirements outlined in these documents provide for a process to maintain readiness in peacetime and achieving success in combat while safeguarding people and resources. The safety and environmental health analysis contained in the following sections addresses issues related to the health and well being of both military personnel and civilians living on or in the vicinity of MCAS Camp Pendleton. Specifically, this section provides information on hazards associated with aircraft mishaps, accident potential zones (APZs), explosives safety, and electromagnetic emissions for the airfield.

4.16.1 Affected Environment

Aircraft Mishaps

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. In order 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 4.16-1). Class A mishaps are the most severe with total property damage of $1 million or more and a fatality and/or permanent total disability. Calculating Class A mishaps can be used for comparing mishap rates for various aircraft types, as shown below.

Table 4.16-1. Aircraft Class Mishaps

Mishap Class	Total Property Damage	Fatality/Injury
A	$1,000,000 or more and/or aircraft destroyed	Fatality or permanent total disability
B	$200,000 or more but less than $1,000,000	Permanent partial disability or three or more persons hospitalized as inpatients
C	$20,000 or more but less than $200,000	Nonfatal injury resulting in loss of time from work beyond day/shift when injury occurred

Class A Mishap Rates for MV-22

During the development and testing phase the V-22 recorded two Class A mishaps. All MV-22's were grounded for 17 months after the second mishap (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 (FY 2002). Since that time, additional safety, reliability and maintainability improvements along with additional capabilities have been implemented in the modified MV-22's flown by the Marines and Naval Air Systems Command's test squadron. These aircraft have logged more than 26,000 flight hours combined without a serious mishap and have recently been deployed to Southwest Asia in the first combat theater mission.

In order 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 (prior to reaching operational status) versus the

number of mishaps after reaching operational status is broken out in Table 4.16-2. Adjusting the flight hours to account for the periods in which the aircraft was not operational, the accident rate for the MV-22 is 11.43 for 26,245 hours.

Table 4.16-2. Class A Flight Mishaps for MV-22

FY	Flight Hours	Mishaps
Prior to Reaching Operational Status		
1999	416	0
2000	221	1
2001	470	1
2002[1]	Unavailable	0
2003[1]	Unavailable	0
Operational Status		
2004[2]	2,238	0
2005	5,405	0
2006	6,989	0
2007	9,745	0

Notes:
1. Aircraft Grounded
2. Aircraft Returns to Flight Status

Source: Navy Safety Center 2007

Class A Mishap Rates for the AV-8B, CH-46, and CH-53

To provide a broader perspective on the potential mishap rate for a new technology like the MV-22, the following discusses mishap rates for the introduction of the AV-8B (Harrier). The AV-8B was introduced in 1984, and provided the USMC with jet powered vertical take-off and landing capability. This new technology is similar to the MV-22 in that it was a new airframe with new vertical take-off capability. With that in mind, it is possible that projected mishap rates for the MV-22 may be similar to the historical rates of the AV-8B. The Class A mishap rates for the AV-8B from fleet inception through 30 September 2007 is provided in Table 3.16-3. Data from Calendar Year (CY) 1979 to FY 1984 relates to the testing and evaluation phase of the AV-8B, while data from FY 1985 to present represents its full introduction to the fleet. Note the highest mishap rate occurred during the testing phase of the aircraft, and that mishap rates during the operational phase of the aircraft fluctuated between 2.80 and 23.00.

Mishap data for the CH-46 and CH-53 are included in Table 4.16-3 since they represent the type of aircraft operations and some similar flight profiles expected by the MV-22. One pattern to note in Table 4.16-3 is the fluctuation of mishap rates from year to year for all three aircraft types.

Table 4.16-3. Historic Class A Flight Mishaps for DoN/USMC

	H-46 (all types)			CH-53E			AV-8B		
Year	Class A Mishaps	Flight Hours	Mishap Rate	Class A Mishaps	Flight Hours	Mishap Rate	Class A Mishaps	Flight Hours	Mishap Rate
FY 64	0	147	0	-	-	-	-	-	-
FY 65	1	9,034	11.07	-	-	-	-	-	-
FY 66	2	33,442	5.98	-	-	-	-	-	-
FY 67	17	75,236	22.60	-	-	-	-	-	-
FY 68	24	92,108	26.06	-	-	-	-	-	-
FY 69	29	161,595	17.95	-	-	-	-	-	-
FY70	21	140,406	14.96	-	-	-	-	-	-
FY 71	9	132,350	6.80	-	-	-	-	-	-
FY 72	9	96,042	9.37	-	-	-	-	-	-
FY 73	6	93,971	6.38	-	-	-	-	-	-
FY 74	6	68,509	8.76	-	-	-	-	-	-

Table 4.16-3. Historic Class A Flight Mishaps for DoN/USMC

Year	H-46 (all types)			CH-53E			AV-8B		
	Class A Mishaps	Flight Hours	Mishap Rate	Class A Mishaps	Flight Hours	Mishap Rate	Class A Mishaps	Flight Hours	Mishap Rate
Jul-Dec 74	4	41,170	9.72	-	-	-	-	-	-
CY 75	5	86,428	5.79	0	105	0	-	-	-
CY 76	5	87,319	5.73	0	27	0	-	-	-
CY 77	3	93,500	3.21	0	249	0	-	-	-
CY 78	5	97,307	5.14	1	0	0	-	-	-
CY 79	3	92,390	3.25	0	88	0	1	248	403.23
Jan-Sep 80	4	66,689	6.00	0	0	0	0	93	0
FY 81	8	88,951	8.99	0	160	0	0	70	0
FY 82	5	92,300	5.42	0	4,629	0	0	431	0
FY 83	3	99,406	3.02	0	10,629	0	0	821	0
FY 84	3	106,039	2.83	1	16,259	6.15	0	1,573	0
FY 85	2	106,883	1.87	4	19,152	20.89	1	8,195	12.20
FY 86	7	110,743	6.32	1	22,748	4.40	2	18,467	10.83
FY 87	5	118,331	4.23	1	16,081	6.22	5	22,212	22.51
FY 88	4	112,606	3.55	0	21,075	0	3	37,415	8.02
FY 89	4	112,365	3.56	0	25,431	0	5	43,570	11.48
FY 90	4	98,775	4.05	1	27,385	3.65	11	48,644	22.61
FY 91	3	110,122	2.72	1	30,269	3.30	6	55,590	10.79
FY 92	4	96,834	4.13	1	28,598	3.50	7	56,873	12.31
FY 93	5	106,743	4.68	1	31,903	3.13	4	55,488	7.21
FY 94	2	98,796	2.02	0	33,779	0	5	51,603	9.69
FY 95	1	96,115	1.04	0	34,345	0	5	51,128	9.78
FY 96	5	90,401	5.53	0	24,867	0	6	50,232	11.94
FY 97	3	81,816	3.67	0	26,439	0	4	39,060	10.24
FY 98	1	87,321	1.15	0	30,327	0	4	33,209	12.04
FY 99	1	84,346	1.19	1	29,408	3.40	7	30,441	23.00
FY 00	1	92,849	1.08	0	32,739	0	2	22,088	9.05
FY 01	2	91,708	2.18	0	28,660	0	1	32,372	3.09
FY 02	2	90,287	2.22	1	36,144	2.77	3	43,078	6.96
FY 03	2	79,390	2.52	0	37,340	0	3	47,103	6.37
FY 04	1	62,235	1.61	2	33,543	5.96	2	40,037	5.00
FY 05	0	20,941	0	1	12,062	8.29	2	13,521	14.79
FY 06	0	58,763	0	1	33,321	3.00	3	40,467	7.41
FY 07	1	55,038	1.82	1	33,325	3.00	1	35,718	2.80
Total	233	3,963,365	5.87	19	705,087	2.69	96	904,933	10.6

Source: Navy Safety Center 2007

Emergency and Mishap Response at MCAS Camp Pendleton

MCAS Camp Pendleton 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-base. Response would normally occur in two phases. The initial response focuses on rescue, evacuation, fire suppression, safety, elimination of explosive devices, ensuring security of the area, and other actions immediately necessary to prevent loss of life or further property damage. The initial response element usually consists of the Fire Chief, who would normally be the first On-scene Commander, fire-fighting and crash-rescue personnel, medical personnel, security police, and crash-recovery personnel. The second phase is the mishap investigation, which includes an array of organizations whose participation would be governed by the circumstances associated with the mishap and actions required to be performed (DoD 2000).

Bird Aircraft Strike Hazards

Bird-aircraft strikes and the hazards they present form another safety concern for aircraft operations. Over 97 percent of bird-aircraft strikes occur below 3,000 feet (915 meters) above ground level, and approximately 30 percent of bird strikes happen at airfields. Since the introduction of the MV-22 on the East Coast at MCAS New River, there have been six reported bird strikes, with minor damage to the aircraft occurring with two of the strikes.

DoN and USMC commands develop BASH plans to reduce hazardous bird/animal activity relative to airport flight operations. MCAS Camp Pendleton has an active BASH prevention program as per Station Order 5100.7. The program is designed to minimize aircraft exposure to potentially hazardous bird and animal strikes. According to the MCAS Camp Pendleton INRMP (MCAS Camp Pendleton 2006), the station periodically evaluates possible improvements to the current plan to further reduce BASH incidents.

Accident Potential Zones

APZs are established to delineate recommended surrounding land uses for the protection of people and property on the ground. APZs define the areas in the vicinity of an airfield that would have the highest potential to be affected if an aircraft mishap were to occur. AICUZ guidelines identify three types of APZs for airfields based on aircraft mishap patterns: the Clear Zone, APZ I, and APZ II. The standard Clear Zone is a trapezoidal area that extends 3,000 feet from the end of a runway and has the highest probability of being impacted by a mishap. APZ I, which typically extends 5,000 feet from the end of the Clear Zone, has a lower mishap probability. APZ II, which typically extends 7,000 feet from the end of APZ I, has the lowest mishap probability of the three zones. To minimize the results of a potential accident involving aircraft operating from MCAS Camp Pendleton, APZs have been established for the airfield, as depicted in Figure 4.16-1.

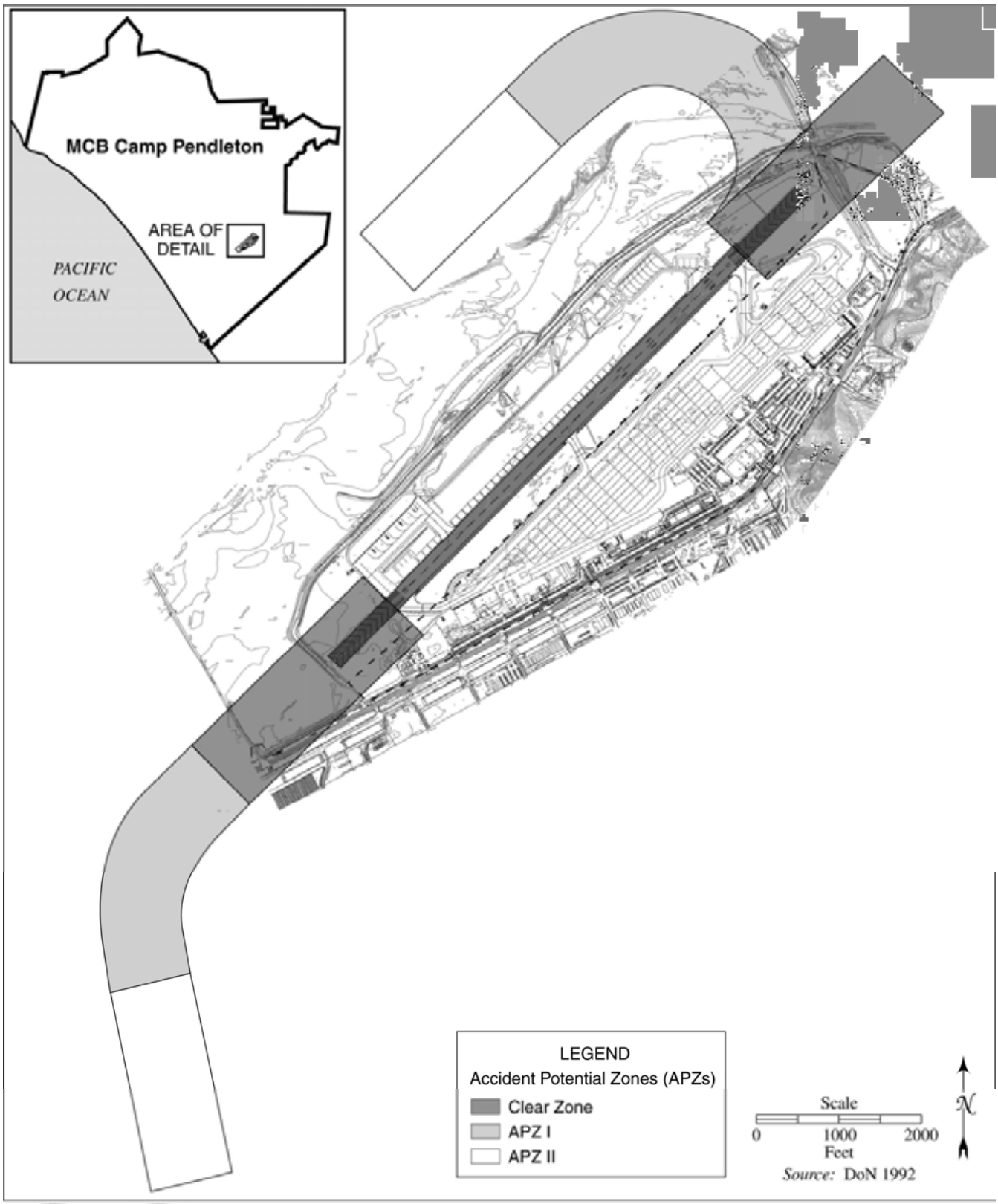
Explosives Safety

Siting requirements for explosive materials storage (e.g., munitions) and handling facilities are based on safety and security criteria established by the DoD Explosive Safety Board. Explosive Safety Quantity Distance (ESQDs) arcs determine the distance between ordnance storage and handling facilities and inhabitable areas. Ammunition and bulk explosives are stored in magazines specifically designed, sited, and designated for this purpose. A magazine's ESQD arc is calculated by the type and amount of ordnance stored in that magazine. ESQD requirements and permissible storage capacities are established by Naval Sea Systems Command (NAVSEASYSCOM) and approved by the DoD Explosives Safety Board.

The MCAS Camp Pendleton CALA, an explosives handling area, is located immediately northeast of the runway and features 1,250-foot (381-meter) ESQD arcs that extend onto the airfield runway and extend to the edge of the parking apron (see Figure 2.3-5). Long-term ordnance storage occurs at MCB Camp Pendleton at the Pulgas Magazine Area is located in the central part of the base (DoN 1992). The ESQD arc associated with the Pulgas Magazine Area does not overlap with the proposed project area.

Electromagnetic Emissions

Radar and other high-energy electromagnetic emissions can constitute a hazard to persons exposed to radiation above a threshold power density. Electromagnetic signals emanating from communication and other radar equipment can also interfere with and adversely affect stored ordnance and fuel. Electromagnetic radiation hazards occur when transmitting equipment generates sufficient field intensity to cause harmful or injurious effects to humans or wildlife;



MCAS Camp Pendleton Accident Potential Zones

FIGURE 4.16-1

induce or couple currents and/or voltages of magnitudes sufficient to initiate electro-explosive devices in ordnance; or create sparks or sufficient magnitude to ignite flammable materials.

According to the Master Plan (DoN 1992), one electromagnetic radiation hazard zone is located in the southeastern portion of MCB Camp Pendleton due to two permanent radar installations associated with the Marine Corps Tactical Systems Support Activity. This zone is located over 4 miles (6 km) away from the proposed project area.

The project site is located approximately 12 miles (19 km) from the San Onofre Nuclear Generating Station (SONGS), which is operated by Southern California Edison (SCE). SCE is responsible for coping with radiation emergencies arising from the operation of SONGS. Specific procedures in the event of a radiation-related emergency are set forth in MCAS Camp Pendleton Emergency Response Plan 1-79, Annex K, Appendix 3 (DoN 1992). This plan sets forth procedures to evacuate MCAS/MCB Camp Pendleton personnel located within 10 miles (16 km) of SONGS within 6 hours of the decision to evacuate (DoN 1992).

4.16.2 Environmental Consequences

Partial Basing (2-Squadron) Alternative

Aircraft Mishaps and Mishap Response

Although the MV-22 is a relatively new type of aircraft, historical trends show that mishaps of all types decrease the longer an aircraft is operational as flight crews and maintenance personnel learn more about the aircraft's capabilities and limitations. Mishap rates generally level out approximately five years after introduction of a new airframe (GAO 2001; Navy Safety Center 2007). Although it is difficult to predict the mishap rate of a new airframe like the MV-22, mishap rates will likely stabilize to levels similar to those shown in Table 3.16-3 soon after its introduction on the West Coast. Therefore, as the MV-22 becomes more operationally mature, the aircraft mishap rate is expected to become comparable with a similarly sized helicopter aircraft with a similar mission.

The basing of two MV-22 squadrons at MCAS Camp Pendleton would result in a decrease in airfield operations compared to current levels. Since the MV-22 is a new airframe and would require response actions specific to the MV-22, the emergency and mishap response plans would be updated to include procedures and response actions necessary to address a mishap involving the MV-22 and associated equipment. With this update, the MCAS Camp Pendleton airfield safety conditions would be similar to existing conditions. Therefore, no significant impact would occur from aircraft mishaps or mishap response.

Bird Aircraft Strike Hazards

Under the Partial Basing Alternative, MCAS Camp Pendleton airfield operations would decrease slightly compared to current operating levels. The overall potential for bird-aircraft or wildlife strikes is not anticipated to change significantly from current levels. MCAS Camp Pendleton has developed aggressive procedures designed to minimize the occurrence of bird/wildlife-aircraft strikes. MCAS Camp Pendleton has documented procedures to monitor and react to heightened risk of bird-strikes (MCAS Camp Pendleton BASH), and when risk increases, limits are placed on

low altitude flight and some types of training (e.g., multiple approaches, closed pattern work, etc.) in the airport environment. MV-22 aircrews would be subject to these procedures. Therefore, no significant impact would occur related to BASH issues.

Accident Potential Zones

Proposed construction, renovation, and infrastructure improvement projects related to the Partial Basing Alternative would be consistent with established APZs. Therefore, construction activity would not result in any greater safety risk, and no significant impact related to APZs would occur.

There would be a five percent decrease in operations over existing conditions under the Partial Basing Alternative. Additionally, the MV-22 would follow established local approach and departure patterns, and no new flight tracks would be established. Therefore, proposed MV-22 operations would not affect or create a need to change the existing APZs. Flight activity and subsequent operations would not result in any greater safety risk, and no significant impact related to APZs would occur.

Explosives Safety

Proposed construction, renovation, and infrastructure improvement projects related to the Partial Basing Alternative would be consistent with established ESQD arcs. No proposed construction or proposed MV-22 parking areas fall under the existing or proposed CALA ESQD arcs. Therefore, construction activity and subsequent operations would not result in any greater safety risk.

The only munitions used by the MV-22 would be associated with its one machine gun. Ordnance is handled and stored in accordance with USMC explosive safety directives (MCO P8020.10A, 3 April 2002, Marine Corps Ammunition Management and Explosives Safety Policy Manual), and all munitions handling is carried out by trained, qualified personnel. Therefore, munitions handling would not result in any greater safety risk, and no significant impact related to explosives safety would occur.

Electromagnetic Emissions

Proposed construction, renovation, and infrastructure improvement projects related to the Partial Basing Alternative would be consistent with established electromagnetic radiation hazard zones. Therefore, construction activity and subsequent operations within new or renovated structures would not result in any greater safety risk, and no significant impact related to electromagnetic emissions would occur.

Mitigation Measures

Because there would be no significant impact on safety and environmental health, no mitigation measures are proposed.

Non-MCAS Camp Pendleton Basing Alternatives

No construction or demolition is associated with the implementation of a non-MCAS Camp Pendleton basing alternative (i.e., MV-22 aircraft would be based at MCAS Miramar or would be

are split between MCAS Miramar and MCAS Yuma). Therefore, no construction-related impacts would occur. Potential operations-related impacts are discussed below.

Aircraft Mishaps and Mishap Response

Under a non-MCAS Camp Pendleton basing alternative, MCAS Camp Pendleton operations would decrease by 14 percent compared to current operating levels due to the elimination of three squadrons of CH-46E helicopter assets currently based at MCAS Camp Pendleton. Although no MV-22 squadrons would be based at MCAS Camp Pendleton, it is possible that transient MV-22 aircraft (aircraft based at other stations) would occasionally utilize the MCAS Camp Pendleton airfield. To ensure effective mishap response, the emergency and mishap response plans would be updated to include those actions necessary to address a mishap involving the MV-22 and associated equipment. With this update, the MCAS Camp Pendleton airfield safety conditions would be similar to existing conditions. Additionally, the overall decrease in airfield operations may slightly lower the overall potential for aircraft mishaps, which may be a beneficial impact. Therefore, no significant adverse impact would occur from aircraft mishaps or mishap response.

Bird Aircraft Strike Hazards

Under a non-MCAS Camp Pendleton basing alternative, MCAS Camp Pendleton operations would decrease by 14 percent compared to current operating levels. This may slightly lower the overall potential for bird-aircraft or wildlife strikes, which may be a beneficial impact. All flight safety actions that are in place for existing aircraft training would continue to be in place. Therefore, no significant adverse impact would occur related to BASH issues.

Accident Potential Zones

Under a non-MCAS Camp Pendleton alternative, there would be a 14 percent decrease in operations compared to existing conditions. Therefore, flight activity and subsequent operations would not result in any greater safety risk, and no significant impact related to APZs would occur.

Explosives Safety

Although no MV-22 squadrons would be based at MCAS Camp Pendleton, it is possible that transient MV-22 aircraft (aircraft based at other stations) would occasionally utilize the MCAS Camp Pendleton airfield. The only munitions used by the MV-22 would be associated with its one machine gun. Ordnance is handled and stored in accordance with USMC explosive safety directives (MCO P8020.10A, 3 April 2002, Marine Corps Ammunition Management and Explosives Safety Policy Manual), and all munitions handling is carried out by trained, qualified personnel. Therefore, munitions handling would not result in any greater safety risk, and no significant impact related to explosives safety would occur.

Mitigation Measures

Because there would be no significant impact on safety and environmental health, no mitigation measures are proposed.

No Action Alternative

Under the No Action Alternative, MCAS Camp Pendleton operations would continue at the current level, and no construction or demolition would occur. The existing aircraft would continue to be based at MCAS Camp Pendleton, therefore safety conditions around the airfield would remain as is. Therefore, no impact on safety and environmental health would occur.

4.17 ENVIRONMENTAL JUSTICE

In 1994, Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations (Environmental Justice)*, was issued to focus the attention of federal agencies on human health and environmental conditions in minority populations and low-income populations. This Executive Order was also established to ensure that, if there were a disproportionately high and adverse human health or environmental effects of federal actions on these populations, those effects would be identified and addressed. The environmental justice analysis addresses the characteristics of race, ethnicity and poverty status for populations residing in areas potentially affected by implementation of the proposed action.

In 1997, Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (*Protection of Children*), was issued to identify and address issues that affect the protection of children. Socioeconomic data specific to the distribution of population by age are presented below.

4.17.1 Affected Environment

For the purpose of this analysis, minority and low-income populations and the population of children are defined as:

- *Minority Populations*: All persons identified by the Census of Population and Housing to be of Hispanic or Latino origin, regardless of race, plus non-Hispanic persons who are Black or African American, American Indian and Alaskan Native, Asian, Native Hawaiian and Other Pacific Islander, Some Other (i.e., non-white) Race or Two or More Races. For purposes of the EIS analysis, the minority population is calculated by subtracting the number of persons who are White but not Hispanic, from the total population.
- *Low-Income Populations*: All persons that fall within the statistical poverty thresholds published by the U. S. Census Bureau in the Current Population Survey are considered to be low-income. For the purposes of this analysis, low-income populations are defined as persons living below the poverty level ($16,895 for a family of four with two children, adjusted based on household size and number of children), as reported in the 2000 Census. The 2000 Census asked people about their income in the previous calendar year. Therefore, poverty estimates reported in the 2000 Census compare family income in 1999 with the corresponding 1999 poverty thresholds. If the total income for a family or unrelated individual falls below the relevant poverty threshold, then the family or unrelated individual is classified as being below the poverty level. The percentage of low-income persons is calculated as the percentage of all persons for whom the Census Bureau determines poverty status, which is generally a slightly lower number than the total population since it excludes institutionalized persons, persons in military group quarters and college dormitories, and unrelated individuals under 15 years old.

- *Children*: All persons identified by the Census of Population and Housing to be under the age of 18 years. For the purposes of this EIS, the number of children is calculated by subtracting the number of persons 18 years and over from the total population.

Environmental Justice

Census data for minority populations, low-income populations and children in the three-county MCAS Camp Pendleton region of influence (which includes San Diego, Orange, and Riverside Counties), nearby cities, and in the State of California are shown in Table 4.17-1. San Diego County has a minority population percentage of 45.0 percent, and communities within the region of influence in the vicinity of MCAS Camp Pendleton have minority population percentages of between 19.5 percent and 50.1 percent, all of which are lower than the State of California (53.3 percent). The communities of Oceanside and Vista have a much higher percentage of minority populations (46.4 and 50.1 percent, respectively) than do Carlsbad, also located in San Diego County and San Clemente, located in Orange County (19.5 and 21.6 percent, respectively). Within San Diego County, approximately 12.4 percent of the population lives below the poverty level, whereas the communities in the vicinity of MCAS Camp Pendleton have poverty percentages between 5.9 percent and 14.2 percent, all of which are the same or lower than the State of California (14.2 percent).

Table 4.17-1 Environmental Justice Data for the MCAS Camp Pendleton Region of Influence and the State of California (2000)

Geographic Area	Total Population	Minority Population	Percent Minority	Low-Income Population	Percent Low-Income	Children Under Age 18	Percent Children
City of Oceanside	161,029	74,719	46.4	18,492	11.6	44,456	27.6
City of Carlsbad	78,247	15,234	19.5	4,576	5.9	18,240	23.3
City of Vista	89,857	45,013	50.1	12,533	14.2	26,653	29.7
San Diego County	2,813,833	1,265,000	45.0	338,399	12.4	723,661	25.7
City of San Clemente	49,936	10,781	21.6	3,753	7.6	12,033	24.1
Orange County	2,846,289	1,387,311	48.7	289,475	10.3	768,419	27.0
Riverside County	1,545,387	756,556	49.0	214,084	14.2	468,691	30.3
Three-County ROI	7,205,509	3,408,867	47.3	841,958	12.0	1,960,771	27.2
State of California	33,871,648	18,054,858	53.3	4,706,130	14.2	9,249,829	27.3

Note:
The percentage of low-income persons is calculated as a percentage of all persons for whom the Bureau of the Census determines poverty status, which is generally a lower number than the total population because it excludes institutionalized persons, persons in military group quarters and college dormitories, and unrelated individuals under 15 years old.
ROI = region of influence
Source: U.S. Census Bureau 2004

Both Orange County and Riverside County have a higher percentage of minority populations (48.7 and 49.0 percent, respectively) than San Diego County and the State of California. The low-income population percentage is lower in Orange County (10.3 percent) and the same or higher in Riverside County (14.2 percent) than in either San Diego County or the State of California. In the three-county region of influence, which is the summation of San Diego, Orange, and Riverside counties, 47.3 percent of the population is minority and 12.0 percent of the population is low-income. In 2000, children under the age of 18 living in the three-county region of influence comprised approximately 27.2 percent of the total population.

Protection of Children

No children would be expected at or in the vicinity of the proposed project area, which falls within MCAS Camp Pendleton. MCAS Camp Pendleton supports flight operations, air-ground training activities, aircraft storage/maintenance, administrative services, rescue services, and supply/storage areas. No facilities frequently used by children, such as family housing units, schools, or childcare centers, are located within MCAS Camp Pendleton.

4.17.2 Environmental Consequences

Environmental justice analysis applies to adverse environmental impacts. Consequently, potential disproportionate impacts to minority or low-income populations are assessed only when adverse environmental consequences to the general human population are anticipated. The same is true for analysis of health and safety risks to children, as the potential for such risks would be driven by adverse environmental impacts.

In order to address the possibility of environmental justice concerns, health and safety factors were analyzed to determine the potential for adverse human health or environmental impacts of the proposed alternatives that could affect the human population. In addition, potential environmental health or safety hazards were examined to assess potential special risks to children. The analyses conducted for Air Quality (section 4.7), Noise (section 4.8), Hazardous Materials Management (section 4.11), and Safety and Environmental Health (section 4.16) indicate that less than significant environmental impacts to the human population are anticipated under all alternatives.

Partial Basing (2-Squadron) Alternative

The facility modifications, personnel changes, and operations associated with the Partial Basing Alternative are not expected to create significant adverse environmental or health effects to the human population, as detailed in the specific resource sections identified in the previous paragraph. Environmental justice concerns related to construction activity typically include air quality, noise, hazardous materials, and safety. Specific issues of concern involve potential accidents at construction sites, exposure to asbestos and lead-based paint, and noise from construction activity. Safety precautions in areas surrounding the work sites would include adequate measures to restrict access, minimization of hazards associated with construction activities, and proper handling and disposal of hazardous materials. Such measures, particularly the restricted access to the study area, would preclude the potential for adverse impacts to human populations. Noise associated with construction would be intermittent and short in duration, not contributing any appreciable impact to the existing acoustic environment in the area. No significant environmental or human health effects are anticipated related to construction or demolition under the Partial Basing Alternative.

Operations under the Partial Basing Alternative would involve a decrease in the number of aircraft based at MCAS Camp Pendleton, and a corresponding decrease in the number of aircraft operations. The proposed airfield environment would be similar to the current operational environment, and would follow established local approach and departure patterns. Environmental justice concerns related to aircraft operations may include air quality, noise, and safety. Specific issues of concern involve aircraft emissions, aircraft noise, and safety concerns related to flight mishaps and explosives handling. The analyses conducted for these resources areas indicate that no significant environmental or human health impacts are anticipated under the Partial Basing

Alternative. Consequently, no disproportionate or adverse impacts related to environmental justice are anticipated, nor would there be any special health or safety risks to children.

Mitigation Measures

Because there would be no disproportionate or adverse impacts anticipated related to environmental justice, no mitigation measures are proposed.

Non-MCAS Camp Pendleton Basing Alternatives

Under a non-MCAS Camp Pendleton alternative, the number of aircraft and personnel at MCAS Camp Pendleton would decline as a result of the elimination of three squadrons of CH-46E, and no construction or demolition activities would occur. No significant environmental or human health impacts would occur; consequently, no disproportionate or adverse impacts related to environmental justice are anticipated, nor are any special health or safety risks to children.

Mitigation Measures

Because there would be no disproportionate or adverse impacts anticipated related to environmental justice, no mitigation measures are proposed.

No Action Alternative

Under the No Action Alternative, there would be no personnel changes, new construction, demolition, or training activities. Therefore, existing conditions would remain unchanged, and no impacts to environmental justice would occur.

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Chapter 5

Marine Corps Air Station Yuma

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5.0 MARINE CORPS AIR STATION YUMA

5.1 INTRODUCTION

The focus of Chapter 5 is on airfield construction and operations at MCAS Yuma. MCAS Yuma could accommodate several basing options for the MV-22 including partial basing of either eight squadrons (Maximum Partial Basing Alternative) or two squadrons (Minimum Partial Basing Alternative). This section provides baseline and impact assessment for each of these basing options as well as a No Action Alternative. This chapter does not provide an analysis for a "non-MCAS Yuma basing alternative" because, unlike MCAS Miramar (Chapter 3) and MCAS Camp Pendleton (Chapter 4), there would be no change in personnel or aircraft at MCAS Yuma if the MV-22 were based elsewhere. It is likely that some transient MV-22 aircraft (aircraft based at other stations) would continue to utilize the MCAS Yuma airfield, similar to existing conditions, and this is addressed under the No Action Alternative.

5.2 AIRFIELDS AND AIRSPACE

This section provides an analysis of airfield use at MCAS Yuma. Aircraft from MCAS Yuma also train within Special Use Airspace under the authority of other military installations (e.g., MCB Camp Pendleton, Bob Stump Training Range Complex, MCAGCC). Information regarding off-station training is discussed in Chapter 6, even though such operations may originate from MCAS Yuma.

5.2.1 Affected Environment

MCAS Yuma is the primary military aviation facility located within the Bob Stump Training Range Complex region. Yuma International Airport is a commercial service airport shared with MCAS Yuma, which makes MCAS Yuma the only shared-use air station in the USMC. Yuma International Airport is owned by the County of Yuma, and operated by the Yuma County Airport Authority, Inc. Through a land use patent, MCAS Yuma provides air traffic control, crash crew services, and maintains the runways and taxiways for both MCAS Yuma and the Yuma International Airport.

There are four runways that support MCAS Yuma (see Figure 5.3-2): 3R/21L, 3L/21R, 17/35, and 8/26 (DoN 2001). Runway 3L/21R, which is used primarily by military aircraft, is 13,299 feet long and 200 feet wide. Runway 3R/21L, also used by military aircraft, is located east of and parallel to 3L/21R and is 9,239 feet long by 150 feet wide (DoN 2001). Runways 17/35 and 8/26 are shorter than the other two main runways, and are primarily used as crosswind and auxiliary runways for civilian aircraft (Naval Facilities Engineering Command [NAVFAC] 2001). Heavy jet aircraft, high performance jet aircraft, and heavy transports use the parallel runways, while smaller jet and propeller aircraft use the shorter runways (NAVFAC 2001).

Flight operations by rotary wing aircraft at MCAS Yuma include the Huey (UH-1), Cobra (AH-1W), Sea Knight (CH-46E), Super Stallion (CH-53E), and Iroquois (HH-1). Flight operation by fixed wing aircraft at MCAS Yuma include the Harrier (AV-8B), Tiger (F-5E), Huron (C-12B), Hercules (C-130, KC-130), Prowler (EA-6B), Hornet (F/A-18), and Fighting Falcon (F-16C/D). Besides departures and arrivals from the airfield, pilots also perform Touch-and-Go and Ground-Controlled Approach patterns to ensure proficiency in these areas. A breakdown of existing rotary

wing and fixed wing operations at MCAS Yuma, including both aircraft based at the station and transient aircraft, is provided below in Table 5.2-1.

Table 5.2-1. Existing Annual Aircraft Flight Operations at MCAS Yuma

Aircraft Type	Departure	Arrival	Closed Patterns			
			TGO	FCLP	GCA	Total
ROTARY WING						
AH-1W	1,581	1,580	-	-	-	3,161
CH-46E	1,431	1,381	-	-	-	2,812
CH-53E	2,102	2,102	-	-	-	4,204
UH-1	620	621	-	-	-	1,241
HH-1N	963	963	-	-	-	1,926
FIXED WING						
AV-8B	12,623	12,623	16,821	-	826	61,576
F-5E	5,734	5,717	9,862	-	-	21,313
C-12B	1,399	1,398	-	-	-	2,797
C-130	199	198	-	-	-	397
EA-6B	164	164	-	-	-	328
F/A-18	1,955	1,954	120	-	-	4,029
F-16C/D	240	241	115	-	-	596
KC-130	531	532	-	-	-	1,063
AIR CARRIER						
DASH-8	5,563	5,311	-	-	-	10,874
GENERAL AVIATION						
C-172, Cherokee, etc.	6,562	6,564	52,496	-	-	65,622
Total	**41,667**	**41,349**	**79,414**	**-**	**826**	**163,256**

Notes:
An airfield flight operation is defined as a single event that occurs at the air station, such as a departure, arrival, or touch-down. For example, aircraft departing and returning would represent two airfield flight operations.
TGO = Touch-and-Go; FCLP = Field Carrier Landing Practice; GCA = Ground-Controlled Approach.
Arrivals do not equal departures due to mission schedules.
GCA, TGO, and FCLP are counted as 2 operations.
FCLPs occur at the MCAS Yuma Auxiliary Field 2 located within the Barry M. Goldwater Range (West) (discussed in Chapter 6)
See Appendix C for details.

5.2.2 Environmental Consequences

Maximum Partial Basing (8-Squadron) Alternative

The basing of eight squadrons of MV-22 aircraft at MCAS Yuma would result in an increase of 96 aircraft based at MCAS Yuma, with a corresponding increase of 39,799 airfield operations per year (Table 5.2-2) or a 24 percent increase in operations compared to existing conditions. This increase falls within historic use of airfield, which at one point accommodated approximately 219,000 flight operations per year (Van Houten and Associates 1978). In addition, the MV-22 would operate in an airfield environment similar to the current operational environment and would follow established local approach and departure patterns. No new flight tracks would be established. Therefore, MCAS Yuma airspace management around the airfield and aircraft ground safety conditions would not change as a result of the new aircraft (see section 5.16 [Safety and Environmental Health] for information regarding aircraft mishap response). No significant impact would occur.

Table 5.2-2. Proposed Change in Annual Airfield Flight Operations at MCAS Yuma under the Maximum Basing Alternative

Operation Type	Addition of MV-22 Operations	Reduction of CH-46 Operation	Change in Operation over Existing Conditions
Departure	17,584	-1,431	+16,153
Arrival	17,586	-1,381	+16,205
Touch-and-Go	3,247	0	+3,247
GCA Box	4,058	0	+4,058
Low Work	136	0	+136
Total	**42,611**	**-2,812**	**+39,799**

Notes:
An airfield flight operation is defined as a single event that occurs at the air station, such as a departure, arrival, or touch-down. For example, aircraft departing and returning would represent two airfield flight operations.
Touch-and-Go, GCA Box, and Low Work are counted as two operations each.
The proposed MV-22 FCLPs would occur at the MCAS Yuma Auxiliary Field 2 instead of the airfield.
Reduction of CH-46 operations based on current use by transient aircraft (aircraft based at other stations).

Mitigation Measures

Because there would be no significant impact on airfield operations, no mitigation measures are proposed.

Minimum Partial Basing (2-Squadron) Alternative

The basing of two squadrons of MV-22 aircraft at MCAS Yuma would result in an increase of 24 aircraft based at MCAS Yuma, with a corresponding increase of 6,320 airfield operations per year (Table 5.2-3) or a four percent increase in operations compared to existing conditions. The MV-22 would operate in an airfield environment similar to the current operational environment and would follow established local approach and departure patterns. No new flight tracks would be established. Therefore, MCAS Yuma airspace management around the airfield and aircraft ground safety conditions would not change as a result of the new aircraft (see section 5.16 [Safety and Environmental Health] for information regarding aircraft mishap response). No significant impact would occur.

Table 5.2-3. Proposed Change in Annual Airfield Flight Operations at MCAS Yuma under the Minimum Partial Basing Alternative

Operation Type	Addition of MV-22 Operations	Reduction of CH-46 Operation	Change in Operation over Existing Conditions
Departure	3,767	-1,431	+2,336
Arrival	3770	-1,381	+2,389
Touch-and-Go	696	0	+696
GCA Box	870	0	+870
Low Work	29	0	+29
Total	**9,132**	**-2,812**	**+6,320**

Notes:
An airfield flight operation is defined as a single event that occurs at the air station, such as a departure, arrival, or touch-down. For example, aircraft departing and returning would represent two airfield flight operations.
Touch-and-Go, GCA Box, and Low Work are counted as two operations each.
The proposed MV-22 FCLPs would occur at the MCAS Yuma Auxiliary Field 2 instead of the airfield.
Reduction of CH-46 operations based on current use by transient aircraft (aircraft based at other stations).

Mitigation Measures

Because there would be no significant impact on airfield operations, no mitigation measures are proposed.

No Action Alternative

Under the No Action Alternative, MCAS Yuma operations would continue at the current level. The existing aircraft would continue to be based at MCAS Yuma, and airspace management around the airfield would remain as is. Therefore, no impact would occur.

5.3 LAND USE

Land use is the description of developed and undeveloped land occurring at a particular location. Land use categories typically include residential; commercial; manufacturing; transportation, communication, and utilities; recreation; institutional; mining and extraction; and agriculture and forestry. On military installations, land use is often divided into operational and support functions. Management plans and zoning regulations determine the type and extent of land use allowable in specific areas and are often intended to protect specially designated or environmentally sensitive areas.

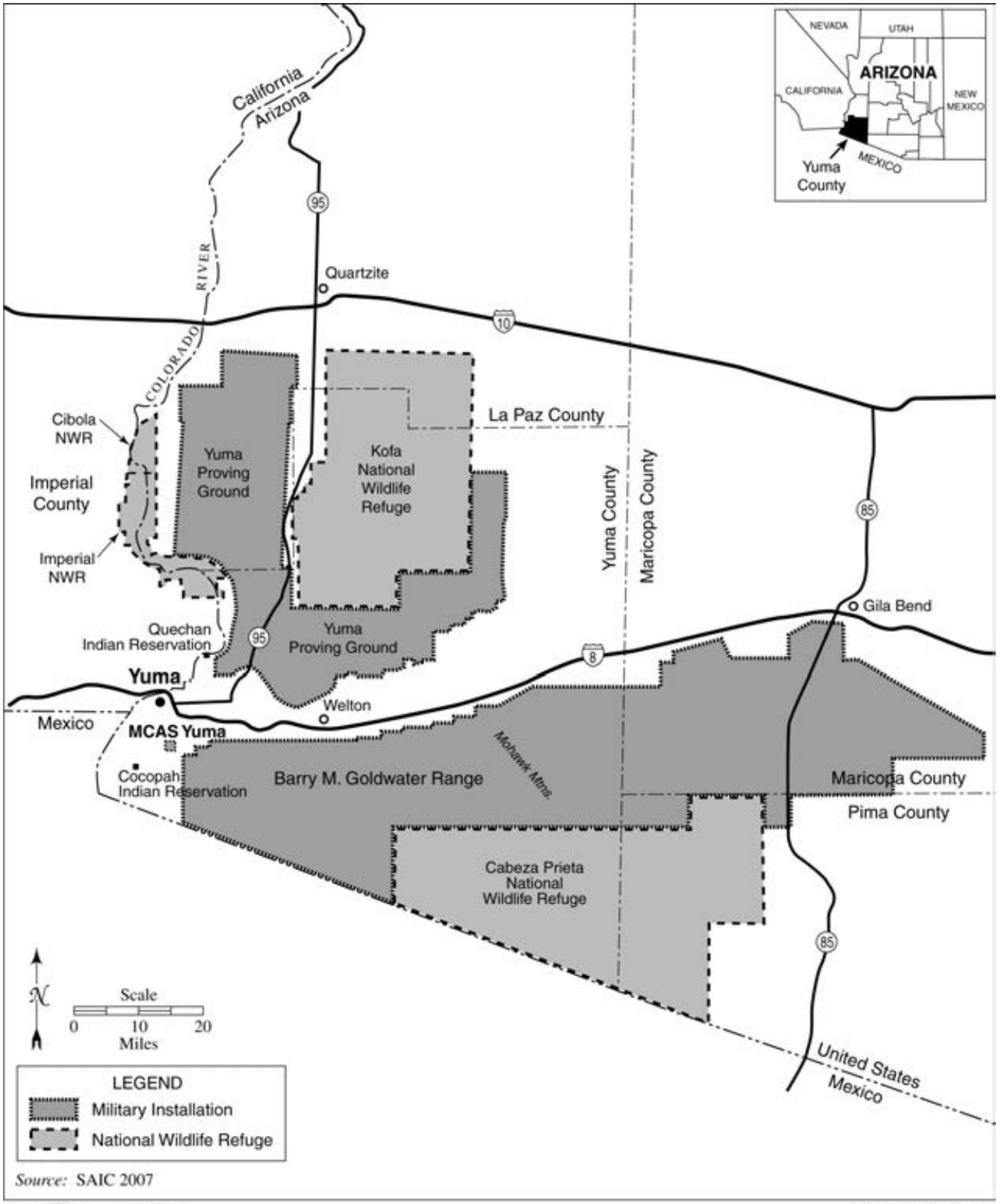
5.3.1 Affected Environment

Regional and Local Land Use

MCAS Yuma encompasses 4,743 acres (1,919 ha) and is located in the southwestern corner of the State of Arizona near both the California border and the international border between Mexico and the U.S. It is located in Yuma County and within the incorporated limits of the City of Yuma. The station is surrounded by a mixture of commercial lands, industrial lands, and recreation/open space to the north; agricultural and industrial lands to the south; agriculture, industry, and recreation/open space to the east; and agricultural and industrial land to the west (City of Yuma 2002). The Yuma International Airport is located near the northwestern boundary of MCAS Yuma and the southeastern portion of the City of Yuma. The airfield is a shared-use facility, which is used by MCAS Yuma for military operations and by the Yuma International Airport for civilian operations (USMC 1999). Additional land uses in the immediate vicinity of MCAS Yuma (Figure 5.3-1) include the Kofa National Wildlife Refuge, Imperial National Wildlife Refuge, Cibola National Wildlife Refuge, and Yuma Proving Grounds to the north, the Barry M. Goldwater Range and Cabeza Prieta National Wildlife Refuge to the southeast, the Cocopa Indian Reservation to the southwest, and various Bureau of Land Management parcels to the east.

MCAS Yuma is composed of eight distinct land use categories or districts. Within these districts, land is generally designated for use by one of the following categories: aircraft operations, aircraft maintenance, training, general maintenance, weapons, supply/warehousing, administration, medical, bachelor and family housing, community support, recreation, communications/utilities, and undeveloped. The main station is densely developed to the south and east of the airfield facilities, leaving little land available for expansion within existing station boundaries.

The MCAS Yuma support district (which includes administration support facilities) is the largest of the eight districts and is located throughout the station (Figure 5.3-2). The flightline district is located



Source: SAIC 2007

Regional Location of MCAS Yuma

FIGURE 5.3-1

on the east side of the airfield and provides aviation support and maintenance functions. The training district (located adjacent to the flightline district) is used for pilot training and simulation, strategic and electronic warfare training, and aircraft maintenance training. The supply district has three locations on the station (two near the North Gate and one near the flightline) and is used for storage facilities. The headquarters district is located west of the Main Gate. The bachelor housing district and family housing district are dispersed throughout the central and southern portions of MCAS Yuma.

The USMC community support district is composed of several large community support areas throughout the station. Although not classified as a district, the airfield is another major land use category (DoN 2001). The proposed project area falls under the flightline and station support districts.

Land Use and the Noise Environment

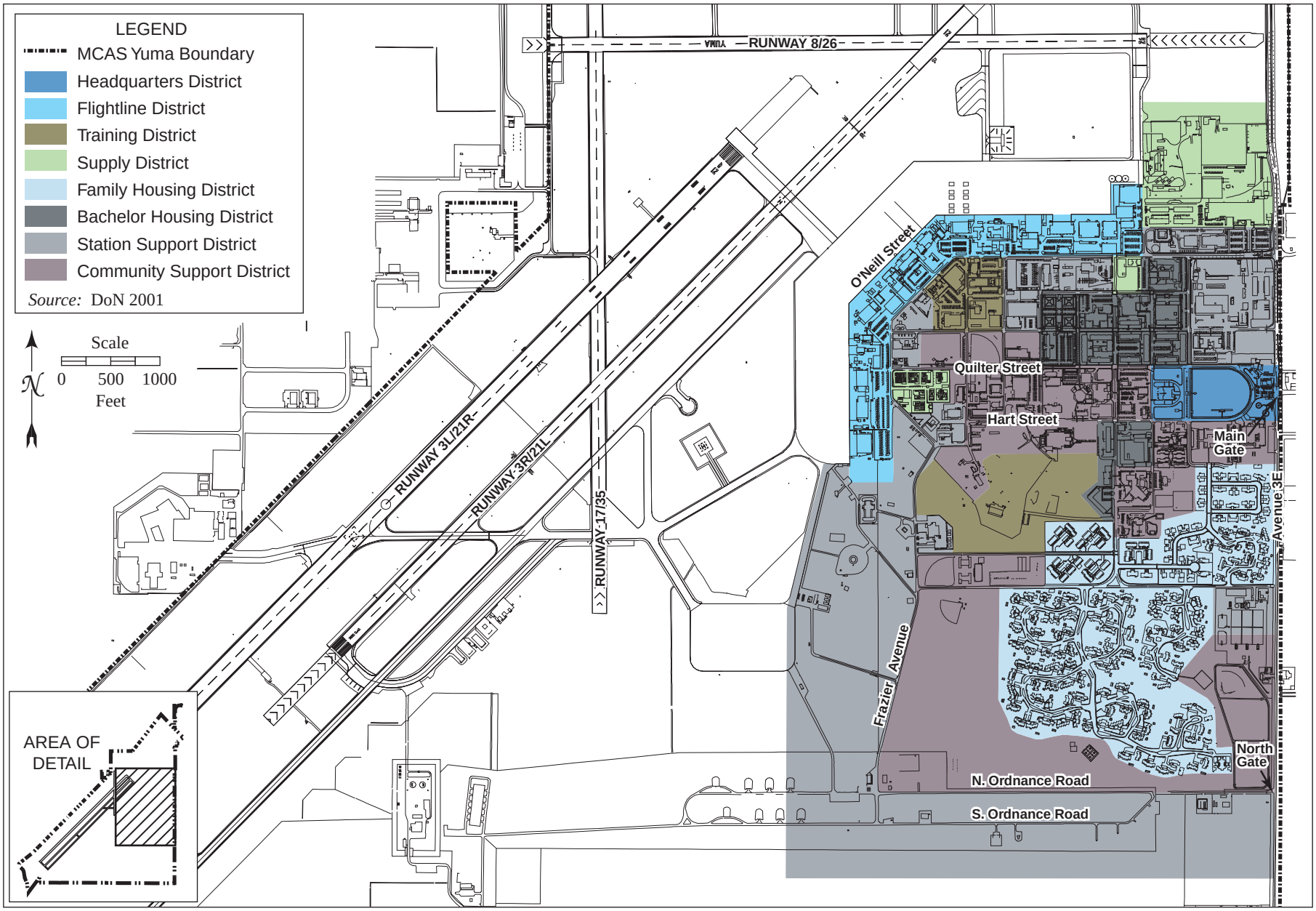
Land use activities most sensitive to noise typically include residential and commercial areas, public services, and areas associated with cultural and recreational uses. For MCAS Yuma, the identified noise-sensitive receptors represent residential areas, places of worship, schools, a fairgrounds, and a civic center (see section 5.8 [Noise] for more details). Noise measurements related to aircraft operations to define the area of noise impact are expressed in terms of Day-Night Average Sound Level (DNL) for Arizona. The DNL represents the average annual day community noise exposure from aircraft operations during a 24 hour period over a year. The DoD has established noise compatibility criteria for various land uses. According to these criteria, sound levels up to 65 decibel (dB) DNL are compatible with land uses such as residences, transient lodging, and medical facilities.

The MCAS Yuma Air Installations Compatible Use Zones (AICUZ) program is intended to achieve compatibility between land uses on the station and in surrounding communities. Noise measurements for MCAS Yuma are expressed as 65, 70, 75, and 80 dB DNL contours. Both existing noise contours and those associated with each alternative are presented in section 5.8 (Noise), along with a discussion of any affect on noise-sensitive receptors and nearby housing and population.

5.3.2 Environmental Consequences

Maximum Partial Basing (8-Squadron) Alternative

Basing eight squadrons of MV-22 aircraft at MCAS Yuma would entail up to 28 MV-22 aircraft housed in hangars and the rest on the aircraft parking apron. Facility construction would occur within previously developed areas of the old CALA and weapons complex (recently relocated). Implementation of the Maximum Partial Basing Alternative would not change existing land use designations and would be compatible with surrounding land uses. Facility construction would be designed and sited to be compatible with existing planning guidelines and airfield safety guidelines. The base master plan and airfield safety guidelines would be updated, as appropriate, to accommodate the proposed MV-22 aircraft. Airfield operations associated with the MV-22 aircraft are not expected to appreciably change the noise level for identified noise-sensitive receptors (see section 5.8, Noise). Furthermore, no significant impacts to surrounding communities would occur since proposed development would be contained within existing military designations at MCAS Yuma, and there would be no change to the existing airfield-related APZs and clear zones (see section 5.16, Safety and Environmental Health). Therefore, no significant impacts to land use would occur with implementation of the Maximum Partial Basing Alternative.



Land Use Categories at MCAS Yuma

FIGURE

5.3-2

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Mitigation Measures

Implementation of the Maximum Partial Basing Alternative at MCAS Yuma would not result in significant impacts to land use; therefore, no mitigation measures would be required.

Minimum Partial Basing (2-Squadron) Alternative

Land use impacts associated with basing two squadrons of MV-22 aircraft at MCAS Yuma would be similar to the eight-squadron configuration with the exception that only two new hangars would be required and a smaller area of apron space would be constructed. Implementation of the Minimum Partial Basing Alternative would not change existing land use designations and would be compatible with surrounding land uses. All facility construction would be designed and sited to be compatible with existing planning guidelines and airfield safety guidelines. The base master plan and airfield safety guidelines would be updated, as appropriate, to accommodate the proposed MV-22 aircraft. Airfield operations associated with the MV-22 aircraft are not expected to appreciably change the noise level for identified noise-sensitive receptors (see section 5.8, Noise). Furthermore, no significant impacts to surrounding communities would occur since proposed development would be contained within existing military designations at MCAS Yuma, and there would be no change to the existing airfield-related APZs and clear zones (see section 5.16, Safety and Environmental Health). Therefore, no significant impacts to land use would occur with implementation of the Minimum Partial Basing Alternative.

Mitigation Measures

Implementation of the Minimum Partial Basing Alternative at MCAS Yuma would not result in significant impacts to land use; therefore, no mitigation measures would be required.

No Action Alternative

There would be no change in airfield operations under the No Action Alternative. However, it is possible that future construction efforts may be needed (e.g., wash racks at MCAS Yuma) related to MV-22 training by East Coast squadrons under the No Action Alternative. This would require less construction than associated with the proposed action (e.g., no new hangar construction). The above analysis demonstrates that proposed construction associated with either basing alternative at MCAS Yuma would not result in significant impacts to land use. Therefore, no significant impacts are expected from these smaller future construction efforts that may occur under the No Action Alternative.

5.4 SOCIOECONOMICS

Socioeconomics describes the basic attributes and resources associated with the human environment, particularly population and economic activity. Economic activity typically encompasses employment, personal income, and industrial growth. The project area for socioeconomics is defined as the area in which the principal effects arising from implementation of the proposed action are likely to occur. The proposed action has the potential to cause socioeconomic impacts to the communities around the stations through changes or relocation of personnel.

MCAS Yuma is located in the southwestern corner of Arizona, approximately 5 miles (8 km) east of the Colorado River and 27 miles (44 km) north/northeast of San Luis Rio Colorado, Sonora, Mexico. The station is located in the southwestern portion of Yuma County in the City of Yuma. Therefore, the MCAS Yuma region of influence consists of the City of Yuma and Yuma County. Socioeconomic data is also provided for the state of Arizona as a general comparison.

5.4.1 Affected Environment

Demographics

As shown in Table 5.4-1, the City of Yuma experienced growth exceeding 40 percent between 1990 and 2000. This growth was comparable to the State of Arizona, but slightly lower than the growth rate in Yuma County (approximately 50 percent). Recent population estimates by the U.S. Census Bureau (U.S. Census) and the Arizona Department of Economic Security (ADES) vary. While the actual growth since 2000 is uncertain, the City of Yuma, Yuma County, and the State of Arizona appear to have continued to grow substantially. However, the growth rates appear to be substantially lower than the previous decade. In addition, the City of Yuma appears to have been growing at a lower rate than both the county and state.

Table 5.4-1. Population Trends

Geographic Area	1990	2000	% Change (1990 to 2000)	July 2006 Census Estimate	July 2006 DES Estimate	% Change (2000 to 2006)
City of Yuma	54,923	77,545	41.2	87,423	92,160	12.7 to 18.8
Yuma County	106,895	160,026	49.7	187,555	196,390	17.2 to 22.7
Arizona	3,665,228	5,130,632	40.0	6,166,318	6,305,210	20.2 to 22.9
Sources: U.S. Census 2007a, U.S. Census 2007b, U.S. Census 2005, ADES 2007a.						

As of December 2007, MCAS Yuma supported a workforce population of 6,156 personnel, including 610 officers, 4,304 enlisted personnel, 758 civilian employees, and 484 contractors or federal employees (MCAS Yuma 2007b). There are 6,716 dependents associated with base military personnel, resulting in a grand total station population of 12,872 persons.

Income and Employment

Median household and family incomes reported from the 2000 Census are shown in Table 5.4-2. In 1999, median household and family incomes for the City of Yuma were approximately $35,000 and $40,000, respectively. These incomes were approximately $3,000 to $5,000 higher (respectively) than for Yuma County and $5,000 to $7,000 less than for the State of Arizona.

Table 5.4-2. Income Levels (1999)

Geographic Area	Median Household Income ($)	Median Family Income ($)
City of Yuma	35,374	39,693
Yuma County	32,182	34,659
Arizona	40,558	46,723
Source: U.S. Census 2007a		

Table 5.4-3 shows employment and compensation by (nonfarm) industry throughout Yuma County for 2001 and 2005 as reported by the Bureau of Economic Analysis (BEA). In 2005, the three largest industries in Yuma County with respect to employment were government (22.1 percent); forestry,

fishing, related activities, and other (16.8 percent); and retail trade (11.4 percent). With respect to compensation, the three largest industries were government (37.8 percent); forestry, fishing, related activities, and other (16.8 percent); and health care and social assistance (10.2 percent). Employment increased by 7,849 (11.1 percent) in Yuma County between 2001 and 2005. As shown in Table 5.4-3, percent growth in employment between 2001 and 2005 within the construction industry (58.2 percent) was among one of the largest in Yuma County.

Table 5.4-3. Nonfarm Employment and Earnings by Industry Sector for Yuma County (2001 and 2005)

Industry	Employment			Compensation ($000s)	
	2001	2005	% Change	2001	2005
Private employment	54,938	61,422	11.8%	$1,095,296	$1,536,095
Forestry, fishing, related activities, and other	ND	13,280	--	ND	$272,605
Mining	ND	80	--	ND	$881
Utilities	165	204	23.6%	$7,351	$10,382
Construction	3,745	5,923	58.2%	$92,462	$160,466
Manufacturing	2,311	3,016	30.5%	$73,371	$105,962
Wholesale trade	2,097	1,855	-11.5%	$72,305	$84,101
Retail trade	7,762	8,975	15.6%	$151,964	$207,981
Transportation and warehousing	1,261	1,486	17.8%	$35,872	$46,696
Information	937	1,222	30.4%	$37,395	$59,360
Finance and insurance	1,181	1,270	7.5%	$22,535	$34,164
Real estate and rental and leasing	1,601	2,183	36.4%	$12,301	$21,202
Professional and technical services	1,389	1,938	39.5%	$26,637	$54,583
Management of companies and enterprises	173	168	-2.9%	$6,688	$7,798
Administrative and waste services	2,350	3,248	38.2%	$35,644	$66,274
Educational services	248	439	77.0%	$3,019	$9,379
Health care and social assistance	5,547	6,691	20.6%	$167,950	$251,333
Arts, entertainment, and recreation	466	469	0.6%	$4,199	$4,569
Accommodation and food services	4,721	5,775	22.3%	$60,164	$86,099
Other services, except public administration	2,865	3,200	11.7%	$41,318	$52,260
Government and government enterprises	16,032	17,397	8.5%	$676,801	$933,486
Federal, civilian	2,538	3,043	19.9%	$172,943	$263,626
Military	4,330	4,020	-7.2%	$197,147	$255,288
State and local	9,164	10,334	12.8%	$306,711	$414,572
Total (Nonfarm)	**70,970**	**78,819**	**11.1%**	**$1,772,097**	**$2,469,581**

Note:
ND: No Data
Source: BEA 2007

The ADES also gathers and reports data on employment by industry and occupation. This data varies in magnitude from the BEA data. For example, ADES estimated the growth in the construction industry in Yuma County between 2001 and 2005 to be approximately 38 percent

(ADES 2007b). ADES labor market data indicates that growth in the construction industry slowed down considerably during 2006 (6.0 percent) compared to the growth in 2005 (16.3 percent). Data up to October 2007 indicates a decline in employment of 9.4 percent. ADES also developed occupational forecasts for Yuma County between 2006 and 2008 (ADES 2007c). Occupational opportunities for construction laborers and managers are estimated to decline by 5.2 percent and 3 percent, respectively, over this period. ADES also developed long-term forecasts by occupation but only for Arizona as a whole (ADES 2007d). Between 2005 and 2015, statewide occupational opportunities for construction labors and managers are estimated to grow by 30.5 percent and 21.3 percent, respectively.

The unemployment rate for Yuma in 2006 was 11.3 percent. This rate is slightly lower than Yuma County (14.7 percent), but higher than the State of Arizona (4.1 percent) (Bureau of Labor Statistics [BLS] 2007).

In 2005, the economic impact of MCAS Yuma to the Yuma community was estimated to be approximately $287 million. The current annual economic impact is estimated to be approximately $336 million (MCAS Yuma 2005, 2007b).

Housing

Table 5.4-4 shows the distribution of housing in the City of Yuma, Yuma County, and the State of Arizona. The total number of housing units, percentages of owners and renters in occupied units, and percent vacant are shown.

Table 5.4-4. Housing (2000 U.S. Census)

Geographic Area	Housing Units	% Vacant	Occupied Housing Units		
			Total	% Owner	% Renter
City of Yuma	34,475	22.6	26,697	63.0	37.0
Yuma County	74,140	27.4	53,848	72.2	27.8
Arizona	2,189,189	13.1	1,901,625	68.0	32.0
Source: U.S. Census 2007a, 2007b					

In 2000, there were 74,140 housing units in Yuma County, 72.6 percent of which were occupied. This is compared to 77.4 percent for the City of Yuma and 86.9 percent for Arizona. Of the occupied housing units in the City of Yuma, 63 percent were owner-occupied which is lower than both the county and state.

Military family housing at MCAS Yuma includes 821 units (Zeiss 2007). As of December 2007, 791 units (96 percent) were occupied by 823 military personnel and 1,646 family members. There are also 36 housing units available for temporary housing. In addition, a total of 2,529 permanent and transient personnel live in barracks.

5.4.2 Environmental Consequences

The action alternatives proposed at MCAS Yuma involve personnel and mission realignments, including facility modification and construction. The economic effects of these actions can be separated into non-recurring and recurring components. Economic effects related to construction activities are temporary, occurring only for the duration of the construction period; therefore, they

are considered non-recurring impacts. Economic effects related to operations, which involves long-term changes in personnel levels, are considered recurring impacts.

Estimated economic effects of the action alternatives were calculated based on proposed construction spending and personnel changes, which are anticipated to be implemented over a period of years. End-state economic impacts were calculated, as opposed to annual or temporal impacts, due to uncertainties in the timing of the relevant project events. Consequently, the estimated impacts represent the accumulation of impacts over time, and may appear substantial; however in actuality the impacts would be dispersed over a period of many years. The exact magnitude of project spending and personnel changes, as well as the timing of the construction schedules and personnel transfers, may alter the estimated economic effects.

The factors driving potential economic impacts of the proposed alternatives at MCAS Yuma include construction costs and personnel changes, as presented in Table 5.4-5. Personnel changes represent the net change in personnel and include both military and civilian employees. The anticipated change in civilian support personnel is based on a typical ratio of 0.07 per military personnel. For example, under the Maximum Partial Basing Alternative, there would be an increase of 2,015 military personnel and an estimated increase of 141 (2,015 x 0.07) civilian support personnel.

Table 5.4-5. Proposed Construction Cost and Net Change in Personnel at MCAS Yuma

		Net Personnel Change		
	Construction Costs	**Military**	**Civilian**	**Total**
Maximum Partial Basing Alternative	$ 424,033,520	+2,015	+141	+2,156
Minimum Partial Basing Alternative	$ 120,619,349	+712	+50	+762

The economic factors presented in Table 5.4-5 represent the direct impacts of the proposed action alternatives. The economic activity associated with these factors generates regional output, income and employment through the multiplier effect of regional purchases (indirect effects) and payroll spending (induced effects). The total economic impact is equal to the sum of the direct, indirect and induced effects. Economic impacts were calculated for the region encompassed by Yuma, County, Arizona, and Imperial County, California, using IMPLAN impact analysis software.

Maximum Partial Basing (8-Squadron) Alternative

Construction

Under the Maximum Partial Basing Alternative at MCAS Yuma, construction, renovation, or infrastructure improvement projects would be implemented over the period between FY 2010 to 2020 (highest concentration between FY 2010 and FY 2014). Estimated spending for proposed construction projects under this alternative is $424 million, which is defined as the direct output impact in Table 5.4-6. Potential direct impacts associated with this spending would include an estimated 5,253 annual construction jobs (i.e., man-years) over the construction period and $180 million in direct income. The total socioeconomic impact of the proposed construction projects would amount to an estimated $617 million in total output (spending), generating 7,659 total annual jobs and personal income of $251 million. These impacts represent total, accumulated effects that would be distributed over the construction period.

Table 5.4-6. Economic Impact of the Maximum Partial Basing Alternative at MCAS Yuma

	Direct Impact	Indirect Impact	Induced Impact	Total Impact
CONSTRUCTION-RELATED (NON-RECURRING)				
Output	$ 424,033,520	$ 96,498,986	$ 96,018,479	$ 616,550,985
Income	$ 179,518,208	$ 39,434,625	$ 31,654,488	$ 250,607,331
Employment	5,253	1,181	1,225	7,659
OPERATIONS-RELATED (RECURRING)				
Output	$ 106,348,512	$ 0	$ 45,526,223	$ 151,874,735
Income	$ 106,348,512	$ 0	$ 15,008,567	$ 121,357,079
Employment	2,156	0	581	2,737
Source: IMPLAN				

Compared to existing industry data discussed in the *Income and Employment* section, anticipated construction employment associated with the Maximum Partial Basing Alternative could represent a substantial increase in demand for local laborers, particularly in the anticipated peak construction years of FY 2010 to 2014. It is very unlikely employment demand related to proposed construction could be met by existing industry resources in the region; therefore, in-migration of workers to the region should be anticipated. These construction-related economic effects would be temporary, however, only occurring for the duration of the construction period.

Operations

The net change in personnel under the Maximum Partial Basing Alternative would be an increase of 2,156 positions, composed of 2,015 military and 141 civilian personnel. This change would amount to an increase of 35 percent to the existing MCAS Yuma employment of 6,156 personnel. Payroll associated with these personnel would amount to an estimated $106 million. The increase in payroll and household spending by station personnel would have a secondary effect of generating 581 regional jobs, $15 million in related personal income, and $46 million in total regional spending. Since the operations-related impacts of the Maximum Partial Basing Alternative are recurring, these would be long-term, annual effects in the region.

Based on existing military dependent ratios at MCAS Yuma, an estimated 2,754 family members would arrive, for a total anticipated population increase of 4,910 persons. An increase of this size would amount to 38 percent of the existing station population of 12,872 persons and 2.5 percent of the Yuma County population. When viewed in the context of the overall Yuma community, the proposed change in station employment and the secondary economic effects generated could be accommodated within the region. In terms of effects at the station level, MCAS Yuma is a dynamic installation, experiencing regular changes in missions and personnel. However, a change in station population of the magnitude anticipated could significantly affect station housing without sufficient advance planning and preparation at the station level.

Mitigation Measures

Potentially significant socioeconomic impacts are anticipated under the Maximum Partial Basing Alternative, related to both the Construction and Operations phases. Insufficient industry resources may be available within the region to accommodate the entire labor demand generated by the proposed construction projects. Military construction projects at MCAS Yuma, however, often are awarded to general/prime contractors from urban centers in neighboring counties. While some local subcontractors are utilized, many firms provide skilled laborers and equipment from

outside the region. With regard to Operations, the anticipated influx of military personnel and their families may overwhelm existing station housing capacity. Advance planning and coordination with station planners and community leaders in the Yuma area could mitigate potential negative effects associated with these transition impacts.

Minimum Partial Basing (2-Squadron) Alternative

Construction

Under the Minimum Partial Basing Alternative at MCAS Yuma, construction, renovation, or infrastructure improvement projects would be implemented sometime between FY 2010 and FY 2014. Estimated spending for proposed construction projects under this alternative is $121 million, which is defined as the direct output impact in Table 5.4-7. Potential direct impacts associated with this spending would include an estimated 1,494 annual construction jobs (i.e., man-years) over the construction period and $51 million in direct income. The total socioeconomic impact of the proposed construction projects would amount to an estimated $175 million in total output (spending), generating 2,178 total annual jobs and personal income of $71 million. These impacts represent total, accumulated effects that would be distributed over the construction period.

Table 5.4-7. Economic Impact of the Minimum Partial Basing Alternative at MCAS Yuma

	Direct Impact	Indirect Impact	Induced Impact	Total Impact
CONSTRUCTION-RELATED (NON-RECURRING)				
Output	$120,619,349	$27,449,822	$27,313,139	$175,382,310
Income	$51,065,232	$11,217,462	$9,004,344	$71,287,038
Employment	1,494	336	348	2,178
OPERATIONS-RELATED (RECURRING)				
Output	$37,586,996	$0	$16,090,436	$53,677,432
Income	$37,586,996	$0	$5,304,512	$42,891,508
Employment	762	0	205	967
Source: IMPLAN				

Compared to existing industry data discussed in the *Income and Employment* section, anticipated construction employment associated with the Minimum Partial Basing Alternative could represent a significant increase in demand for local laborers, particularly in the anticipated peak construction years of FY 2010 to 2014. While the impacts anticipated under this alternative are not as substantial as those under the Maximum Partial Basing Alternative, it is similarly unlikely employment demand related to proposed construction could be met by existing industry resources in the region; therefore, in-migration of workers to the region should be anticipated. These construction-related economic effects would be temporary, however, only occurring for the duration of the construction period.

Operations

The net change in personnel under the Minimum Partial Basing Alternative would be an increase of 762 positions, composed of 712 military and 50 civilian personnel. This change would amount to an increase of 12 percent to the existing MCAS Yuma employment of 6,156 personnel. Payroll associated with these personnel would amount to an estimated $38 million. The increase in payroll and household spending by station personnel would have a secondary effect of generating 205 regional jobs, $5 million in related personal income, and $16 million in total regional spending. Since the operations-related impacts of the Minimum Partial Basing Alternative are recurring, these would be long-term, annual effects in the region.

Based on existing military dependent ratios at MCAS Yuma, an estimated 973 family members would arrive, for a total anticipated population increase of 1,735 persons. An increase of this size would amount to 13 percent of the existing station population of 12,872 persons and 0.9 percent of the Yuma County population. When viewed in the context of the overall Yuma community, the proposed change in station employment and the secondary economic effects generated could be accommodated within the region. In terms of effects at the station level, MCAS Yuma is a dynamic installation, experiencing regular changes in missions and personnel. However, a change in station population of the magnitude anticipated could significantly affect station housing without sufficient advance planning and preparation at the station level.

Mitigation Measures

Potentially significant socioeconomic impacts are anticipated under the Minimum Partial Basing Alternative, related to both the Construction and Operations phases. Insufficient industry resources may be available within the region to accommodate the entire labor demand generated by the proposed construction projects. Military construction projects at MCAS Yuma, however, often are awarded to general/prime contractors from urban centers in neighboring counties. While some local subcontractors are utilized, many firms provide skilled laborers and equipment from outside the region. With regard to Operations, the anticipated influx of military personnel and their families may exceed existing station housing capacity. Advance planning and coordination with station planners and community leaders in the Yuma area could mitigate potential negative effects associated with these transition impacts.

No Action Alternative

There would be no change in airfield operations or associated personnel under the No Action Alternative. However, it is possible that future construction efforts may be needed (e.g., wash racks at MCAS Yuma) related to MV-22 training by East Coast squadrons under the No Action Alternative. This would require less construction than associated with the proposed action (e.g., no new hangar construction). Depending on the extent and timing of the any future construction effort, it is possible that insufficient industry resources may be available within the region to accommodate the entire labor demand generated by the proposed construction projects, as described above for both basing alternative at MCAS Yuma. However, military construction projects at MCAS Yuma often are awarded to general/prime contractors from urban centers in neighboring counties. While some local subcontractors are utilized, many firms provide skilled laborers and equipment from outside the region. Therefore, no significant socioeconomic impacts are expected.

5.5 COMMUNITY FACILITIES AND SERVICES

Community facilities and services include medical, security, fire and other emergency support services, education, and recreational services. Housing is discussed under section 5.4 (Socioeconomics). This section describes the range of community facilities within the vicinity of MCAS Yuma potentially affected by implementation of the proposed action or alternatives. It also describes the availability of fire and emergency services at the airfields where aircraft landings and take-offs occur.

5.5.1 Affected Environment

Health Services

Medical services for Yuma and surrounding communities are provided by the Yuma Regional Medical Center, which is a 328-bed acute care hospital that offers quality medical/surgical services, and is complimented by other outpatient clinics, long-term retirement homes, and assisted living complexes.

MCAS Yuma's Branch Medical Clinic provides primary medical treatment for base personnel. Emergencies are handled by the local civilian hospital. The MCAS Yuma Dental Clinic is co-located with the Branch Medical Clinic (DoN 2001).

Security Services

The Yuma County Sheriff's office and the Yuma Police Department provide law enforcement and security in the region surrounding MCAS Yuma. The Sheriff's Patrol Bureau and the Yuma Police Department have 72 and 269 certified peace officers, respectively, who patrol the city and county, investigate crimes and respond to emergencies.

The Provost Marshall's Office (PMO) provides law enforcement and security at MCAS Yuma (USMC 1999). The PMO advises the Commanding Officer on activities involving physical security and law enforcement at the station and coordinates with the Naval Criminal Investigative Service in cases involving security and counterintelligence matters. The department includes operations, counter intelligence, services (administration, supply, armory) and training. PMO jurisdiction extends from MCAS Yuma to the local training ranges (DoN 2001).

Fire Protection

The Yuma Fire Department has 107 employees in operations, emergency medical services, training, prevention, emergency management, support and administrative services. The department operates five fire stations strategically located throughout Yuma to respond in minutes to most fires within the city limits. These fire stations respond to 9-1-1 emergency rescue and fire calls. One station is equipped with a hazardous materials vehicle and trained personnel who respond to calls related to exposure to hazardous materials.

MCAS Yuma currently maintains fire protection mutual assistance agreements with the City of Yuma, Somerton, San Luis, Niland, and Welton, Arizona as well as with the City of Winterhaven and the County of Imperial in California.

Education

There are 28 elementary schools, five junior high schools, ten middle schools, and six senior high schools in Yuma County. Students residing on-base usually attend public schools located in the City of Yuma including Palmcroft and Rolle Elementary Schools, Woodard Junior High School, and Kofa High School. According to the Office of the Superintendent for the Yuma school district, the schools surrounding MCAS Yuma have available capacity to accommodate an increase in base population (Yuma School District 2007). Southern Illinois University and University of Phoenix have off-campus education programs at MCAS Yuma. Arizona Western College/Northern Arizona University-Yuma campus has an enrollment of over 10,000 and offers two and four year degrees in a number of subjects.

Park and Recreation Facilities

The City of Yuma and Yuma County offer many parks and recreational features, including golf courses, a myriad of sports facilities (e.g., tennis complexes, swimming pools, handball and racquetball facilities and parks, as well as baseball, softball and soccer fields), sand dunes, and many cultural tourist attractions. The nearby Colorado River offers fishing, water skiing, swimming, and camping opportunities.

Recreational facilities at MCAS Yuma include three baseball fields, a little league field, a running track and gymnasium, movie theater, bowling alley, youth center, a new community center, and a Consolidated Officer/Enlisted Club (DoN 2001). In addition, the Marine Corps Community Services manages the Lake Martinez Recreation Area which is located 39 miles north of MCAS Yuma. The Lake Martinez Recreation Area offers a variety of recreational opportunities including, camping, fishing, boating, water sports, and wildlife viewing.

5.5.2 Environmental Consequences

Maximum Partial Basing (8-Squadron) Alternative

Under the Maximum Partial Basing Alternative, the amount of aircraft and personnel at MCAS Miramar would increase. There would be a net increase of 2,156 personnel under this alternative (see Table 5.4-5). However, in spite of the increase in personnel, for the range of community facilities and services discussed below, the increase would not cause significant impacts since the installation is required to proactively plan for and assess all essential services to ensure that the proposed increase in personnel and their dependents would be accommodated under the Maximum Partial Basing Alternative. The installation routinely evaluates community facilities and services to account for fluctuations associated with new units assigned to the installation and the deployment of existing units, and there have been no indication that the existing community facilities and services are considered deficient and that the introduction of the proposed additional personnel would impact those services.

Health Services

The installation is required to plan for and assess all essential services to ensure that the existing health services can adequately accommodate the proposed increase of personnel and their dependents with implementation of the Maximum Partial Basing Alternative. Therefore, no significant impacts would occur.

Security Services

The installation is required to plan for and assess all essential services to ensure that the existing security services can adequately accommodate the proposed increase of aircraft and personnel with implementation of the Maximum Partial Basing Alternative. Therefore, no significant impacts would occur.

Fire Protection

The installation is required to plan for and assess all essential services to ensure that the existing fire protection services can adequately accommodate the proposed increase of aircraft and

personnel with implementation of the Maximum Partial Basing Alternative. Therefore, no significant impacts would occur.

Education

The installation is required to plan for and assess all essential services to ensure that existing educational services can adequately accommodate the proposed increase of personnel and their dependents with implementation of the Full Basing Alternative. A variety of schools and universities are located in Yuma County that can accommodate the proposed increase of personnel dependents with implementation of the Maximum Partial Basing Alternative. The schools surrounding MCAS Yuma have available capacity to accommodate the increase in personnel dependents, and in the event that space becomes limited at any of the schools surrounding the base, any number of the 28 schools within the district would have sufficient capacity to accommodate those students (Yuma School District 2007). Therefore, no significant impacts would occur.

Park and Recreation Facilities

The installation is required to plan for and assess all essential services to ensure that the existing parks and recreation facilities can adequately accommodate the proposed increase of personnel and their dependents with implementation of the Maximum Partial Basing Alternative. Therefore, no significant impacts would occur.

Mitigation Measures

Implementation of the Maximum Partial Basing Alternative at MCAS Yuma would not result in significant impacts to community facilities and services; therefore, no mitigation measures would be required.

Minimum Partial Basing (2-Squadron) Alternative

The impacts to community facilities and services for the Minimum Partial Basing Alternative would be similar to those described above under the Maximum Partial Basing Alternative. There would be a net increase of 762 personnel under this alternative (see Table 5.4-5). Although there would be an overall increase in military aircraft operations, ground-based activity, and personnel associated with the two MV-22 squadrons, as discussed under the Maximum Partial Basing Alternative, the installation is required to proactively plan for and assess all essential services to ensure that the existing community facilities and services are adequate and would accommodate the proposed increase. Therefore, no significant impacts to community facilities and services would occur with implementation of the Minimum Partial Basing Alternative.

Mitigation Measures

Implementation of the Minimum Partial Basing Alternative at MCAS Yuma would not result in significant impacts to community facilities and services; therefore, no mitigation measures would be required.

No Action Alternative

There would be no change in airfield operations or associated personnel under the No Action Alternative. Therefore, existing conditions would remain unchanged, and no impacts to community facilities and services would occur.

5.6 GROUND TRAFFIC AND TRANSPORTATION

Ground traffic and transportation refer to the movement of vehicles throughout a road and highway network. Roadways are classified into one of three types according to the function they serve in moving traffic: arterial highways, collector roadways, and local streets. Arterial highways and interstates serve the movement of traffic regionally and between population and activity centers with a minimal level of access to adjacent properties. Collector roadways serve the movement of traffic from population and activity centers and funnel them onto arterial highways with a moderate level of access to adjacent properties. Local roadways provide access to adjacent properties and move traffic onto collector and arterial roadways.

Roadways are evaluated by comparing the average daily traffic (ADT) that is carried on the roadway segment to the design capacity of the roadway. Each roadway segment is then given a corresponding Level of Service (LOS) designation. LOS designation is a professional industry standard by which the operating conditions of a given roadway segment or intersections are measured. LOS is defined on a scale of A to F; where LOS A represents the best operating conditions and LOS F represents the worst operating conditions. LOS A facilities are characterized as having free flowing traffic conditions with no restrictions on maneuvering or operating speeds; traffic volumes are low and travel speeds are high. LOS F facilities are characterized as having forced flow with many stoppages and low operating speeds.

5.6.1 Affected Environment

Regional and Local Circulation

MCAS Yuma is located in the City of Yuma, in the southwest corner of Arizona. The station is bordered by Avenue 3E to the east, County 14th Street to the south, South 4th Street and the Airport Loop to the west, and 32nd Street (Business Highway 8) to the north (DoN 2001) (Figure 5.6-1). The regional routes that provide access to MCAS Yuma are Interstate-8 from the east and west and Route 95 from the east and south. The following provides more detail regarding the principal roadways that may be utilized to gain access to MCAS Yuma:

- Avenue 3E is a four-lane major roadway between 32nd Street (Business Highway 8) and East 40th Street that serves as an access point for MCAS Yuma; it has a volume of 19,393 ADT, and Avenue 3E is a 2-lane roadway between East 40th Street and County 13th Street with a volume of 10,547 ADT (Yuma Metropolitan Planning Organization [YMPO] 2007).

- County 14th Street is a two-lane rural road with an ADT volume of 5,265 between Airport Loop-South Avenue A and Avenue 3E (YMPO 2009).

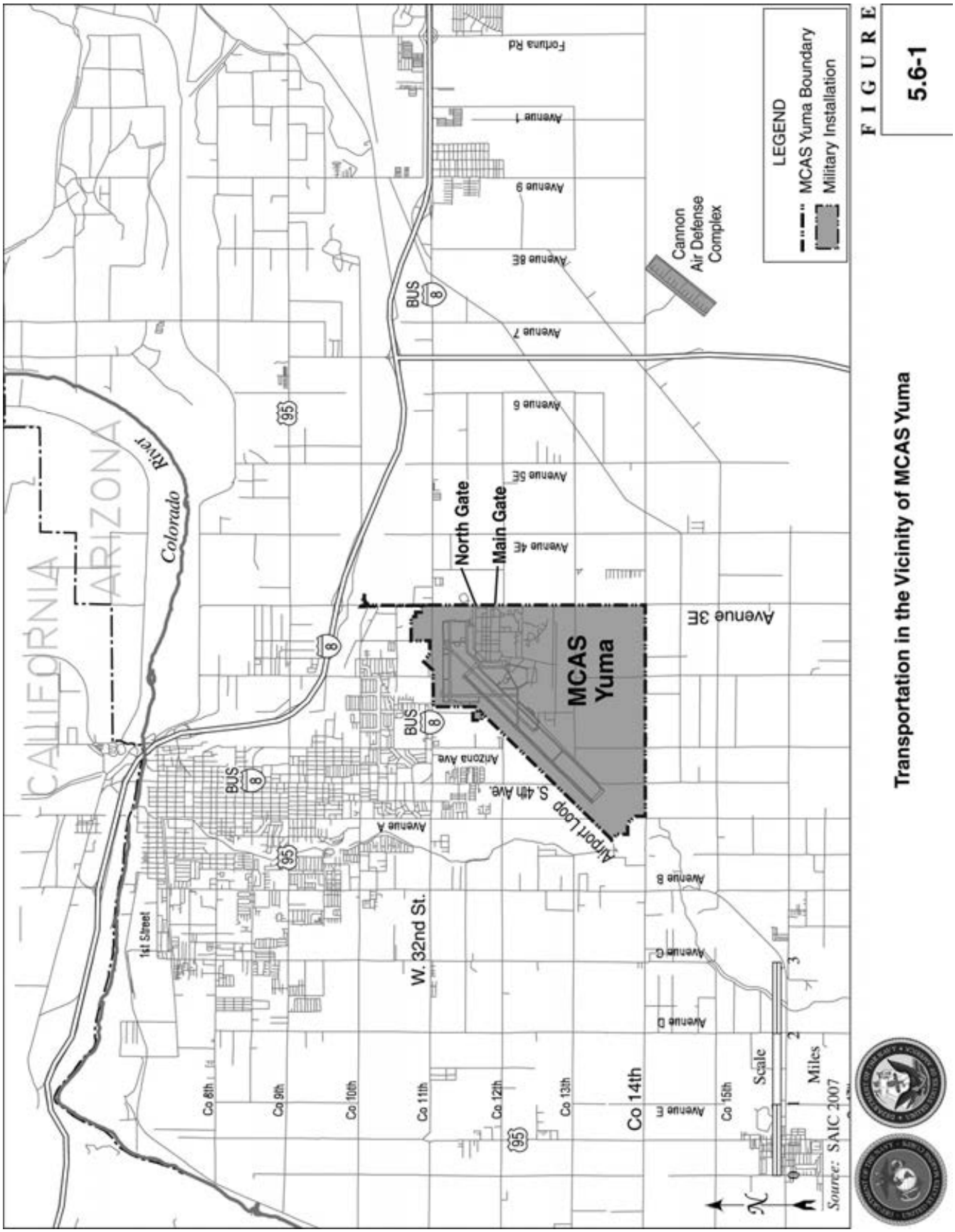

FIGURE 5.6-1

Transportation in the Vicinity of MCAS Yuma

Table 5.6-1. Existing Roadway Segment Daily Level of Service for MCAS Yuma Area

Roadway Segment	Classification	Capacity[1]	ADT	LOS
INTERSTATE-8				
Co 9th St to Avenue 3E	4-Lane Interstate	80,000	29,038	A
Avenue 3E to Araby Rd	4-Lane Interstate	80,000	26,339	A
BUSINESS 8				
West of Avenue 3E	6-Lane Principal Arterial	54,000	28,577	B
East of Avenue 3E	4-Lane Principal Arterial	36,000	20,357	B
COUNTY 14TH STREET				
West of Avenue 3E	2-Ln Rural Minor Collector	13,120	5,502	A
AVENUE 3E				
Interstate 8 to Business 8	2-Ln Rural Minor Collector	**13,120**	**16,208**	**F**
Business 8 to 40th St.	4-Ln Minor Arterial	32,400	19,393	B
40th St to Co 14th St.	2-Ln Rural Minor Collector	13,120	20,885	C
Co 14th St to Co 15th St.	2-Ln Rural Minor Collector	13,120	10,547	D

Notes:
1. Capacity is based on the upper limit of LOS E per the YMPO LOS Thresholds.
ADT = Average Daily Traffic, LOS = Level of Service

Source: YMPO 2009

Circulation at MCAS Yuma

There are currently three entry points to the station. The Main Gate, which provides primary access for station visitors, residents, and staff, is located just north of the intersection of Avenue 3E and East County 12th Street. This gate gives access to the internal roadways Quilter Street and Hart Street. The second gate (North Gate) is on Avenue 3E at the intersection of Avenue 3E and O'Neill Street. A third gate for ordnance use only is located at the southwest corner of the base.

According to a 1993 traffic and circulation study, it was noted that there were no notable traffic circulation problems near the Main Gate (USMC 1999). Circulation within MCAS Yuma is organized in a grid street pattern for the administrative and station support functions to help equally distribute traffic flow throughout the station (DoN 2001) (see Figure 5.3-2). Access to the flightline facilities, including the proposed project area, is provided by O'Neill Street (see Figure 5.3-2).

Parking in the administration and station support areas as well as the flightline is provided by paved parking lots and by linear parallel parking areas (DoN 2001).

Daily Hours of Operation at MCAS Yuma

Regular hours of operation at MCAS Yuma are 0730 to 2230 Mountain Standard Time (MST) Monday through Friday and 1000 to 1800 MST Saturday and Sunday.

5.6.2 Environmental Consequences

Maximum Partial Basing (8-Squadron) Alternative

Construction

Construction hours of operation at MCAS Yuma would occur between 0730 to 1730 Monday through Friday MST. During the construction phase at MCAS Yuma for the Maximum Partial

Basing Alternative, it is estimated that 5,165 truck trips would be required to haul demolished material off-site and provide the needed construction materials. Estimating that each truck would make one inbound and one outbound trip, and that the construction traffic would be evenly distributed over a one year period (51 work weeks)[1], there would be approximately 41 daily two-way truck trips added to the adjacent roadway network. Estimating that each truck is equivalent to two passenger cars, a net of 82 daily two-way passenger car equivalent (PCE) trips would be added to the existing roadway network during construction. As shown in Table 5.6-2, if the 82 daily PCE trips are added to Avenue 3E at the Main Gate, Avenue 3E would continue to operate at an acceptable LOS B. However, construction-related traffic would be a significant portion of the total traffic volumes for the segment of Avenue 3E between Interstate 8 and Business 8.

Table 5.6-2. MCAS Yuma Maximum Basing Alternative Construction Traffic Roadway Segment Daily Level of Service

Roadway Segment	Capacity	Existing			Existing + Project			Impact?	
		ADT	V/C	LOS	ADT	V/C	LOS	Δ ADT(1)	Sig.? (2)
INTERSTATE-8 (a)									
Co 9th St. to Avenue 3E	80,000	29,038	0.363	A	29,079	0.363	A	41	No
Avenue 3E to Araby Rd.	80,000	26,339	0.329	A	26,380	0.330	A	41	No
AVENUE 3E (b)									
Interstate 8 to Business 8	13,120	**16,208**	**1.235**	**F**	**16,290**	**1.242**	**F**	**82**	**Yes(3)**
Business 8 to 40th St.-Main Gate	32,400	19,393	0.599	B	19,475	0.601	B	82	No

Notes:

a. ADOT criteria (i.e., a change in LOS) was used as a reference point for significance for the interstate.
b. City of Yuma Traffic Impact Study Guidelines (i.e., a roadway segment operates a worse than LOS D) was used as a reference point for significance for roadways.
1. The incremental change in conditions associated with the proposed action (i.e., the difference between existing with project and existing without project conditions).
2. Significant impacts assess whether the project traffic, itself, is a considerable portion of the total direct impacts.
3. Roadway segment operates at worse than LOS D; using the City of Yuma Traffic Impacts Study Guidelines as a reference point for significance, this segment is considered to be significant (City Standard 2100).

ADT = Average Daily Traffic; LOS = Level of Service; v/c = volume-to-capacity; N/A = Not Applicable; Δ = Change In; Sig.? = Significant

Operations

MCAS Yuma Maximum Partial Basing Alternative would add a net of 2,015 military personnel and 141 civilian employees. Estimating that each employee makes two trips per day and that all employees would be on the base at the same time, the implementation of the Maximum Partial Basing Alternative would add an additional 4,312 trips onto the existing roadway conditions after the construction phase is completed. As shown in Table 5.6-3, operations-related traffic associated with this alternative would be a significant portion of the total traffic volumes for the segment of Avenue 3E between Interstate 8 and Business 8.

[1] To be conservative, total construction-related truck traffic was estimated to occur within a one-year time frame instead of a two or more-year time frame for all alternatives. This means that the daily truck trips are likely an overestimate of what would actually occur.

Table 5.6-3. MCAS Yuma Maximum Partial Basing Alternative Operations-Related Traffic Roadway Segment Daily Level of Service

Roadway Segment	Capacity	Existing			Existing + Project			Impact?	
		ADT	V/C	LOS	ADT	V/C	LOS	Δ ADT(1)	Sig.? (2)
INTERSTATE-8 (a)									
Co 9th St. to Avenue 3E	80,000	29,038	0.363	A	31,151	0.389	A	2,113	No
Avenue 3E to Araby Rd	80,000	26,339	0.329	A	28,452	0.356	A	2,113	No
BUSINESS 8 (b)									
West of Avenue 3E	54,000	28,577	0.529	B	29,486	0.546	B	909	No
East of Avenue 3E	36,000	20,357	0.565	B	21,266	0.591	B	909	No
COUNTY 14TH STREET (b)									
West of Avenue 3E	13,120	5,502	0.419	A	5,502	0.419	A	0	No
AVENUE 3E (b)									
Interstate 8 to Business 8	13,120	**16,208**	**1.235**	**F**	**20,434**	**1.557**	**F**	**4,226**	**Yes(3)**
Business 8 to 40th St.	32,400	19,393	0.599	B	23,705	0.732	D	4,312	No
40th St to Co 14th St.	13,120	20,885	0.645	C	20,971	0.647	C	86	No
Co 14th St to Co 15th St.	13,120	10,547	0.804	D	10,547	0.804	D	0	No

Notes:

a. ADOT criteria (i.e., a change in LOS) was used as a reference point for significance for the interstate.
b. City of Yuma Traffic Impact Study Guidelines (i.e., a roadway segment operates a worse than LOS D) was used as a reference point for significance for roadways.
1. The incremental change in conditions associated with the proposed action (i.e., the difference between existing with project and existing without project conditions).
2. Significant impacts assess whether the project traffic, itself, is a considerable portion of the total direct impacts.
3. Roadway segment operates at worse than LOS D; using the City of Yuma Traffic Impacts Study Guidelines as a reference point for significance, this segment is considered to be significant (City Standard 2100).

ADT = Average Daily Traffic; LOS = Level of Service; v/c = volume-to-capacity; N/A = Not Applicable; Δ = Change In; Sig.? = Significant

Mitigation Measures

Significant traffic impacts resulting from the Maximum Partial Basing Alternative cannot be mitigated because the additional traffic volume does not meet eligibility criteria for the Defense Access Roads Program (23 U.S. Code § 210), and the DoN has no other legal authority for funding roadway improvements outside the installation.

Minimum Partial Basing (2-Squadron) Alternative

Construction

During the construction phase at MCAS Yuma for the Minimum Partial Basing Alternative, it is estimated that 2,333 truck trips would be required to haul demolished material off-site and provide the needed construction materials. Estimating that each truck would make one inbound and one outbound trip, and that the construction traffic would be evenly distributed over a one year period (51 work weeks), there would be approximately 19 daily two-way truck trips added to the adjacent roadway network. Estimating that each truck is equivalent to two passenger cars, a net of 38 daily two-way PCE trips would be added to the existing roadway network during construction. As shown in Table 5.6-4, if the 38 daily PCE trips are added to Avenue 3E at the Main Gate, Avenue 3E would continue to operate at an acceptable LOS B. Additionally, this alternative would add 38 trips to the average daily traffic of 16,408 on Avenue 3E between Interstate 8 and Business 8, which is at LOS F. This increase of 0.2 percent is not a considerable portion of the traffic, and is not a significant impact.

Table 5.6-4. MCAS Yuma Minimum Basing Alternative Construction Traffic Roadway Segment Daily Level of Service

Roadway Segment	Capacity	Existing			Existing + Project			Impact?	
		ADT	V/C	LOS	ADT	V/C	LOS	Δ ADT(1)	Sig.? (2)
INTERSTATE-8									
Co 9th St. to Avenue 3E	80,000	29,038	0.363	A	29,057	0.363	A	19	No
Avenue 3E to Araby Rd.	80,000	26,339	0.329	A	26,358	0.329	A	19	No
AVENUE 3E									
Interstate 8 to Business 8	13,120	16,208	1.235	F	16,246	1.238	F	38	No
Business 8 to 40th St-Main Gate	32,400	19,393	0.599	B	19,431	0.600	B	38	No

Notes:
1. The incremental change in conditions associated with the proposed action (i.e., the difference between existing with project and existing without project conditions).
2. Significant impacts assess whether the project traffic, itself, is a considerable portion of the total direct impacts.

ADT = Average Daily Traffic; LOS = Level of Service; v/c = volume-to-capacity; N/A = Not Applicable; Δ = Change In; Sig.? = Significant

Operations

MCAS Yuma Minimum Partial Basing Alternative would add a net of 712 military personnel and 50 civilian employees. Estimating that each employee makes two trips per day and that all employees would be on the base at the same time, the implementation of the Minimum Partial Basing Alternative would add an additional 1,524 trips onto the existing roadway conditions after the construction phase is completed. As shown in Table 5.6-5, Avenue 3E between 32nd Street (Business Highway 8) and East 40th Street would continue to operate at LOS C with the addition of 1,524 ADT. However, operations-related traffic would be a significant portion of the total traffic volumes for the segment of Avenue 3E between Interstate 8 and Business 8.

Table 5.6-5. MCAS Yuma Minimum Partial Basing Alternative Operations-Related Traffic Roadway Segment Daily Level of Service

Roadway Segment	Capacity	Existing			Existing + Project			Impact?	
		ADT	V/C	LOS	ADT	V/C	LOS	Δ ADT(1)	Sig.? (2)
INTERSTATE-8 (a)									
Co 9th St to Avenue 3E	80,000	29,038	0.363	A	29,770	0.372	A	732	No
Avenue 3E to Araby Rd.	80,000	26,339	0.329	A	27,071	0.338	A	732	No
BUSINESS 8 (b)									
West of Avenue 3E	54,000	28,577	0.529	B	28,928	0.536	B	351	No
East of Avenue 3E	36,000	20,357	0.565	B	20,708	0.575	B	351	No
COUNTY 14TH STREET (b)									
West of Avenue 3E	13,120	5,502	0.419	A	5,502	0.419	A	0	No
AVENUE 3E (b)									
Interstate 8 to Business 8	13,120	**16,208**	**1.235**	**F**	**17,672**	**1.347**	**F**	**1,464**	**Yes(3)**
Business 8 to 40th St.	32,400	19,393	0.599	B	20,887	0.645	C	1,494	No
40th St. to Co 14th St.	13,120	20,885	0.645	C	20,915	0.646	C	30	No
Co 14th St. to Co 15th St.	13,120	10,547	0.804	D	10,547	0.804	D	0	No

Notes:
a ADOT criteria (i.e., a change in LOS) was used as a reference point for significance for the interstate.
b City of Yuma Traffic Impact Study Guidelines (i.e., a roadway segment operates a worse than LOS D) was used as a reference point for significance for roadways.
1. The incremental change in conditions associated with the proposed action (i.e., the difference between existing with project and existing without project conditions).
2. Significant impacts assess whether the project traffic, itself, is a considerable portion of the total direct impacts.
3. Roadway segment operates at worse than LOS D; using the City of Yuma Traffic Impacts Study Guidelines as a reference point for significance, this segment is considered to be significant (City Standard 2100).

ADT = Average Daily Traffic; LOS = Level of Service; v/c = volume-to-capacity; N/A = Not Applicable; Δ = Change In; Sig.? = Significant

Mitigation Measures

Significant traffic impacts associated with the Minimum Partial Basing Alternative cannot be mitigated because the additional traffic volume does not meet eligibility criteria for the Defense Access Roads Program (23 U.S. Code § 210), and the DoN has no other legal authority for funding roadway improvements outside the installation.

No Action Alternative

There would be no change in airfield operations or associated personnel under the No Action Alternative. However, it is possible that future construction efforts may be needed (e.g., wash racks at MCAS Yuma) related to MV-22 training by East Coast squadrons under the No Action Alternative. This would require less construction than associated with the proposed action (e.g., no new hangar construction). It is likely that future construction would be less than proposed under the Minimum Partial Basing Alternative, which would not have a significant impact on traffic (see above analysis). Therefore, no significant impacts are expected from these smaller future construction efforts that may occur under the No Action Alternative.

5.7 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 national standards, established by the USEPA, are termed the National Ambient Air Quality Standards (NAAQS). 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 NAAQS are shown in Table 5.7-1. In Arizona, the Arizona Department of Environmental Quality (ADEQ) has adopted the NAAQS to regulate sources of air pollution and is the responsible agency for enforcing these standards.

Toxic compounds are toxic air pollutants (TACs) that have been determined to present some level of acute or chronic health risk (cancer or non-cancer) to the general public. Units of concentration for both of these types of pollutants are generally expressed in parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). The main pollutants of concern considered in this air quality analysis include volatile organic compounds (VOCs), ozone (O_3), 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) have no established ambient standards, they are important as precursors to O_3 formation.

5.7.1 Affected Environment

Region of Influence

The project region for the proposed action includes MCAS Yuma, proposed training areas, and aircraft flight routes between these locations. 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 and particulates in the form of dust), 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 VOCs. In the presence of solar radiation, the maximum effect of precursor emissions on ozone levels usually occurs several hours after they are emitted and many miles from the source.

Table 5.7-1. National Ambient Air Quality Standards

Pollutant	Averaging Time	National Standards [a]	
		Primary [b,c]	Secondary [b,d]
Ozone (O3)	8-hour	0.075 ppm (147 μg/m³)	Same as primary
	1-hour	0.12 ppm (235 μg/m³)	Same as primary
Carbon monoxide (CO)	8-hour	9 ppm (10 mg/m³)	—
	1-hour	35 ppm (40 mg/m³)	—
Nitrogen dioxide (NO2)	Annual	0.053 ppm (100 μg/m³)	Same as primary
	1-hour	—	—
Sulfur dioxide (SO2)	Annual	0.03 ppm (80 μg/m³)	—
	24-hour	0.14 ppm (365 μg/m³)	—
	3-hour	—	0.5 ppm (1,300 μg/m³)
	1-hour	—	—
PM10	24-hour	150 μg/m³	Same as primary
PM2.5	Annual	15 μg/m³	
	24-hour	35 μg/m³	
Lead	Rolling 3-month period	0.15 μg/m³	Same as primary

Notes:

a. Standards other than the 1-hour ozone, 24-hour PM10, and those based on annual averages are not to be exceeded more than once a year. The 8-hour ozone standard will eventually replace the 1-hour ozone standard and the PM2.5 standard (particulate matter with a 2.5 micron diameter) will be implemented over an extended time frame.

b. Concentrations are expressed first in units in which they were promulgated. Equivalent units given in parenthesis.

c. Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. Each state must attain the primary standards no later than three years after that state's implementation plan is approved by the USEPA.

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

The project air quality analysis includes an evaluation of proposed aircraft emissions that would occur from both surface and airborne operations within 3,000 feet (914 meters) of the ground. This upper limit is the average depth of the 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.

Existing Air Quality

The project region surrounding MCAS Yuma presently attains all NAAQS except the PM_{10} standard. However, air monitoring data show that O_3 levels in the Yuma region approach the limit for the national eight-hour O_3 standard (0.075 ppm) (ADEQ 2008b).

MCAS Yuma is within the Yuma PM_{10} moderate nonattainment area, which extends roughly 10 to 15 miles (16 to 24 km) east of the greater Yuma metropolitan area. Based upon monitored data collected from 1998 through 2000, the region had attained the PM_{10} standards. As a result, the ADEQ developed a PM_{10} Maintenance Plan for the Yuma area and submitted the Plan to the USEPA on 14 August 2006 (ADEQ 2006). Upon the USEPA's approval of the Maintenance Plan, the USEPA will re-designate the Yuma area to attainment for PM10 (ADEQ 2007).

Ozone concentrations are the highest during the warmer months of the year and coincide with the period of maximum insolation. Maximum O_3 concentrations tend to be homogeneously spread throughout a region, since it often takes several hours to convert precursor emissions to O_3 in the atmosphere. Inert pollutants from combustive sources, such as CO, tend to have the highest concentrations during the colder months of the year, when light winds and nighttime/early morning surface-based temperature inversions inhibit atmospheric dispersion. Maximum inert pollutant concentrations are usually found near an emission source. In regard to PM_{10} emissions from fugitive dust within the project region, maximum PM_{10} impacts occur in combination with ground-disturbing activities (such as agricultural tilling) or vehicular activities (on paved and unpaved surfaces) and high wind events.

MCAS Yuma Emissions

Table 5.7-2 presents the emissions that occurred from stationary sources that require an ADEQ air permit at MCAS Yuma for the year 2002 (URS 2003a). These data show that the main stationary sources of (1) VOC emissions occur from gasoline storage and transfer and material usage (such as solvents) and (2) all other emissions occur from natural gas combustion in boilers/chillers and jet engine testing. Mobile source emissions data for MCAS Yuma are not available. However, since the facility experiences a relatively high level of aviation operations and support activities, it is expected that total aircraft and personally owned vehicle emissions at MCAS Yuma are greater than total estimated stationary source emissions.

Table 5.7-2. Annual Emissions at MCAS Yuma for the Year 2002

Activity	Air Pollutant Emissions (tons/year)				
	VOC	*CO*	*NOx*	*SOx*	*PM10*
Abrasive Blasting	---	---	---	---	0.00
Boilers and Chillers	0.25	3.65	4.58	0.03	0.34
Degreasers	0.16	---	---	---	---
Fuel Storage Tanks	6.69	---	---	---	---
Gasoline Dispensing	3.48	---	---	---	---
Internal Combustion Engines	0.22	3.12	1.63	0.11	0.12
Jet Engine Test Cells	0.20	2.61	5.45	0.21	1.58
Material Usage	4.42	---	---	---	---
Open Pit Burning	0.54	0.34	0.01	0.04	0.26
Painting	0.08	---	---	---	0.00
Remediation Systems	0.00	---	---	---	---
Welding	---	---	---	---	0.01
Total Stationary Source Emissions [1]	**16.04**	**9.72**	**11.67**	**0.39**	**2.31**
CH-46E Aircraft Ops - Year 2000	4.76	14.95	0.75	0.10	0.95
Total Existing Emissions	**20.80**	**24.67**	**12.42**	**0.49**	**3.26**

Note:
1. Only includes stationary source emissions that require an ADEQ air permit (URS 2003a).

Greenhouse Gas Emissions

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. These emissions occur from natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the earth's temperature. 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 negative environmental, economic and social consequences across the globe.

Recent observed changes due to global warming include shrinking glaciers, thawing permafrost, a lengthened growing season, and shifts in plant and animal ranges (Intergovernmental Panel on Climate Change 2007). 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.

The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Examples of GHGs created and emitted primarily through human activities include fluorinated gases (hydro fluorocarbons and per fluorocarbons) and sulfur hexafluoride. Each GHG is assigned a global warming potential (GWP). The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. The GWP rating system is standardized to CO_2, which has a value of one. For example, CH_4 has a GWP of 21, which means that it has a global warming effect 21 times greater than CO_2 on an equal-mass basis. To simplify 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 emission of each GHG by its GWP and adding the results together to produce a single, combined emission rate representing all GHGs.

Federal agencies are, on a national scale, addressing emissions of GHGs by reductions mandated in federal laws and Executive Orders, most recently, Executive Order 13423. Several states have promulgated laws as a means to reduce statewide levels of GHG emissions. In particular, the California Global Warming Solutions Act of 2006 directs the State of California to reduce statewide GHG emissions to 1990 levels by the year 2020. In addition, groups of states (such as the Western Climate Initiative) have formed regionally-based collectives 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 Executive Order 13123 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 continues to promote and install new renewable energy projects within the NAVFAC Southwest region.

The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Therefore, the impact of proposed GHG emissions to climate change is discussed in the context of cumulative impacts in Chapter 8.0 of this EIS. Appendix B presents estimates of GHG emissions generated by each alternative.

Regional Climate

The climate of the MCAS Yuma project region is classified as arid continental, characterized by hot summers, mild winters, low humidity, and large diurnal variations in temperature. This arid condition produces low soil moisture and a high potential for fugitive dust emissions (PM_{10}), which is one of the main air pollution problems in the region. Data collected at the Yuma International Airport, adjacent to MCAS Yuma, are used to describe the climatic conditions of the project region (Western Region Climate Center 2004).

Precipitation

The project region is within the Lower Colorado River Valley, which has the driest climate in the U.S. This condition occurs because (1) the region is at the southern extent of the track of wintertime North Pacific storms, (2) the rain shadow effects of the Coast Ranges block the flow of moisture into the region from the Pacific Ocean, and (3) the region is at the western fringe of the summertime monsoon regime, whose moisture sources originate from the Gulf of Mexico and Gulf of California. The annual precipitation in the region averages about 3 inches (8 cm). Monsoon rains, which generally occur between the months of July through October, produce about 45 percent of the annual rainfall at MCAS Yuma.

Temperature

The average high and low temperatures at MCAS Yuma during the summer months range from about 105 to 78 degrees Fahrenheit (°F). The average high and low temperatures during the winter months range from 70 to 44 °F. The low humidity in the region is responsible for the large diurnal variations in temperature.

Prevailing Winds

The winds at MCAS Yuma generally fall into three seasonal patterns: (1) northerly winds during the winter, (2) westerly winds during the spring, and (3) southeast winds during the summer as part of the monsoon circulation. Average daily wind speeds range from a low of about 7 knots in the fall to almost 10 knots in the summer.

Applicable Regulations and Standards

The Federal Clean Air Act of 1970 and its subsequent amendments (the CAA) establish air quality regulations and the NAAQS and delegate the enforcement of these standards to the states. 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 project actions.

Federal Regulations

Section 176(c) of the CAA, as articulated in the USEPA General Conformity Rule, states that a federal agency cannot issue a permit for 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 must not (1) cause or contribute to any new violation of a NAAQS, (2) increase the frequency or severity of any existing violation, or (3) delay the timely attainment of any standard, interim emission reduction, or other milestone. ADEQ Article 18-2-14 implements the USEPA's General Conformity Rule. Within the MCAS Yuma project region, if net annual emissions of PM_{10} increase by less than 100 tons, a CAA conformity determination is not required. If emissions of PM_{10} exceed this *de minimis* threshold, the DoN must demonstrate conformity under one of the methods prescribed by ADEQ Article 18-2-14. The project conformity applicability analysis for the MV-22 proposed action within the Yuma PM_{10} nonattainment area is summarized in section 7.3.6 and is presented in complete form in Appendix B.1 of this EIS.

State Regulations

The ADEQ regulates sources of air pollution within the MCAS Yuma project region and the State of Arizona (other than Indian lands). The ADEQ has developed a PM_{10} attainment plan that is designed to reduce emissions to a level that will bring the Yuma area into attainment of the PM_{10} ambient air quality standard. Once adopted, these emission control measures are incorporated into *Title 18 of the Arizona Administrative Code, Chapter 2: Department of Environmental Quality - Air Pollution Control*, which is used to regulate sources of air pollution in Arizona (ADEQ 2008a).

5.7.2 Environmental Consequences

Air quality impacts were reviewed for significance in light of federal, state, and local air pollution standards and regulations. For the purposes of the present analysis, if project emissions were projected to exceed a threshold requiring a conformity determination in the MCAS Yuma project region (i.e., 100 tons per year PM_{10}), further analysis would be conducted to determine whether impacts were significant. In the case of criteria pollutants for which the MCAS Yuma project region is in attainment of NAAQS, the analysis looked at whether the magnitude and location of project emissions reasonably would be expected to cause a significant adverse impact to air quality.

Maximum Partial Basing (8-Squadron) Alternative

Construction

Air quality impacts from construction of the Maximum Partial Basing Alternative would occur from (1) combustive emissions due to the use of fossil fuel-powered equipment and (2) fugitive dust emissions during demolition activities, earth-moving activities, and the operation of equipment on bare soil. Equipment usage estimated for proposed construction activities were used to estimate project combustive and fugitive dust emissions (DoN 2007).

Factors needed to derive construction source emission rates were obtained from *Compilation of Air Pollution Emission Factors, AP-42, Volume I* (USEPA 1995), *EMFAC2007 Model* for on-road vehicles (ARB 2006a), and the USEPA NONROAD2005 model for nonroad construction equipment (USEPA 2006). The analysis estimated that construction equipment would equate to the average Maricopa County fleets for years 2010 and 2011. The analysis also reduced PM_{10} emissions from earth-moving activities by 75 percent from uncontrolled levels to simulate implementation of best management practices (BMPs) for fugitive dust control. Appendix B includes data and assumptions used to calculate proposed construction emissions.

Table 5.7-3 summarizes the annual and total construction emissions associated with the Maximum Partial Basing Alternative. These data show that annual PM_{10} emissions for proposed construction activities would not exceed the conformity *de minimis* threshold. The MCAS Yuma project region is in attainment for O_3, CO, NO_2, SO_2, and $PM_{2.5}$ and the nominal construction emissions of these criteria pollutants and their precursors are only a small fraction of their conformity *de minimis* levels in a nonattainment area (100 tons per year). Air quality impacts associated with these emissions would not be significant. The main sources of PM_{10}/$PM_{2.5}$ emissions would occur as fugitive dust from earth-moving and demolition activities.

Table 5.7-3. Annual and Total Emissions Due to Construction of the Maximum Partial Basing Alternative at MCAS Yuma

Construction Activity	Air Pollutant Emissions (tons)					
	VOC	CO	NOx	SOx	PM10	PM2.5
2010						
Demolition – Building Facilities	0.04	0.19	0.43	0.07	0.04	0.04
Demolition – Airfield Facilities	0.22	1.12	2.38	0.36	0.92	1.62
Construction – Building Facilities	0.21	1.38	2.23	0.36	0.26	0.25
Construction – Airfield Facilities	0.61	3.31	5.54	0.90	1.35	0.75
Annual Emissions (1)	**1.08**	**6.00**	**10.58**	**1.68**	**2.56**	**2.66**
Conformity *De Minimis* Level	**NA**	**NA**	**NA**	**NA**	**100**	**NA**
Total Emissions	**2.16**	**12.00**	**21.16**	**3.37**	**5.13**	**5.32**

Note:
1. Year 2010 emissions equal to 50% of total emissions.

Project construction equipment would emit TACs that could potentially impact public health. The main source of TACs would occur in the form of particulates from the combustion of diesel fuel. Due to the mobile and intermittent operation of proposed diesel-powered construction equipment over a large construction area, they would produce minimal ambient impacts of TACs in a localized area. As a result, construction of the Maximum Partial Basing Alternative would produce less than significant impacts to public health.

Operations

Air quality impacts associated with the Maximum Partial Basing Alternative were determined by comparing the increase in emissions associated with proposed MV-22 operations within the MCAS Yuma region. Emissions from the alternative would include (1) operations and engine maintenance/testing of MV-22 aircraft, (2) personal- and government-owned vehicles (POVs and GOVs), (3) ground/tactical support equipment (G/TSE), (4) construction activities performed by each detachment as part of routine operations, and (5) stationary and other sources.

Operational data used to calculate proposed MV-22 emissions were obtained from the USMC (USMC 2007 and Wyle Laboratories 1999). Factors used to calculate combustive emissions for the MV-22 aircraft were obtained from the DoN (Aircraft Environmental Support Office [AESO] 2001a and 2001b). Emissions from stationary sources were estimated by multiplying emissions from current MCAS Yuma activities (Table 5.7-2) by the ratio of the proposed MV-22 and current MCAS Yuma personnel (2,015/6,000). Emissions from all other source categories were estimated equal to those estimated for the Maximum Partial Basing Alternative at MCAS Miramar (Tables 3.7-6). It is expected that this technique overestimates proposed ground/tactical support equipment emissions, as it does not consider the replacement of newer and cleaner emitting equipment into the proposed fleet. Details of emission source data and calculations used to estimate operational emissions are included in Appendix B of this EIS.

Table 5.7-4 presents a summary of the annual operational emissions that would occur from the Maximum Partial Basing Alternative at MCAS Yuma. These data show that project emissions would be well below the conformity *de minimis* threshold for PM_{10}. The MCAS Yuma project region is in attainment of NAAQS for all other criteria pollutants. Project emissions of VOC, SO_x, and $PM_{2.5}$ are only a fraction of their conformity *de minimis* levels in a nonattainment area (100 tons per year). Impacts associated with these emissions would not be significant.

Table 5.7-4. Annual Emissions Due to Operation of the Maximum Partial Basing Alternative at MCAS Yuma

Activity	Air Pollutant Emissions (tons) (1)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
MV-22 Operations	0.74	48.34	110.66	5.45	18.80	18.80
MV-22 Engine Maintenance/Testing	0.19	12.44	22.08	1.09	3.67	3.67
Personal-Owned Vehicles	4.67	33.93	4.34	0.02	0.31	0.30
Government-Owned Vehicles	0.47	3.03	1.47	0.01	0.10	0.10
Ground/Tactical Support Equipment	16.39	161.56	14.05	0.07	1.55	1.51
Construction	0.19	1.94	0.77	0.00	0.09	0.08
Other Sources	0.97	4.65	0.97	0.06	0.54	0.15
Stationary Sources	5.32	2.39	2.09	0.06	0.25	0.11
Annual Emissions	**28.94**	**268.27**	**156.43**	**6.77**	**25.29**	**24.73**
Reduction of CH-46 Ops	**-4.76**	**-14.96**	**-0.75**	**-0.10**	**-0.95**	**-0.95**
Net Change from Existing Conditions	**24.18**	**253.31**	**155.68**	**6.67**	**24.34**	**23.78**
Conformity *De Minimis* Level	**NA**	**NA**	**NA**	**NA**	**100**	**NA**

Notes:
1. Basing of the eight MV-22 squadrons would finish in CY 2015. Emissions from the alternative would remain constant at these levels from this point forward in the future.
2. Excludes jet engine test cells, as estimated to be part of MV-22 engine maintenance/testing.
3. – indicates a reduction in emissions

Emissions of CO and NO_x that would occur from the Maximum Partial Basing Alternative within Yuma County were compared to the most recent Yuma County emissions inventory (year 2002) to determine the relative magnitude of proposed emissions and, therefore, their potential to combine with baseline emissions and contribute to an exceedance of an ambient air quality standard. In 2002, CO and NO_x emissions generated within Yuma County amounted to 40,420 and 9,540 tons, respectively (USEPA 2008b). Review of Table 5.7-4 shows that the Maximum Partial Basing Alternative would generate 253.3 tons per year of CO emissions within Yuma County. These emissions would amount to 0.63 percent of the annual CO emissions for Yuma County in 2002. Given that the County attains the CO NAAQS by wide margins, these emission increases would not contribute to an exceedance of an ambient air quality standard, and they would produce less than significant air quality impacts.

Review of Table 5.7-4 shows that the Maximum Partial Basing Alternative would generate 155.7 tons per year of NO_x emissions within Yuma County. Although O_3 levels in the Yuma region are near the eight-hour O_3 standard, this proposed increase in NO_x emissions within Yuma County would amount to only 1.6 percent of the County's annual NO_x emissions based on 2002 data. Moreover, operations would occur across a wide area of the county, avoiding a localized impact that might lead to an exceedance of the O_3 standard or an otherwise significant impact to air quality. Therefore, the Maximum Partial Basing Alternative would produce less than significant impacts to air quality.

Operation of the Maximum Partial Basing Alternative would emit TACs that could potentially impact public health. The main sources of TACs from the alternative would include aircraft and

G/TSE. TACs generally are subsets of VOC and PM_{10} emissions. Additionally, the main sources of proposed TACs are mostly mobile and intermittent in nature and, therefore, they would produce minimal impacts of TACs in a localized area. As a result, operation of the Maximum Partial Basing Alternative would produce less than significant impacts to public health.

Mitigation Measures

Since the Maximum Partial Basing Alternative would produce less than significant air quality impacts, no mitigation measures are required. However, to minimize fugitive dust and equipment combustive emissions during proposed construction activities, the project construction contractor shall implement the following measures as part of a Construction Emissions Mitigation Plan.

Measure 1. Fugitive dust control measures. The construction contractor shall implement the following measures during all proposed ground disturbance activities.

1. Use water trucks or sprinkler systems to keep all areas of vehicle movement damp enough to prevent dust from leaving the construction area.
2. Minimize the amount of disturbed ground area at a given time.
3. Minimize traffic speeds on all unpaved roads.
4. Install gravel pads at construction area access points to prevent tracking of soil onto paved roads.
5. Provide temporary wind fencing around sites being graded or cleared.
6. Suspend all soil disturbance activities when winds exceed 25 mph or when visible dust plumes emanate from the site. Stabilize all disturbed areas at this time.
7. Cover truck loads that haul dirt, sand, or gravel or maintain at least two feet of freeboard.
8. After completion of clearing, grading, earthmoving, or excavation, treat the disturbed areas by watering, re-vegetation, or by spreading non-toxic soil binders until they are paved or otherwise developed to prevent dust generation.
9. Designate personnel to monitor the dust control program and to order increased watering, as necessary, to prevent the transport of dust off-site. Their duties shall include holiday and weekend periods when work may not be in progress.

Measure 2. Construction equipment emission control measures. The construction contractor shall implement the following measures during all proposed construction activities, where feasible.

1. Maintain equipment according to manufacturer specifications.
2. Restrict idling of equipment and trucks to a maximum of five minutes at any location.
3. Use diesel oxidation catalysts and/or catalyzed diesel particulate traps.
4. Use electricity from power poles rather than temporary diesel- or gasoline-powered generators.
5. Provide temporary traffic control, such as flag person, during all phases of construction to maintain smooth traffic flow.

6. Keep construction equipment and equipment staging areas away from sensitive receptor areas (such as day care centers).
7. Re-route construction trucks away from congested streets or sensitive receptor areas.
8. Use construction equipment with engines that meet EPA Tier 3 and 4 nonroad standards.
9. Use alternatively-fueled construction equipment, such as compressed natural gas (CNG), liquefied natural gas (LNG), or electric.

Minimum Partial Basing (2-Squadron) Alternative

Construction

Similar to the Maximum Partial Basing Alternative, air quality impacts from construction of the Minimum Partial Basing Alternative would occur from (1) combustive emissions due to the use of fossil fuel-powered equipment and (2) fugitive dust emissions during demolition activities, earth-moving activities, and the operation of equipment on bare soil. The methods used to estimate emissions associated with construction of the Minimum Partial Basing Alternative were the same as those used for the Maximum Partial Basing Alternative. Appendix B includes data and assumptions used to calculate proposed construction emissions.

Table 5.7-5 summarizes the annual and total construction emissions associated with the Minimum Partial Basing Alternative. These data show that annual PM_{10} emissions for proposed construction activities would be only 1.41 tons, less than 2 percent of the conformity *de minimis* threshold. The air basin is in attainment for O_3, CO, NO_2, SO_2, and $PM_{2.5}$ and the nominal construction emissions of these criteria pollutants and their precursors are only a small fraction of their conformity *de minimis* levels in a nonattainment area (100 tons per year). Air quality impacts associated with these emissions would not be significant. The main sources of PM_{10}/$PM_{2.5}$ emissions would occur as fugitive dust from earth-moving and demolition activities.

Table 5.7-5. Annual and Total Emissions Due to Construction of the Minimum Partial Basing Alternative at MCAS Yuma

Construction Activity	Air Pollutant Emissions (tons)					
	VOC	CO	NOx	SOx	PM10	PM2.5
2010						
Demolition – Building Facilities	0.00	0.01	0.03	0.00	0.02	0.01
Demolition – Airfield Facilities	---	---	---	---	---	---
Construction – Building Facilities	0.07	0.43	0.70	0.11	0.23	0.11
Construction – Airfield Facilities	0.15	0.80	1.33	0.21	0.45	0.20
Annual Emissions [1]	**0.22**	**1.24**	**2.06**	**0.32**	**0.70**	**0.32**
Conformity *De Minimis* Level	**NA**	**NA**	**NA**	**NA**	**100**	**NA**
Total Emissions	**0.44**	**2.48**	**4.12**	**0.65**	**1.41**	**0.64**

Note:
1. Year 2010 emissions equal to 50% of total emissions.

Project construction equipment would emit TACs that could potentially impact public health. The main source of TACs would occur in the form of particulates from the combustion of diesel fuel. Due to the mobile and intermittent operation of proposed diesel-powered construction equipment over a large construction area, they would produce minimal ambient impacts of TACs in a localized area. As a result, construction of the Minimum Partial Basing Alternative would produce less than significant impacts to public health.

Operations

Air quality impacts associated with the Minimum Partial Basing Alternative were determined by comparing the increase in emissions associated with proposed MV-22 operations within the MCAS Yuma region. Similar to the Maximum Partial Basing Alternative, proposed sources affected by the alternative would include (1) operations and engine maintenance/testing of MV-22 aircraft, (2) POVs and GOVs, (3) G/TSE, (4) routine construction activities, and (5) stationary and other sources.

The methods used to estimate emissions associated with the operation of the Minimum Partial Basing Alternative were the same as those used for the Maximum Partial Basing Alternative. Appendix B includes data and assumptions used to calculate proposed operational emissions.

Table 5.7-6 presents a summary of the annual operational emissions that would occur from the Minimum Partial Basing Alternative at MCAS Yuma. These data show that project emissions would be well below the conformity *de minimis* threshold for PM_{10}. The MCAS Yuma project region is in attainment of NAAQS for all other criteria pollutants. Project emissions of VOC, NOx, SOx, and $PM_{2.5}$ are well below the conformity *de minimis* levels for these pollutants in a nonattainment area (100 tons per year). Air quality impacts associated with these emissions would not be significant.

Table 5.7-6. Annual Emissions Due to Operation of the Minimum Partial Basing Alternative at MCAS Yuma

Activity	Air Pollutant Emissions (tons) (1)					
	VOC	CO	NOx	SOx	PM10	PM2.5
MV-22 Operations	0.16	10.36	23.71	1.17	4.03	4.03
MV-22 Engine Maintenance/Testing	0.04	2.66	4.73	0.23	0.79	0.79
Personal-Owned Vehicles	1.65	11.99	1.53	0.01	0.11	0.11
Government-Owned Vehicles	0.17	1.07	0.52	0.00	0.04	0.04
Ground/Tactical Support Equipment	4.10	40.39	3.51	0.02	0.39	0.38
Construction	0.07	0.68	0.27	0.00	0.03	0.03
Other Sources	0.34	1.64	0.34	0.02	0.19	0.05
Stationary Sources	1.88	0.84	0.74	0.02	0.09	0.04
Annual Emissions	**8.40**	**69.64**	**35.37**	**1.48**	**5.65**	**5.46**
Reduction of CH-46 Ops	**-4.76**	**-14.96**	**-0.75**	**-0.10**	**-0.95**	**-0.95**
Net Change from Existing Conditions	**3.64**	**54.69**	**34.61**	**1.38**	**4.70**	**4.51**
Conformity *De Minimis* Level	**NA**	**NA**	**NA**	**NA**	**100**	**NA**

Notes:
1. Basing of the two MV-22 squadrons would finish in Year 2017. Emissions from the alternative would remain constant at these levels from this point forward in the future.
2. – indicates a reduction in emissions

Operation of the Minimum Partial Basing Alternative would emit TACs that could potentially impact public health. The main sources of TACs from the alternative would include aircraft and G/TSE. TACs generally are subsets of VOC and PM_{10} emissions. Additionally, the main sources of proposed TACs are mostly mobile and intermittent in nature and therefore they would produce minimal impacts of TACs in a localized area. As a result, operation of the Minimum Partial Basing Alternative would produce less than significant and beneficial impacts to public health.

Mitigation Measures

Since the Minimum Partial Basing Alternative would produce less than significant air quality impacts, no mitigation measures are required. However, to minimize fugitive dust and equipment

combustive emissions during proposed construction activities, the project construction contractor shall implement the Construction Emissions Mitigation Plan identified in the mitigation measures section for the Maximum Partial Basing Alternative.

No Action Alternative

No changes to current operational activities would occur at MCAS Yuma due to the No Action Alternative. However, it is possible that future construction efforts may be needed (e.g., wash racks at MCAS Yuma) related to MV-22 training by East Coast squadrons under the No Action Alternative. This would require less construction than associated with the proposed action (e.g., no new hangar construction). The above analysis demonstrates that proposed construction associated with either basing alternative at MCAS Yuma would not exceed the conformity *de minimis* threshold or present potentially significant impacts under the NEPA. Therefore, smaller future construction efforts that may occur under the No Action Alternative are expected to result in less than significant air quality impacts.

5.8 NOISE

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air or water, and are sensed by the human ear. Sound is all around us. Noise is defined as unwanted or annoying sound that interferes with or disrupts normal human activities. Although exposure to very high noise levels can cause hearing loss, the principal human response to noise is annoyance. 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.

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

5.8.1 Noise Metrics

Noise and sound are expressed in logarithmic units of decibels (dB). A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB; sound levels above 120 dB begin to be felt inside the human ear as discomfort. Sound levels between 130 to 140 dB are felt as pain (Berglund and Lindvall 1995). The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. On average, a person perceives a doubling (or halving) of the sound's loudness when there is a 10 dB change in sound level.

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

add the "A" to the measurement unit in order to identify that the measurement has been made with this filtering process (dBA). In this document, the dB unit refers to A-weighted sound levels. "C-weighting" is typically applied to impulsive sounds such as sonic boom or ordnance detonation and is denoted by the units "dBC".

In accordance with DoD guidelines and standard practice for environmental impact analysis documents, the noise analysis herein utilizes the following (A-weighted) noise descriptors or metrics: Maximum Sound Level (ALM), Sound Exposure Level (SEL), Day-Night Average Sound Level (DNL) and Community Noise Equivalent Level (CNEL). ALM and SEL describe single noise events whereas DNL and CNEL are time-averaged metrics describing the cumulative noise environment of individual noise events over longer periods, usually up to 24 hours. DNL and CNEL account for single-event noise levels and also weight or penalize those levels depending on the time period in which they occur, weighting evening and nighttime sounds up to 10 dB. CNEL is specific to California and DNL is applicable to the remaining 49 states. The Onset-Rate Adjusted Monthly variant of DNL and CNEL, denoted L_{dnmr} and CNELmr, respectively, are specifically utilized for describing aircraft noise exposure from Special Use Airspace operations. Each descriptor, along with other noise metrics, is described in more detail in Appendix C.

5.8.2 Noise Modeling

In accordance with DoN AICUZ guidelines (DoN 2002b), the noise exposure area is divided into three noise zones. Noise Zone I (less than 65 dB DNL/CNEL) is essentially an area of low or no impact. Noise Zone II (65 dB DNL/CNEL to less than 75 dB DNL/CNEL) is an area of moderate impact where some land use controls are needed. Noise Zone III (greater than or equal to 75 dB DNL/CNEL) is the most severely impacted area and requires the greatest degree of compatible land use controls.

As noise from future aircraft operations cannot be physically measured in the present, this EIS computes and estimates the noise generated by aircraft operations and compares exposures from operational alternatives. Analysis of aircraft noise exposure and compatible land use around DoD airfields and airspace areas are typically accomplished using the following computer programs: NOISEMAP (Wyle 1998), the Rotorcraft Noise Model (RNM) (Wyle 2007a), and MOA-Range NOISEMAP (MR_NMAP) (Wyle 1997). These programs are described in detail in Appendix C, and it is important to note that their computations draw from a spectral database of actual aircraft noise measurements. These programs are most appropriate for comparing "before-and-after" noise impacts, which would result from proposed changes or alternative actions, when the calculations are made in a consistent manner. The model allows noise predictions for such proposed actions without the actual implementation or noise monitoring for those actions.

For airfield environments, lines of equal noise level (i.e., contours of DNL or CNEL) associated with the aforementioned Noise Zones are typically plotted from the output of NOISEMAP and RNM. For airspace environments, L_{dnmr}/CNELmr contours are plotted and/or tabulated from the MR_NMAP program, depending on the magnitude of the exposure. This EIS shows contours and tabulated levels.

Noise levels from flight operations exceeding ambient 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 ambient. This EIS focuses only on aircraft noise levels (not the non-aircraft ambient) and their change due to operational alternatives.

5.8.3 Affected Environment

The existing aircraft noise environment at MCAS Yuma[2] are taken directly from a 1978 aircraft noise study (Van Houten and Associates 1978) which was used to update the air station's original AICUZ. The City and County of Yuma currently use the Van Houten contours for land use planning and other activities. The noise contours from the Van Houten study serve as the baseline for MCAS Yuma for this EIS. The Van Houten study focused on aircraft operations at the main field and did not consider operations at Auxiliary Field #2 (AUX-2), which lies approximately nine miles to the southeast of the air station in the Barry M. Goldwater Range (West).

The 1994 AICUZ for AUX-2 serves as the baseline for AUX-2 for this EIS (Dames & Moore 1993). The AICUZ findings relied on a projection of flight operations for maximum capacity/utilization of AUX-2 assuming several airfield improvements allowing for Forward Operating Base (FOB) practice activity by AV-8 aircraft.

As the Van Houten study or AUX-2 AICUZ were not updated for this EIS, typical factors such as current flight operations by aircraft type, runway and flight track were not considered or updated in the analysis of noise levels from existing aircraft operations at the air station. However, these typical factors were included in the previous studies. Modeled flight operations are summarized below.

Eighteen representative noise-sensitive receptor locations chosen by the USMC (MCAS Yuma 2007c) are relevant to this EIS for MCAS Yuma (see Figure 5.8-1). These locations equally represent residential areas, places of worship and schools in the vicinity of the air station. Additionally, two of the sites –consist of the Fairgounds and the Yuma Civic Center.

Flight Operations

The baseline condition for MCAS Yuma considered approximately 219,000 flight operations annually as shown in Table 5.8-1. Nearly 75 percent of the modeled flight operations are by military aircraft. Most of the named modeled aircraft are currently retired from service (e.g. F-4, A-4, F-14 and A-7) and have been replaced by aircraft such as F/A-18 and EA-6B. AV-8 squadrons are still based at the air station. Military helicopters comprise approximately 14,000 annual flight operations (i.e., 7 percent of the total modeled flight operations), of which the CH-46E Sea Knight (twin engine, twin rotor helicopter) is a likely component. Of the total modeled flight operations, DNL nighttime flight operations account for 12 percent.

Military aircraft primarily use Runways 03/21. Civilian aircraft primarily use Runways 08/26 and 17/35. Many flight tracks were modeled to support the flight operations listed in Table 5.8-1.

[2] and Yuma International Airport (shared-use airfield)

Table 5.8-1. Estimated Historical Modeled Annual Aircraft Flight Operations for Baseline Conditions at MCAS Yuma

Aircraft Type	Departure	Arrival	Closed Patterns			Total
			TGO	FCLP	GCA Box	
F-4	19,032	19,032	10,006	2,655	112	50,837
A-4	12,622	12,594	6,448	1,640	57	33,361
F-14	3,603	3,631	1,838	-	459	9,531
AV-8	4,763	4,763	5,688	617	56	15,887
A-7	7,797	7,797	5,001	-	57	20,652
Other Military	5,406	5,391	2,766	706	28	14,297
Military Helicopter	7,149	7,149	-	-	-	14,298
DC-9 (Douglas)	-	-	731	-	-	731
DC-10 (Douglas)	-	-	6,578	-	-	6,578
Air Carrier	2,029	4,335	-	-	-	6,364
General Aviation	21,811	21,811	2,835	-	-	46,457
Total	**84,212**	**86,503**	**41,891**	**5,618**	**769**	**218,993**

Notes:
TGO = Touch-and-Go; FCLP = Field Carrier Landing Practice; GCA = Ground-Controlled Approach Box.
Arrivals do not equal departures due to mission schedules.
GCA Box, TGO, and FCLP are counted as 2 operations.
See Appendix C for details.

The baseline condition for AUX-2 considered approximately 51,000 flight operations as shown in Table 5.8-2. Nearly all of these operations were from AV-8 aircraft with three percent by C-130 turboprop aircraft and CH-46 helicopters. Approximately 25 percent of the flight operations at AUX-2 are during the nighttime period.

Table 5.8-2. Estimated Historical Modeled Annual Aircraft Flight Operations for Baseline Conditions at AUX-2

Aircraft Type	Departure	Arrival	FOB	FCLP or TGO	Total
AV-8	1,488	1,488	7,488	39,168	49,632
C-130	179	179	-	718	1,076
CH-46	286	286	-	-	572
Total	**1,953**	**1,953**	**7,488**	**39,886**	**51,280**

Notes:
FOB = Forward Operating Base; TGO = Touch-and-Go; FCLP = Field Carrier Landing Practice.
FOB, TGO, and FCLP are counted as 2 operations.

Noise Exposure

The DNL contours in the Van Houten study were computed with a legacy version of NOISEMAP. Electronic modeling files were not available to update the modeling using the latest version of NOISEMAP. Instead, the contour lines from the report were digitized. Figure 5.8-1 shows the 65 to 75 dB DNL contours, in 5 dB increments, from the Van Houten study. The contours follow main departure and arrival routes to Runway 03/21 and the closed patterns over the south side of the airfield. The 65 dB DNL contour is approximately 4.5 miles wide and 11 miles long, with a northern lobe following the westerly departure routes from Runway 03 and a southern lobe following the westerly departure routes from Runway 21.

Based on these contours, Table 5.8-3 shows the noise exposure in terms of estimated acreage, housing units and population within each DNL contour band. These estimates exclude MCAS Yuma itself and bodies of water. Noise Zone II (65 to 75 dB) includes 7,461 housing units and 16,017 people. Noise Zone III (75 dB and greater) includes 2,420 housing units and 6,380 people.

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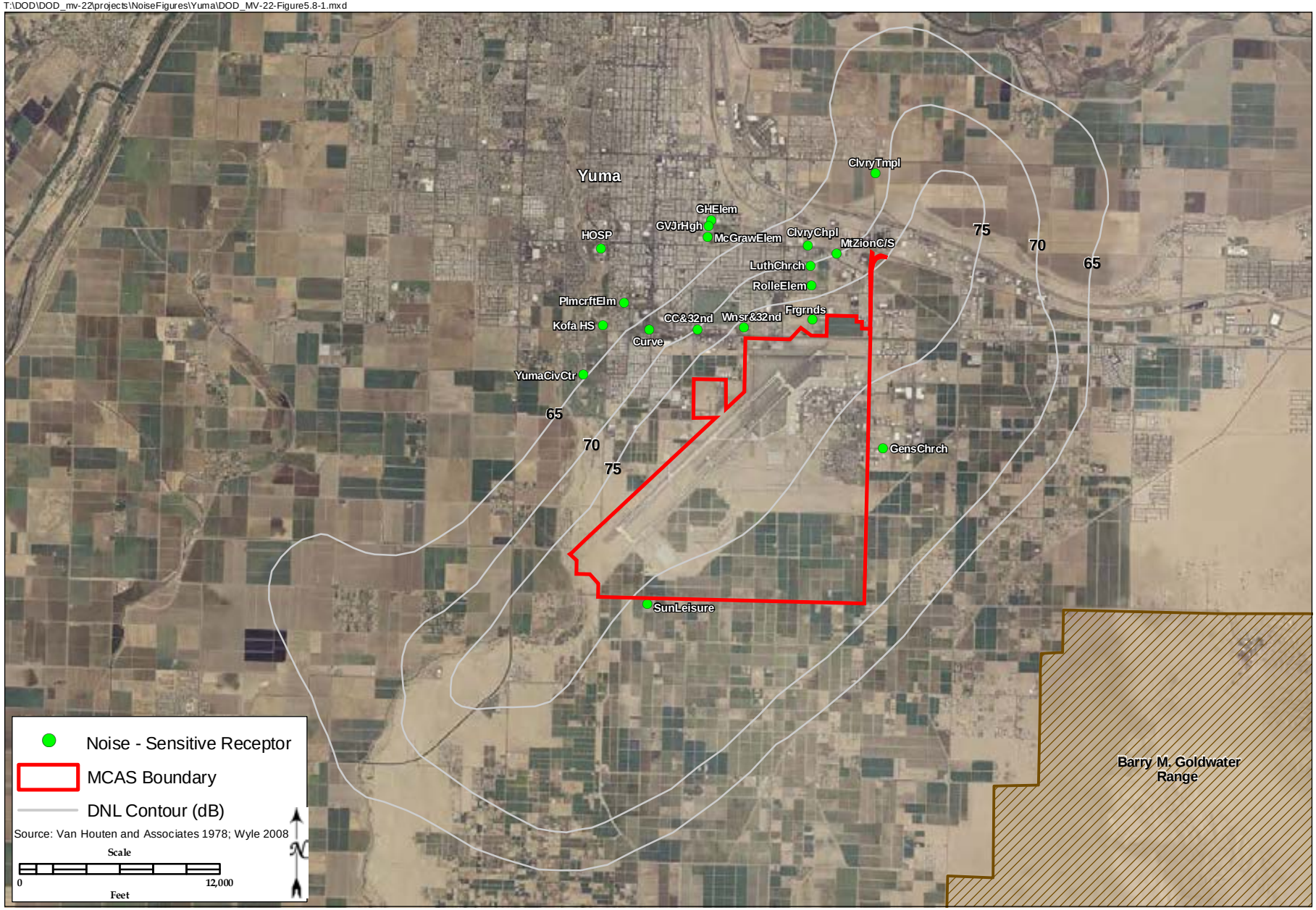

Aircraft Noise Contours from Operations at MCAS Yuma/Yuma International Airport for Existing Conditions

FIGURE

5.8-1

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Table 5.8-3. Off-Station Aircraft Noise Exposure within Baseline DNL Contours for MCAS Yuma

Contour Band (DNL, dB) [1]	Acreage	Population [2]	Housing Units [2]
65-70	10,046	9,542	4,498
70-75	12,526	6,475	2,963
75+	6,518	6,380	2,420

Notes:
1. Exclusive of upper bound for all bands; excludes MCAS Yuma itself
2. Estimated based on 2000 Census with population density methodology.

Table 5.8-4 shows the Points-of-Interest (POI) results for the baseline condition. One-third of the representative receptors have exposure less than 65 dB DNL, including five schools and one hospital. These are not discussed further. Four of the sites are within the 65 to 70 dB DNL band, five sites are exposed to DNL between 70 and 75 dB, and three sites are exposed to DNL greater than or equal to 75 dB (Sun Leisure Estates, Winsor Avenue & 32nd Street [residential], and the Fairgrounds). All twelve applicable representative receptors are considered incompatible with aircraft operations per the AICUZ guidelines.

Table 5.8-4. Estimated Aircraft DNL for Representative Noise-Sensitive Receptors for Existing Conditions at MCAS Yuma/AUX-2

Description	Address	Receptor Type	Estimated DNL (dB)
Gwyneth Ham Elementary School	840 E. 22nd St.	School	<65
Gila Vista Junior High	2245 S. Arizona Ave.	School	<65
Yuma Regional Medical Center	Avenue A and 24th St.	Hospital	<65
Kofa High School	Avenue A & 32nd St.	School	<65
McGraw Elementary School	2345 S. Arizona Ave.	School	<65
Palmcroft Elementary School	901 W. Palmcroft Dr.	School	<65
Generations Church	3185 E. 42nd St.	Worship	73
Sun Leisure Estates	County 14th and 4th Ave. Ext.	Residential	75
Country Club & 32nd	Country Club Drive and 32nd St.	Residential	70
Calvary Chapel	2351 E. Engler Ave.	Worship	68
Calvary Temple of Christ	4151 S. Ave 3E	Worship	69
34th St & 4th Ave	34th St & 4th Ave	Residential	67
Christ Lutheran Church/Yuma Lutheran School	2555 Engler Ave.	Worship/School	70
Mt. Zion Church and School	2445 E. 24th St.	Worship/School	70
James Rolle Elementary School	2711 S. Engler Ave.	School	73
Winsor Ave & 32nd (1)	Winsor Ave and 32nd St.	Residential	75
Fairgrounds	West of Pacific Ave & 32nd St.	Public	75
Yuma Civic Center (2)	1440 Desert Hills Dr. (Ave. A & Desert Hills)	Auditorium	65

Notes:
1. Within the baseline 75 dB DNL contour; set to 75 dB DNL.
2. Outside but sufficiently close to the 65 dB DNL contour to be included in this analysis.

Figure 5.8-2 shows the 60 to 85 dB DNL contours, in 5 dB increments, for the AUX-2 baseline condition directly from the AUX-2 AICUZ. The contours extend approximately five miles west of the westernmost boundary of the Barry M. Goldwater Range. As stated in the AUX-2 AICUZ, approximately 12 to 13 housing units and the Southern Mesa recreational vehicle park (up to 200 spaces) are within the off-base noise exposure contours.

Noise due to construction and maintenance equipment, as well as general vehicle traffic is a common ongoing occurrence in the station environment. Trucks, as well as heavy equipment, are

usually found in the station environment on a daily basis to support existing facility operations and infrastructure upgrades.

5.8.4 Environmental Consequences

Prior to discussing the potential impacts due to each alternative, the following information provides modeling parameters common to all alternatives involving the MV-22 aircraft at MCAS Yuma and AUX-2.

- Detailed flight operations by type of operation, DNL period and general airfield routing were derived from data provided by the USMC (NAVFAC 2007), and are based on best estimates by MV-22 operators for this new aircraft.
- All FCLP flight operations would be conducted at AUX-2 southeast of the air station in the Barry M. Goldwater Range (West).
- With updated flight tracks provided by Air Traffic Control at MCAS Yuma (Powers and Nelson 2006), USMC personnel provided runway and flight track utilization (Powers 2007). No new tracks/routes would be necessary for the MV-22 basing. It was resolved that the MV-22 aircraft would depart/arrive the runways for 100 percent of the operations and use tracks for fixed and rotary wing aircraft at the air station. Further detail regarding runway and flight track utilization percentages is contained in Appendix C.
- MV-22 flight profiles for representative modeled tracks were provided by USMC personnel (Powers and Nelson 2006). Appendix C contains maps of representative modeled flight profiles for each type of flight operation.
- Low Work flight operations were modeled as run-ups consistent with the East Coast basing EIS noise study (Wyle 1999). It was estimated that all Low Work activity would be conducted at the proposed Hover Check Pad northwest of the flightline.
- Most maintenance activity on MV-22 engines would occur off-site at the engine manufacturer (Moye and Aitchison 2007). However, for the purposes of the EIS, the MV-22 maintenance run-ups were estimated to be identical to those modeled for the East Coast basing EIS noise study (Wyle 1999) and were estimated to be located at a run-up pad on Taxiway G. MV-22 run-ups were modeled with in-frame CH-53E aircraft source data as the noise model's database does not yet contain source acoustic data for the MV-22. Appendix C provides further modeling details.
- Weather conditions for CY2006 were applied to the MV-22 modeling (Belford 2007).

The overall approach to the noise analysis for Yuma and AUX-2 focuses on comparing MV-22-only noise exposure to the baseline condition in a "semi-quantitative" fashion. DNL contours for MV-22 aircraft operations were graphically overlaid onto the Van Houten and 1994 AUX-2 AICUZ studies' contours. Contour values were logarithmically added in areas of overlap and tested to determine if the MV-22 noise exposure would change the shape and/or size of the contours from their baseline state. Due to the graphical (and semi-quantitative) nature of this analysis, proposed MV-22-only noise exposure could not be added to the baseline noise exposure in the typical fashion, precluding noise exposure estimates of acreage, housing units and population within the DNL contours.

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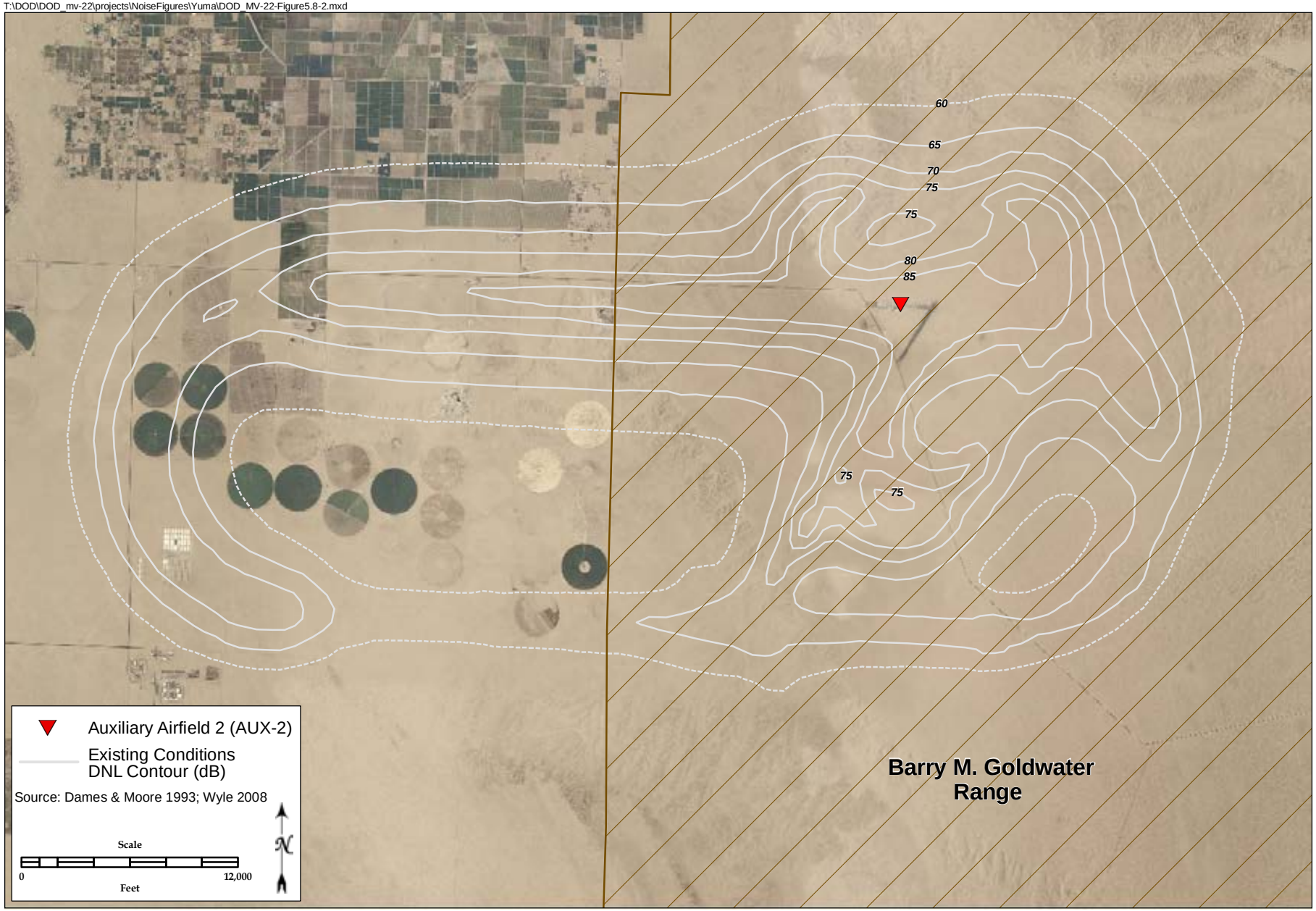

Aircraft Noise Contours from Operations at the AUX-2 Airfield for Existing Conditions

FIGURE

5.8-2

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Because only proposed MV-22 aircraft operations were modeled for this EIS, the noise-sensitive receptor analysis conducted for MCAS Miramar could not be conducted for MCAS Yuma and AUX-2. Instead, baseline noise exposure (in terms of DNL only) was estimated for each representative receptor outside the reported 75 dB DNL contour but within the reported 65 dB DNL contour for MCAS Yuma and AUX-2 via linear interpolation. Receptors inside the 75 dB DNL contour (i.e., receptors exposed to baseline DNL greater than or equal to 75 dB) were conservatively set to 75 dB DNL for purposes of comparison to proposed MV-22 activity. Noise exposure (in terms of DNL only) for representative receptors outside of the reported 65 dB DNL contour for MCAS Yuma and AUX-2 (i.e., receptors exposed to baseline DNL less than 65 dB) was only estimated for proposed MV-22 activity.

Maximum Partial Basing (8-Squadron) Alternative

The Maximum Partial Basing Alternative involves the addition of eight active duty squadrons of MV-22 aircraft at MCAS Yuma. However, it is estimated that one squadron would be deployed at all times. Therefore, the noise modeling is based on seven active duty squadrons. Because of the graphical and semi-quantitative analysis approach required for the MCAS Yuma/AUX-2 airfields, any CH-46E aircraft that were included in the baseline analyses could not be subtracted from the baseline noise exposure. Table 5.8-5 shows the numbers of proposed annual MV-22 flight operations at MCAS Yuma for the Maximum Partial Basing Alternative. Proposed MV-22 flight operations would total approximately 42,600 annually, with six percent during the DNL nighttime period. It was estimated by USMC personnel that five percent of the departures would be interfacility flights to AUX-2 to conduct the FCLP operations. Nearly 78 percent of the MV-22 flight operations at the air station would consist of departures and arrivals to/from other places, approximately 18 percent would consist of closed-pattern operations in the vicinity of the air station, and the remaining four percent would consist of interfacility operations to/from AUX-2.

Table 5.8-5. Proposed Modeled Annual MV-22 Flight Operations for Each Alternative at MCAS Yuma

	Maximum Partial Basing Alternative			Minimum Partial Basing Alternative		
Operation Type	**Day**	**Night**	**Total**	**Day**	**Night**	**Total**
Departure	15,484	1,221	16,705	3,317	261	3,578
Interfacility Departure	815	64	879	175	14	189
Arrival (no break)	815	65	880	175	14	189
Interfacility arrival (no break)	815	64	879	175	14	189
Overhead Break Arrival	14,670	1,157	15,827	3,144	248	3,392
Touch-and-Go	3,247	-	3,247	696	-	696
GCA Box	4,058	-	4,058	870	-	870
Low Work	136	-	136	29	-	29
Total	**40,040**	**2,571**	**42,611**	**8,581**	**551**	**9,132**

Notes:
Day = 0700-2159, Night = 2200-0659
Touch-and-Go, Ground-Controlled Approach (GCA) Box, and Low Work are counted as two operations each.
Low Work comprised of maintenance check flights, hover work and any other low work training operations conducted at less than 50 feet above ground level, lasting seven minutes, on average.
100% of FCLP operations would be conducted at AUX-2; departures and arrival operations account for off-site FCLP missions.
See Appendix C for details.

Table 5.8-6 shows the numbers of proposed annual MV-22 flight operations at AUX-2 for the Maximum Partial Basing Alternative. Proposed MV-22 flight operations would total approximately 8,500 annually, with nearly nine percent during the DNL nighttime period.

Using the data and methodology described above and in Appendix C, the NOISEMAP (for run-ups) and RNM computer model were used to calculate and plot the DNL contours for annual average daily MV-22 aircraft operations. Figures 5.8-3 and 5.8-4 show the 60 to 85 dB DNL contours, in 5 dB increments, for the MV-22-only component of the Maximum Partial Basing Alternative overlaying the baseline contours. At the air station (Figure 5.8-3), the MV-22 contours would be limited to primarily following the right-traffic touch-and-go patterns on Runway 03L and 03R, which have downwind legs approximately two miles abeam of the Runway 03R/21L to the east side of the airfield and would extend less than two miles southwest of Runway 03 and less than 3.5 miles northeast of Runway 21. Smaller lobes follow the departure and arrival tracks on Runway 08/26. The DNL contours for AUX-2 (Figure 5.8-4) would be primarily due to FCLP operations on Runway 04/22 and would extend approximately one mile from Runway 04/22 at AUX-2 and be wholly contained within the Barry M. Goldwater Range boundary.

Table 5.8-6. Proposed Modeled Annual MV-22 Flight Operations for Each Alternative at AUX-2

	Maximum Partial Basing Alternative			Minimum Partial Basing Alternative		
Operation Type	**Day**	**Night**	**Total**	**Day**	**Night**	**Total**
Departure	815	64	879	175	14	189
Arrival	815	64	879	175	14	189
FCLP	6,087	676	6,763	1,304	145	1,449
Total	**7,717**	**804**	**8,521**	**1,654**	**173**	**1,827**

Notes:
Day = 0700-2159, Night = 2200-0659
Field Carrier Landing Practice (FCLP) is counted as two operations each.
See Appendix C for details.

Figures 5.8-3 and 5.8-4 show the graphical comparisons of the baseline contours to the MV-22-only contours. Regarding MCAS Yuma, the MV-22 operations would add less than 1 dB DNL to the contours for the air station in two areas: a) between the baseline's 65 dB and 70 dB DNL contours within one nm of US 80, where the MV-22 noise exposure would be 60 to 65 dB DNL, and (b) between the baseline's 70 dB and 75 dB DNL contours south of the airfield, where the MV-22 noise exposure would be 65 to 70 dB DNL. At AUX-2, the MV-22 would not change the baseline noise exposure.

Table 5.8-7 shows the change in estimated DNL for the representative receptors for this alternative. None of the applicable receptors would increase in DNL by 0.5 dB or more.

In terms of increase in DNL, the Maximum Partial Basing Alternative would not cause a significant noise impact, but impacts are unknown in terms of the associated change in affected acreage, population and housing units due to the modeling methodology described above.

The Maximum Partial Basing Alternative would cause short-term noise increases due to construction and renovation, as well as infrastructure installment and realignment. Construction would occur in stages; the earlier stage entails trucks, bulldozers, and other heavy construction equipment for the major construction projects (e.g., hangars, aircraft parking facilities, and apron). This stage of construction would involve less heavy equipment and would also be temporary in nature. Construction associated with this alternative would be undertaken adjacent to the

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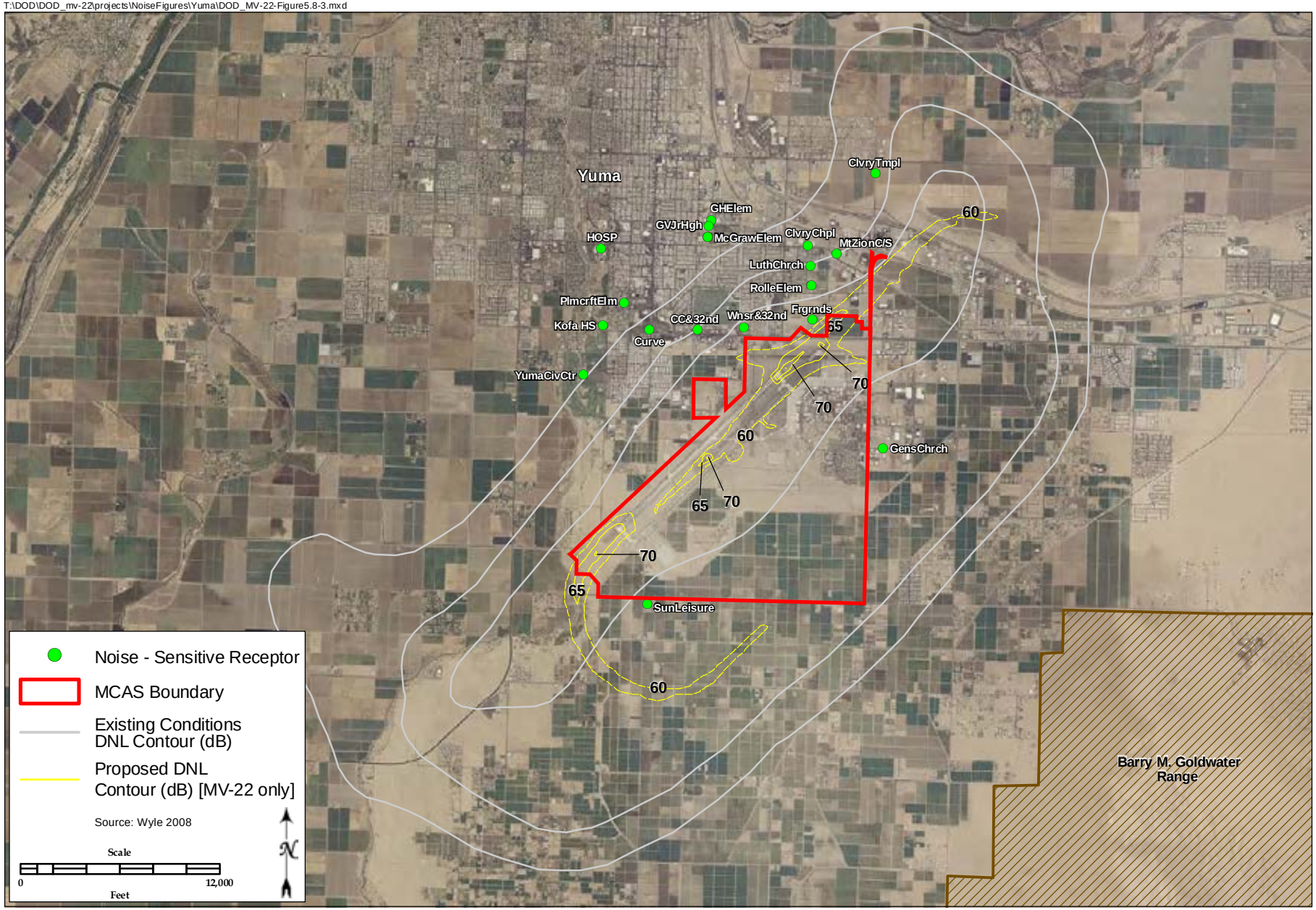

Aircraft Noise Contours from Operations at MCAS Yuma/Yuma International Airport for 8 - Squadron Alternative

FIGURE

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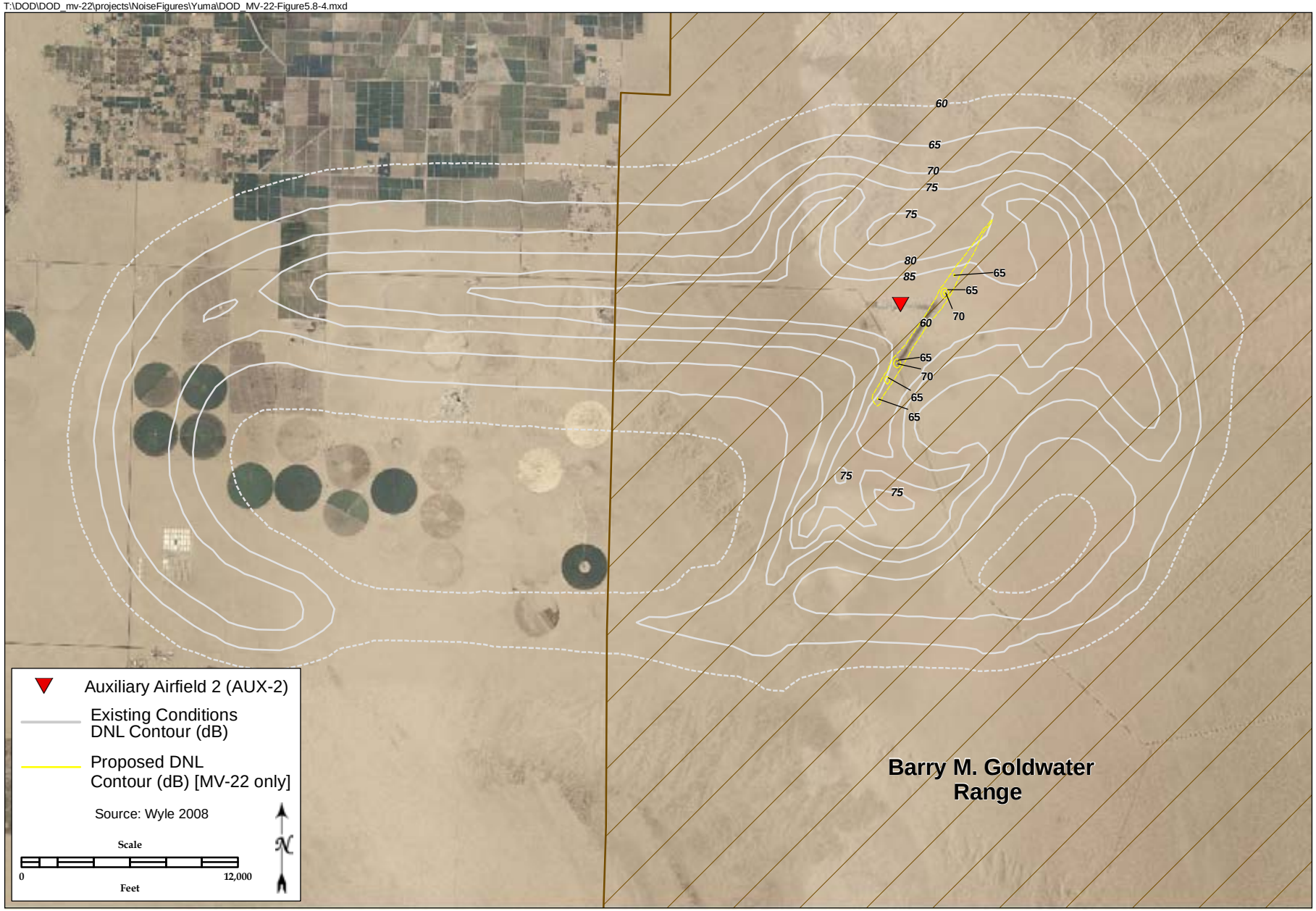

Aircraft Noise Contours from Operations at the AUX-2 Airfield for 8 - Squadron Alternative

FIGURE

5.8-4

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flightline and occupy industrial areas, and would be isolated from any off-base communities. In addition, construction would take place during daylight hours and would follow BMPs to minimize noise to off-base receptors. Construction noise would be contained within the station environment because most of the heavy construction would occur near the flightline, where noise would be compatible with current and ongoing activities.

Therefore, there would be no significant noise impact from construction or operations at MCAS Yuma from the Maximum Partial Basing Alternative.

Table 5.8-7. Estimated Change in Aircraft DNL for Applicable Representative Noise-Sensitive Receptors for Each Alternative at MCAS Yuma/AUX-2

Description	Address	Receptor Type	Baseline Estimated DNL (dB)	Maximum or Minimum Partial Basing Change in DNL (dB) [3]
Generations Church	3185 E. 42nd St.	Worship	73	< 0.5
Sun Leisure Estates	County 14th and 4th Ave. Exit	Residential	75	< 0.5
Country Club & 32nd	Country Club Drive and 32nd St.	Residential	70	< 0.5
Calvary Chapel	2351 E. Engler Ave.	Worship	68	< 0.5
Calvary Temple of Christ	4151 S. Ave 3E	Worship	69	< 0.5
34th St & 4th Ave	34th St & 4th Ave.	Residential	67	< 0.5
Christ Lutheran Church/Yuma Lutheran School	2555 Engler Ave.	Worship/ School	70	< 0.5
Mt. Zion Church and School	2445 E. 24th St.	Worship/ School	70	< 0.5
James Rolle Elementary School	2711 S. Engler Ave.	School	73	< 0.5
Winsor Ave & 32nd [1]	Winsor Ave and 32nd St.	Residential	75	< 0.5
Fairgrounds	West of Pacific Ave. and 32nd St.	Public	75	< 0.5
Yuma Civic Center [2]	1440 Desert Hills Dr. (Ave. A & Desert Hills)	Auditorium	65	< 0.5

Notes:
1. Within the baseline 75 dB DNL contour; set to 75 dB DNL for baseline.
2. Outside but sufficiently close to the baseline 65 dB DNL contour to be included in this analysis.
3. Does not exclude CH-46 operations.
4. Table does not show those receptors with a baseline exposure less than 65 dB DNL.

Mitigation Measures

Because there would be no significant impacts, no mitigation measures would be required.

Minimum Partial Basing (2-Squadron) Alternative

The Minimum Partial Basing Alternative involves the addition of two reserve squadrons of MV-22 aircraft at MCAS Yuma. Because of the graphical and semi-quantitative analysis approach required for the MCAS Yuma/AUX-2 airfields, any CH-46E aircraft that were included in the baseline analyses could not be subtracted from the baseline noise exposure. Table 5.8-5 shows the numbers of proposed annual MV-22 flight operations at the air station for the Minimum Partial Basing Alternative. Proposed MV-22 flight operations would total approximately 9,100 annually, with six percent during the DNL nighttime period. It was estimated by USMC personnel that five percent of the departures would be interfacility flights to AUX-2 to conduct the FCLP operations.

Nearly 78 percent of the MV-22 flight operations at the air station would consist of departures and arrivals to/from other places, approximately 18 percent would consist of closed-pattern operations in the vicinity of the air station, and the remaining four percent would consist of interfacility operations to/from AUX-2.

Table 5.8-6 shows the numbers of proposed annual MV-22 flight operations at AUX-2 for the Minimum Partial Basing Alternative. Proposed MV-22 flight operations would total approximately 1,800 annually, with nearly nine percent during the DNL nighttime period.

Using the data and methodology described above and in Appendix C, the NOISEMAP (for run-ups) and RNM computer model were used to calculate and plot the DNL contours for annual average daily MV-22 aircraft operations. Figures 5.8-5 and 5.8-6 show the 60 to 85 dB DNL contours, in 5 dB increments, for the MV-22-only component of the Minimum Partial Basing Alternative overlaying the baseline contours. At the air station (Figure 5.8-5), the MV-22 contours would be primarily limited to the base boundary with the 65 dB DNL contour extending off-station by approximately 500 feet. The DNL contours for AUX-2 (Figure 5.8-6) would be primarily due to FCLP operations and would extend less than one mile from AUX-2 and be wholly contained within the Barry M. Goldwater Range boundary.

Figures 5.8-5 and 5.8-6 show the graphical comparison of the baseline contours to the MV-22-only contours. Regarding MCAS Yuma and AUX-2, the MV-22 would not change the baseline noise exposure.

Table 5.8-7 shows the change in estimated DNL for the representative receptors for this scenario. None of the applicable receptors would increase in DNL by 0.5 dB or more.

In terms of increase in DNL, the Minimum Partial Basing Alternative would not cause a significant noise impact, but impacts are unknown in terms of the associated change in affected acreage, population and housing units due to the modeling methodology described above.

Similar to the Maximum Partial Basing Alternative, the Minimum Partial Basing Alternative would cause short-term noise increases due to construction and renovation, as well as infrastructure installment and realignment. Construction would occur in stages; the earlier stage entails trucks, bulldozers, and other heavy construction equipment for the major construction projects (e.g., hangars, aircraft parking facilities, and apron). This stage of construction would involve less heavy equipment and would also be temporary in nature. Construction associated with this alternative would be undertaken adjacent to the flightline and occupy industrial areas, and would be isolated from any off-base communities. In addition, construction would take place during daylight hours and would follow BMPs to minimize noise to off-base receptors. Construction noise would be contained within the station environment because most of the heavy construction would occur near the flightline, where noise would be compatible with current and ongoing activities.

Therefore, there would be no significant noise impact from construction or operations at MCAS Yuma from the Minimum Partial Basing Alternative.

Mitigation Measures

Because there would be no significant impacts, no mitigation measures would be required.

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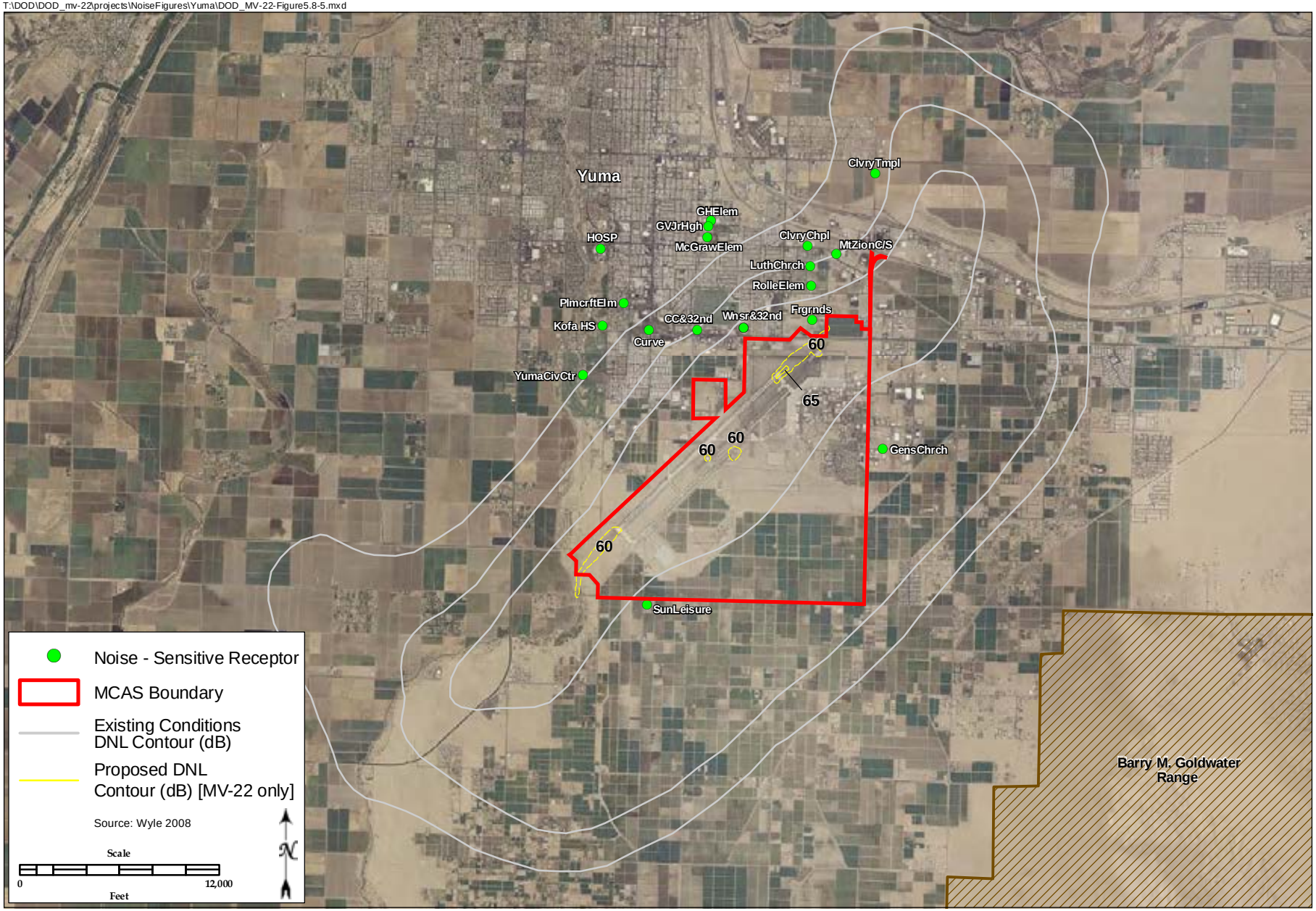

Aircraft Noise Contours from Operations at MCAS Yuma/Yuma International Airport for 2 - Squadron Alternative

FIGURE

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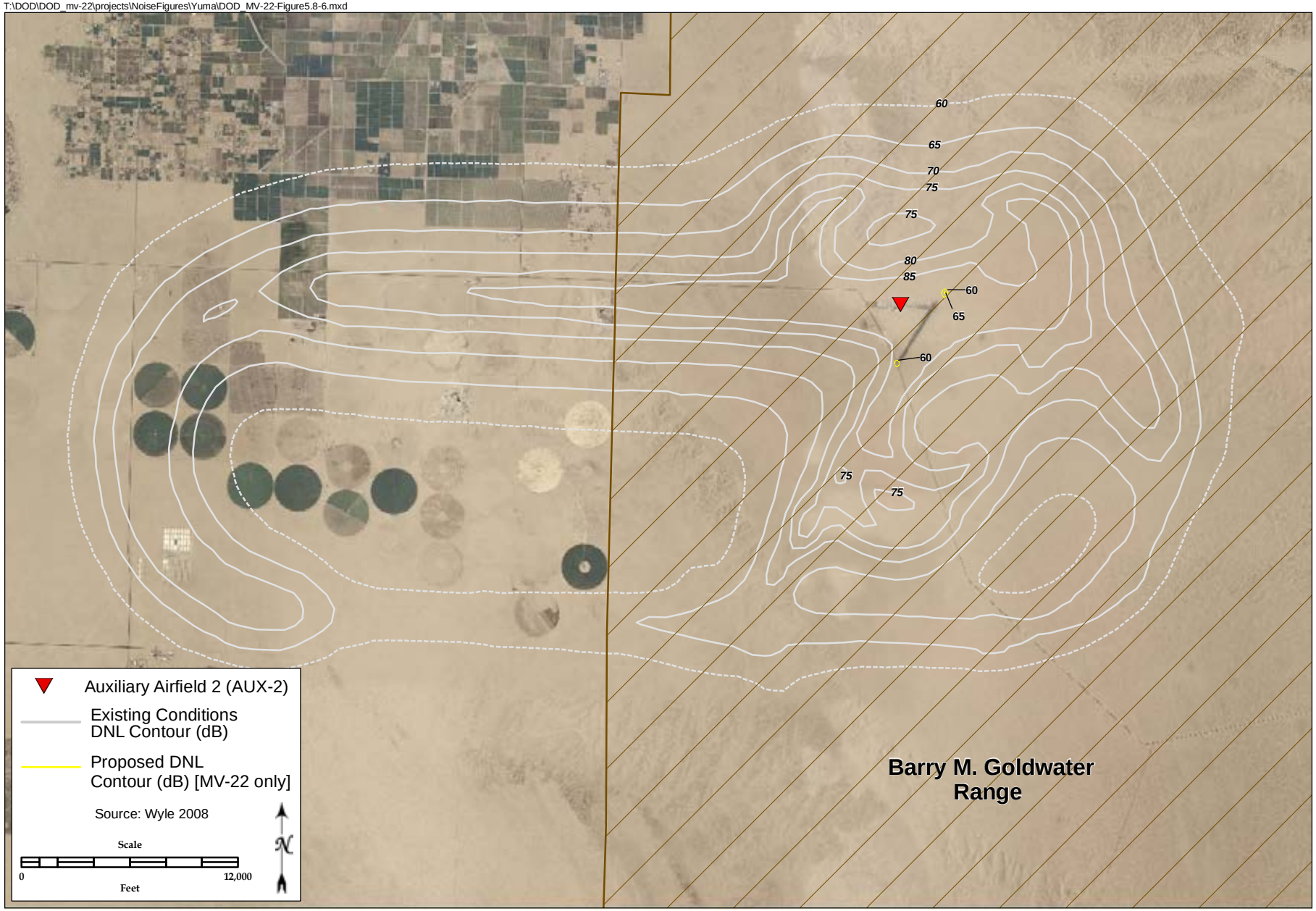

Aircraft Noise Contours from Operations at the AUX-2 Airfield for 2 - Squadron Alternative

FIGURE

5.8-6

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No Action Alternative

There would be no change in airfield operations under the No Action Alternative. It is likely that some transient MV-22 aircraft (aircraft based elsewhere) would continue to utilize the MCAS Yuma airfield and AUX-2, similar to current use by East Coast MV-22 aircraft. Although quantified data is not available at this time regarding current MV-22 operations by East Coast squadrons, it is estimated that such use would be similar to or less than proposed under the Minimum Partial Basing Alternative. Therefore, based on the above analysis, such use would not cause a significant noise impact.

Although it is possible that future construction efforts may be needed (e.g., wash racks at MCAS Yuma) related to MV-22 training by East Coast squadrons under the No Action Alternative, this would require less construction than associated with the proposed action (e.g., no new hangar construction). The above analysis demonstrates that construction noise would be contained within the station environment because most of the heavy construction would occur near the flightline, where noise would be compatible with current and ongoing activities. Therefore, no significant noise impacts would occur.

5.9 INFRASTRUCTURE AND UTILITIES

Infrastructure and utilities include water supply and treatment facilities, wastewater treatment and disposal facilities, electrical supply facilities, solid waste management facilities, heating, natural gas, and stormwater control and treatment facilities.

5.9.1 Affected Environment

Water Supply

The Treatment Utilities Division of the Yuma City Public Works Department provides water and wastewater services to all citizens of Yuma and some of the outlying areas. This Division provides water originally obtained from the Colorado River. Water is processed through many stages at the Water Treatment Facility, and then the residue is treated prior to returning it to the river. Wastewater sludge is used to fertilize many agricultural fields in the area.

The potable water supply for MCAS Yuma is obtained from the U.S. Bureau of Reclamation. The water is derived from a branch of the Colorado River and is transported to the on-station water treatment facility through a series of canals maintained by the Yuma Mesa Irrigation and Drainage District. The station's water treatment plant has three settling basins with a combined total capacity of 7.5 million gallons (28.4 million liters) of water. The water treatment plant processes water via rapid sand filtration, clarification, and disinfection with chlorine. The processed water is pumped into two elevated water storage tanks (capacity 500,000 gallons each [1,892,706 liters]) through five electric pumps. Two clear wells, located at the water treatment facility, provide a water storage capacity of 1.2 million gallons (4.5 million liters). A backwash basin, which has a capacity of 300,000 gallons (1.1 million liters), and an underground well that pumps water from below the station provide an alternative backup source of water for the water treatment plant (DoN 2001).

Wastewater Treatment and Disposal Facilities

Wastewater generated by the region and MCAS Yuma is disposed of at the Yuma Municipal Wastewater Facility within the City of Yuma. The wastewater system on-station operates using a gravity flow system with two sanitary sewer lift stations, which have a capacity of 900 to 1,500 gallons (3,406 to 5,678 liters) per minute. The first lift station is located near Hangar 109, and it serves the majority of the flightline facilities and aviation support activities. The second lift station is located near the southeast corner of the military family housing area. The collection system is composed of pipes that are 6 to 18 inches (15 to 46 centimeter [cm]) in diameter. The wastewater is delivered to the City of Yuma's interceptor line via Avenue 3E and other connection lines, which are owned and maintained by MCAS Yuma (DoN 2001).

Electrical Supply Facilities

Electrical power is provided regionally and on-station by Arizona Public Service and Western Area Power Administration. This power is distributed via Arizona Public Service lines, which feed into the MCAS Yuma electric substation. The MCAS Yuma electric substation distributes the primary electric power across five electrical distribution circuits to various locations throughout the station (DoN 2001).

Solid Waste Management Facilities

The City of Yuma Solid Waste Collection provides services to approximately 20,290 residential and commercial customers (City of Yuma 2008). This solid waste collection and disposal service is provided to city residents twice a week by either curb or alley collection. The County of Yuma Solid Waste Division also provides a means for disposing of residential solid waste and the collection/disposal of waste tires through transfer facilities located in North Gila Valley, Welton, Tacna and Dateland.

Solid waste produced at MCAS Yuma is removed from the station through a contractor and is taken to the Copper Mountain Landfill (approximately 42 miles [68 km] east of the station). Solid waste collection and disposal is managed by the Facilities Management Department, and hazardous waste is disposed under a separate contract through DRMO and is discussed further in section 5.11 (Hazardous Materials Management) (DoN 2001).

Natural Gas

Natural gas is provided to the Yuma region by a private utility, Southwest Gas. The natural gas used on-station is obtained through the Defense Fuel Support Contract Program. This program allows the station to purchase gas from various suppliers at reduced rates. The gas is metered at two locations, located south of the Main Gate and north of the North Gate, and is delivered by Southwest Gas Corporation lines to the on-station distribution system. The distribution system consists of lines that maintain a constant pressure of 25 pounds per square inch (psi) (1.8 kilogram [kg] per cm^2) (DoN 2001).

Stormwater Drainage Facilities

The stormwater system on-station consists of retention basins, street collector basins (within the Family Housing District), and dry wells (DoN 2001).

5.9.2 Environmental Consequences

Maximum Partial Basing (8-Squadron) Alternative

There would be a net increase of 2,156 personnel under this alternative (see Table 5.4-5) as well as the construction of various facilities under the Maximum Partial Basing Alternative. For the range of infrastructure and utilities discussed below, the installation is required to proactively plan for and assess infrastructure and utility needs within the scope of each corresponding MILCON project to ensure that the proposed increase in personnel would be accommodated.

Water Supply

The City of Yuma and the U.S. Bureau of Reclamation maintain adequate water supplies to meet the needs of all its users, including MCAS Yuma. The current systems can adequately accommodate the proposed increase of aircraft and personnel with implementation of the Maximum Partial Basing Alternative. It is possible that an additional storage tank would be required to store an adequate amount of potable water to support the proposed increase in personnel if new military personnel and family were all housed on-station; however, it is likely that required military family housing would be off-station and would be connected to the City of Yuma water distribution system (Kruse, personal communication 2008). Therefore, no significant impacts would occur. See also section 5.13 (Water Resources) for additional information.

Wastewater Treatment and Disposal Facilities

Sufficient capacity of the Yuma Municipal Wastewater Facility exists to adequately accommodate the proposed increase of aircraft and personnel with implementation of the Maximum Partial Basing Alternative. Therefore, no significant impacts would occur.

Electrical Supply Facilities

The installation has planned for and assessed infrastructure and utilities within the scope of each corresponding MILCON project to ensure that sufficient electrical capacity exists to adequately accommodate the proposed increase of aircraft and personnel with implementation of the Maximum Partial Basing Alternative. Therefore, no significant impacts would occur.

Solid Waste Management Facilities

Construction, demolition, and operational activities associated with implementation of the Maximum Partial Basing Alternative would contribute to an overall increase in solid waste generation, requiring landfill disposal. Sufficient capacity exists within the Copper Mountain Landfill to accommodate the increase in solid waste generation and materials would be recycled whenever possible. In addition, the Maximum Partial Basing Alternative would comply with the MCAS Yuma Solid Waste Management Plan, and established waste reduction and recycling programs. Therefore, no significant impacts would occur.

Natural Gas

The installation has planned for and assessed infrastructure and utilities within the scope of each corresponding MILCON project to ensure that sufficient natural gas supply exists to adequately

accommodate the proposed increase of aircraft and personnel with implementation of the Maximum Partial Basing Alternative. Therefore, no significant impacts would occur.

Stormwater Drainage Facilities

Implementation of the Maximum Partial Basing Alternative would contribute to additional demands on the existing stormwater drainage system. In addition, the installation has planned for and assessed infrastructure and utilities within the scope of each corresponding MILCON project to ensure that on-site stormwater retention is sufficient to handle surface runoff associated with the Maximum Partial Basing Alternative. All new construction would comply with DoN/USMC *Stormwater Low Impact Development Policy* and the MCAS Yuma *Water Quality Station Order P6280.9A*, which requires new construction to include a stormwater retention design capacity of 125 percent to prepare for a 100-year storm event. In addition, the Maximum Partial Basing Alternative would comply with National Pollution Discharge Elimination System (NPDES) permit requirements and stormwater retention BMPs for the base. Therefore, no significant impacts would occur.

Mitigation Measures

Implementation of the Maximum Partial Basing Alternative at MCAS Yuma would not result in significant impacts to infrastructure and utilities; therefore, no mitigation measures would be required.

Minimum Partial Basing (2-Squadron) Alternative

The impacts to infrastructure and utilities for the Minimum Partial Basing Alternative would be similar to those described above under the Maximum Partial Basing Alternative. There would be a net increase of 762 personnel under this alternative (see Table 5.4-5). Although there would be an overall increase in military aircraft operations, ground-based activity, and personnel associated with the two MV-22 squadrons, as discussed under the Maximum Partial Basing Alternative, the installation has planned for and assessed infrastructure and utilities within the scope of each corresponding MILCON project to ensure that existing infrastructure and utilities are adequate and would accommodate the proposed increase. Therefore, no significant impacts to infrastructure and utilities would occur with implementation of the Minimum Partial Basing Alternative.

Mitigation Measures

Implementation of the Minimum Partial Basing Alternative at MCAS Yuma would not result in significant impacts to infrastructure and utilities; therefore, no mitigation measures would be required.

No Action Alternative

There would be no change in airfield operations or associate personnel under the No Action Alternative. However, it is possible that future construction efforts may be needed (e.g., wash racks at MCAS Yuma) related to MV-22 training by East Coast squadrons under the No Action Alternative. This would require less construction than associated with the proposed action (e.g., no new hangar construction). The above analysis demonstrates that proposed construction associated with either basing alternative at MCAS Yuma would not result in significant impacts. Therefore,

no significant impacts are expected from these smaller future construction efforts that may occur under the No Action Alternative.

5.10 AESTHETICS AND VISUAL RESOURCES

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, an 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 of the area, and general community concern for visual resources in the area. These social considerations equate to visual sensitivity and are defined as the degree of public interest in a visual resource and concern over potential adverse changes in the quality of that resource.

5.10.1 Affected Environment

The visual environment at MCAS Yuma consists of developed areas characteristic of a military installation (e.g., buildings and training areas). The station is fully developed, except for recently acquired former agricultural fields, and most buildings are located to the southeast of the airfield. The man-made structures, buildings, and roads do not support native vegetation. MCAS Yuma has implemented structural design and maintenance guidelines, as outlined in the Base Exterior Architecture Plan (MCAS Yuma 1998), to promote a coordinated visual environment throughout the installation. The plan notes that "with the exception of a few isolated areas, the installation presents a generally unattractive appearance" (MCAS Yuma 1998).

MCAS Yuma lies within the Sonoran Desert section of the Basin and Range Province. The Sonoran Desert is characterized by generally low mountains separated by extensive desert plains. Elevations at the station range from 180 to 290 feet (55 to 88 meters) above MSL. The Colorado River flows near the installation in a series of narrow valleys or canyons through the mountains and broader alluvial valleys and through the desert plains. Habitats occurring within the boundaries of MCAS Yuma include such species as tumbleweed (*Amaranthus albus*), black mustard (*Brassica nigra*), and horseweed (*Conyza* spp.) (DoN 2001). No unique visual resources exist at MCAS Yuma.

5.10.2 Environmental Consequences

Maximum Partial Basing (8-Squadron) Alternative

Implementation of the Maximum Partial Basing Alternative would not affect the overall visual environment at MCAS Yuma. Proposed construction would be visually consistent with existing structures and would adhere to the Base Exterior Architecture Plan. In addition, the visual environment of MCAS Yuma is already characteristic of a military airfield, and local visual sensitivity is low. Even though there would be a 24 percent increase in airfield operations over existing conditions, the MV-22 would follow established local approach and departure patterns. Away from the airfield, the MV-22 would fly more often in fixed wing mode, which is higher and

faster than typical rotary wing aircraft. This would lessen any perceived visual impact from the MV-22. Therefore, no significant impacts to aesthetics and visual resources are expected with implementation of the Maximum Partial Basing Alternative.

Mitigation Measures

Implementation of the Maximum Partial Basing Alternative at MCAS Yuma would not result in significant impacts to aesthetics and visual resources; therefore, no mitigation measures would be required.

Minimum Partial Basing (2-Squadron) Alternative

Implementation of the Minimum Partial Basing Alternative would not affect the overall visual environment at MCAS Yuma. Proposed construction would be visually consistent with existing structures and would adhere to the Base Exterior Architecture Plan. In addition, the visual environment of MCAS Yuma is already characteristic of a military airfield, and local visual sensitivity is low. Even though there would be a four percent increase in airfield operations over existing conditions, the MV-22 would follow established local approach and departure patterns. Away from the airfield, the MV-22 would fly more often in fixed wing mode, which is higher and faster than typical rotary wing aircraft. This would lessen any perceived visual impact from the MV-22. Therefore, no significant impacts to aesthetics and visual resources are expected with implementation of the Minimum Partial Basing Alternative.

Mitigation Measures

Implementation of the Minimum Partial Basing Alternative at MCAS Yuma would not result in significant impacts to aesthetics and visual resources; therefore, no mitigation measures would be required.

No Action Alternative

There would be no change in airfield operations or associate personnel under the No Action Alternative. However, it is possible that future construction efforts may be needed (e.g., wash racks at MCAS Yuma) related to MV-22 training by East Coast squadrons under the No Action Alternative. This would require less construction than associated with the proposed action (e.g., no new hangar construction). The above analysis demonstrates that proposed construction associated with either basing alternative at MCAS Yuma would not result in significant impacts. Therefore, no significant impacts are expected from these smaller future construction efforts that may occur under the No Action Alternative.

5.11 HAZARDOUS MATERIALS MANAGEMENT

Hazardous materials are chemical substances that pose a substantial hazard to human health or the environment. Hazardous materials include hazardous substances, extremely hazardous substances, hazardous chemicals, and toxic chemicals. In general, these materials pose hazards because of their quantity, concentration, physical, chemical, or infectious characteristics. A hazardous waste may be a solid, liquid, semi-solid, or contained gaseous material that alone or in combination may: 1) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or

incapacitating reversible illness; or 2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

This section describes hazardous materials/waste management at MCAS Yuma, and provides background information on potential hazardous waste contamination areas being investigated as part of the Defense Environmental Restoration Program (DERP). As part of DERP, the DoD has created the Installation Restoration Program (IRP). This program was instituted to satisfy the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), for former and current hazardous waste sites.

The CERCLA definitions of hazardous substances (42 USC § 9601[14]) and pollutants or contaminants (42 USC § 9601[33]) specifically exclude petroleum unless specifically listed. The USEPA interprets the term petroleum to include hazardous substances found naturally in crude oil and crude oil fractions, such as benzene, and hazardous substances normally added to crude oil during refining. Petroleum additives or contaminants that increase in concentration in petroleum during use are not excluded from CERCLA regulations.

Hazardous waste at active sites at MCAS Yuma is regulated under the Resource Conservation and Recovery Act (RCRA), which gave the USEPA the authority to control hazardous waste from the "cradle-to-grave", including the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also sets forth a framework for the management of non-hazardous waste, including Petroleum, Oil, and Lubricants (POL) sites, which are regulated under the Underground Storage Tank/Aboveground Storage Tank (UST/AST) program at MCAS Yuma.

5.11.1 Affected Environment

Hazardous Materials/Waste Management

Activities at MCAS Yuma require the use and storage of a variety of hazardous materials and wastes, including flammable and combustible liquids, acids, corrosives, caustics, compressed gases, solvents, paints, paint thinners, and various other petroleum oils and lubricants.

Hazardous Waste Accumulation Areas (HWAAs) are used at MCAS Yuma to store hazardous waste for up to 90 days prior to being transported offbase. Hazardous materials are stored in various locations, including storage tanks, flammable storage lockers, shelves, and materials storage warehouses. Hazardous materials storage and disposal at MCAS Yuma is regulated by a MCAS Yuma-specific Hazardous Waste Management Plan (USMC 1997c).

Asbestos-containing materials (ACMs) may be present in buildings or other facilities that would be demolished as part of the proposed action. ACMs have been classified as a hazardous air pollutant by the USEPA, in accordance with Section 112 of the CAA (USEPA 2002). Surveys would be conducted for ACMs, as required by 40 CFR 61.145 and OPNAVINST 5100.23E, during the design phase of the project and prior to demolition of the structure. Proposed building demolition activities that include the removal and/or handling of regulated asbestos-containing material (RACM) would comply with requirements of the Arizona Department of Environmental Quality, Air Quality Compliance Section, Asbestos National Emissions Standards for Hazardous Air Pollution (NESHAP) Program. Included in this program are requirements for facility surveys, notification of intent to disturb RACM, control measures, RACM removal, and handling and disposal techniques.

Lead-based paint may also be present in buildings or other facilities that would be demolished as part of the proposed action. Surveys would be conducted for lead-based paint in accordance with Federal Register, Volume 64, No. 110 and 40 CFR Part 745, Section 402/404, of the Federal Toxic Substances Control Act, pertaining to lead-based paint at construction sites and in the work place. In addition, 15 USC section 2601, of the Federal Toxic Substances Control Act, would apply to analysis of lead-based paint in on-site structures. Included in these regulations are requirements for facility surveys, notification of intent to disturb lead-based paint, control measures, removal measures, and handling and disposal techniques. Proposed building demolition activities that include the removal and/or handling of lead-based paint would have to comply with these regulations. In addition, demolition would be completed in accordance with the Arizona Lead-Based Paint and Certification program.

Hazardous Waste Release Sites

At MCAS Yuma, there are currently four groundwater contamination plumes and eighteen soil contamination sites; all which have been addressed as part of the IRP (Figure 5.11-1). Of the 18 soil contamination sites, 12 have been determined to be no further action sites, three sites required institutional controls, and three sites required cleanup, which has been completed (USMC 2000).

The largest of the groundwater plumes is located in Area 1 of Site 19/Operable Unit 1 (see Figure 5.11-1). Operable Unit 1 was divided into areas to better manage the investigation. As illustrated in Figure 5.11-1, two of these areas of Operable Unit 1 are located within the proposed project area. Cleanup Area 1 was found to contain extensive chlorinated solvent contamination near Building 230 and extending offbase. This area was given high priority because MCAS Yuma is partially bordered by developed land. Groundwater is currently being remediated to meet federally mandated levels. More than three million gallons of contaminated groundwater have been successfully treated and reinjected into the groundwater. Three smaller chlorinated solvent plumes are also located in Site 19/Operable Unit 1 (USMC 2000).

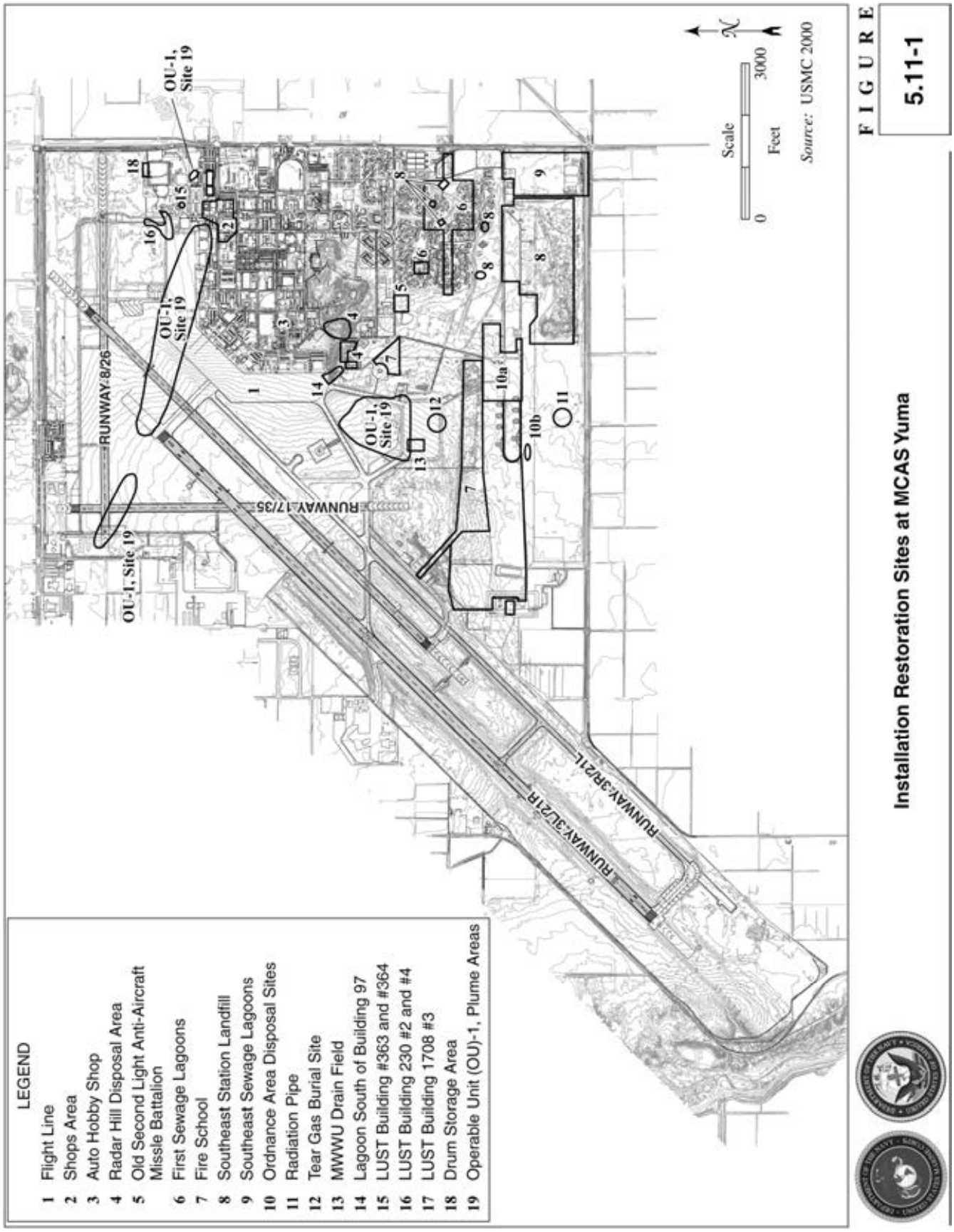
5.11.2 Environmental Consequences

Maximum Partial Basing (8-Squadron) Alternative

Construction

Asbestos-Containing Material. ACMs may be present in structures proposed to be demolished. Surveys would be conducted for ACMs, as required by 40 CFR 61.145, during the design phase of the project and prior to demolition of the structures. Such surveys would categorize any ACMs found in the facilities into four different categories, depending on the friable nature of the material. Based on this categorization, an Arizona licensed asbestos abatement contractor would determine the proper technique for removing the ACMs and demolishing the facilities. ACMs would be removed, characterized, managed, transported, and disposed according to applicable state and federal requirements for protecting human health and safety and the environment. Therefore, significant impacts associated with ACMs would not occur.

Lead-Based Paint. Similar to ACMs, surveys would be conducted on structures to be demolished for lead-based paint during the design phase of the project and prior to structure demolition and relocation. Lead-based paint sampling would be conducted on the structures to be removed and analyzed in accordance with USEPA approved Toxicity Characteristic Leaching Procedure (TCLP) methodology.


LEGEND
1 Flight Line
2 Shops Area
3 Auto Hobby Shop
4 Radar Hill Disposal Area
5 Old Second Light Anti-Aircraft Missle Battalion
6 First Sewage Lagoons
7 Fire School
8 Southeast Station Landfill
9 Southeast Sewage Lagoons
10 Ordnance Area Disposal Sites
11 Radiation Pipe
12 Tear Gas Burial Site
13 MWWU Drain Field
14 Lagoon South of Building 97
15 LUST Building #363 and #364
16 LUST Building 230 #2 and #4
17 LUST Building 1708 #3
18 Drum Storage Area
19 Operable Unit (OU)-1, Plume Areas
OU-1, Site 19
RUNWAY 8/26
RUNWAY 17/35
RUNWAY 3L/21R
RUNWAY 3R/21L
Scale
0
3000
Feet
Source: USMC 2000
FIGURE
5.11-1
Installation Restoration Sites at MCAS Yuma

Based on this Federal testing methodology, the paint would be considered hazardous if lead is detected at concentrations greater than five micrograms per liter (µg/l). If lead-based paint were detected at hazardous concentrations, these materials would be removed. Lead-based paint would be characterized, managed, transported, and disposed according to applicable state and federal requirements for protecting human health and safety and the environment. Therefore, significant impacts associated with lead-based paint would not occur.

Installation Restoration Program (IRP) Sites. New support facilities associated with the Maximum Partial Basing Alternative would include seven new hangar modules, a new taxiway, parking apron, wash racks, and other facilities. The construction projects would be located south of existing parking aprons, hangars, and support facilities. In comparing Figures 2.3-6 and 5.11-1, many of the existing and former areas of soil and groundwater contamination are not located in the vicinity of any of the proposed facility improvements. However, portions of the proposed new aircraft parking aprons, hangars, and wash racks coincide with Site 19, Operable Unit-1, as well as Sites 4, 7, 10a, 10b, 12, and 13. Remediation at these sites, within the construction/ grading footprint for the MV-22 project, has either been completed or would be completed concurrent with or prior to construction of proposed project facilities.

Although many of the contaminated sites have been sufficiently characterized, remediated, and closed with respect to regulatory compliance, it is possible that residual contamination remains in the subsurface at these locations and may be excavated or disturbed during construction. In addition, unknown or undocumented subsurface contamination may also be encountered in construction areas located outside of designated IRP sites.

If contaminated soil or groundwater is encountered or disturbed during demolition or construction-related activities, potentially significant impacts on surface water, groundwater, or the health and safety of on-site workers could occur. However, these potential impacts would be reduced to below a level of significance by implementation of the following actions proposed as part of project planning and design:

- Prior to any demolition, excavation, or construction activities, all known utilities (including fuel, sewer, steam, and electrical) would be identified by the demolition and construction contractor.
- The USMC will conduct remedial actions, pursuant to CERCLA, to remove hazardous substances, pollutants, or contaminants present at these sites, prior to or in conjunction with the commencement of grading and construction activities, in coordination with the Arizona Department of Environmental Quality, as appropriate.
- All remedial actions and excavations would be conducted in compliance with all federal and state statutes and regulations pertaining to soil and groundwater contamination.

Construction personnel current with respect to Occupational Safety and Health Administration (OSHA) 40-hour training for hazardous materials would complete excavations in areas of potentially contaminated soil. An OSHA 40-hour trained monitor, with experience in identification of contaminated soil, would also be present during grading and excavations to determine whether petroleum-based contaminated soil and/or groundwater are encountered. Contaminated soils would be segregated from clean soils prior to offsite disposal.

The contractor would also prepare and implement a Health and Safety Plan prior to the start of grading/excavating to establish policies and procedures to protect workers and the public from potential hazards posed by potentially contaminated soil. The plan would identify all contaminants, appropriate OSHA 40-hour trained workers, public health and environmental protection equipment and procedures, emergency response procedures, route to the hospital, etc. The plan would be reviewed and signed off by all workers that may be in contact with potentially contaminated soil.

These actions would be subject to the requirements of CERCLA. DoN would coordinate with CERCLA program managers before executing the proposed action to ensure conformance with CERCLA requirements for this location. In addition, construction in contaminated areas would be conducted in accordance with the National Contingency Plan (40 CFR 300, CERCLA Section 105), and the following regulations and guidance manuals.

- 29 CFR 1910.120 (addresses hazardous waste releases and health and safety of workers);
- Department of the Navy Environmental Restoration Program Manual, August 2006 (protocol to evaluate, characterize, and control the potential migration of possible contaminants resulting from past operations and disposal practices at DoD facilities);
- EM 385-1-1 U.S. Army Corps of Engineers (USACE) Safety and Health Requirement Manual, September 1996 (addresses health and safety issues for workers handling potentially hazardous materials or waste); and
- OPNAVINST 5090.1C, Environmental and Natural Resources Program Manual.

Other IRP sites are located throughout MCAS Yuma; however, project-related construction is not proposed in these areas. Therefore, impacts would not occur.

Incidental Spills and Construction Waste. Construction would include the use of heavy equipment that would be subject to potential spills of fuel, oil, lubricants, coolant, transmission fluid, hydraulic oil, or other miscellaneous fluids. Servicing these vehicles could similarly result in spills of such petroleum products. In addition, the project may generate small quantities of hazardous waste, such as solvents, adhesives, and paint. Spills of petroleum products or hazardous waste could potentially penetrate into on-site soils resulting in soil and/or groundwater contamination. However, through implementation of the following actions proposed as part of project planning and design, significant impacts would not occur:

- Contractors would be adequately prepared to respond and clean up accidental spills and releases of hazardous materials used or contained in equipment and heavy machinery. Spill response equipment, such as sorbent pads and containment booms, would be available in fueling and maintenance areas.
- Construction-generated petroleum and hazardous waste (e.g., gasoline, solvents, adhesives, and paint) would be properly managed and disposed.
- Contractors would identify, manage, transport, and dispose of regulated wastes (solid waste, hazardous waste, recyclable waste, etc.) in accordance with provisions of Title 49 of the Arizona Code.

- Shipping paperwork (hazardous waste manifests, special waste manifests, bills of laden, etc.) used to transport waste from the station would be reviewed and signed by the Waste Management Division.
- Cleared construction and demolition materials would be recycled in accordance with the Navy Affirmative Procurement Instruction.
- Contractors would remove excess hazardous materials from the site once work is completed.

In addition, construction, repair, modifications, and maintenance activities that involve the storage of oils in quantities equal or greater than 55 gallons would be required to implement Spill Prevention, Control, and Countermeasure (SPCC) requirements, as presented in 40 CFR 112 and MCO P5090.2A, Chapter 7. These requirements include any container used for standby storage, seasonal storage, temporary storage, or storage not otherwise considered "permanently closed". Spill containment structures would be provided to prevent spills, leaks, and unauthorized discharges.

The aforementioned statutes and regulations pertaining to IRP and POL sites, incidental spills, and construction waste are aimed at protecting human health and the environment. These statutes and regulations address worker safety, regulatory notification, clean-up requirements, and handling, storage, treatment, and disposal requirements for hazardous materials and waste. Compliance with all applicable federal, state, and local regulations would reduce the potential for significant adverse impacts from contaminants, if encountered, to below a level of significance. Also, see section 5.13 (Water Resources) regarding implementation of a site-specific Stormwater Pollutions Prevention Plan (SWPPP) to control potentially contaminated surface runoff during demolition and construction-related activities.

Operations

Potential impacts to surface or groundwater quality through the accidental release of chemicals during MV-22 operations (e.g., refueling) would be reduced to below a level of significance by implementation of an NPDES-mandated SWPPP and compliance with federal, state, and local statutes and regulations regarding stormwater retention and treatment and soil and groundwater contamination (described above). As indicated in section 5.13 (Water Resources), the SWPPP includes an SPCC plan, which provides protective and corrective measures for accidental releases of hazardous substances or petroleum products, as described above. Additionally, all squadrons must participate in Hazardous Materials Management System to track hazardous material usage and waste. Therefore, operational impacts would not be significant.

Mitigation Measures

Because there would be no significant hazardous material related impacts, no mitigation measures are proposed.

Minimum Partial Basing (2-Squadron) Alternative

Construction

Under this alternative, hazardous material related impacts would be less than under the Maximum Partial Basing Alternative, due to a decrease in grading and construction (see Table 2.3-7). The

2-squadron configuration is similar to the 8-squadron configuration, except only two new hangars and a smaller amount of new apron space would be constructed. Construction activities would include a new rinse facility and other facilities, but the new taxiway would not be necessary.

In comparing Figure 5.11-1 with Figure 2.3-7, new construction associated with the Minimum Partial Basing Alternative would be completed in the vicinity of portions of Site 19, Operable Unit-1, as well as portions of Sites 4, 7, 12, and 13. Remediation at these sites, within the construction/grading footprint for the MV-22 project, has either been completed or would be completed concurrent with or prior to construction of proposed project facilities.

Although many of the contaminated sites at MCAS Yuma have been sufficiently characterized, remediated, and closed with respect to regulatory compliance, it is possible that residual contamination remains in the subsurface at these locations and may be excavated or disturbed during construction. In addition, unknown or undocumented subsurface contamination may also be encountered in construction areas. If contaminated soil or groundwater is encountered or disturbed during demolition or construction-related activities, potentially significant impacts on surface water or groundwater could occur as a result of a discharge or accidental release. However, these potential impacts would be reduced to below a level of significance by implementation of the actions outlined for the Maximum Partial Basing Alternative. If necessary, remediation would be conducted in accordance with CERCLA, and in coordination with the Remedial Project Manager at NAVFAC and IRP Manager. No construction would occur on contaminated sites until the site has been remediated, in accordance with MCO 5090.Compliance with all applicable federal, state, and local regulations would reduce the potential for significant adverse impacts from contaminants, if encountered, to below a level of significance. Also, see section 5.13 (Water Resources) regarding implementation of a site-specific SWPPP to control potentially contaminated surface runoff during demolition and construction-related activities.

Operations

Potential impacts to surface or groundwater quality through the accidental release of chemicals during MV-22 operations (e.g., refueling) would be reduced to below a level of significance by implementation of an NPDES-mandated SWPPP and compliance with federal, state, and local statutes and regulations regarding stormwater retention and treatment and soil and groundwater contamination (described above). As indicated in section 5.13 (Water Resources), the SWPPP includes an SPCC plan, which provides protective and corrective measures for accidental releases of hazardous substances or petroleum products. Additionally, all squadrons must participate in Hazardous Materials Management System to track hazardous material usage and waste. Therefore, operational impacts would not be significant.

Mitigation Measures

Significant impacts would not occur; therefore, no mitigation measures are proposed.

No Action Alternative

There would be no change in airfield operations or associate personnel under the No Action Alternative. However, it is possible that future construction efforts may be needed (e.g., wash racks at MCAS Yuma) related to MV-22 training by East Coast squadrons under the No Action Alternative. This would require less construction than associated with the proposed action (e.g., no

new hangar construction). The above analysis demonstrates that proposed construction associated with either basing alternative at MCAS Yuma would not result in significant impacts. Therefore, no significant impacts are expected from these smaller future construction efforts that may occur under the No Action Alternative.

5.12 TOPOGRAPHY, GEOLOGY, AND SOILS

This section describes the general geology, topography, soils, and seismicity at MCAS Yuma. The geologic resources of an area consist of soil and bedrock materials. For the purpose of this study, the terms soil and rock refer to unconsolidated and consolidated earth materials, respectively, regardless of depth.

5.12.1 Affected Environment

General Geology and Topography

MCAS Yuma is located on the Yuma Mesa area of the Salton Trough. This structural trough is located within the Basin and Range Physiographic Province, a region generally characterized by parallel, northwest-trending, block-faulted mountains (horsts) and sediment-filled basins (grabens). Yuma Mesa encompasses remnants of ancestral Colorado and/or Gila River valleys and deltas. The topography at MCAS Yuma is relatively flat to gently sloping, with on-site elevations ranging from approximately 180 to 290 feet (55 to 88 meters) above MSL. The area is underlain by Plio/Pleistocene alluvium (Olmsted et al. 1973, USMC 1999).

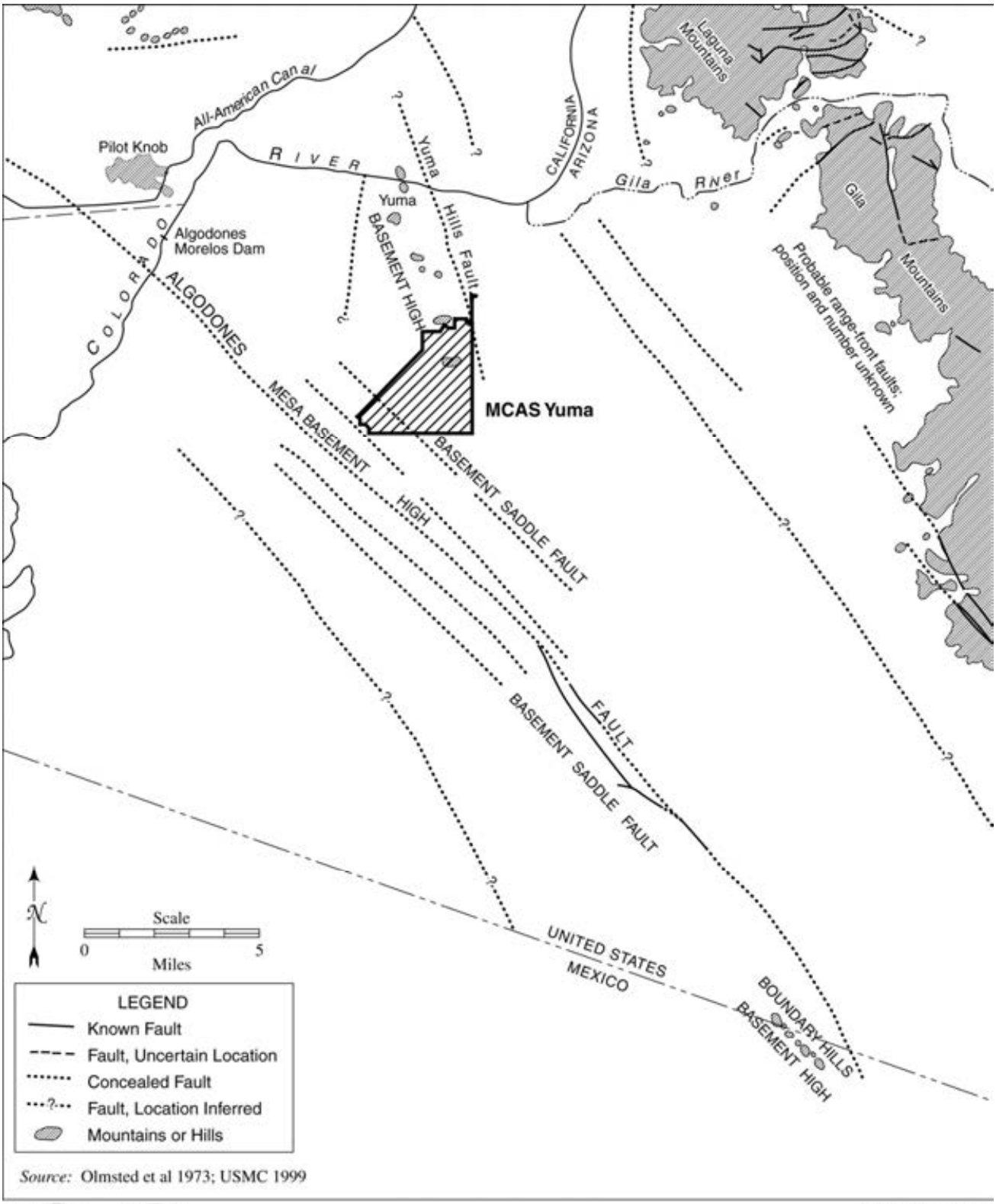
Soils

Surface soils at MCAS Yuma consist of Superstition Sand, which characteristically has high sand content, low water erosion potential, high wind erosion potential, low expansion (shrink-swell) potential, and moderate alkalinity (USMC 1999).

Seismicity

MCAS Yuma is located in a seismically active region, which is subject to events along regional, major active faults. Faulting within the Salton Trough is dominated by northwest-trending transform structures with most major faults related to three principal fault zones: San Andreas, San Jacinto, and Elsinore. These three fault zones consist of numerous individual fault traces that display both major strike-slip (lateral) and relatively minor dip-slip displacement. All three faults are considered active and have produced large magnitude historic earthquakes. The San Andreas Fault is the closest major active fault to MCAS Yuma. The San Andreas Fault extends into the Yuma area as the Algodones Fault, which is considered potentially active. The Algodones Fault is exposed at or near the surface approximately one mile (1.6 km) southwest of the project focus area. Several other inactive faults are located in the vicinity of the site (Figure 5.12-1) (CDMG 1994, 1999; USMC 1999).

MCAS Yuma is subject to potentially destructive effects associated with large earthquake events along major regional faults. Perceptible earthquakes (i.e., Richter magnitude of approximately 3.0 and above) are a regular occurrence, and smaller events are recorded on a daily basis. It is anticipated that the Yuma area could potentially be subject to ground acceleration values of up to 0.6 g, where "g" equals acceleration due to gravity, associated with a maximum credible earthquake event (i.e., the largest event considered capable of occurring) of magnitude 7.25, along nearby segments of the Algodones Fault (Table 5.12-1). However, because of the uncertainty



Source: Olmsted et al 1973; USMC 1999

Regional Fault Map - MCAS Yuma

FIGURE 5.12-1

regarding the existence and activity potential of this fault in the Yuma area, a more likely scenario would include ground acceleration values of up to approximately 0.4 g associated with a large magnitude earthquake event on the Imperial Fault (in the Imperial Valley to the west). Large earthquakes along extensive faults, such as the San Andreas, can produce ground accelerations with longer wavelengths and durations than smaller faults, even though the latter structures may be closer and thus generate greater peak acceleration values. The wavelength, amplitude, and duration of seismic shaking can contribute to the destructive potential of individual earthquake events (USMC 1999).

Table 5.12-1. Seismic Parameters for Major Active Faults Within 60 Miles (96 km) of MCAS Yuma

Fault	Distance to Project Area (miles/kilometers)	Maximum Credible Earthquake (Richter Magnitude)
Algodones	5/8	7.2
Imperial	36/58	7.0
Superstition Hills	60/96	7.0
Source: Greensfelder 1974; CDMG 1994		

Due to the occurrence of shallow groundwater and loose, sandy surficial materials, the majority of MCAS Yuma has a moderate to high potential for liquefaction (i.e., the process by which soils become liquid when subject to ground shaking) during seismic events (USMC 1999).

5.12.2 Environmental Consequences

Maximum Partial Basing (8-Squadron) Alternative

Topography

New support facilities associated with the Maximum Partial Basing Alternative would include seven new hangar modules, a new taxiway, parking apron, wash racks, and other facilities.

The construction projects would be located south of existing parking aprons, hangars, and support facilities. Minimal grading would be required, as the construction site is generally flat to gently sloping. Therefore, changes to the existing topography would be minimal. Grading/construction would be completed in accordance with Uniform Building Code and DoD Unified Facilities Criteria (UFC) requirements. In addition, a site-specific geotechnical report would be prepared for the proposed construction areas. Due to the limited changes to the existing topography and completion of grading in accordance with Uniform Building Code (Chapter 70) and UFC specifications and geotechnical consulting recommendations, topographic impacts would not occur as a result of the proposed action.

Geology and Soils

Soils at MCAS Yuma have high sand content, low water erosion potential, high wind erosion potential, and low expansion potential. Construction activities at MCAS Yuma would be completed in compliance with the geotechnical recommendations incorporated into the project design; however, no geotechnical remedial measures would be required for these soil conditions. Site grading and construction of the proposed facilities would result in temporary soil disturbance. The relatively flat topography in the construction areas would minimize the water erosion potential

during construction; however, these disturbed soils would be highly subject to wind erosion. Dust emissions are one of the main air pollution problems in the region. See section 5.7 (Air Quality), for an evaluation of dust emissions during grading and construction.

With respect to surface runoff, construction activities would be completed in compliance with a project-specific NPDES General Construction Permit. As part of the permit, a SWPPP would be prepared. The SWPPP would incorporate stormwater runoff control measures. In addition, as outlined in the USEPA's NPDES Phase II Stormwater Regulations (USEPA 1999a), BMPs would be implemented prior to, and during, the rainy season for erosion and sediment control to be effective. Provisions for both temporary and permanent erosion and sediment control measures would be implemented in accordance with the SWPPP prepared/designed specifically for the construction sites. Once implemented, these control measures would be monitored and maintained to ensure their effectiveness. Due to implementation of BMPs, including incorporation of standard erosion control measures, significant erosional impacts associated with project construction would not occur.

Seismicity

MCAS Yuma is not underlain by any active or potentially active faults. However, active faults located within 60 miles (97 km) of MCAS Yuma could result in strong seismically induced ground motion and associated ground shaking and, therefore, proposed construction and operations could increase exposure of people and property to seismic hazards from a major or great earthquake. New facilities would be designed and constructed in accordance with a site-specific geotechnical investigation and would comply with the seismic design criteria identified in the Uniform Building Code, the NAVFAC P-355 Seismic Design Manual, and the most stringent criteria identified in the latest design specifications of the Yuma Arizona Structural Code (Yuma Code of Ordinances, Title 15, Chapter 150-105). As a result, significant impacts associated with seismically induced ground motion and ground shaking would not occur.

Mitigation Measures

Because there would be no significant geologic impacts, no mitigation measures are proposed.

Minimum Partial Basing (2-Squadron) Alternative

Under this alternative, geologic impacts would be less than under the Maximum Partial Basing Alternative due to a decrease in grading and construction (see Table 2.3-7). The 2-squadron configuration is similar to the 8-squadron configuration, except only two new hangars and a smaller amount of new apron space would be constructed. Construction activities would include a new rinse facility and other facilities, but the new taxiway would not be necessary.

Similar to the Maximum Partial Basing Alternative, changes to the existing topography and erosion would be minimal during construction due to the relatively flat topography. Based on compliance with geotechnical recommendations and implementation of BMPs, including incorporation of standard erosion control measures, significant erosional impacts associated with project construction would not occur.

In addition, similar to the Maximum Partial Basing Alternative, proposed structures and infrastructure would be subject to seismically induced ground shaking and, therefore, proposed

construction and operations could increase exposure of people and property to seismic hazards from a major or great earthquake. New facilities would be designed and constructed in accordance with a site-specific geotechnical investigation and would comply with the seismic design criteria identified in the Uniform Building Code, the NAVFAC P-355 Seismic Design Manual, and the most stringent criteria identified in the latest design specifications of the Yuma Arizona Structural Code (Yuma Code of Ordinances, Title 15, Chapter 150-105). As a result, significant impacts associated with seismically induced ground motion and ground shaking would not occur.

Mitigation Measures

Because there would be no significant geologic impacts, no mitigation measures are proposed.

No Action Alternative

There would be no change in airfield operations or associate personnel under the No Action Alternative. However, it is possible that future construction efforts may be needed (e.g., wash racks at MCAS Yuma) related to MV-22 training by East Coast squadrons under the No Action Alternative. This would require less construction than associated with the proposed action (e.g., no new hangar construction). Similar to the above analysis, proposed structures and infrastructure would be subject to seismically induced ground shaking and, therefore, proposed construction and operations could increase exposure of people and property to seismic hazards from a major or great earthquake. However, any new facilities would have to comply with current building codes and standard geotechnical engineering protocol, as described above. Therefore, no significant impacts are expected from these smaller future construction efforts that may occur under the No Action Alternative.

5.13 WATER RESOURCES

This section describes the surface and groundwater hydrology at MCAS Yuma, including water quality, water supply, and flooding. Hydrology is the science that deals with global water, its properties, circulation, and distribution, on and under the surface of the earth and in the atmosphere, from the moment of precipitation until it returns to the atmosphere through evapotranspiration or is discharged into the ocean. Water quality describes the chemical and physical composition of water as affected by natural conditions (e.g., erosion) and human activities (e.g., hazardous waste spills). Water supply includes a general discussion of groundwater availability in the vicinity of the site.

Floodplains are generally located adjacent to rivers and other bodies of water and in low-lying areas near a water source. Floodplains are areas with a one percent chance of flooding in any given year. Floodways are more hazardous due to the anticipated velocities of the floodwaters and expected damage to life and property. Floodplains are identified with respect to project components to determine the likelihood of inundation following high intensity rainfall events.

5.13.1 Affected Environment

Surface Water

Southwestern Arizona and MCAS Yuma are located within the Basin and Range Lowlands hydrogeologic province. This province is characterized by isolated mountain ranges separated by

alluvial valleys and basins. The principal drainage courses in the area include the Colorado and Gila Rivers, both of which extend into the Yuma area. Other drainages in the area are ephemeral (i.e., do not contain surface water year-round). MCAS Yuma is located on Yuma Mesa, which is separated from the adjacent Colorado and Gila River valleys by a relatively low ridgeline. Annual precipitation in the Yuma area averages approximately three inches (7.5 cm), with most falling during the periods of July to August and December to March (USMC 1997a, 1999).

Surface drainage within MCAS Yuma is generally via overland (i.e., non-point) flows, with no defined drainage courses present. Surface flow is generally minimal due to the level topography and sandy soils. The Yuma area is divided into eight irrigation and drainage districts to manage water use related to agriculture, with MCAS Yuma located within the Yuma Mesa Irrigation and Drainage District (USMC 1999).

The Colorado and Gila Rivers are the only perennial drainages in the vicinity of MCAS Yuma. The Colorado River is the primary source of water for MCAS Yuma (Rodriguez, personal communication 2005). The Colorado River exhibits generally good water quality upstream of the Yuma area, but agricultural runoff from the Yuma area and upstream portions of the Gila River Watershed add substantial chemical and mineral contaminants. Groundwater quality data indicate that agricultural runoff from the Yuma area is of generally poor quality, with portions of this effluent treated at the U.S. Bureau of Reclamation Yuma Desalting Plant prior to downstream discharge (USMC 1999).

The Gila River exhibits generally poor water quality, including pesticide contamination that is characterized as some of the most significant in the Western U.S. (Arizona Department of Water Resources [ADWR] 1994). Discharge into the Gila River upstream of Yuma includes both agricultural and municipal effluent, with the Gila River flowing into the Colorado River just east of Yuma (USMC 1999). As a result of this contaminated runoff, the Colorado River has been identified as an impaired water body, with respect to the surface water quality standards for dissolved oxygen and selenium (ADEQ 2008c).

Due to the general ephemeral nature (no year-round flow) of surface waters at MCAS Yuma, little known data are available regarding surface water quality at the base.

Stormwater runoff during operational phases of the project would be regulated under an NPDES Permit and associated SWPPP, prior to off-base discharge. NPDES is the national program for issuing, modifying, revoking, etc., permits under Sections 307, 318, 402, and 405 of the Clean Water Act. The NPDES permit is an authorization issued by the USEPA, or an approved state, to discharge under certain specified conditions. The SWPPP is designed to minimize water quality degradation through establishment of project-specific BMPs, implementation of standard erosion control measures, and implementation of a SPCC plan. Currently, MCAS Yuma maintains an activity-wide (base-wide) SWPPP. Stormwater runoff during construction activities would be regulated under an Arizona Pollution Discharge Elimination System (AZPDES) General Stormwater Construction Permit, and associated SWPPP. This plan would override existing SWPPPs. Following construction, BMPs would be applied to new operational activities.

Flooding

Floodplains are generally located adjacent to rivers and other bodies of water and in low-lying areas near a water source. Floodplains are areas with a one percent chance of flooding in any given year. Floodways are more hazardous due to the anticipated velocities of the flood waters and expected damage to life and property.

Federal Emergency Management Agency (FEMA) floodplain maps do not extend into MCAS Yuma (i.e., MCAS Yuma is marked as "area not included"); however, the air station is not located within a floodplain (Britain, personal communication 2004).

Groundwater

The basins of the Basin and Range hydrogeologic province are tectonically depressed troughs that have been filled to depths of several thousand feet with unconsolidated alluvium eroded from the mountains. Most of the groundwater storage is located in these intermountain basins. Mountain ranges typically function as aquifer boundaries. MCAS Yuma is located within the Yuma Basin, where basin-fill sediments exceed 12,000 feet (3,658 meters) thick. The Yuma Basin aquifers are bound by impermeable strata to the north and east, generally consistent with the Colorado and Gila Rivers and Gila and Laguna Mountains, but extend into Mexico to the west and south. Regional groundwater flow is generally to the south, but local variations exist due to shallow bedrock, fault barriers, and irrigation. Groundwater flows to the northwest under MCAS Yuma due to groundwater mounding on shallow bedrock near the southern portion of the base. Groundwater is present at depths of approximately 60 to 75 feet (18 to 23 meters) beneath MCAS Yuma. Recharge to the Yuma Basin occurs almost exclusively from large-scale irrigation with Colorado River water (USMC 1997a, 1999).

Groundwater wells at MCAS Yuma are available as back-up water supply to Colorado River water (Rodriguez, personal communication 2005). Groundwater quality data is variable in the vicinity of MCAS Yuma. A number of sites that may contain hazardous waste and may have degraded local groundwater quality are present at the station (USMC 1999). These sites are described in section 5.11 (Hazardous Materials Management).

5.13.2 Environmental Consequences

Maximum Partial Basing (8-Squadron) Alternative

Water Quality

New support facilities associated with the Maximum Partial Basing Alternative would include seven new hangar modules, a new taxiway, parking apron, wash racks, and other facilities. The construction projects would be located south of existing parking aprons, hangars, and support facilities. Surface water quality of nearby drainages and the Colorado and Gila Rivers could potentially be impacted by fuel spills and surface water run-off associated with construction-related activities. However, stormwater runoff would be regulated under AZPDES Construction General Permit AZG2008-001, as well as an AZPDES Multi-Sector General Permit (MSGP). MCAS Yuma filed for MSGP coverage with the ADEQ, Water Quality Division, on 7 April 2003. In compliance with MSGP and ADEQ Water Quality Division Construction General Permit requirements, an SWPPP would be designed to minimize water quality degradation through

establishment of project-specific BMPs, including implementation of a SPCC plan and erosion control measures. Construction-related erosion control measures would include, but not be limited to, erosion control blankets, soil stabilizers, temporary seeding, silt fencing, hay bales, sand bags, and storm drain inlet protection devices. In addition, the wash racks would be constructed in accordance with a General Permit for Vehicle and Equipment Washes, which is part of an Aquifer Protection Permit, as required by the ADEQ, Water Quality Division. Due to implementation of BMPs, including incorporation of a SPCC plan and Aquifer Protection Permit, significant water quality impacts associated with project construction would not occur.

Flooding

FEMA floodplain maps do not extend into MCAS Yuma (i.e., MCAS Yuma is marked as "area not included"); however, the airfield is not located within a floodplain. MCAS Yuma is located on Yuma Mesa, which is separated from the adjacent Colorado and Gila River valleys by a relatively low ridgeline. In addition, stormwater retention basins would be designed to a capacity of 125 percent of a 100-year, 24-hour storm event in association with the proposed action. Therefore, significant flooding impacts would not occur.

Water Supply

Operational activities associated with the proposed action would result in increased personnel water use; construction of a new wash rack; and construction of approximately 583,493 square feet of building space and approximately 390,023 square yards of airfield facilities. One water supply well is located within the water treatment plant area at MCAS Yuma. This water is used to supplement the Colorado River water received through the agricultural irrigation canal system. This well water is blended with the surface water to reduce select regulated water treatment by-product produced from Colorado River water. The existing well does not have adequate capacity to meet current daily demands at MCAS Yuma and would not be able to solely support increases in personnel and aircraft washing activities generated under the MV-22 scenarios. However, the well would continue to be used for blending purposes to off-set water treatment by-product generation. Estimating approximately 100 gallons per day per person, anticipated project-related water demand would have little to no impacts on available water supplies at MCAS Yuma (Kruse, personal communication 2008). In addition, the design of proposed water supply improvements would be completed in accordance with approval from the ADEQ, Water Quality Division, which is responsible for ensuring the delivery of safe drinking water to customers of regulated public water systems, at federal facilities located within the State of Arizona. Therefore, significant impacts to existing water supplies would not occur.

Mitigation Measures

Because there would be no significant water resources impacts, no mitigation measures are proposed.

Minimum Partial Basing (2-Squadron) Alternative

Under this alternative, water resources impacts would be less than under the Maximum Partial Basing Alternative due to a decrease in grading and construction (see Table 2.3-7). The 2-squadron configuration is similar to the 8-squadron configuration, except only two new hangars and a

smaller amount of new apron space would be constructed. Construction activities would include a new rinse facility and other facilities, but the new taxiway would not be necessary.

Similar to the Maximum Partial Basing Alternative, surface water quality of nearby drainages and the Colorado and Gila Rivers could potentially be impacted by fuel spills and surface water run-off associated with construction-related activities. However, due to implementation of BMPs, including incorporation of a SPCC plan and Aquifer Protection Permit, significant water quality impacts associated with project construction would not occur.

Similar to that described for the Maximum Partial Basing Alternative, the airfield is not located within a floodplain. MCAS Yuma is located on Yuma Mesa, which is separated from the adjacent Colorado and Gila River valleys by a relatively low ridgeline. In addition, stormwater retention basins would be designed to a capacity of 125 percent of a 100-year, 24-hour storm event in association with the proposed action. Therefore, significant flooding impacts would not occur.

Also similar to the Maximum Partial Basing Alternative, construction and operation activities associated with the Minimum Partial Basing Alternative would likely have minimal impact on water supply. In comparison to the Maximum Partial Basing Alternative, substantially less construction would occur and substantially fewer personnel would be necessary in association with this alternative, resulting in less water demand. Projected increase in water demand would have little to no impacts on available water supplies at MCAS Yuma (Kruse, personal communication 2008). In addition, the design of proposed water supply improvements would be completed in accordance with approval from the ADEQ, Water Quality Division. Therefore, significant impacts to existing water supplies would not occur.

Mitigation Measures

Significant impacts would not occur; therefore, no mitigation measures are proposed.

No Action Alternative

There would be no change in airfield operations or associate personnel under the No Action Alternative. However, it is possible that future construction efforts may be needed (e.g., wash racks at MCAS Yuma) related to MV-22 training by East Coast squadrons under the No Action Alternative. This would require less construction than associated with the proposed action (e.g., no new hangar construction). The above analysis demonstrates that proposed construction associated with either basing alternative at MCAS Yuma would not result in significant impacts. Therefore, no significant impacts are expected from these smaller future construction efforts that may occur under the No Action Alternative.

5.14 BIOLOGICAL RESOURCES

This section describes biological resources which may directly or indirectly be affected by the proposed basing of the MV-22 at MCAS Yuma. Biological resources represent the components of larger ecological communities and include all native and introduced plant and animal species and the habitats, including wetlands, within which they occur. The definition of specific resources and their distribution in the vicinity of the project area are discussed below under section 5.14.1 (Affected Environment).

This chapter evaluates the project area (MCAS Yuma) where, under certain basing alternatives, the MV-22 aircraft would be stationed, take-off and land, and where support facilities would be constructed. The proposed basing of the MV-22 at MCAS Yuma would occur within the developed and/or disturbed airfield area. To provide context and assure due consideration of species or habitats that are legally protected or otherwise of special concern, the geographical area for biological resources is somewhat larger than the direct impact area for the proposed action and includes a brief discussion of species and habitats that occur in the vicinity of MCAS Yuma.

Key sources of baseline information for this section include the INRMP for the Barry M. Goldwater Range (Department of Air Force and Navy 2007), and EISs prepared for the Yuma Training Range Complex (USMC 1997a), Improved Ordnance Storage at MCAS Yuma (USMC 1999), and professional experience. The affected environment of vegetation, wildlife, endangered, threatened, and sensitive species, and special status habitats within the project area are discussed in section 5.14.1, and a discussion of environmental consequences of the applicable basing alternatives in section 5.14.2.

5.14.1 Affected Environment

Vegetation Communities and Wildlife Habitats

The area surrounding MCAS Yuma supports a mixture of commercial and residential development, agricultural land, and relatively small areas of native Sonoran desert scrub vegetation. The native vegetation is categorized as creosote bush scrub or creosote-bursage series (e.g., Munz and Keck 1968; Brown 1982; Holland 1986; Sawyer and Keeler-Wolf 1995) and is typically dominated by creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*). Species diversity within this habitat type increase as the topography transitions to rocky slopes and drainage areas. Ocotillo (*Fouquieria splendens*), brittlebush (*Encelia farinosa*), blue palo verde (*Cercidium floridum*), smoke tree (*Psorothamnus spinosa*), ironwood (*Olneya tesota*), and honey mesquite (*Prosopis glandulosa*) become more common in these areas. On heavier and more saline soils near the Colorado River, stands of saltbush (*Atriplex* spp.) are common, while big galleta grass (*Hilaria rigida*) is common on dunes that border the river valley.

The MCAS Yuma project area consists of developed and disturbed land (Figure 5.14-1); however, it is likely that prior to development the area supported native desert scrub vegetation. Current vegetation is limited to weedy species and landscape plantings around developed areas. Landscaping includes a variety of non-native plants as well as native Sonoran Desert species such as saguaro cactus (*Cereus giganteus*), barrel cactus (*Ferocactus acanthodes*), California fan palm (*Washingtonia filifera*), ocotillo, and creosote bush, planted in decorative rock. There are no streams or impoundments on MCAS Yuma. Irrigation ditches are present on surrounding agricultural land.

Wildlife

Wildlife habitat on MCAS Yuma is limited by the lack of native vegetation and the development and use of facilities on the installation. Apart from developed and landscaped areas, wildlife habitats are generally disturbed and devoid of native vegetation. Further, these existing habitats are exposed to high noise levels and human activity, particularly within the project area. As a result, the majority of the wildlife species that occur at MCAS Yuma are urban-adapted species such as European starling (*Sturnus vulgaris*), mourning dove (*Zenaida macroura*), and hummingbird (*Calypte sp.*). These species are widely distributed in the southwest portion of the facility and

within modified urban or agricultural land uses (USMC 1999). Turkey vulture (*Cathartes aura*) and red-tailed hawk (*Buteo jamaicensis*) are frequently seen overhead. These species would likely be transient in nature, passing through on their way to areas of greater wildlife value. In addition, there are several burrowing rodent species in some areas of MCAS Yuma, and the burrowing owl (*Athene cunicularia hypugaea*) is known to occur within base boundaries.

Endangered, Threatened, and Sensitive Species

Sensitive species include those that are listed, proposed, or candidates for listing as threatened or endangered under the federal Endangered Species Act (ESA); species that have been designated as special concern by the Arizona Game and Fish Department (AGFD); and other species that are of regional concern due to rarity and potential vulnerability to extinction. Sensitive habitats include the formally designated critical habitats of federally listed endangered species; other habitats that support endangered and other sensitive species and are therefore important to the conservation of these species; and wetlands and other Clean Water Act regulated waters.

No federally listed threatened or endangered plant species are known to occur within or in the immediate vicinity of the project area. According to the AGFD Heritage Data Management System, the blue sand lily (*Triteliopsis palmeri*) and the dune sunflower (*Helianthus tephrodes*) have been recorded from within three miles of the project site (AGFD 2008). These plant species have not been documented on the project site and are not expected there because of the severely disturbed conditions of the project area, the lack of native plant communities, and the present-day isolation of the project area from native habitats due to surrounding land uses.

No federally listed threatened or endangered animal species are known or likely to occur in the immediate vicinity of the project area. One sensitive species, the flat-tailed horned lizard (*Phrynosoma mcallii*), may occur within the project area (Table 5.14-1). It is restricted to sandy soils in the lower Colorado River subdivision of the Sonoran Desert. Formerly proposed for federal listing as threatened, the flat-tailed horned lizard is protected through an Interagency Conservation Agreement (1997) and subsequent Rangewide Management Strategy. State and federal agencies that own or manage land or natural resources within the range of the flat-tailed horned lizard are participating agencies in the Conservation Agreement and the Rangewide Management Strategy. MCAS Yuma, NAF El Centro, and NAVFAC Southwest are participants (Flat-tailed Horned Lizard Interagency Coordinating Committee 2003). Five Management Areas have been designated, four in California and one in Arizona. The latter lies to the south and east of MCAS Yuma, and not within the project area. Because MCAS Yuma is a signatory to the management strategy and because project impacts in around MCAS Yuma are localized and outside of the identified Management Areas, mitigation or compensation are not required (AGFD 2009).

Due to the degree of habitat disturbance and human activity on MCAS Yuma and the lack of contiguous natural habitat due to the location of MCAS Yuma within an extensive area of irrigated cropland and adjacent to the rapidly developing outskirts of Yuma, it is very unlikely that flat-tailed horned lizard survive on MCAS Yuma.

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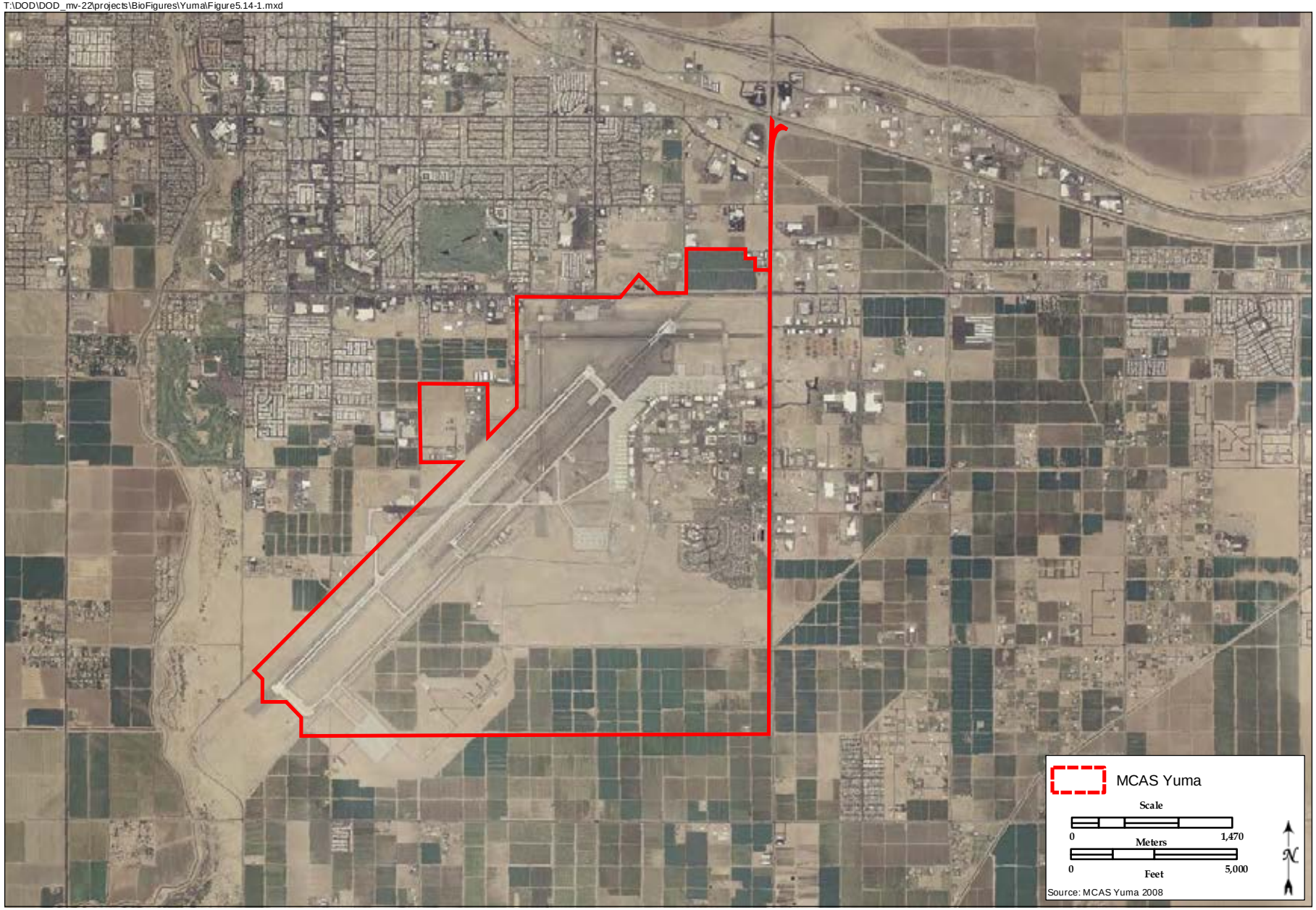

Biological Environment in the Vicinity of MCAS Yuma (Developed and Disturbed Ruderal)

FIGURE

5.14-1

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Table 5.14-1. Sensitive Wildlife with the Potential to Occur in the Vicinity of MCAS Yuma

Scientific Name Common Name	Regulatory Status (Federal/State)	Habitat Association	Occurrence in the Study Area
Phrynosoma mcallii Flat-tailed Horned Lizard	-/WSC	Open country, especially sandy areas, washes, floodplains, and windblown deposits below 6,000 feet.	Possible in undeveloped areas on and around MCAS Yuma including the project area but very unlikely to be extant due to the degree of habitat disturbance and isolation of the project site from other native habitat by urban development and irrigated farmlands.

Notes:
Federal ESA
FE: Federally Listed as Endangered
FT: Federally Listed as Threatened
FSC: Federal Special Concern Species
- : No listing

Arizona Game and Fish Department
WSC: Wildlife of Special Concern
-: No listing

Other non-federally listed but regionally sensitive species that are known to occur within three miles (4.8 km) of the project area, but are not known to occur within MCAS Yuma grounds are Yuma desert fringe-toed lizard (*Uma rufopunctata*) and western burrowing owl (*Athene cunicularia hypugaea*). The AGFD (2009) recommends that surveys be conducted for burrowing owls and active burrows prior to ground disturbing activities, and they further recommend that any ground disturbing activities take place between approximately August and January, outside the burrowing owl nesting season. Any burrows found to be active during the project construction would need to be excluded or relocated (AGFD 2009).

The absence of sensitive wildlife species is consistent with the disturbed conditions of the project area, the lack of native plant communities, and the isolation of the project area due to surrounding land uses.

Sensitive Habitats

Wetlands and Other Clean Water Act Regulated Waters

Under the Federal Water Pollution Control Act and subsequent amendments, collectively known as the Clean Water Act (33 USC § 1251 et seq.), wetlands are defined as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted to saturated soil conditions. Executive Order 11990, dated 24 May 1977 and amended by Executive Order 12608 on 9 September 1987, requires federal agencies to minimize the destruction, loss, or degradation of wetlands and to enhance their natural and beneficial values. No wetlands or other Clean Water Act regulated waters are known to occur within and in the vicinity of the project area.

Critical Habitat

The project area does not occur within any USFWS designated Critical Habitat.

Established Plans, Measures, and Procedures Applicable to All Training on MCAS Yuma

All project components, as well as all activities that occur on MCAS Yuma, would be conducted in compliance with the MBTA and Executive Order 13186. The MBTA affirms and implements the

United States' commitment to international conventions for the protection of shared migratory bird resources, and prohibits the take, possession, import, export, transport, selling, purchase, barter, or offering for sale, purchase or barter, any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit. Executive Order 13186 directs Federal agencies to avoid or minimize the negative impact of their actions on migratory birds, and to take active steps to protect birds and their habitat. On December 2, 2003, the President signed the 2003 National Defense Authorization Act. The Act provides that the Secretary of the Interior shall exercise his/her authority under the MBTA to prescribe regulations to exempt the Armed Forces from the incidental taking of migratory birds during military readiness activities authorized by the Secretary of Defense. Congress defined military readiness activities as all training and operations of the Armed Forces that relate to combat and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use. Congress further provided that military readiness activities do not include: (A) the routine operation of installation operating support functions, such as administrative offices, military exchanges, commissaries, water treatment facilities, storage facilities, schools, housing, motor pools, laundries, morale, welfare, and recreation activities, shops, and mess halls; (B) the operation of industrial activities; or (C) the construction or demolition of facilities used for a purpose described in (A) or (B).

On July 31, 2006, the DoD and the USFWS entered into an Memorandum of Understanding (MOU) to Promote the Conservation of Migratory Birds, in accordance with Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds." Only the training component of the proposed action is a "Military Readiness" activity and therefore incidental take is authorized unless the action jeopardizes bird populations; however, as part of the MOU between USFWS and DoD, all Military Readiness activities shall include conservation measures as part of the NEPA process to minimize and avoid impacts on species protected under the MBTA. These measures are identified at the end of this section and include the avoidance, restoration, and/or enhancement of all sensitive native plant communities that could be affected by proposed projects, seasonal avoidance of nesting birds, avoidance of riparian and wetland habitats, and fuel and fire management.

Additionally, as noted in section 5.16, DoN and USMC commands develop Bird Air Strike Hazard (BASH) plans to reduce hazardous bird/animal activity relative to airport flight operations. The intent of the MCAS Yuma BASH Reduction Plan (MCAS Yuma 2001) is to reduce BASH issues at the air station by creating an integrated hazard abatement program through awareness, avoidance, monitoring, and actively controlling bird and animal population movements. Some of the procedures outlined in the plan include monitoring the airfield for bird activity, issuing bird hazard warnings, initiating bird avoidance procedures when potentially hazardous bird activities are reported, and submitting BASH reports for all incidents.

5.14.2 Environmental Consequences

A 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, legal protection of the resource, and local/regional management. The results of this impact assessment are discussed below. All of the sensitive biological resources within the action area (sphere of influence subject to effects caused by the proposed action) have been evaluated to determine their potential to be affected by the project components. Potential temporary and permanent impacts on species

federally listed as threatened or endangered are considered significant and would require formal consultation with the USFWS under Section 7 of the ESA prior to project implementation. Conservation and minimization measures provided to reduce impacts to federally listed species would be implemented in addition to guidance and measures issued by the consultation process with USFWS.

Maximum Partial Basing Alternative

The Maximum Partial Basing Alternative represents the proposed alternative with greatest potential environmental consequences at this installation. Figure 2.3-6 illustrates new construction proposed for the Maximum Partial Basing Alternative at MCAS Yuma.

Vegetation

New infrastructure associated with the Maximum Partial Basing Alternative would include new hangar modules, a new taxiway, parking apron, wash racks, a rinse facility, and other support facilities. The development would be located south of existing parking aprons, hangars, and support facilities. Removal of existing vegetation would be required; however, nearly all of the area is highly disturbed or previously developed and supports virtually no native vegetation. The ecological value of this habitat is low and is further reduced by persistent disturbance as a result of air station activities. Due to its low habitat value and lack of native plant species, construction impacts on vegetation would be less than significant.

Other construction associated with this alternative would occur within the developed portion of the air station and would not result in vegetation removal.

Wildlife

As noted above, development of the Maximum Partial Basing Alternative would result in the loss of potentially suitable habitat for wildlife species common in disturbed desert and urban environments. Due to the low biological resource value of the proposed construction areas, impacts of construction would be less than significant.

Bird strikes are also an inevitable risk associated with the use of any aircraft, including the MV-22. The potential for risk is higher where suitable habitat occurs near low-elevation training areas. Even with the introduction of more aircraft than current levels, the overall potential for bird-aircraft or wildlife strikes is not anticipated to be significantly greater than current levels and would not be expected to have a detectable impact on bird populations. Because of the danger of bird strikes to aircraft and aircrews, MV-22 aircrews operating in MCAS Yuma airspace would be required to follow applicable procedures outlined in the MCAS Yuma BASH Reduction Plan (MCAS Yuma 2001). MCAS Yuma has developed aggressive procedures designed to minimize the occurrence of bird/wildlife-aircraft strikes, and has documented detailed procedures to monitor and react to heightened risk of bird-strikes (MCAS Yuma 2001). When risk increases, limits are placed on low altitude flight and some types of training (e.g., multiple approaches, closed pattern work) in the airport environment. Special briefings are provided to pilots whenever the potential exists for greater bird-strike sightings within the airspace. MV-22 pilots would be subject to these procedures. Therefore, impacts on wildlife resulting from bird-aircraft strikes would be less than significant.

Sensitive Species and Habitats

The only sensitive plant or wildlife species that could potentially occur in the project area is the flat-tailed horned lizard (*Phrynosoma mcallii*). MCAS Yuma is outside of management areas for the species and is unlikely to support the species due to the disturbed nature of the habitat and the prevalence of urban development and irrigated agriculture surrounding the installation and isolating it from native habitat that could support the species. Therefore, impacts of facilities construction on listed or sensitive species on site would be less than significant.

Mitigation Measures

Because there would be no significant impacts on biological resources, no mitigation measures are proposed.

Minimum Partial Basing Alternative

Vegetation, Wildlife, and Sensitive Species Habitats

The Minimum Partial Basing Alternative at MCAS Yuma would have impacts similar to the Maximum Partial Basing Alternative. However, since there would be less construction and disturbance associated with this alternative, it would result in a lower degree of impact. Figure 2.3-7 illustrates the proposed new construction for the Minimum Partial Basing Alternative. The disturbance area consists of previously disturbed land that is sparsely dominated by weedy non-native vegetation and previously developed land with buildings or paved surfaces. The ecological value of the proposed construction area is very low and is further reduced by the persistent disturbance from air station activities. Other than the decreased acreage, impacts to vegetation would be similar to the Maximum Partial Basing Alternative and would be less than significant due to the low biological resource value of the affected habitat.

Impacts to sensitive plant or wildlife species would be less than significant as for the Maximum Partial Basing Alternative because suitable habitat for the only sensitive species known from the project area (flat-tailed horned lizard) does not occur in areas that would be disturbed for the project.

Mitigation Measures

Because there would be no significant impacts to biological resources, no mitigation measures are proposed.

No Action Alternative

There would be no change in airfield operations or associate personnel under the No Action Alternative. However, it is possible that future construction efforts may be needed (e.g., wash racks at MCAS Yuma) related to MV-22 training by East Coast squadrons under the No Action Alternative. This would require less construction than associated with the proposed action (e.g., no new hangar construction). The above analysis demonstrates that proposed construction associated with either basing alternative at MCAS Yuma would not result in significant impacts. Therefore, no significant impacts are expected from these smaller future construction efforts that may occur under the No Action Alternative.

5.15 CULTURAL RESOURCES

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 any 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 (National Historic Preservation Act [NHPA], as amended [16 USC 470 et seq.]). Additionally, cultural resources are protected under the Archeological Resource Protection Act (ARPA) (16 USC 470aa-470mm; Public Law 96-95 and amendments), the Native American Graves Protection and Repatriation Act (NAGPRA) (Public Law 101-601; 25 USC 3001-3013), and the American Indian Religious Freedom Act (Public Law 95-341; 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 includes guidance for Native American consultation regarding cultural significance of potential religious and sacred artifacts (16 USC 470a [a][6][A] and [B]).

Cultural resources located within the jurisdiction of MCAS Yuma are managed in accordance with the laws, regulations and guidance summarized above as well as DoD Instruction 4715.16 (Cultural Resources Management) and MCO P5090.2A, Change 2 (Environmental Compliance and Protection Manual).

5.15.1 Affected Environment

Cultural Setting

The regional prehistoric cultural sequence at MCAS Yuma can be divided into four periods – Paleoindian, Archaic, Patayan, and Protohistoric (see SAIC 2006).

The earliest, well-documented prehistoric sites in the region are identified as belonging to the San Dieguito complex/tradition that dates to late in the Paleoindian Period (approximately 8,000 to 9,000 years ago). Sites dating to this period in the Yuma area proper are not well documented, but many surface sites on both sides of the Colorado River near Yuma have been assigned to the San Dieguito complex/tradition. This complex is generally seen as representing small, mobile bands of hunters and gatherers with a hunting economy focused on highly ranked resources such as large mammals. Even though subsistence also included collecting seasonally available wild plants, the use of seed grinding technology was limited. This strategy was most likely responsible for a pattern of relatively high residential mobility. Cultural remains associated with the Paleoindian Period have been found around dry inland lakes, on old desert terrace deposits, in the vicinity of the Tucson Basin, and also near the California coast.

The Archaic Period (approximately 8,000 to 1,500 years ago), often termed the Amargosa complex in the Yuma area, is differentiated from the earlier Paleoindian cultural complex by a shift to a more generalized hunting and gathering economy and an increased focus on seed grinding and processing technology. This type of economy was later replaced by horticulture and/or agriculture in the Yuma area. The increased presence of groundstone artifacts and atlatl (spear thrower) dart

points, along with a mixed core-based tool assemblage, may indicate a range of adaptations to a more diversified set of plant and animal resources.

The Late Prehistoric period (known as the Patayan period on the Lower Colorado River) is separated from the Archaic period by the introduction of ceramics and floodplain agriculture approximately 1,200 years ago. Burial practices shifted from inhumations to cremations around the same time. Elaborate kinship systems, rock art, and trading networks are also associated with the Patayan Period. This period is typified by a settlement pattern with small mobile groups living in seasonal settlements along the Colorado River floodplain. Trail systems throughout the Colorado Desert suggest travel to distant resource areas, for trading expeditions, religious activities, and possibly warfare.

Ethnographically, the MCAS Yuma area was occupied by the Quechan (also known as the Yuma), one of various Yuman-speaking groups that occupied the Lower Colorado River. The Quechan derived about 40 percent of their diet from floodwater horticulture of domesticated plants such as corn, beans, squash, melon, and various grasses, and supplemented their diet by collecting wild plants, fishing, and hunting. The lower Colorado River groups were organized militarily and traveled great distances to fight, visit, or trade (Moratto 1984). The Quechan were bounded by the Halchidoma to the north and the Cocopah to the south, and often united with the Mohave, a more northerly group, to fight the Halchidoma or other western Arizona groups for control of their territory.

Spanish explorers in the 1500s were the first Europeans to cross through the Yuma area, but it was not until the late 1700s that the Spanish attempted to establish a permanent land route from their Sonoran settlements to their missions along the California coast. Two missions were established near the junction of the Gila and Colorado Rivers, but both were destroyed in 1781 by the Quechan, and the Spanish abandoned their attempt of this overland route to California. Later conflicts between gold rush settlers crossing the river at Yuma eventually led to the establishment of Fort Yuma and the removal of the river tribes to small reservations (Mooney and Associates 2000).

With the gold rush strikes along the Colorado River and western Arizona during the late 1850s, Yuma became a transportation hub and then later the location for the territorial prison. Agriculture and tourism provided an economic boom during the early and mid-20th Century. MCAS Yuma was originally a municipal flying field (Fly Field), but the facility was taken over by the military during World War II and has been used as an important training base ever since. It was first established as the Yuma Army Air Base in 1942 for the development of an advanced flying school. After the war, the base was left inactive for a while until reactivated in 1951 as an Air Force Weapons Training Center, and it was declared a permanent installation in 1954. The base was transferred to the DoN in 1959 and was used for USMC and DoN training. The installation's name and status changed to the Marine Corps Air Station in 1962 (Mooney and Associates 2000), and it is now the busiest air station in the USMC.

Definition of the Area of Potential Effects

The area of potential effects (APE) of an undertaking is defined at 36 CFR 800.16(d) as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist." The APE for MCAS Yuma consists of all areas of ground disturbance associated with proposed construction activities, as

shown in Figures 2.3-6 and 2.3-7. Construction vehicle parking and staging activities would occur within designated areas near the construction zones or within unpaved areas immediately adjacent to construction activities (included in the APE). For historic architectural resources, the APE includes any buildings/structures that would be altered or demolished, as well as any viewsheds of historic buildings that may be affected by construction. For Native American resources, the APE includes the construction footprint and the viewsheds of any traditional cultural resources that could be affected by construction.

Known and Predicted Resources

A site record and literature search of the AZSITE Arizona Cultural Resource Inventory at the Arizona State Museum was conducted to identify previously recorded cultural resources and cultural surveys within the APE and within one mile of the APE. In addition, a literature review and records check was conducted at the MCAS Yuma Range Management Department. The following provides a summary of those findings.

Archaeological Survey Coverage. The APE was recently surveyed by SAIC (2006). A cultural resources survey of approximately 128 acres on MCAS Yuma took place on 30 November 2005 in support of the proposed action (SAIC 2006). The survey area covered all construction areas associated with basing up to eight squadrons at MCAS Yuma. The cultural resource survey identified one new cultural resource, an isolate consisting of two historic nickels. The nickels are not sufficient to effectively address questions about historic activities that may have taken place in the area and are not considered eligible for inclusion on the National Register. The Arizona SHPO has not yet agreed with these findings.

No other surveys have been completed within the APE; however, at least five previous archaeological surveys have been conducted within one mile of the APE. The latter surveys were associated with construction projects on or adjacent to MCAS Yuma (KEA Environmental Inc. 1996a, 2000; Louis Berger Group 2002; EDAW 2002a, 2002b).

Archaeological Resources. Besides the one isolated find noted during SAIC's survey (SAIC 2006), there are no recorded archaeological resources within the APE. The isolated find (two historic nickels) does not meet the definition of an archaeological site and, therefore, is not a historic property. Six recorded archaeological sites are located within one mile of the project area; however, none are located within or immediately adjacent to the APE and, therefore, they are not discussed further.

Historic Buildings and Structures. A 1996 architectural survey of the Main Station of MCAS Yuma inventoried 30 pre-1946 buildings and structures (KEA Environmental Inc. 1996b). Buildings constructed prior to 1946 were evaluated based on National Register Criteria A, B, C, and D. Buildings that were built after 1946 were evaluated using Criterion Consideration G with regard to the Cold War Era (KEA Environmental Inc. 1996b). Two World War II structures were recommended as eligible for listing on the National Register (pending SHPO agreement). The Yuma Army Aircraft Beacon, located about a ¼-mile from the APE, was constructed in 1942 as a steel tower mounted on concrete footings. The Yuma Army Explosives Magazine, located adjacent to the APE for the maximum partial basing alternative, was constructed in 1943 as a concrete magazine covered by an earthen mound.

NAVFAC Southwest is currently conducting a further study of Cold War buildings at the air station, especially with regard to buildings or structures that have subsequently reached 50 years of age after the KEA 1996 architectural survey (Lawson, personal communication 2009; Smith, personal communication 2009). Therefore, it is possible that additional buildings or structures will be recommended as eligible for listing on the National Register based on this new study.

Native American Consultation. MCIWEST initiated consultation in November and December 2008 with non-federally recognized Indian tribes subject to 36 CFR 800.3(f) (consulting parties) and federally recognized Indian tribes affiliated with lands currently under Marine Corps jurisdiction and involved in this proposed action. MCAS Yuma consults with the following tribal Nations on proposed military projects on MCAS Yuma: Ak-Chin Indian Community, Cocopah Indian Tribe, Colorado River Reservation, Fort McDowell Yavapai Nation, Fort Yuma Indian Reservation - Quechan Tribe, Gila River Pima-Maricopa Indian Community, Salt River Pima-Maricopa Indian Community, Tohono O'odham Nation, and Fort McDowell Yavapai Nation. MCIWEST is in the process of consulting with these tribal Nations regarding any concerns with the proposed action (see Appendix H).

5.15.2 Environmental Consequences

Maximum Partial Basing (8-Squadron) Alternative

Ground disturbance associated with the Maximum Partial Basing Alternative would result from the expansion of apron space, the installation of new hangars and support facilities, and construction of new washracks and a rinse facility, as shown on Figure 2.3-6. There are no archaeological resources in the APE that meet the definition of a historic property. Therefore, there would be no effect on a historic property, and no impacts would occur under the NEPA.

An evaluation of historic structures at MCAS Yuma recommended two structures as eligible for listing on the National Register (pending SHPO agreement). A new architectural survey is currently being conducted that could recommend additional buildings or structures as eligible for listing on the National Register. Overall, the introduction of some new visual elements within the viewshed of existing buildings under the proposed action would be visually consistent with existing architecture and functions along the flightline, and would not adversely affect the setting of existing buildings and structures within the APE. Therefore, there would be no adverse effect on the Yuma Army Aircraft Beacon (which now sits on the Yuma International Airport terminal) or other buildings within the viewshed of the proposed action. However, the Yuma Army Explosives Magazine is located within a few feet of proposed apron expansion and a new hangar on the south side of the APE. Proposed construction would adversely affect the integrity of this historic structure. If SHPO agrees with the eligibility of this structure, disturbance to the structure would result in an adverse effect on a historic property. This would be a significant impact under the NEPA.

MV-22 operations at the airfield under the Maximum Partial Basing Alternative would not result in ground disturbance or modifications to existing buildings or structures. Therefore, there would be no effect on a historic property, and no impacts would occur under the NEPA.

There are no identified traditional cultural resources within the MCAS Yuma APE. However, consultations with tribal Nations are on-going. MCIWEST is entering into a Programmatic Agreement with the Arizona SHPO, the Advisory Council of Historic Preservation, and other

consulting parties to resolve adverse effects from the proposed action. If a traditional cultural resource is identified based on continuing dialogue with identified tribal Nations, MCIWEST will follow the procedures outlined in the Programmatic Agreement.

Mitigation Measures

With the following measure, impacts on historic structures that are eligible for listing on the National Register would be avoided or minimized, and impacts would be reduced to less than significant:

- In coordination with an architectural historian, site layouts for the Maximum Partial Basing Alternative shall be redesigned to avoid all impact on the Yuma Army Explosives Magazine. Final site layouts shall be approved by the Cultural Resources Manager of the MCAS Yuma Range Management Department.

Minimum Partial Basing (2-Squadron) Alternative

Ground disturbance associated with the Minimum Partial Basing Alternative would result from the expansion of apron space, the installation of new hangars and support facilities, and construction of new washracks and a rinse facility, as shown on Figure 2.3-7. There are no archaeological resources in the APE that meet the definition of a historic property. Therefore, there would be no effect on a historic property, and no impacts would occur under the NEPA.

A previous evaluation of historic structures at MCAS Yuma recommended two structures as eligible for listing on the National Register (pending SHPO agreement). A new architectural survey is currently being conducted that could recommend additional buildings or structures as eligible for listing on the National Register. Overall, the introduction of some new visual elements within the viewshed of existing buildings under the proposed action would be visually consistent with existing architecture and functions along the flightline, and would not adversely affect the setting of existing buildings and structures within the APE. Therefore, there would be no adverse effect on the Yuma Army Aircraft Beacon, the Yuma Army Explosives Magazine, or other buildings within the viewshed of the proposed action. No significant impacts would occur under the NEPA.

MV-22 operations at the airfield under the Maximum Partial Basing Alternative would not result in ground disturbance or modifications to existing buildings or structures. Therefore, there would be no effect on a historic property, and no impacts would occur under the NEPA.

There are no identified traditional cultural resources within the MCAS Yuma APE. However, consultations with tribal Nations are on-going. MCIWEST is entering into a Programmatic Agreement with the Arizona SHPO, the Advisory Council of Historic Preservation, and other consulting parties to resolve adverse effects from the proposed action. If a traditional cultural resource is identified based on continuing dialogue with identified tribal Nations, MCIWEST will follow the procedures outlined in the Programmatic Agreement.

Mitigation Measures

Implementation of the Minimum Partial Basing Alternative at MCAS Yuma would not result in significant impacts on cultural resources; therefore, no mitigation measures would be required

No Action Alternative

It is possible that future construction efforts may be needed (e.g., wash racks at MCAS Yuma) related to MV-22 training by East Coast squadrons under the No Action Alternative. This would require less construction than associated with the proposed action (e.g., no new hangar construction), and the locations of potential new facilities would likely be chosen to avoid all archaeological resources, historic structures, or traditional cultural resources similar to those facilities associated with the proposed action. Additionally, projects with potential for significant impacts on cultural resources would undergo Section 106 review under the NHPA and any potentially significant impacts would be mitigated as required. Therefore, possible future construction efforts related to MV-22 training by East Coast squadrons would not result in significant impacts on cultural resources.

5.16 SAFETY AND ENVIRONMENTAL HEALTH

The USMC practices Operational Risk Management as outlined in OPNAV 3500.39A and Marine Corps Order (MCO) 3500.27A. Requirements outlined in these documents provide for a process to maintain readiness in peacetime and achieving success in combat while safeguarding people and resources. The safety and environmental health analysis contained in the following sections addresses issues related to the health and well being of both military personnel and civilians living on or in the vicinity of MCAS Yuma. Specifically, this section provides information on hazards associated with aircraft mishaps, accident potential zones (APZs), explosives safety, and electromagnetic emissions for the airfield.

5.16.1 Affected Environment

Aircraft Mishaps

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. In order 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 5.16-1). Class A mishaps are the most severe with total property damage of $1 million or more and a fatality and/or permanent total disability. Calculating Class A mishaps can be used for comparing mishap rates for various aircraft types, as shown below.

Table 5.16-1. Aircraft Class Mishaps

Mishap Class	Total Property Damage	Fatality/Injury
A	$1,000,000 or more and/or aircraft destroyed	Fatality or permanent total disability
B	$200,000 or more but less than $1,000,000	Permanent partial disability or three or more persons hospitalized as inpatients
C	$20,000 or more but less than $200,000	Nonfatal injury resulting in loss of time from work beyond day/shift when injury occurred

Class A Mishap Rates for MV-22

During the development and testing phase, the V-22 recorded two Class A mishaps. All MV-22's were grounded for 17 months after the second mishap (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 (FY 2002). Since that time, additional safety, reliability and maintainability improvements along with additional capabilities have been implemented in the modified MV-22's flown by the Marines and Naval Air Systems Command's test squadron. These aircraft have logged more than 26,000 flight hours combined without a serious mishap and have recently been deployed to Southwest Asia in the first combat theater mission.

In order 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 (prior to reaching operational status) versus the number of mishaps after reaching operational status is broken out in Table 5.16-2. Adjusting the flight hours to account for the periods in which the aircraft was not operational, the accident rate for the MV-22 is 11.43 for 26,245 hours.

Table 5.16-2. Class A Flight Mishaps for MV-22

FY	Flight Hours	Mishaps
PRIOR TO REACHING OPERATIONAL STATUS		
1999	416	0
2000	221	1
2001	470	1
2002[1]	Unavailable	0
2003[1]	Unavailable	0
OPERATIONAL STATUS		
2004[2]	2,238	0
2005	5,405	0
2006	6,989	0
2007	9,745	0

Notes:
1. Aircraft Grounded
2. Aircraft Returns to Flight Status

Source: Navy Safety Center 2007

Class A Mishap Rates for the AV-8B, CH-46, and CH-53

To provide a broader perspective on the potential mishap rate for a new technology like the MV-22, the following discusses mishap rates for the introduction of the AV-8B (Harrier). The AV-8B was introduced in 1984, and provided the USMC with jet powered vertical take-off and landing capability. This new technology is similar to the MV-22 in that it was a new airframe with new vertical take-off capability. With that in mind, it is possible that projected mishap rates for the MV-22 may be similar to the historical rates of the AV-8B. The Class A mishap rates for the AV-8B from fleet inception through 30 September 2007 is provided in Table 5.16-3. Data from Calendar Year (CY) 1979 to FY 1984 relates to the testing and evaluation phase of the AV-8B, while data from FY 1985 to present represents its full introduction to the fleet. Note the highest mishap rate occurred during the testing phase of the aircraft, and that mishap rates during the operational phase of the aircraft fluctuated between 2.80 and 23.00.

Table 5.16-3. Historic Class A Flight Mishaps for DoN/USMC

Year	H-46 (all types)			CH-53E			AV-8B		
	Class A Mishaps	Flight Hours	Mishap Rate	Class A Mishaps	Flight Hours	Mishap Rate	Class A Mishaps	Flight Hours	Mishap Rate
FY 64	0	147	0	-	-	-	-	-	-
FY 65	1	9,034	11.07	-	-	-	-	-	-
FY 66	2	33,442	5.98	-	-	-	-	-	-
FY 67	17	75,236	22.60	-	-	-	-	-	-
FY 68	24	92,108	26.06	-	-	-	-	-	-
FY 69	29	161,595	17.95	-	-	-	-	-	-
FY70	21	140,406	14.96	-	-	-	-	-	-
FY 71	9	132,350	6.80	-	-	-	-	-	-
FY 72	9	96,042	9.37	-	-	-	-	-	-
FY 73	6	93,971	6.38	-	-	-	-	-	-
FY 74	6	68,509	8.76	-	-	-	-	-	-
Jul-Dec 74	4	41,170	9.72	-	-	-	-	-	-
CY 75	5	86,428	5.79	0	105	0	-	-	-
CY 76	5	87,319	5.73	0	27	0	-	-	-
CY 77	3	93,500	3.21	0	249	0	-	-	-
CY 78	5	97,307	5.14	1	0	0	-	-	-
CY 79	3	92,390	3.25	0	88	0	1	248	403.23
Jan-Sep 80	4	66,689	6.00	0	0	0	0	93	0
FY 81	8	88,951	8.99	0	160	0	0	70	0
FY 82	5	92,300	5.42	0	4,629	0	0	431	0
FY 83	3	99,406	3.02	0	10,629	0	0	821	0
FY 84	3	106,039	2.83	1	16,259	6.15	0	1,573	0
FY 85	2	106,883	1.87	4	19,152	20.89	1	8,195	12.20
FY 86	7	110,743	6.32	1	22,748	4.40	2	18,467	10.83
FY 87	5	118,331	4.23	1	16,081	6.22	5	22,212	22.51
FY 88	4	112,606	3.55	0	21,075	0	3	37,415	8.02
FY 89	4	112,365	3.56	0	25,431	0	5	43,570	11.48
FY 90	4	98,775	4.05	1	27,385	3.65	11	48,644	22.61
FY 91	3	110,122	2.72	1	30,269	3.30	6	55,590	10.79
FY 92	4	96,834	4.13	1	28,598	3.50	7	56,873	12.31
FY 93	5	106,743	4.68	1	31,903	3.13	4	55,488	7.21
FY 94	2	98,796	2.02	0	33,779	0	5	51,603	9.69
FY 95	1	96,115	1.04	0	34,345	0	5	51,128	9.78
FY 96	5	90,401	5.53	0	24,867	0	6	50,232	11.94
FY 97	3	81,816	3.67	0	26,439	0	4	39,060	10.24
FY 98	1	87,321	1.15	0	30,327	0	4	33,209	12.04
FY 99	1	84,346	1.19	1	29,408	3.40	7	30,441	23.00
FY 00	1	92,849	1.08	0	32,739	0	2	22,088	9.05
FY 01	2	91,708	2.18	0	28,660	0	1	32,372	3.09
FY 02	2	90,287	2.22	1	36,144	2.77	3	43,078	6.96
FY 03	2	79,390	2.52	0	37,340	0	3	47,103	6.37
FY 04	1	57,893	1.73	2	35,010	5.71	2	40,775	4.91
FY 05	1	70,901	1.41	1	34,595	2.89	5	37,969	13.17
FY 06	0	58,763	0	1	33,321	3.00	3	40,467	7.41
FY 07	1	55,038	1.82	1	33,325	3.00	1	35,718	2.80
Total	**233**	**3,963,365**	**5.87**	**19**	**705,087**	**2.69**	**96**	**904,933**	**10.6**

Source: Navy Safety Center 2007

Mishap data for the CH-46 and CH-53 are included in Table **3**.16-3 since they represent the type of aircraft operations and some similar flight profiles expected for the MV-22. One pattern to note in Table 5.16-3 is the fluctuation of mishap rates from year to year for all three aircraft types.

Emergency and Mishap Response at MCAS Yuma

MCAS Yuma 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-base. Response would normally occur in two phases. The initial response focuses on rescue, evacuation, fire suppression, safety, elimination of explosive devices, ensuring security of the area, and other actions immediately necessary to prevent loss of life or further property damage. The initial response element usually consists of the Fire Chief, who would normally be the first On-scene Commander, fire-fighting and crash-rescue personnel, medical personnel, security police, and crash-recovery personnel. The second phase is the mishap investigation, which includes an array of organizations whose participation would be governed by the circumstances associated with the mishap and actions required to be performed (DoD 2000).

Bird Aircraft Strike Hazards

Bird-aircraft strikes and the hazards they present form another safety concern for aircraft operations. Over 97 percent of bird-aircraft strikes occur below 3,000 feet (915 meters) above ground level, and approximately 30 percent of bird strikes happen at airfields. Since the introduction of the MV-22 on the East Coast at MCAS New River, there have been six reported bird strikes, with minor damage to the aircraft occurring with two of the strikes.

DoN and USMC commands develop BASH plans to reduce hazardous bird/animal activity relative to airport flight operations. The intent of the MCAS Yuma BASH Reduction Plan (MCAS Yuma 2001) is to reduce BASH issues at the air station by creating an integrated hazard abatement program through awareness, avoidance, monitoring, and actively controlling bird and animal population movements. Some of the procedures outlined in the plan include monitoring the airfield for bird activity, issuing bird hazard warnings, initiating bird avoidance procedures when potentially hazardous bird activities are reported, and submitting BASH reports for all incidents.

Accident Potential Zones

APZs are established to delineate recommended surrounding land uses for the protection of people and property on the ground. APZs define the areas in the vicinity of an airfield that would have the highest potential to be affected if an aircraft mishap were to occur. AICUZ guidelines identify three types of APZs for airfields based on aircraft mishap patterns: the Clear Zone, APZ I, and APZ II. The standard Clear Zone is a trapezoidal area that extends 3,000 feet from the end of a runway and has the highest probability of being impacted by a mishap. APZ I, which typically extends 5,000 feet from the end of the Clear Zone, has a lower mishap probability. APZ II, which typically extends 7,000 feet from the end of APZ I, has the lowest mishap probability of the three zones. To minimize the results of a potential accident involving aircraft operating from MCAS Yuma, APZs have been established for the airfield, as depicted in Figure 5.16-1.

Explosives Safety

Siting requirements for explosive materials storage (e.g., munitions) and handling facilities are based on safety and security criteria established by the DoD Explosive Safety Board. Explosive Safety Quantity Distance (ESQDs) arcs determine the distance between ordnance storage and handling facilities and inhabitable areas. Ammunition and bulk explosives are stored in magazines

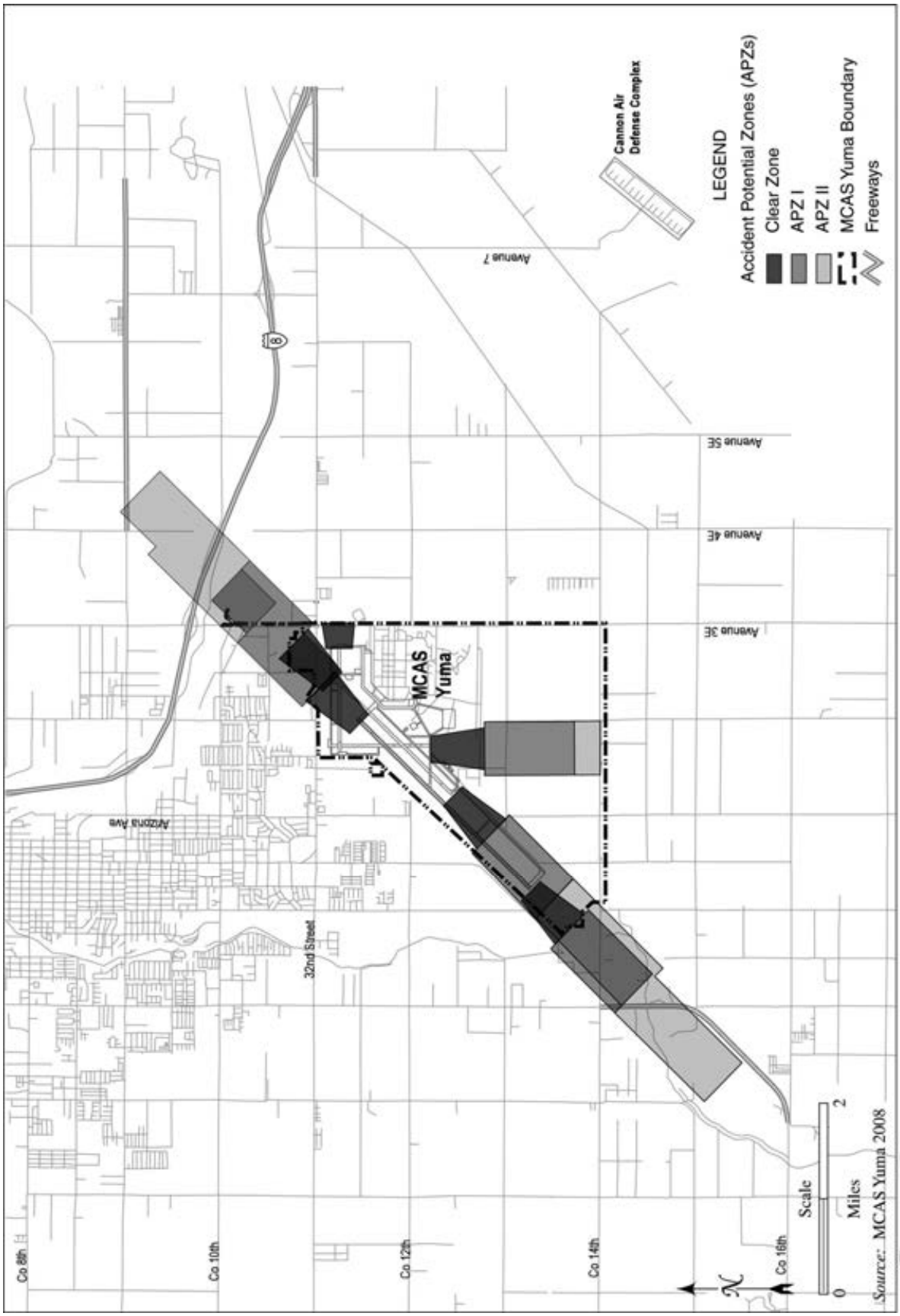

FIGURE 5.16-1

MCAS Yuma Accident Potential Zones

specifically designed, sited, and designated for this purpose. A magazine's ESQD arc is calculated by the type and amount of ordnance stored in that magazine. ESQD requirements and permissible storage capacities are established by Naval Sea Systems Command (NAVSEASYSCOM) and approved by the DoD Explosives Safety Board.

The existing magazine complex and CALA at MCAS Yuma was recently relocated to newly acquired land directly south of the airfield. The ESQD arc surrounding this new location falls outside the proposed project area.

Electromagnetic Emissions

Radar and other high-energy electromagnetic emissions can constitute a hazard to persons exposed to radiation above a threshold power density. Electromagnetic signals emanating from communication and other radar equipment can also interfere with and adversely affect stored ordnance and fuel. Electromagnetic radiation hazards occur when transmitting equipment generates sufficient field intensity to cause harmful or injurious effects to humans or wildlife; induce or couple currents and/or voltages of magnitudes sufficient to initiate electro-explosive devices in ordnance; or create sparks or sufficient magnitude to ignite flammable materials.

A Hazards of Electromagnetic Radiation to Ordnance Assessment was conducted in June 2007 (Naval Surface Warfare Center 2007). Additionally, an Electromagnetic Radiation Hazards Survey was conducted at MCAS Yuma in 1997. The results of the latter survey showed there were no electromagnetic radiation hazards for humans and wildlife (DoN 2001).

5.16.2 Environmental Consequences

Maximum Partial Basing (8-Squadron) Alternative

Aircraft Mishaps and Mishap Response

Although the MV-22 is a relatively new type of aircraft, historical trends show that mishaps of all types decrease the longer an aircraft is operational as flight crews and maintenance personnel learn more about the aircraft's capabilities and limitations. Mishap rates generally level out approximately five years after introduction of a new airframe (GAO 2001; Navy Safety Center 2007). Although it is difficult to predict the mishap rate of a new airframe like the MV-22, mishap rates will likely stabilize to levels similar to those shown in Table 3.16-3 soon after its introduction on the West Coast. Therefore, as the MV-22 becomes more operationally mature, the aircraft mishap rate is expected to become comparable with a similarly sized helicopter aircraft with a similar mission.

The basing of 8 squadrons of MV-22 aircraft at MCAS Yuma would result in a 24 percent increase in airfield operations compared to current levels, but the MV-22 would operate in an airfield environment similar to the current operational environment. Since the MV-22 is a new airframe and would require response actions specific to the MV-22, the emergency and mishap response plans would be updated to include procedures and response actions necessary to address a mishap involving the MV-22 and associated equipment. With this update, the MCAS Yuma airfield safety conditions would be similar to existing conditions. Therefore, no significant impact would occur from aircraft mishaps or mishap response.

Bird Aircraft Strike Hazards

Even with the introduction of more aircraft than current levels, the overall potential for bird-aircraft or wildlife strikes is not anticipated to be significantly greater than current levels. MV-22 aircrews operating in MCAS Yuma airspace would be required to follow applicable procedures outlined in the MCAS Yuma BASH Reduction Plan (MCAS Yuma 2001). MCAS Yuma has developed aggressive procedures designed to minimize the occurrence of bird/wildlife-aircraft strikes, and has documented detailed procedures to monitor and react to heightened risk of bird-strikes (MCAS Yuma 2001). When risk increases, limits are placed on low altitude flight and some types of training (e.g., multiple approaches, closed pattern work) in the airport environment. Special briefings are provided to pilots whenever the potential exists for greater bird-strike sightings within the airspace. MV-22 pilots would be subject to these procedures. Therefore, no significant impact would occur related to BASH issues.

Accident Potential Zones

Proposed construction, renovation, and infrastructure improvement projects related to the Maximum Partial Basing Alternative would be consistent with established APZs. Therefore, construction activity would not result in any greater safety risk, and no significant impact related to APZs would occur.

There would be a 24 percent increase in operations over existing conditions under the Maximum Partial Basing Alternative. This increase falls within historic use of airfield, which at one point accommodated approximately 219,000 flight operations per year (Van Houten and Associates 1978). Additionally, the MV-22 would follow established local approach and departure patterns, and no new flight tracks would be established. Proposed MV-22 operations at MCAS Yuma would not affect or create a need to change the existing APZs. Therefore, flight activity and subsequent operations would not result in any greater safety risk, and no significant impact related to APZs would occur.

Explosives Safety

The proposed project area does not fall within an established ESQD arc, and proposed construction, renovation, and infrastructure improvement projects related to the Maximum Partial Basing Alternative would be consistent with established ESQD arcs. Therefore, construction activity and subsequent operations would not result in any greater safety risk.

The only munitions used by the MV-22 would be associated with its one machine gun. Ordnance is handled and stored in accordance with USMC explosive safety directives (MCO P8020.10A, 3 April 2002, Marine Corps Ammunition Management and Explosives Safety Policy Manual), and all munitions handling is carried out by trained, qualified personnel. Therefore, munitions handling would not result in any greater safety risk, and no significant impact related to explosives safety would occur.

Electromagnetic Emissions

Proposed construction, renovation, and infrastructure improvement projects related to the Maximum Partial Basing Alternative would be consistent with established electromagnetic radiation hazard zones. Therefore, construction activity and subsequent operations within new or

renovated structures would not result in any greater safety risk, and no significant impact related to electromagnetic emissions would occur.

Mitigation Measures

Because there would be no significant impact on safety and environmental health, no mitigation measures are proposed.

Minimum Partial Basing (2-Squadron) Alternative

Aircraft Mishaps and Mishap Response

As described for the Maximum Partial Basing Alternative, it is expected that, as the MV-22 becomes more operationally mature, the aircraft mishap rate would become comparable with a similarly sized helicopter aircraft with a similar mission. To ensure effective mishap response, the emergency and mishap response plans would be updated to include those actions necessary to address a mishap involving the MV-22 and associated equipment. With this update, the MCAS Yuma airfield safety conditions would be similar to existing conditions. Therefore, no significant impact would occur from aircraft mishaps or mishap response.

Bird Aircraft Strike Hazards

Similar to the Maximum Partial Basing Alternative, the overall potential for bird-aircraft or wildlife strikes is not anticipated to be significantly greater under the Minimum Partial Basing Alternative than current levels. MV-22 pilots would be subject to all BASH procedures, as described above. Therefore, no significant impact would occur related to BASH issues.

Accident Potential Zones

Proposed construction, renovation, and infrastructure improvement projects related to the Minimum Partial Basing Alternative would be consistent with established APZs. Therefore, construction activity would not result in any greater safety risk, and no significant impact related to APZs would occur.

There would be a four percent increase in operations over existing conditions under the Minimum Partial Basing Alternative. This increase falls within historic use of airfield, which at one point accommodated approximately 219,000 flight operations per year (Van Houten and Associates 1978). Additionally, the MV-22 would follow established local approach and departure patterns, and no new flight tracks would be established. Therefore, flight activity and subsequent operations would not result in any greater safety risk, and no significant impact related to APZs would occur.

Explosives Safety

The proposed project area does not fall within an established ESQD arc, and proposed construction, renovation, and infrastructure improvement projects related to the Minimum Partial Basing Alternative would be consistent with established ESQD arcs. Therefore, construction activity and subsequent operations would not result in any greater safety risk.

The only munitions used by the MV-22 would be associated with its one machine gun. Ordnance is handled and stored in accordance with USMC explosive safety directives (MCO P8020.10A, 3 April 2002, Marine Corps Ammunition Management and Explosives Safety Policy Manual), and all munitions handling is carried out by trained, qualified personnel. Therefore, munitions handling would not result in any greater safety risk, and no significant impact related to explosives safety would occur.

Electromagnetic Emissions

Proposed construction, renovation, and infrastructure improvement projects related to the Minimum Partial Basing Alternative would be consistent with established electromagnetic radiation hazard zones. Therefore, construction activity and subsequent operations within new or renovated structures would not result in any greater safety risk, and no significant impact related to electromagnetic emissions would occur.

Mitigation Measures

Because there would be no significant impact on safety and environmental health, no mitigation measures are proposed.

No Action Alternative

There would be no change in airfield operations or associate personnel under the No Action Alternative. However, it is possible that future construction efforts may be needed (e.g., wash racks at MCAS Yuma) related to MV-22 training by East Coast squadrons under the No Action Alternative. This would require less construction than associated with the proposed action (e.g., no new hangar construction). The above analysis demonstrates that proposed construction associated with either basing alternative at MCAS Yuma would not result in significant impacts. Therefore, no significant impacts are expected from these smaller future construction efforts that may occur under the No Action Alternative.

5.17 ENVIRONMENTAL JUSTICE

In 1994, Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations (Environmental Justice)*, was issued to focus the attention of federal agencies on human health and environmental conditions in minority populations and low-income populations. This Executive Order was also established to ensure that, if there were a disproportionately high and adverse human health or environmental effects of federal actions on these populations, those effects would be identified and addressed. The environmental justice analysis addresses the characteristics of race, ethnicity and poverty status for populations residing in areas potentially affected by implementation of the proposed action.

In 1997, Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (*Protection of Children*), was issued to identify and address issues that affect the protection of children. Socioeconomic data specific to the distribution of population by age are presented below.

5.17.1 Affected Environment

Minority and Low-Income Populations

For the purpose of this analysis, minority and low-income populations are defined as:

- *Minority Populations*: All persons identified by the Census of Population and Housing to be of Hispanic or Latino origin, regardless of race, plus non-Hispanic persons who are Black or African American, American Indian and Alaskan Native, Asian, Native Hawaiian and Other Pacific Islander, Some Other (i.e., non-white) Race or Two or More Races. For purposes of the EIS analysis, the minority population is calculated by subtracting the number of persons who are White but not Hispanic, from the total population.
- *Low-Income Populations*: All persons that fall within the statistical poverty thresholds published by the U. S. Census Bureau in the Current Population Survey are considered to be low-income. For the purposes of this analysis, low-income populations are defined as persons living below the poverty level ($16,895 for a family of four with two children, adjusted based on household size and number of children), as reported in the 2000 Census. The 2000 Census asked people about their income in the previous calendar year. Therefore, poverty estimates reported in the 2000 Census compare family income in 1999 with the corresponding 1999 poverty thresholds. If the total income for a family or unrelated individual falls below the relevant poverty threshold, then the family or unrelated individual is classified as being below the poverty level. The percentage of low-income persons is calculated as the percentage of all persons for whom the Census Bureau determines poverty status, which is generally a slightly lower number than the total population since it excludes institutionalized persons, persons in military group quarters and college dormitories, and unrelated individuals under 15 years old.
- *Children*: All persons identified by the Census of Population and Housing to be under the age of 18 years. For the purposes of this EIS, the number of children is calculated by subtracting the number of persons 18 years and over from the total population.

Environmental Justice

Census data on minority populations, low-income populations, and children in the MCAS Yuma region of influence are shown in Table 5.17-1. This includes the City of Yuma and Yuma County, Arizona and Imperial County, California. The City of Yuma and Yuma County have a higher minority population percentage (52.5 and 55.7 percent, respectively) than the State of Arizona (36.2 percent). The percent of persons living below poverty level in the City of Yuma and Yuma County (14.7 percent and 19.2 percent, respectively) is higher than the State of Arizona (13.9 percent). Imperial County has a higher minority population percentage (79.8 percent) than the State of California (53.3 percent). The percent of persons living below poverty level in Imperial County (22.6 percent) is higher than the State of California (14.2 percent). By comparison, the minority population in the two-county MCAS Yuma region of influence (comprising Yuma and Imperial counties) is 67.0 percent of the total population, and the percent of persons living in poverty is 20.8 percent. In 2000, children under the age of 18 living in the two-county region of influence comprised approximately 30.1 percent of the total population.

Table 5.17-1 Environmental Justice Data for the MCAS Yuma Region of Influence and the States of Arizona and California (2000)

Geographic Area	Total Population	Minority Population	Percent Minority	Low-Income Population	Percent Low-Income[1]	Children Under Age 18	Percent Children
City of Yuma	77,515	40,731	52.5	10,910	14.7	22,930	29.6
Yuma County	160,026	89,070	55.7	29,670	19.2	46,271	28.9
State of Arizona	5,130,632	1,856,374	36.2	698,669	13.9	1,366,947	26.6
Imperial County	142,361	113,593	79.8	29,681	22.6	44,746	31.4
State of California	33,871,648	18,054,858	53.3	4,706,130	14.2	9,249,829	27.3
Two-County ROI	302,387	202,663	67.0	59,351	20.8	91,017	30.1

Notes:
1. The percentage of low-income persons is calculated as a percentage of all persons for whom the Bureau of the Census determines poverty status, which is generally a lower number than the total population because it excludes institutionalized persons, persons in military group quarters and college dormitories, and unrelated individuals under 15 years old.
2. ROI – region of influence

Source: U.S. Census Bureau 2000

Protection of Children

No children would be expected at or in the vicinity of the proposed project area, which falls under the flightline and station support land use categories or districts. There are 693 family housing units on MCAS Yuma, located south of the Main Gate, west of the station's Avenue 3E boundary (DoN 2001). The Youth Center and the Childcare Center are both located just north of the family housing units. The only place where children would normally be present at MCAS Yuma would be at these locations or at the recreational facilities, none of which are located within the proposed project area. No schools are located on the base.

5.17.2 Environmental Consequences

Environmental justice analysis applies to adverse environmental impacts. Consequently, potential disproportionate impacts to minority or low-income populations are assessed only when adverse environmental consequences to the general human population are anticipated. The same is true for analysis of health and safety risks to children, as the potential for such risks would be driven by adverse environmental impacts.

In order to address the possibility of environmental justice concerns, health and safety factors were analyzed to determine the potential for adverse human health or environmental impacts of the proposed alternatives that could affect the human population. In addition, potential environmental health or safety hazards were examined to assess potential special risks to children. The analyses conducted for Air Quality (section 5.7), Noise (section 5.8), Hazardous Materials Management (section 5.11), and Safety and Environmental Health (section 5.16) indicate that less than significant environmental impacts to the human population are anticipated under all alternatives.

Maximum Partial Basing (8-Squadron) Alternative

Construction

Environmental justice concerns related to construction activity typically include air quality, noise, hazardous materials, and safety. Specific issues of concern involve potential accidents at construction sites, exposure to asbestos, lead-based paint, and combustive emissions, and noise from construction activity. Safety precautions in areas surrounding the work sites would include adequate measures to restrict access, minimization of hazards associated with construction activities, and proper handling and disposal of hazardous materials. Such measures, particularly the restricted access to the study area, would preclude the potential for adverse impacts to human populations. Noise associated with construction would be intermittent and short in duration, not contributing any appreciable impact to the existing acoustic environment in the area. No significant environmental or human health effects are anticipated related to construction or demolition under the Maximum Partial Basing Alternative. Consequently, no disproportionate or adverse impacts related to environmental justice are anticipated, nor would there be any special health or safety risks to children.

Operations

Operations under the Maximum Partial Basing Alternative would involve a 24 percent increase in the number of aircraft operations at MCAS Yuma. Although the proposed airfield environment would be similar to the current operational environment, and would follow established local approach and departure patterns, the substantial increase in operations was evaluated for potential environmental impacts. Environmental justice concerns related to aircraft operations may include air quality, noise, and safety. Specific issues of concern involve aircraft emissions, aircraft noise, and safety concerns related to flight mishaps and explosives handling. The analyses conducted for these resources areas indicate that no significant environmental or human health impacts are anticipated under the Maximum Partial Basing Alternative. Consequently, no disproportionate or adverse impacts related to environmental justice are anticipated, nor would there be any special health or safety risks to children.

Mitigation Measures

Because there would be no disproportionate or adverse impacts anticipated related to environmental justice, no mitigation measures are proposed.

Minimum Partial Basing (2-Squadron) Alternative

Construction

The facility modifications, personnel changes, and operations associated with the Minimum Partial Basing Alternative are not expected to create significant adverse environmental or health effects to the human population, as detailed in the specific resource sections identified above. Environmental justice concerns related to construction activity typically include air quality, noise, hazardous materials, and safety. Specific issues of concern involve potential accidents at construction sites, exposure to asbestos and lead-based paint, and noise from construction activity. Safety precautions in areas surrounding the work sites would include adequate measures to restrict access, minimization of hazards associated with construction activities, and proper handling and disposal of hazardous materials. Such measures,

particularly the restricted access to the study area, would preclude the potential for adverse impacts to human populations. Noise associated with construction would be intermittent and short in duration, not contributing any appreciable impact to the existing acoustic environment in the area. No significant environmental or human health effects are anticipated related to construction or demolition under the Minimum Partial Basing Alternative. Consequently, no disproportionate or adverse impacts related to environmental justice are anticipated, nor would there be any special health or safety risks to children.

Operations

Operations under the Minimum Partial Basing Alternative would involve a four percent increase in the number of aircraft operations at MCAS Yuma. The proposed airfield environment would be similar to the current operational environment, and would follow established local approach and departure patterns. Environmental justice concerns related to aircraft operations may include air quality, noise, and safety. Specific issues of concern involve aircraft emissions, aircraft noise, and safety concerns related to flight mishaps and explosives handling. The analyses conducted for these resources areas indicate that no significant environmental or human health impacts are anticipated under the Minimum Partial Basing Alternative. Consequently, no disproportionate or adverse impacts related to environmental justice are anticipated, nor would there be any special health or safety risks to children.

Mitigation Measures

Because there would be no disproportionate or adverse impacts anticipated related to environmental justice, no mitigation measures are proposed.

No Action Alternative

There would be no change in airfield operations or associate personnel under the No Action Alternative. However, it is possible that future construction efforts may be needed (e.g., wash racks at MCAS Yuma) related to MV-22 training by East Coast squadrons under the No Action Alternative. This would require less construction than associated with the proposed action (e.g., no new hangar construction). The above analysis demonstrates that proposed construction associated with either basing alternative at MCAS Yuma would not result in disproportionate or adverse impacts related to environmental justice. Therefore, no disproportionate or adverse impacts related to environmental justice are anticipated under the No Action Alternative.