Final Environmental Assessment
Operational Test and Evaluation Center at MCAS Yuma

Marine Corps Air Station
Yuma

June 2015

Photo courtesy of www.huitt-zollars.com

DEPARTMENT OF DEFENSE
UNITED STATES MARINE CORPS
FINDING OF NO SIGNIFICANT IMPACT
FOR PROPOSED ESTABLISHMENT OF
OPERATIONAL TEST AND EVALUATION CENTER
AT MARINE CORPS AIR STATION YUMA
YUMA COUNTY, ARIZONA

Pursuant to the Council on Environmental Quality regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508) implementing procedural provisions of the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code §§ 4321-4370h); Department of the Navy procedures for implementing NEPA (32 CFR Part 775); and Marine Corps Order P5090.2A, Change 3, dated 26 August 2013, *Environmental Compliance and Protection Manual,* the United States Marine Corps (USMC) gives notice that an Environmental Assessment (EA) has been prepared and an Environmental Impact Statement (EIS) will not be prepared for the proposed establishment of a Marine Aviation Operational Test and Evaluation Center (OTEC) and relocation of Marine Operational Test and Evaluation Squadron 22 (VMX-22) from Marine Corps Air Station (MCAS) New River to MCAS Yuma.

Purpose and Need: The purpose of the proposed action is to establish a consolidated Marine Aviation OTEC to provide a single source multi-platform Marine aviation operational test center and optimize development of aviation combat element tactics, techniques, and procedures. The proposed action is needed to achieve efficiencies and enhance the mission effectiveness of the operational testing and evaluation (OT&E) force and enhance synergistic efforts with Marine Aviation Weapons and Tactics Squadron-1 (MAWTS-1). The proposed action is also needed to consolidate geographically separate, single platform OT&E squadrons under VMX-22 and co-locate them with MAWTS-1, in accordance with the guidance contained in the *Marine Aviation Plan 2015*. MAWTS-1's mission is to provide standardized graduate-level advanced tactical training for Marine aviation and assist in the development and employment of aviation weapons and tactics. VMX-22's mission is to conduct operational flight testing and evaluation of Marine Corps' fixed-wing aircraft, tilt-rotor aircraft, rotary-wing aircraft, unmanned aircraft systems, and command and control systems. Year round tactical testing and evaluation and collaboration on development of new tactics, techniques, and procedures for aviation weapons and command and control systems are needed to improve operational efficiencies. That same collaboration would support Marine Air Ground Task Force aviation operational testing to ensure USMC's aviation systems meet evolving operational requirements by maximizing the combat advantage of new and existing systems and supporting the ability of Marine aviation to maintain operational readiness.

Proposed Action: Under the Proposed Action, the USMC would establish a consolidated Marine Aviation OTEC and transition 22 aircraft and personnel associated with VMX-22 to MCAS Yuma. The proposed action would consolidate geographically separate, single platform OT&E squadrons under VMX-22, and would co-locate them with MAWTS-1 at MCAS Yuma. VMX-22 would complete operational development and testing of aviation weapons and air command and control systems to support Marine aviation training and readiness for a variety of aircraft platforms, including fixed-wing aircraft (F-35B), tilt-rotor aircraft (MV-22B), heavy lift helicopters (CH-53E and CH-53K), light attack helicopters (AH-1W, UH-1Y, and UH-1Y), and unmanned aircraft systems (MQ-21). VMX-22 would conduct day

and nighttime aircraft operations using live, inert, and simulated ordnance. Proposed operations would occur at MCAS Yuma and within the Bob Stump Training Range Complex.

Alternatives: The EA analyzed the potential environmental effects of three alternatives: Alternative 1, Alternative 2, and the No-Action alternative. Alternative 1 would include 1) relocation of VMX-22 aircraft and personnel to MCAS Yuma; 2) temporary relocation in transient facilities; 3) construction of new facilities; 4) upgrades and demolition of existing facilities; and 5) conducting operational flight testing and evaluations at the airfield and nearby ranges. Alternative 2 would include the same relocation of aircraft and personnel and proposed training operations as Alternative 1. However, Alternative 2 would include modifications to Building 408 or Building 410 interior systems and minor retrofitting; no other construction, renovation, or demolition activities would occur. Under the No-Action Alternative, a consolidated Marine Aviation OTEC would not be established and relocation of VMX-22 from MCAS New River to MCAS Yuma would not occur. Under the No-Action Alternative, VMX-22 would not be co-located with MAWTS-1, and VMX-22 operational testing would continue at geographically separate military installations. Marine aviation operational testing would not be optimized to ensure USMC's aviation systems meet evolving operational requirements. Furthermore, development and experimentation of tactics, techniques and procedures for future aviation weapons and air command and control systems would not be maximized as stipulated in the *Marine Aviation Plan 2015*.

Summary of Environmental Effects: The EA analyzed the environmental impacts that would potentially result from the implementation of Alternative 1, Alternative 2, and the No-Action Alternative. The resources that had the most potential to be affected by the alternatives, and were analyzed in-depth in the EA, included the following: airspace; air quality; hazardous materials and waste; noise; safety and environmental health; community facilities and services; transportation; utilities and infrastructure; and cultural resources.

Airspace: The Proposed Action would not have a significant effect on airspace. Aircraft operations would have minimal effects on overall operational capabilities at MCAS Yuma and would be consistent with current activities conducted within Special Use Airspace.

Air Quality: The Proposed Action would not have a significant effect on air quality. Emissions generated by the Proposed Action would be below the conformity *de minimis* levels. Implementation of Special Conservation Measure 1 (*Fugitive Dust Control Measures*) and Special Conservation Measure 2 (*Construction Equipment Emission Control Measures*) would minimize fugitive dust and equipment combustion emissions from construction activities.

Hazardous Materials and Waste: The Proposed Action would not have a significant effect on hazardous materials and waste. All hazardous materials would be removed, characterized, managed, transported, and disposed of according to applicable federal and state requirements. Construction activities within Installation Restoration Program and Munitions Response Program sites would be conducted in accordance with Comprehensive Environmental Response, Compensation, and Liability Act requirements. Potential impacts would be reduced with implementation of Special Conservation Measure 3 (*Health and Safety Plan*). Impacts associated with incidental spills and construction waste would be minimized with implementation of Special Conservation Measure 4 (*Hazardous Materials Best Management Practices).*

Noise: The Proposed Action would not have a significant effect on sensitive noise receptors. Construction-related noise would be compatible with on-going activities and isolated from any off-station communities. Aircraft operations would result in a minimal change between baseline conditions and proposed operations.

Safety and Environmental Health: The Proposed Action would not have a significant effect on safety and environmental health. Proposed construction activities would be consistent with established airfield safety clearances, Accident Potential Zones, and Explosive Safety Quantity Distance arcs. Existing air safety rules would continue to segregate activities that would be hazardous to non-participating aircraft within the MCAS Yuma and adjacent operating ranges. Ordnance use would only occur within designated airspace and training ranges that are specifically designed for air-to-ground delivery.

Community Facilities and Services: The Proposed Action would not have a significant effect on community facilities and services. The increase in personnel and dependents associated with the Proposed Action would have little effect on housing, health services, security services, fire protection, education, or parks and recreation.

Transportation: The Proposed Action would not have a significant effect on transportation. Regional and local access roads as well as the MCAS Yuma street network have adequate capacity to accommodate the amount of additional traffic without major impacts on traffic flow, circulation, or level of service.

Utilities and Infrastructure: The Proposed Action would not have a significant effect on utilities and infrastructure. The existing capacities of all utilities at MCAS Yuma are adequate to accommodate the increased demands associated with the Proposed Action.

Cultural Resources: The Proposed Action would not have a significant effect on cultural resources. Proposed construction activities could directly or indirectly effect buildings eligible for the National Register of Historic Places. MCAS Yuma anticipates State Historic Preservation Officer concurrence on pending building eligibility determinations, as well as a finding of No Historic Properties Affected. Implementation of Special Conservation Measure 5 (*State Historic Preservation Officer Concurrence*) would require State Historic Preservation Officer concurrence prior to authorization of construction. The potential to impact previously unrecorded cultural resources during ground disturbing activities would be reduced by implementing Special Conservation Measure 6 (*Post Review Discovery Procedures*).

With implementation of Special Conservation Measures, none of the alternatives analyzed in the EA would result in significant direct, indirect, or cumulative impacts on the quality of the local environment.

Agency Coordination and Public Involvement: In accordance with Section 106 of the National Historic Preservation Act, the USMC initiated consultation with the State Historic Preservation Officer for the Proposed Action.

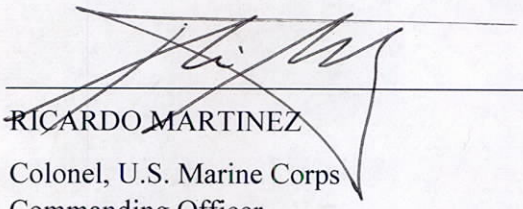
A public notice informing interested parties and agencies of the EA was published in the Yuma Sun and Imperial Valley Press on 24, 25, and 26 April 2015, and in the Bajo El Sol (Spanish language newspaper) on 24 April 2015.

Special Conservation Measures: The EA identified measures to avoid, minimize, and mitigate impacts associated with the Proposed Action. These measures will be included as contract requirements on all

relevant project scoping, scheduling, and planning documents. Should regulatory coordination result in the identification of additional measures, they will be incorporated into the alternative selected for action. In addition, training operations would follow measures as required by regulations and applicable Biological Opinions to avoid impacts on sensitive species.

Findings: After careful review of the EA, I have selected to implement Alternative 1, and find that it will have no significant impact on the human environment. This finding of no significant impact is based on the attached EA which has been independently evaluated by the USMC, and determined to adequately and accurately discuss the need, environmental issues, and impacts of the Proposed Action. The EA provides sufficient evidence and analysis for determining that an EIS is not required.

The EA addressing this Proposed Action may be obtained by contacting Ms. Rachelle Hill, Naval Facilities Engineering Command Southwest Central IPT, 1220 Pacific Highway, San Diego, CA 92132, telephone (619) 532-4468.



20150611

RICARDO MARTINEZ — Date

Colonel, U.S. Marine Corps
Commanding Officer
Marine Corps Air Station Yuma

Final

Environmental Assessment for Operational Test and Evaluation Center at Marine Corps Air Station Yuma

Lead Agency for the EA:	United States Marine Corps
Title of Proposed Action:	Operational Test and Evaluation Center at Marine Corps Air Station (MCAS) Yuma
Location of the Proposed Action:	State of Arizona, Yuma County
Document Type:	Environmental Assessment

Abstract

The United States Marine Corps has prepared this Environmental Assessment in accordance with the National Environmental Policy Act (NEPA) of 1969, 42 United States Code §§ 4321–4370h, as implemented by the Council on Environmental Quality regulations, 40 Code of Federal Regulations Parts 1500–1508, and Marine Corps Order P5090.2A, Change 3, Chapter 12, dated 26 August 2013, *Environmental Compliance and Protection Manual*, which establishes procedures for implementing NEPA. The proposed action includes the establishment of a consolidated Marine Aviation Operational Test and Evaluation Center and relocation of Marine Operational Test and Evaluation Squadron 22 from MCAS New River to MCAS Yuma. This Environmental Assessment describes the potential environmental consequences resulting from two action alternatives (Alternatives 1 and 2) and the No-Action Alternative on the following resource areas: airspace; air quality; hazardous materials and waste; noise; safety and environmental health; community facilities and services; transportation; utilities and infrastructure; and cultural resources.

Prepared By:	United States Marine Corps
Point of Contact:	Department of the Navy Naval Facilities Engineering Command Southwest Central IPT Ms. Rachelle Hill, Project Manager 1220 Pacific Highway San Diego, California 92132-5190

June 2015

This page intentionally left blank.

Table of Contents

Appendices

List of Tables

List of Figures

Acronyms

ACMs	Asbestos-containing materials
AD	Anno Domini
ADEQ	Arizona Department of Environmental Quality
ALF	Auxiliary Landing Field
AMSL	above mean sea level
APZs	Accident Potential Zones
ARFF	aircraft rescue and fire fighting
ATC	air traffic control
ATCAA	Air Traffic Control Assigned Airspace
AUX-2	Auxiliary Airfield 2
BASH	Bird Aircraft Strike Hazard
BC	Before Christ
BMGR	Barry M. Goldwater Range
BSTRC	Bob Stump Training Range Complex
CAOC	CERCLA Areas of Concern
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CH_4	methane
CMAGR	Chocolate Mountain Aerial Gunnery Range
CO	carbon monoxide
CO_2	carbon dioxide
CO2e	CO_2 equivalent
COMOPTEVFOR	Commander, Operational Test and Evaluation Force
dB	decibel
dBA	decibel on an “A-weighted” scale
DNL	Day-Night Average Sound Level
DoD	Department of Defense
DoN	Department of the Navy
DT&E	developmental testing and evaluation
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
ESQD	Explosive Safety Quantity Distance
FAA	Federal Aviation Administration
GHG	greenhouse gas
GWP	global warming potential
HVAC	heating, ventilation, and air conditioning
IRP	Installation Restoration Program
LEED	Leadership in Energy and Environmental Design
LID	Low Impact Development
LOS	level of service
MAGTF	Marine Air Ground Task Force
Marine Corps	United States Marine Corps
MAWTS-1	Marine Aviation Weapons and Tactics Squadron-1
MCAS	Marine Corps Air Station
MCI West	Marine Corps Installations West
MCO	Marine Corps Order

MILCON	Military Construction Program
MMMR	Minimization, Mitigation, Monitoring, and Reporting
MOA	Military Operating Area
MRP	Munitions Response Program
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NATOPS	Naval Air Training and Operating Procedures Standardization
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NRHP	National Register of Historic Places
O_3	ozone
OSHA	Occupational Safety and Health Administration
OT&E	operational testing and evaluation
OTEC	Operational Test and Evaluation Center
PM_{10}	particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
ppm	parts per million
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
RMO	Range Management Office
ROI	region of influence
SHPO	State Historic Preservation Officer
SO_2	sulfur dioxide
STOVL	short take-off and vertical landing
SUA	Special Use Airspace
U.S.	United States
UAS	Unmanned Aircraft Systems
UFC	Unified Facilities Criteria
USC	United States Code
USEPA	United States Environmental Protection Agency
USMC	United States Marine Corps
VMFT-401	Marine Fighter Training Squadron 401
VMU-1	Marine Unmanned Aerial Vehicle Squadron 1
VMX-22	Marine Operational Test and Evaluation Squadron 22
VOCs	volatile organic compounds

Executive Summary

The United States Marine Corps (USMC) has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) of 1969, 42 United States Code (USC) §§ 4321-4370h, as implemented by the Council on Environmental Quality (CEQ) regulations, 40 Code of Federal Regulations (CFR) Parts 1500-1508, and Marine Corps Order (MCO) P5090.2A, Change 3, Chapter 12, dated 26 August 2013, *Environmental Compliance and Protection Manual*, which establishes procedures for implementing NEPA. This EA describes the potential environmental consequences resulting from a proposal to establish a consolidated Marine Aviation Operational Test and Evaluation Center (OTEC) and relocate the Marine Operational Test and Evaluation Squadron 22 (VMX-22) from Marine Corps Air Station (MCAS) New River to MCAS Yuma. The proposed action would consolidate geographically separate, single platform operational testing and evaluation (OT&E) squadrons under VMX-22, and would co-locate them with Marine Aviation Weapons and Tactics Squadron-1 (MAWTS-1) at MCAS Yuma. The USMC has developed two action alternatives to implement the proposed action.

The purpose of the proposed action is to establish a consolidated Marine Aviation OTEC to provide a single source multi-platform Marine aviation operational test center and optimize development of aviation combat element tactics, techniques, and procedures. The proposed action is needed to achieve efficiencies and enhance the mission effectiveness of the OT&E force and enhance synergistic efforts with MAWTS-1. The proposed action is also needed to consolidate geographically separate, single platform OT&E squadrons under VMX-22 and co-locate them with MAWTS-1, in accordance with the guidance contained in the *Marine Aviation Plan 2015* (USMC 2014). Year round testing and evaluation and collaboration on development of new tactics, techniques, and procedures for aviation weapons and command and control systems is needed to improve operational efficiencies. That same collaboration would support Marine Air Ground Task Force aviation operational testing to ensure USMC's aviation systems meet evolving operational requirements by maximizing the combat advantage of new and existing systems and supporting the ability of Marine aviation to maintain operational readiness.

The following resource areas were evaluated for potential environmental consequences: Airspace; Air Quality; Hazardous Materials and Waste; Noise; Safety and Environmental Health; Community Facilities and Services; Transportation; Utilities and Infrastructure; and Cultural Resources. The potential environmental consequences associated with implementation of Alternative 1, Alternative 2, and the No-Action Alternative are summarized in Table ES-1. Alternative 1 would include 1) relocation of VMX-22 aircraft and personnel to MCAS Yuma; 2) temporary relocation in transient facilities; 3) construction of new facilities; 4) upgrades and demolition of existing facilities; and 5) conducting operational flight testing and evaluations at the airfield and nearby ranges. Alternative 2 would include the same relocation of aircraft and personnel and proposed training operations as Alternative 1. However, Alternative 2 would include modifications to Building 408 or Building 410 interior systems and minor retrofitting; no other construction, renovation, or demolition activities would occur. As shown in Table ES-1, no significant impacts to any resource area would occur with implementation of the proposed action with the inclusion of Special Conservation Measures. Based on the analysis presented in this EA, the USMC has identified Alternative 1 as the Preferred Alternative.

Table ES-1. Summary of Potential Environmental Consequences

Resource	*Alternative 1*	*Alternative 2*	*No-Action Alternative*
Airspace	Proposed VMX-22 operations would have minimal effects on the overall operational capabilities at MCAS Yuma, including air traffic control services. Aircraft operations associated with Alternative 1 would be consistent with current activities conducted within Special Use Airspace (e.g., restricted areas, Military Operations Areas, and Air Traffic Control Assigned Airspace). Aircraft operations at nearby public and private airfields would be unaffected by the proposed VMX-22 operations. Therefore, no significant impacts on airspace would occur. Relocation of aircraft to MCAS Yuma would have negligible impacts on airspace at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.	Under Alternative 2, impacts on airspace would be the same as those described for Alternative 1. No significant impacts on airspace would occur. Relocation of aircraft to MCAS Yuma would have negligible impacts on airspace at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.	For the No-Action Alternative, the proposed action would not occur, and there would be no change in existing conditions. No impacts on airspace would occur.
Air Quality	Emissions generated by Alternative 1 would be below the conformity de minimis levels or the United States Environmental Protection Agency Prevention of Significant Deterioration threshold. Implementation of Special Conservation Measure 1 (*Fugitive Dust Control Measures*) and Special Conservation Measure 2 (*Construction Equipment Emission Control Measures*) would minimize fugitive dust and equipment combustion emissions from construction activities. Therefore, no significant impacts on air quality would occur. Relocation of aircraft and personnel to MCAS Yuma would have negligible beneficial impacts on air quality at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.	Alternative 2 would include modifications to Building 408 or Building 410 interior systems and minor retrofitting; no other construction, renovation, or demolition activities would occur. Therefore, construction-related air quality impacts would be negligible. Air emissions from Alternative 2 operations would be the same as those described for Alternative 1. No significant impacts on air quality would occur. Relocation of aircraft and personnel to MCAS Yuma would have negligible beneficial impacts on air quality at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.	For the No-Action Alternative, the proposed action would not occur, and there would be no change in existing conditions. No impacts on air quality would occur.

Table ES-1. Summary of Potential Environmental Consequences (continued)

Resource	*Alternative 1*	*Alternative 2*	*No-Action Alternative*
Hazardous Materials and Waste	Asbestos-containing material, lead-based paint, and other hazardous materials could be present in structures proposed for demolition under Alternative 1. However, these materials would be removed, characterized, managed, transported, and disposed of according to applicable federal and state requirements for protecting human health and safety and the environment. All construction, renovation, and demolition activities within Installation Restoration Program and Munitions Response Program sites would be conducted in accordance with Comprehensive Environmental Response, Compensation, and Liability Act requirements. Potential impacts would also be reduced with implementation of Special Conservation Measure 3 (Health and Safety Plan). Impacts associated with incidental spills and construction waste would be minimized with implementation of Special Conservation Measure 4 (Hazardous Materials Best Management Practices). Implementation of a National Pollutant Discharge Elimination System Stormwater Pollution Prevention Plan and compliance with federal, state, and local statutes and regulations regarding stormwater retention and treatment and soil and groundwater contamination would ensure no significant operational impacts would occur at MCAS Yuma or within the Bob Stump Training Range Complex. Therefore, no significant impacts on hazardous materials and waste would occur. Relocation of aircraft and personnel to MCAS Yuma would have negligible impacts on hazardous materials and waste at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.	Alternative 2 would include modifications to Building 408 or Building 410 interior systems and minor retrofitting; no other construction, renovation, or demolition activities would occur. Therefore, construction-related hazardous materials and waste impacts would be negligible. Alternative 2 operations would be the same as those described for Alternative 1. No significant impacts on hazardous materials and waste would occur. Relocation of aircraft and personnel to MCAS Yuma would have negligible impacts on hazardous materials and waste at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.	For the No-Action Alternative, the proposed action would not occur, and there would be no change in existing conditions. No impacts on hazardous materials and waste would occur.

Table ES-1. Summary of Potential Environmental Consequences (continued)

Resource	*Alternative 1*	*Alternative 2*	*No-Action Alternative*
Noise	Construction, renovation, and demolition activities would temporarily increase noise in the project vicinity. However, construction-related noise would occur near the flightline, where noise would be compatible with current and ongoing activities, and would be isolated from any off-station communities. Aircraft operations would result in a minimal change between baseline conditions and proposed operations. Therefore, no significant impacts on noise would occur. Relocation of aircraft and personnel to MCAS Yuma would have negligible impacts on noise at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.	Alternative 2 would include minor modifications to Building 408 or Building 410 interior systems and minor retrofitting; no other construction, renovation, or demolition activities would occur. Therefore, construction-related noise impacts would be negligible. Aircraft operations under Alternative 2 would be the same as those described under Alternative 1. Therefore, changes in noise exposure from proposed aircraft operations would be minimal, and no significant impacts on noise would occur. Relocation of aircraft and personnel to MCAS Yuma would have negligible impacts on noise at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.	For the No-Action Alternative, the proposed action would not occur, and there would be no change in existing conditions. No impacts on noise would occur.

Table ES-1. Summary of Potential Environmental Consequences (continued)

Resource	*Alternative 1*	*Alternative 2*	*No-Action Alternative*
Safety and Environmental Health	Proposed construction activities would be consistent with established airfield safety clearances, Accident Potential Zones, and Explosive Safety Quantity Distance arcs. Alternative 1 would result in a small increase in aircraft operations at MCAS Yuma. Similar to existing operations, air safety rules would continue to contain and segregate activities that would be hazardous to non-participating aircraft within the MCAS Yuma and adjacent operating ranges. Ordnance expenditures associated with training exercises would only occur within designated Bob Stump Training Range Complex airspace and training ranges specifically designed for air-to-ground delivery. These ranges have standard procedures (e.g., weapons safety footprints, entrance restrictions) in place to ensure safety of personnel on the ground during range exercises and during ordnance clean-up and clearance activities. Therefore, no significant impacts on safety and environmental health would occur. Relocation of aircraft and personnel to MCAS Yuma would have negligible impacts on safety and environmental health at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.	Alternative 2 would include minor modifications to Building 408 or Building 410 interior systems and minor retrofitting; no other construction, renovation, or demolition activities would occur. Therefore, construction-related safety and environmental health impacts would be negligible. Proposed operations under Alternative 2 would be the same as those described under Alternative 1. Although Alternative 2 would result in a slight increase in operations over existing conditions, the associated safety risk would not be substantially greater than existing conditions. Therefore, no significant impacts on safety and environmental health would occur. Relocation of aircraft and personnel to MCAS Yuma would have negligible impacts on safety and environmental health at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.	For the No-Action Alternative, the proposed action would not occur, and there would be no change in existing conditions. No impacts on safety and environmental health would occur.

Table ES-1. Summary of Potential Environmental Consequences (continued)

Resource	*Alternative 1*	*Alternative 2*	*No-Action Alternative*
Community Facilities and Services	Alternative 1 would result in an increase of about 246 military personnel (32 officers and 214 enlisted), with an estimated 589 dependents and 50 contractor-support personnel. The increase in personnel and dependents associated with Alternative 1 would have little effect on housing, health services, security services, fire protection, education, or parks and recreation. In addition, Alternative 1 would be consistent with surges in demands for community facilities and services at MCAS Yuma during large-scale training events. Therefore, no significant impacts on community facilities and services would occur. Relocation of personnel to MCAS Yuma would have negligible impacts on community facilities and services at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.	Proposed changes in military personnel and dependents under Alternative 2 would be the same as those described under Alternative 1. Although Alternative 2 would result in a slight increase in military personnel over existing conditions, this would have little effect on housing, health services, security services, fire protection, education, or parks and recreation. Alternative 2 would be consistent with surges in demands for community facilities and services at MCAS Yuma during large-scale training events. Therefore, no significant impacts on community facilities and services would occur. Relocation of personnel to MCAS Yuma would have negligible impacts on community facilities and services at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.	For the No-Action Alternative, the proposed action would not occur, and there would be no change in existing conditions. No impacts on community facilities and services would occur.

Table ES-1. Summary of Potential Environmental Consequences (continued)

Resource	*Alternative 1*	*Alternative 2*	*No-Action Alternative*
Transportation	Construction-related traffic would comprise only a small portion of the total existing traffic volume at MCAS Yuma and in the surrounding area. Potential temporary congestion impacts could be avoided or minimized by scheduling truck deliveries outside the peak inbound traffic time and using the secondary gates. The increase in daily commuting traffic trips associated with operations could increase congestion and queuing at the Main Gate during rush hours. Should an issue arise, MCAS Yuma would coordinate with City of Yuma staff to adjust the timing of traffic lights to improve traffic flow. Because South Avenue 3E has a history of capacity exceedance, the marginal contribution of operations-related traffic to that exceedance would not be significant. Regional and local access roads as well as the MCAS Yuma street network have adequate capacity to accommodate the amount of additional traffic without major impacts on traffic flow, circulation, or level of service. Therefore, no significant impacts on transportation would occur. Relocation of personnel to MCAS Yuma would have negligible impacts on transportation at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.	Alternative 2 would include minor modifications to Building 408 or Building 410 interior systems and minor retrofitting; no other construction, renovation, or demolition activities would occur. Therefore, construction-related transportation impacts would be negligible. Proposed changes in military personnel and dependents under Alternative 2 would be the same as those described under Alternative 1. Regional and local access roads as well as the MCAS Yuma street network have adequate capacity to accommodate the small amount of additional traffic associated with the change in personnel without major impacts on traffic flow, circulation, or level of service. Therefore, no significant impacts on transportation would occur. Relocation of personnel to MCAS Yuma would have negligible impacts on transportation at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.	For the No-Action Alternative, the proposed action would not occur, and there would be no change in existing conditions. No impacts on transportation would occur.

Table ES-1. Summary of Potential Environmental Consequences (continued)

Resource	*Alternative 1*	*Alternative 2*	*No-Action Alternative*
Utilities and Infrastructure	Alternative 1 would increase demands on electricity, natural gas, water, sewer, and solid waste disposal. However, the existing capacities of all utilities are adequate to accommodate Alternative 1. The potential increase in stormwater runoff associated with new impervious surfaces (i.e., aircraft parking apron and vehicle parking area) would be managed such that discharge exiting the site post-construction would be equal to or less than existing conditions through the use of appropriately designed conveyance structures and implementation of stormwater Best Management Practices. Therefore, no significant impacts on utilities and infrastructure would occur. Relocation of aircraft and personnel to MCAS Yuma would have negligible impacts on utilities and infrastructure at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.	Alternative 2 would include minor modifications to Building 408 or Building 410 interior systems and minor retrofitting; no other construction, renovation, or demolition activities would occur. Therefore, construction-related utilities and infrastructure impacts would be negligible. Proposed changes in military personnel and dependents under Alternative 2 would be the same as those described under Alternative 1. Existing station utilities are considered adequate to accommodate the nominal increase in demands. Therefore, no significant impacts on utilities and infrastructure would occur. Relocation of aircraft and personnel to MCAS Yuma would have negligible impacts on utilities and infrastructure at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.	For the No-Action Alternative, the proposed action would not occur, and there would be no change in existing conditions. No impacts on utilities and infrastructure would occur.

Table ES-1. Summary of Potential Environmental Consequences (continued)

Resource	*Alternative 1*	*Alternative 2*	*No-Action Alternative*
Cultural Resources	Under Alternative 1, 62 buildings could be directly or indirectly impacted from construction, renovation, and demolition activities. Forty-two of these buildings have been determined not eligible for the National Register of Historic Places, and the State Historic Preservation Officer (SHPO) has concurred with those determinations. MCAS Yuma anticipates SHPO concurrence on pending not eligible determinations for the other 20 buildings, as well as a finding of No Historic Properties Affected. Implementation of Special Conservation Measure 5 (*SHPO Concurrence)* would require SHPO concurrence prior to authorization of construction. The potential to impact previously unrecorded cultural resources during ground disturbing activities would be reduced by implementing Special Conservation Measure 6 (*Post Review Discovery Procedures).* Relocation of aircraft and personnel to MCAS Yuma would have no impacts on cultural resources at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.	Alternative 2 would include minor modifications to Building 408 or Building 410 interior systems and minor retrofitting; no other construction, renovation, or demolition activities would occur. Building 408 and Building 410 are considered not eligible for the National Register of Historic Places. The minor increases in operations would be consistent with current conditions and would not cause effects to any historic properties within the Region of Influence. Therefore, no impacts on cultural resources would occur. Relocation of aircraft and personnel to MCAS Yuma would have no impacts on cultural resources at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.	For the No-Action Alternative, the proposed action would not occur, and there would be no change in existing conditions. No impacts on cultural resources would occur.

This page intentionally left blank.

1 Purpose and Need

1.1 Introduction

This Environmental Assessment (EA) has been prepared by the United States Marine Corps (Marine Corps or USMC) in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] §§ 4321–4370h, as amended), the Council on Environmental Quality (CEQ) *Regulations for Implementing the Procedural Provisions of NEPA* (40 Code of Federal Regulations [CFR] Parts 1500–1508), and Marine Corps Order (MCO) P5090.2A, Change 3, Chapter 12, dated 26 August 2013, *Environmental Compliance and Protection Manual*. NEPA encourages public involvement in the environmental review process. The development of this EA includes stakeholder coordination and the publication of a Notice of Availability on 24-26 March 2015, informing interested parties or agencies of the existence of the report.

The USMC proposes to establish a consolidated Marine Aviation Operational Test and Evaluation Center (OTEC) and relocate the Marine Operational Test and Evaluation Squadron 22 (VMX-22) from Marine Corps Air Station (MCAS) New River to MCAS Yuma. The proposed action would consolidate geographically separate, single platform operational testing and evaluation (OT&E) squadrons under VMX-22, and would co-locate them with Marine Aviation Weapons and Tactics Squadron-1 (MAWTS-1) at MCAS Yuma (Figure 1.1-1). VMX-22 would complete operational development and testing of aviation weapons and air command and control systems to support Marine aviation training and readiness for a variety of aircraft platforms, including fixed-wing aircraft, tilt-rotor aircraft, heavy lift helicopters, light attack helicopters, and Unmanned Aircraft Systems (UAS).

This EA describes the potential environmental consequences of establishing a consolidated Marine Aviation OTEC and transitioning aircraft and personnel associated with VMX-22 to MCAS Yuma. Aircraft would include the Joint Strike Fighter (F-35B), Super Stallion (CH-53E), King Stallion (CH-53K), Super Cobra (AH-1W), Viper (AH-1Z), Venom (UH-1Y), Osprey (MV-22B), and Blackjack (MQ-21). This EA addresses MCAS Yuma airfield facilities and VMX-22 aircraft operations at the air station and within the Bob Stump Training Range Complex (BSTRC).

1.2 Project Location

The proposed action would be implemented at MCAS Yuma, which is one of the USMC's main aviation training installations, located in the southwest corner of Arizona (Figure 1.2-1). 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. The airfield currently supports fixed-wing, rotary-wing, and tilt-rotor aircraft, and has over 129,000 flight operations per year (Wyle Laboratories Inc. 2014).

MCAS Yuma is home to a number of tenant units, including MAWTS-1, Marine Aircraft Group-13, Marine Wing Support Squadron-371, Marine Fighter Training Squadron-401 (VMFT-401), Marine Air Control Squadron-1, and Combat Logistics Company 16. MCAS Yuma provides access to ranges, support facilities, and services that enable tenants and other Marine Corps commands to enhance their mission capability and combat readiness.

MCAS Yuma manages the BSTRC, which consists of Department of Defense (DoD)-controlled airspace and Department of the Navy (DoN)/USMC-controlled training ranges, including Barry M. Goldwater Range-West (BMGR-West) (R-2301W) in Arizona and the Chocolate Mountain Aerial Gunnery Range (CMAGR) (R-2507N, R-2507S) in California.

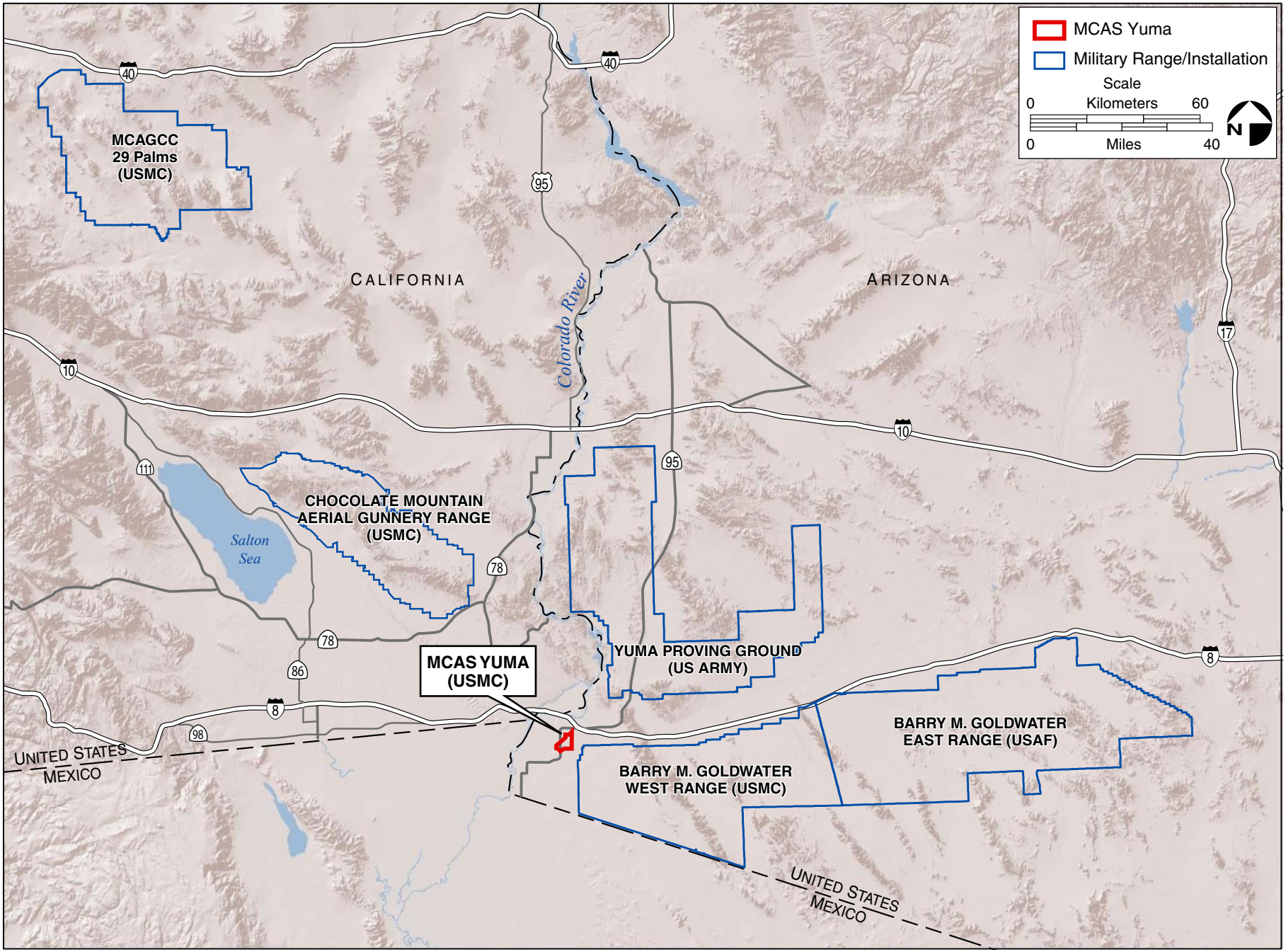


Figure 1.1-1. Regional Map

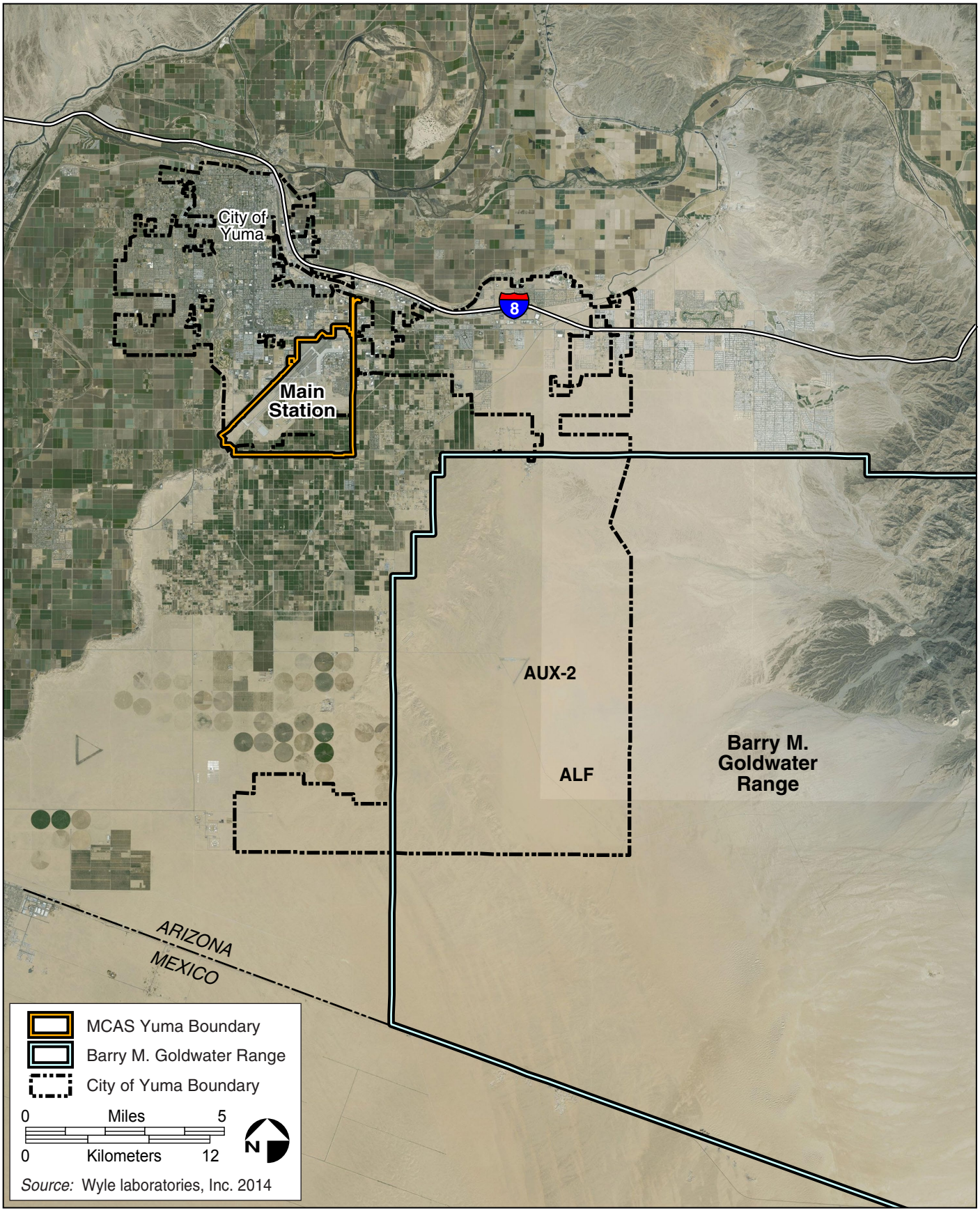


Figure 1.2-1. Project Vicinity Map

The BSTRC encompasses about 1,900 square miles of land reserved as aerial bombing and gunnery ranges as well as 10,000 square nautical miles of associated Special Use Airspace (SUA) (USMC 2013). This airspace allows military flight operations to occur without exposing civil aviation users, military aircrews, and the general public to hazards associated with military training and operations. With easy access to three live-fire ranges and ideal year-round flying weather, the air station provides suitable conditions that support Marine Air Ground Task Force[1] (MAGTF) aviation training.

1.3 Purpose and Need for the Proposed Action

The *purpose* of the proposed action is to establish a consolidated Marine Aviation OTEC to provide a single source multi-platform Marine aviation operational test center and optimize development of aviation combat element tactics, techniques, and procedures. The proposed action is *needed* to achieve efficiencies and enhance the mission effectiveness of the OT&E force and enhance synergistic efforts with MAWTS-1. The proposed action is also *needed* to consolidate geographically separate, single platform OT&E squadrons under VMX-22 and co-locate them with MAWTS-1, in accordance with the guidance contained in the *Marine Aviation Plan 2015* (USMC 2014). MAWTS-1's mission is to provide standardized graduate-level advanced tactical training for Marine aviation and assist in the development and employment of aviation weapons and tactics. VMX-22's mission is to conduct operational flight testing and evaluation of Marine Corps' fixed-wing aircraft, tilt-rotor aircraft, rotary-wing aircraft, UAS, and command and control systems. Year round tactical testing and evaluation and collaboration on development of new tactics, techniques, and procedures for aviation weapons and command and control systems are needed to improve operational efficiencies. That same collaboration would support MAGTF aviation operational testing to ensure USMC's aviation systems meet evolving operational requirements by maximizing the combat advantage of new and existing systems and supporting the ability of Marine aviation to maintain operational readiness.

1.4 Applicable Regulatory Requirements

This EA discusses reasonable alternatives for meeting the purpose and need for the proposed action; existing environmental conditions in the vicinity of the proposed action; direct, indirect, and cumulative impacts that might result from the action alternatives and No-Action Alternative; and measures to avoid, minimize, or mitigate potential adverse impacts. The decision to be made by the MCAS Yuma Commanding Officer relates to which alternative best fulfills the purpose and need for the proposed action.

This EA has been prepared in accordance with applicable federal regulations, instructions, and public laws, including but not limited to, those identified in Appendix A. NEPA requires consideration of potential impacts to the environment in the decision-making process for federal actions. CEQ regulations represent the "action forcing" provisions of NEPA to ensure that federal agencies comply with NEPA. MCO P5090.2A provides specific guidance for the Marine Corps in preparing environmental documentation for proposed actions subject to NEPA.

[1] The Marine Corps organizes its ground combat divisions and air wings into MAGTFs, which are composed of four organizational elements: a command or headquarters element; a ground combat element; a combat logistics element; and an aviation combat element. Marine aviation is an integral and essential component of every MAGTF by providing six functions: assault support; anti-aircraft warfare; offensive air support; electronic warfare; control of aircraft and missiles; and aerial reconnaissance.

2 Proposed Action and Alternatives

The proposed action addressed in this EA is the establishment of a consolidated Marine Aviation OTEC and relocation of VMX-22 from MCAS New River to MCAS Yuma. This chapter describes the reasonable alternatives for accomplishing the proposed action. The CEQ, in its *Regulations for Implementing the Procedural Provisions of NEPA* (40 CFR Parts 1500–1508), establishes a number of policies for federal agencies, including "using the NEPA process to identify and assess reasonable alternatives to the proposed action that would avoid or minimize adverse effects of these actions on the quality of the human environment" (40 CFR §1500.2 (e)).

The Marine Corps identified several selection criteria to assist them in developing reasonable alternatives that meet the purpose and need for the proposed action. These criteria include the following:

- Proximity of the facility to appropriate training areas and adequate SUA within a reasonable distance of the airfield;
- Compatibility with existing air operations and future proposed actions;
- Ability to conduct year-round testing and evaluation to support MAGTF aviation operational testing;
- Availability of space for needed airfield facilities, such as apron space, hangar space, and support facilities to accommodate the aircraft and personnel; and
- Avoidance or minimization of environmental impacts.

Two action alternatives were carried forward for full analysis, as described below. The relocation of aircraft and personnel and the proposed training operations would be the same for both alternatives. However, the construction and demolition of airfield facilities proposed under Alternative 1 would not occur under Alternative 2. Alternatives considered but eliminated as infeasible are discussed in Section 2.5, *Alternatives Considered but Eliminated*.

2.1 Alternative 1

Alternative 1 would include 1) relocation of VMX-22 aircraft and personnel to MCAS Yuma; 2) temporary relocation in transient facilities; 3) construction of new facilities (e.g., VMX-22 aircraft maintenance hangar, aircraft parking apron, VMX-22 Integration Facility, VMFT-401 aircraft maintenance facility, and aircraft rescue and fire fighting [ARFF] facility); 4) upgrades and demolition of existing facilities; and 5) conducting operational flight testing and evaluations at the airfield and nearby ranges. Proposed construction activities would require demolition of up to 20 buildings and facilities.

2.1.1 VMX-22 Aircraft and Personnel Relocation

VMX-22, which is under the authority of the Commander, Operational Test and Evaluation Force (COMOPTEVFOR), is based at MCAS New River, North Carolina. VMX-22's mission includes conducting operational flight testing and evaluation of Marine Corps' fixed-wing, tilt-rotor, and rotary-wing aircraft, UAS, and command and control systems in support of developing and training Fleet Marine Forces across the six functions of Marine aviation[2].

[2] These include assault support, anti-aircraft warfare, offensive air support, electronic warfare, control of aircraft and missiles, and aerial reconnaissance.

VMX-22 current operations include the following:

- Conduct OT&E of assigned aircraft in anticipated operational environments against likely threats;
- Plan, conduct, and report on all assigned aircraft OT&E programs directed by the Chief of Naval Operations to COMOPTEVFOR;
- Identify enhancing features and systems deficiencies for assigned aircraft;
- Provide operational effectiveness and suitability evaluations and make recommendations regarding program development and fleet introduction;
- Coordinate with MAWTS-1 and the Naval Strike Air Warfare Center as required;
- Coordinate with developing agencies as directed by COMOPTEVFOR to ensure mutual understanding of respective test requirements and plans;
- Participate in all planning and developmental testing and evaluation (DT&E) that may satisfy OT&E objectives and assist in the DT&E effort as directed by COMOPTEVFOR; and
- Monitor DT&E and comment on relevant OT&E issues to program managers through COMOPTEVFOR.

Under the proposed action, aircraft and personnel associated with VMX-22 would relocate to MCAS Yuma as described below.

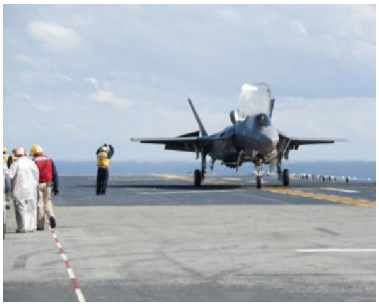
2.1.1.1 Proposed Aircraft Transitions and Schedule

The aircraft platform types assigned to VMX-22 that would transition to MCAS Yuma include fixed-wing aircraft (F-35B), tilt-rotor aircraft (MV-22B), heavy lift helicopters (CH-53E and CH-53K), light attack helicopters (AH-1W, AH-1Z, and UH-1Y), and UAS (MQ-21) (Figure 2.1-1). Relocation of the F-35B to MCAS Yuma has already been analyzed under the F-35B West Coast Basing Environmental Impact Statement (EIS) (DoN 2010a).

Fixed-Wing Aircraft (F-35B Lightning II Joint Strike Fighter)

The F-35B is a new type of aircraft for the Marine Corps and represents the future of Marine Corps tactical aviation. It brings strategic agility, operational flexibility and tactical supremacy to the MAGTF and represents the centerpiece of Marine aviation transformation. The F-35B unites stealth technology, precision weapons and multi-spectral sensors with the expeditionary responsiveness of a short take-off and vertical landing (STOVL) fighter-attack platform (USMC 2014). The USMC is currently replacing two legacy platforms, the F/A-18 Hornet and the AV-8B Harrier, with the F-35B. By combining the STOVL and payload capacity of the AV-8B with the supersonic speed and range of the F/A-18, the F-35B can perform the missions of both of these aircraft.

VMX-22 is currently in the process of accepting F-35B aircraft as a detachment at Edwards Air Force Base as part of a joint DoD testing program of all variants of the F-35 (i.e., Air Force [F-35A], USMC [F-35B], and DoN [F-35C]). Under the proposed action, the VMX-22 F-35B detachment would transition to MCAS Yuma in 2018.



Joint Strike Fighter (F-35B)

Osprey (MV-22B)

Super Stallion (CH-53E)

King Stallion (CH-53K)

Super Cobra (AH-1W)

Viper (AH-1Z)

Venom (UH-1Y)

Blackjack (MQ-21)

Figure 2.1-1. Photographs of Aircraft Platforms

Tilt-Rotor Aircraft (MV-22B Osprey)

The MV-22B blends the vertical flight capabilities of helicopters with the speed, range, altitude, and endurance of fixed-wing transport aircraft. Since the first deployment in 2007, the MV-22B's revolutionary capability has been a cornerstone of the MAGTF (USMC 2014). Combat support is enhanced by the MV-22B's ability to operate at night, under adverse weather conditions, in confined or isolated areas, and with various internal and external loads. These special capabilities allow the USMC to rapidly insert assault forces into enemy territory while enhancing aircraft and passenger security and survivability. VMX-22 Headquarters and four MV-22B aircraft are currently based at MCAS New River. Under the proposed action, VMX-22 Headquarters and four MV-22B aircraft would transition to MCAS Yuma in July 2015.

Heavy Lift Helicopters (CH-53E Super Stallion, CH-53K King Stallion)

The mission of the heavy lift helicopter squadrons is to support the MAGTF commander by providing assault support transport of heavy equipment, combat troops, and supplies (USMC 2014). The CH-53E is a heavy lift helicopter designed to transport heavy equipment and supplies to and from offshore ships as well as support subsequent onshore operations. The CH-53K is a new aircraft model currently in the developmental stage, which will operate at distances, airspeeds, and gross weights sufficient to support the full range of military operations, expeditionary maneuver warfare, and operational maneuver from the sea and seabasing concepts. The CH-53K is designed to reduce operating costs per aircraft, reduce direct maintenance man hours per flight hours, and significantly reduce threat vulnerability compared to the CH-53E (USMC 2014).

The CH-53E and CH-53K would be the last aircraft to transition to MCAS Yuma under the proposed action. The VMX-22's existing two CH-53E aircraft would initially remain in MCAS New River to support operational and developmental testing at that location. Once the CH-53K has been introduced into the USMC fleet, two CH-53E and two CH-53K aircraft would transition to MCAS Yuma in 2021 (USMC 2014).

Light Attack Helicopters (AH-1W Super Cobra, AH-1Z Viper, UH-1Y Venom)

The AH-1W, AH-1Z, and UH-1Y are light attack helicopters, whose mission is to support the MAGTF commander by providing offensive air support, utility support, and armed escort and airborne supporting arms coordination (USMC 2014). The AH-1W is a combat proven aircraft for the MAGTF; it provides close air support, strike coordination and reconnaissance, armed reconnaissance, escort, forward air controller airborne, and air interdiction. Two new light attack helicopters, AH-1Z and UH-1Y, are currently undergoing testing and evaluation, and will eventually replace the AH-1W. The AH-1Z and UH-1Y are the next generation of attack and utility aircraft, respectively, each with increased speed, range, and payload (USMC 2014). Under the proposed action, one AH-1W, two AH-1Z, and two UH-1Y would begin to transition from the VX-9 squadron at Naval Air Weapons Station China Lake to VMX-22 at MCAS Yuma in summer 2015.

Unmanned Aircraft Systems (MQ-21 Blackjack)

UAS are composed of one or more unmanned aircraft, controlled from the ground, and a variety of ground-support and communication equipment that supports single or multiple-site flight operations. The UAS increases the effectiveness of the air-ground team by extending the team's influence over time and space on the battlefield. The persistence and reach of current UAS provide improved aerial reconnaissance and command–and–control capability exceeding that of manned aviation assets.

UAS are found in a variety of shapes and sizes, and serve diverse purposes. Small tactical UAS provide support to the Marine Expeditionary Unit and regimental-sized elements using payloads designed for a

variety of tasks, such as detecting explosives, monitoring signals, tracking moving targets through cloud or tree cover, and cyber security (USMC 2014). The small tactical UAS mission for the USMC is currently served by the MQ-21[3], which has a 135 pound, multiple payload capacity. The MQ-21 is catapult-launched, has a range of about 50 nautical miles, a normal operating altitude of 3,000 to 8,000 feet above mean sea level (AMSL), has a maximum airspeed of 85 knots (98 miles per hour), and can remain in flight for up to 15 hours. The MQ-21 utilizes a recovery system known as Skyhook, which uses a hook on the end of the wingtip to catch a cable hanging from a pole. This system eliminates the need for runways and enables a safe recovery and expeditionary capability for tactical missions on land or sea. VMX-22 will assume responsibility of operational testing and experimentation of UAS, beginning in 2015 with the MQ-21 (USMC 2014). Under the proposed action, VMX-22 would operate a single system of three MQ-21 air vehicles at MCAS Yuma starting in late 2015.

Schedule

As noted above and summarized in Table 2.1-1, transition of aircraft from MCAS New River, Naval Air Weapons Station China Lake, and Edwards Air Force Base would occur between 2015 and 2021, based on the *Marine Aviation Plan 2015* (USMC 2014).

Table 2.1-1. VMX-22 Aircraft Transitions to MCAS Yuma

Aircraft Platform	*Number of Aircraft*	*Current Basing Location (Current Squadron Assignment)*	*Transition Date*
Fixed-Wing Aircraft			
F-35B (Joint Strike Fighter)[1,2]	6	Edwards Air Force Base (VMX-22 detachment)	2018
Tilt-Rotor Aircraft			
MV-22B (Osprey)	4	MCAS New River (VMX-22)	2015
Heavy Lift Helicopters			
CH-53E (Super Stallion)	2	MCAS New River (VMX-22)	2021
CH-53K (King Stallion)	2	MCAS New River (VMX-22)	2021
Light Attack Helicopters			
AH-1W (Super Cobra)	1	Naval Air Weapons Station China Lake (VX-9)	2015
AH-1Z (Viper)	2	Naval Air Weapons Station China Lake (VX-9)	2015
UH-1Y (Venom)	2	Naval Air Weapons Station China Lake (VX-9)	2015
Unmanned Aircraft Systems			
MQ-21 (Blackjack)	3	New aircraft type; currently under initial operational testing and evaluation.	2015

Source: USMC 2014.
Notes: [1] The F-35B West Coast Basing EIS (DoN 2010a) analyzed the potential environmental consequences of basing and operating the F-35B at MCAS Yuma, which included one F-35B OT&E squadron. The F-35B OT&E squadron is now part of VMX-22. Because the F-35B West Coast Basing EIS evaluated F-35B operations associated with VMX-22, these operations and personnel relocation are not evaluated in this EA.
[2] There is the potential for two additional F-35B aircraft and 66 personnel from the United Kingdom (DoN 2010a).

[3] Formerly referred to as "RQ-21."

This would begin with the relocation of VMX-22 Headquarters and four MV-22B from MCAS New River to MCAS Yuma in July 2015. VMX-22 operational testing and experimentation would begin with the arrival of the first MV-22B aircraft in late 2015.

2.1.1.2 Proposed Personnel Transitions and Schedule

The establishment of a consolidated Marine Aviation OTEC and relocation of VMX-22 to MCAS Yuma would result in an additional 246 military personnel[4] (32 officers and 214 enlisted) at MCAS Yuma. Based on existing military dependent ratios at MCAS Yuma, an estimated 589 family members would arrive, for a total population increase of 835 persons. The proposed relocation of military personnel from their current basing locations to MCAS Yuma is considered routine re-deployment of aviation assets. There would also be about 50 contractor-support personnel associated with the squadron. The largest influx of personnel is anticipated to occur between 2015 and 2016.

2.1.2 Construction of Facilities at MCAS Yuma

New airfield facilities would be constructed and existing facilities renovated to accommodate and maintain the consolidated Marine Aviation OTEC and VMX-22 squadron. New support facilities (i.e., VMX-22 aircraft maintenance hangar, aircraft parking apron, VMX-22 Integration Facility, VMFT-401 aircraft maintenance facility, and ARFF facility), Hangar 103 renovations, and modifications to existing buildings would be sited as shown on Figure 2.1-2. The F-35B component of VMX-22 would be located at Hangar 95, which will be renovated as part of a previously approved action, Military Construction Program (MILCON) P-596. MILCON P-596 was approved under the Record of Decision for the USMC West Coast Basing of the F-35B Aircraft (DoN 2010b).

Proposed construction activities would require demolition of up to 20 buildings (Table 2.1-2). The removal and disposal of the buildings' associated structures and equipment would also occur, including foundations; hazmat pads; plumbing; electrical; heating, ventilation, and air conditioning (HVAC) systems; miscellaneous exterior equipment; and fencing. Some buildings are currently vacant, while other buildings would require functions to be relocated before they could be demolished.

Proposed construction activities could require renovations and/or modifications to the following buildings: 97, 101, 103, 109, 149, 151, 153, 404, and 406. There would also be modifications to the interior systems and minor retrofitting to Building 408 or Building 410.

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

Sustainable design principles and energy conservation measures would be integrated into the design, development, and construction of Alternative 1, in accordance with the Energy Policy Act of 2005 (Section 109), Executive Order (EO) 13693 — *Planning For Federal Sustainability in the Next Decade* standards, and other applicable laws. Proposed facilities would be designed, constructed, and certified to Leadership in Energy and Environmental Design (LEED®) standards for high-performance, sustainable buildings. Low Impact Development (LID) design technologies to reduce stormwater runoff (e.g., impervious drainage features) would be constructed to the extent feasible in accordance with Unified Facilities Criteria (UFC) 3-210-10.

[4] An additional 144 military personnel (12 officers and 132 enlisted) would be part of VMX-22 to support relocation of the F-35B. Because the F-35B West Coast Basing EIS evaluated F-35B personnel changes associated with VMX-22, the relocation of these personnel are not evaluated in this EA.

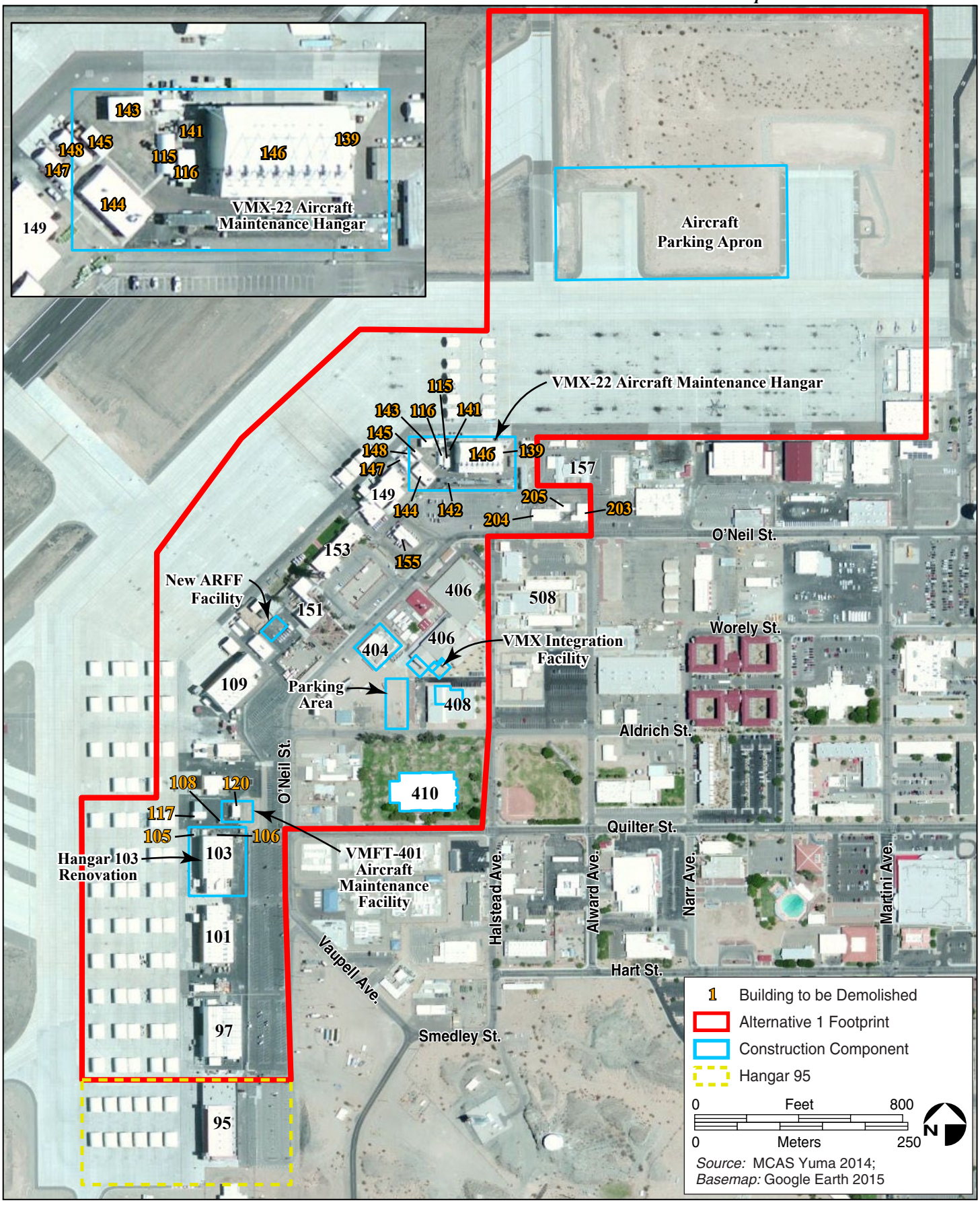


Figure 2.1-2. Alternative 1 Conceptual Site Layout

Table 2.1-2. Alternative 1 - Structures Proposed for Demolition

Building No.[1]	*Description*	*Building Area (square feet)*	*Year Built*
105	Ready Ammo Service Locker	63	1964
106	Hazardous Waste Pad	11 square yards	1989
108	Ready Service Locker	306	1982
115	Maintenance Shop	1,000	1961
116	Paint Shop	600	1983
117	Maintenance Facility	1,219	1968
120	Miscellaneous Equipment Canopy	1,350	1983
139	Covered Canopy	840	1961
141	Utility Substation	594	1973
142	Ready Ammo Service Locker	63	1964
143	Maintenance Shelter	1,350	1983
144	CFR Training Building	4,032	1956
145	Maintenance Storage Canopy	89 square yards	1977
146	VMFT-401 Aircraft Maintenance Hangar	30,953	1961
147	Line Ops Building	1,000	1961
148	Line Ops Building	1,000	1961
155	Fire Station Shop	2,535	1962
203	IMA	2,972	1954
204	VMFT-401 Airframes	4,000	1956
205	Storage Building	1,014	1983

Notes: [1] This list includes the maximum number of structures that could be demolished under Alternative 1. As the project is still in the conceptual design stage, this list is subject to modification during final design.
A/C = aircraft, CFR = Crash Fire Rescue, IMA = Individual Mobilization Augmentee, Ops = Operations, VMFT-401 = Marine Fighter Training Squadron 401.

For the purposes of this EA analysis, the conceptual project layout was designed to represent the maximum development footprint and level of disturbance, and all areas potentially disturbed are included within the Alternative 1 footprint. As the project is still in the conceptual design stage, modifications to the building sizes, configurations, and/or locations discussed below, could be refined during final design. However, all design modifications would occur within the Alternative 1 footprint (Figure 2.1-2). Any design modifications would be reviewed and authorized by MCAS Yuma. Final design plans would be provided to the appropriate regulatory agencies for review and approval before commencement of construction.

2.1.2.1 VMX-22 Aircraft Maintenance Hangar and Parking Apron

A new Type II aircraft hangar would be constructed west of Hangar 157 (Figure 2.1-2) to support the basing of VMX-22 and associated maintenance and operations activities. The VMX-22 aircraft maintenance hangar would be approximately 78,000 square feet and include a high bay space, crew and equipment area, planning and briefing area, and administrative areas. The building would be designed with a reinforced concrete foundation and slab, structural steel framing, steel trusses, concrete piles, and spread beam foundations. The facility would include communication systems and antiterrorism and force protection features. Built-in equipment would include a bridge crane, aircraft emissions system, bird deterrent system (e.g., bird netting), catwalks, welding hood, personnel/freight elevator, power-operated roll up doors in shop areas, emergency generators, compressed air system in the hangar bays and shop areas, aircraft cooling units and systems, and roof mounted antenna with working platform and roof ladder access.

An approximately 292,500 square foot aircraft parking apron would be constructed north of the new hangar (Figure 2.1-2). The new concrete aircraft apron would be constructed using methods to eliminate alkali silica reactions that cause expansion and cracking in concrete, and their resulting structural problems.

2.1.2.2 VMX-22 Integration Facility

Building 408 or Building 410 would be adaptively reused and modified to support the VMX-22 Integration Facility (Figure 2.1-2). The selected building would support temporary administration activities until a new facility is constructed on or adjacent to MAWTS-1 Building 406. The VMX-22 Integration Facility would provide space for approximately 50 contractor-support personnel.

2.1.2.3 Hangar 103

Hangar 103 would be renovated to support relocation of VMFT-401 from Hangar 146, which is proposed for demolition under this alternative (Figure 2.1-2). Proposed renovations would include relocation of air conditioning sunshades and replacement of existing utility infrastructure (e.g., electrical, wastewater, and HVAC). An approximately 10,000 square foot facility would be constructed adjacent to Hangar 103 to support existing VMFT-401 aircraft maintenance activities. Construction of the VMFT-401 aircraft maintenance shop would require demolition of Building 108. Modifications to the existing aircraft parking apron adjacent to Hangar 103 would be required to install aircraft electrical fixed point services.

2.1.2.4 Aircraft Rescue and Fire Fighting Facility

A new ARFF facility would be constructed between Buildings 136 and 151 to replace existing ARFF operations at Buildings 144, 147, and 148, which would be demolished as part of Alternative 1 (Figure 2.1-2). The new facility would be designed with a reinforced concrete foundation and slab, structural steel framing, and steel trusses. Mission required built-in equipment would also be provided. Construction of a new ARFF facility could require demolition of Building 132 (storage shed). Building 404 could be used to provide space for potential ARFF storage. Internal modifications (e.g., subdivide space, remove abandoned equipment foundations and systems, etc.) to Building 404 would be required to meet ARFF storage requirements.

2.1.2.5 Temporary Facilities

VMX-22 personnel would be temporarily located in Building 408 or Building 410 (Figure 2.1-2). Modifications to Building 408 or Building 410 interior systems (e.g., HVAC) and minor retrofitting would be required to support VMX-22. No structural modifications would occur.

2.1.2.6 Site Improvements

Construction areas within the Alternative 1 footprint would be cleared and graded in preparation for the proposed facilities and support infrastructure. Site development would require special foundation features including structural fill, excavation, and shoring. Site improvements would include paved sidewalks, pads for back-up generators, curbs/gutters, parking area, roadways, and other miscellaneous hardscape (e.g., outdoor break areas), flag poles, trash enclosures, drainage, signage, lighting, and landscaping/irrigation. Parking for approximately 230 personally owned vehicles would be provided and could include sun shades/renewable energy systems. All facilities would incorporate antiterrorism and force protection features in compliance with UFC 4-010-01, change 1, including security fencing, barriers, gates, camera infrastructure, and turnstiles to support flightline security.

This alternative would expand, renovate, and repair the existing aircraft parking aprons in front of Hangar 146 and Hangar 103 for the relocation of VMFT-401 aircraft from Hangar 146 to Hangar 103. Proposed improvements would include renovations and/or repairs to aircraft parking apron concrete, striping, fixed-point utility systems, grounding points, and sunshades at each aircraft parking space.

Proposed drainage improvements would include detention basins, swales, and pervious pavement. All drainage facilities would be designed to comply with design manuals and local standards and guidelines, and the regulations stipulated in Energy Independence and Security Act, UFC 3-210-10 for LID, National Pollutant Discharge Elimination System design standards, and official Navy, USMC, and DoD LID policies (2007, 2008, 2010).

2.1.2.7 Utilities

Utility system upgrades and modifications would be required to support the VMX-22 aircraft maintenance hangar, VMX-22 Integration Facility, VMFT-401 aircraft maintenance facility, ARFF facility, Hangar 103 renovations, and modifications to existing buildings. Electrical and communication system improvements would include provisions for transformers and telecommunications infrastructure. Alternative 1 would also include exterior lighting for safety purposes to illuminate building areas. Additional utilities including HVAC, water (potable and fire protection systems), and sewer would also be installed to support construction and renovation of airfield facilities. All new utilities would connect directly to existing infrastructure and systems within the Alternative 1 footprint.

2.1.2.8 Construction Schedule

Construction activities are anticipated to occur primarily between 2015 and 2016. The initial aircraft and personnel associated with the VMX-22 relocation would temporarily use Hanger 157 and Building 408 or Building 410 until the proposed VMX-22 facilities are completed. Hangar 157 was approved under a separate environmental document to support transient rotary-wing aircraft at MCAS Yuma.

2.1.3 Proposed VMX-22 Operations

VMX-22 would conduct day and nighttime aircraft operations to test and evaluate mission-critical capabilities using live, inert, and simulated ordnance. Proposed operations would occur at MCAS Yuma and within the BSTRC. Military training ranges and SUA associated with the BSTRC allow military activities to occur without exposing civil aviation users, military aircrews, and the general public to hazards associated with military training and operations.

During flight operations, VMX-22 aircraft would take off and land at the air station and at currently approved landing zones located in the BSTRC. The majority of VMX-22 landing and take-off operations would occur at three airfields: 1) MCAS Yuma; 2) Auxiliary Airfield 2 (AUX-2) in BMGR-West; and 3) Auxiliary Landing Field (ALF) in BMGR-West (Figure 1.2-1 and Table 2.1-3). VMX-22 would schedule air station and range activities with MCAS Yuma using standard procedures that allow viewing and de-confliction by local and remote units.

Proposed VMX-22 operations would not require changes in airspace designations, and no range improvements are proposed. VMX-22 operations would be consistent with existing, approved training activities within the BSTRC, as described and evaluated in the Yuma Training Range Complex EIS and Supplemental EIS (USMC 1997, 2001), West Coast Basing of the MV-22 EIS (DoN 2009), and the F-35B West Coast Basing EIS (DoN 2010a). Additionally, employment of ordnance would be in compliance with federal, state, and local regulations and would occur in approved working areas only.

Table 2.1-3. Proposed VMX-22 Annual Airfield Operations

Aircraft Type	*MCAS Yuma*	*AUX-2*	*ALF*
F-35B	2,611[1]	-	326[1]
MV-22B	1,462	382	-
CH-53E, CH-53K	1,137	784	-
AH-1W, AH-1Z, UH-1Y	708	630	-
MQ-21[2]	-	-	-
Total	5,918	1,796	326

Source: Wyle Laboratories Inc. 2014.
Notes: [1] The F-35-B operations at MCAS Yuma and the ALF noted above were previously evaluated and approved under the Record of Decision for the USMC West Coast Basing of the F-35B Aircraft (DoN 2010b); therefore, the analyses in this EA consider these existing operations.
[2] The MQ-21 does not need an airfield for operations because it is catapult-launched from the back of a truck and is recovered via a Skyhook (refer to Section 2.1.1, *VMX-22 Aircraft and Personnel Relocation*).

All proposed flight activities would be conducted in conformance with Federal Aviation Administration (FAA)-mandated restrictions, Naval Air Training and Operating Procedures Standardization (NATOPS) flight instructions (e.g., Chief of Naval Operations Instruction 3710.7U), and MCAS Yuma Station Order 3710.6 and Station Order P3710.4L (Airfield Operations Manual). All aircraft would also operate in accordance with their corresponding NATOPS training manuals, which identify measures and limitations on how a particular aircraft is flown.

The USMC expects to continue updating the VMX-22 training plans to reflect lessons learned from training evolutions and deployment experience. Due to the evolving nature of these VMX-22 training requirements, additional training areas and airspace could emerge as necessary or useful for applying the various aircrafts' 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 (NHPA) where applicable.

2.2 Alternative 2

Alternative 2 would be the same as Alternative 1, except no construction or demolition activities at the air station would occur. The relocation of aircraft and personnel and the proposed training operations would be the same as described in Section 2.1.1, *VMX-22 Aircraft and Personnel Relocation*, and Section 2.1.3, *Proposed VMX-22 Operations*, respectively. Under this alternative, no new airfield facilities (e.g., VMX-22 aircraft maintenance hangar and parking apron) would be constructed. VMX-22 aircraft and personnel would be located in Hangar 157 and Building 408 or Building 410. This alternative would include modifications to Building 408 or Building 410 interior systems (e.g., HVAC) and minor retrofitting; no structural modifications would occur. No existing functions at MCAS Yuma would be relocated to accommodate and maintain the consolidated Marine Aviation OTEC and VMX-22 squadron.

Similar to Alternative 1, the F-35B component of VMX-22 would be located at Hangar 95, which will be renovated as part of a previously approved action, MILCON P-596. MILCON P-596 was approved under the Record of Decision for the USMC West Coast Basing of the F-35B Aircraft (DoN 2010b).

2.3 Preferred Alternative

The USMC has identified Alternative 1 as the Preferred Alternative.

2.4 No-Action Alternative

Under the No-Action Alternative, a consolidated Marine Aviation OTEC would not be established and relocation of VMX-22 from MCAS New River to MCAS Yuma would not occur. Under the No-Action Alternative, VMX-22 would not be co-located with MAWTS-1, and VMX-22 operational testing would continue at geographically separate military installations. As discussed in Chapter 1, *Purpose and Need*, without establishment of a consolidated Marine Aviation OTEC, Marine aviation operational testing would not be optimized to ensure USMC's aviation systems meet evolving operational requirements. Furthermore, development and experimentation of tactics, techniques and procedures for future aviation weapons and air command and control systems would not be maximized as stipulated in the *Marine Aviation Plan 2015* (USMC 2014).

Under this alternative, the establishment of an F-35B OT&E squadron at MCAS Yuma would still occur as approved under the Record of Decision for the USMC West Coast Basing of the F-35B Aircraft (DoN 2010b).

The No-Action Alternative is not considered a reasonable alternative because it does not meet the purpose and need for the proposed action. However, it does provide a measure of the baseline conditions against which the impacts of the proposed action can be compared. In this EA, the No-Action Alternative represents the baseline conditions described in Chapter 3, *Affected Environment and Environmental Consequences*.

2.5 Alternatives Considered But Eliminated

As part of the Marine Corps' decision-making process, other alternatives were considered but eliminated as infeasible, as described below.

2.5.1 Alternative Basing Locations for VMX-22

Establishing a consolidated Marine Aviation OTEC at MCAS New River and relocating MAWTS-1 from MCAS Yuma to MCAS New River was considered as a potential alternative. However, this alternative would not provide the ability to conduct year-round testing and evaluation to support MAGTF aviation operational testing of USMC's aviation systems. Furthermore, relocating MAWTS-1 to MCAS New River would limit the squadron's ability to fulfill their mission related to providing graduate-level advanced tactical training for Marine aviation (i.e., decrease proximity to operational training ranges and airspace). Therefore, this alternative was eliminated from further consideration.

2.5.2 Alternative Siting Locations at MCAS Yuma

Available development space near the flightline is limited at MCAS Yuma, especially with the pending basing of the F-35B active squadrons. The USMC reviewed and evaluated the feasibility of potential siting areas for facilities related to the proposed action. One potential siting area analyzed by the USMC was carried forward under Alternative 1, as discussed above. The USMC also reviewed another potential siting area at the southern end of the runway. However, development space on the southern flightline is limited due to environmental constraints. Furthermore, development at this location would decrease the proximity of VMX-22 to MAWTS-1, potentially limiting collaboration efforts between the squadrons. Therefore, this alternative was eliminated from further consideration.

2.6 Resource Areas Eliminated From Detailed Consideration

Several resource areas have not been carried forward for detailed analysis in this EA because potential impacts were determined to be non-existent or negligible. Resources not addressed further in this EA include aesthetics; biological resources; environmental justice; geology/seismicity; land use; socioeconomics; and water resources.

Aesthetics: The proposed action would be visually compatible with existing military development and activities in the project vicinity. Therefore, no impacts would occur.

Biological Resources: The project footprint is comprised primarily of developed and disturbed areas. Vegetation and wildlife habitat within the project footprint is highly disturbed or previously developed and supports no native vegetation communities or habitat. No wetlands or other Clean Water Act regulated waters occur within the project footprint. Wildlife-aircraft strikes occur infrequently and are primarily associated with take-offs and landings at airfields (i.e., MCAS Yuma, AUX-2, and ALF). The types of wildlife that are most susceptible are common bird species that utilize the open areas around the airfields. Potential impacts on wildlife populations associated with the rare incidence of aircraft strikes are negligible. VMX-22 operations would be consistent with existing, approved training activities within the BSTRC and would result in minimal increases in noise. Potential biological impacts associated with training activities were evaluated in the Yuma Training Range Complex EIS and Supplemental EIS (USMC 1997, 2001), West Coast Basing of the MV-22 EIS (DoN 2009), and the F-35B West Coast Basing EIS (DoN 2010a). In addition, training operations would follow measures as required by regulations and applicable Biological Opinions to avoid impacts on sensitive species. Therefore, negligible impacts on biological resources would occur.

Environmental Justice: Proposed construction, renovation, and demolition activities would not result in disproportionate impacts to minority and low-income populations or environmental health and safety risks to children. MCAS Yuma currently serves similar types of fixed-wing aircraft, tilt-rotor aircraft, heavy lift helicopters, and light attack helicopters that are associated with proposed VMX-22 operations. Therefore, there would be no change in how the different runways are currently utilized for aircraft operations. Annual VMX-22 air station operations would result in less than a 3 percent increase compared to current operations. Therefore, the proposed action would not result in disproportionate impacts to minority and low-income population housing located within or near existing flight paths. No impacts on environmental justice would occur.

Geology/Seismicity: The project footprint is located in a seismically active region, which is subject to events along regional, major active faults. No major active faults traverse the project footprint. However, the Basement Saddle Fault traverses the southwestern portion of the air station and the Yuma Hills Fault is adjacent to the station's eastern boundary. Active faults located within 60 miles of the project footprint could result in strong seismically induced ground motion and associated ground shaking from naturally occurring processes. The proposed action would be built to comply with International Building Code guidelines and applicable seismic design standards. Therefore, no impacts on geology/seismicity would occur.

Land Use: The proposed action would be consistent with existing land uses within MCAS Yuma, the BSTRC and associated SUA, and established land use development guidelines addressing safety, functionality, and environmental protection zones. Therefore, the proposed action would be compatible with existing and planned land uses in the project vicinity and no impacts on land use would occur.

Socioeconomics: As described in Section 2.1.1.2, *Proposed Personnel Transitions and Schedule*, the proposed action would result in an additional 246 military personnel (32 officers and 214 enlisted) and

about 589 family members, for a total population increase of 835 persons. This increase in military personnel and dependents would represent a 0.4 percent increase in the general population of Yuma County (estimated population of 201,201 in 2013 [U.S. Census Bureau 2015]). Approximately 67 percent of the additional military personnel and dependents and all 50 contractor-support personnel would be required to live off-station. The population increase and associated economic effects (income/employment and housing) would occur over a period of years (2015-2021). Therefore, negligible beneficial impacts on socioeconomics would occur.

Water Resources: The proposed action would potentially discharge waste materials that would affect the quality of surface water or groundwater. Stormwater runoff during construction activities would be covered under the Arizona Pollutant Discharge Elimination System Construction General Permit AZG2008-001. A Notice of Intent would be filed with the Arizona Department of Environmental Quality (ADEQ) to obtain coverage under the Construction General Permit prior to commencement of construction activities, in addition to the implementation of a site-specific Storm Water Pollution Prevention Plan and associated Best Management Practices. The potential increase in stormwater runoff as a result of the proposed action would be managed such that discharge exiting the site post-construction would be equal to or less than existing conditions through the use of appropriately designed conveyance structures and Best Management Practices. 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. Therefore, negligible impacts on water resources would occur.

2.7 Anticipated Permits and Approvals

Any agency permits, concurrence, and/or determinations would be obtained as necessary before moving forward with implementation of the proposed action.

2.8 Special Conservation Measures

Measures that would be incorporated into Alternative 1 to avoid, minimize, and mitigate impacts are included in the Minimization, Mitigation, Monitoring, and Reporting (MMMR) tracking sheet provided in Appendix B. These measures would be included as contract requirements on all relevant project scoping, scheduling, and planning documents.

2.9 Summary of Impacts

Resource areas analyzed in this EA include the following: Airspace; Air Quality; Hazardous Materials and Waste; Noise; Safety and Environmental Health; Community Facilities and Services; Transportation; Utilities and Infrastructure; and Cultural Resources. The environmental consequences associated with implementation of Alternative 1, Alternative 2, and the No-Action Alternative are presented and compared in Table 2.9-1. A detailed description of the affected environment and analysis of the environmental consequences is presented in Chapter 3, *Affected Environment and Environmental Consequences*.

Table 2.9-1. Summary of Impacts

Resource Area	*Alternative 1*	*Alternative 2*	*No-Action Alternative*
Airspace	NSI	NSI	NI
Air Quality	NSI	NSI	NI
Hazardous Materials and Waste	NSI	NSI	NI
Noise	NSI	NSI	NI
Safety and Environnemental Health	NSI	NSI	NI
Community Facilites and Services	NSI	NSI	NI
Transportation	NSI	NSI	NI
Utilities and Infrastructure	NSI	NSI	NI
Cultural Resources	NSI	NI	NI

Notes: NSI = no significant impact; NI = no impact.

This page intentionally left blank.

3 Affected Environment and Environmental Consequences

3.1 Airspace

The section addresses airspace within the Region of Influence (ROI) considered relevant to the proposed action and any effects it could have on existing airspace uses in this region. Of particular interest is the Class D and E airspace associated with the airfield at MCAS Yuma and SUA associated with the BSTRC. Airfield safety at MCAS Yuma, including aircraft mishap potential and hazards from bird strikes, are discussed in Section 3.5, *Safety and Environmental Health*.

3.1.1 Affected Environment

MCAS Yuma is the primary military aviation facility located within the BSTRC region. An average of 129,330 annual flight operations are conducted at the MCAS Yuma/Yuma International Airport, and about half of these are military operations (Wyle Laboratories Inc. 2014). The Yuma International Airport is a commercial service airport shared with MCAS Yuma, so the airfield serves both commercial and military aircraft operations. There are four runways that support flight operations at the airfield. The two longer parallel runways are primarily used by military aircraft while the shorter runways closest to the civilian portion of the airport are primarily used for civil aircraft.

Specific flight rules and procedures govern aircraft flights within the ROI. Military aircraft operations are regulated by FAA and USMC regulations, NATOPS Instructions, MCAS Yuma Stations Orders, and other safety initiatives that regulate military flight operations throughout the area. Two sets of regulations govern civil aviation aircraft operations: Visual Flight Rules; and Instrument Flight Rules. Flights operating under Visual Flight Rules are flown solely by reference to outside visual references (horizon, buildings, flora, etc.), which permit navigation, orientation, and separation from terrain and other traffic. Instrument Flight Rules are established by the FAA to govern flights under conditions in which flight by outside visual reference is not safe. Flight operations under Instrument Flight Rules depend on flying by reference to instruments in the aircraft, and navigation is accomplished by reference to electronic signals.

Air traffic control (ATC) and airfield services are provided by MCAS Yuma. The airport is situated within Class D airspace. The MCAS Yuma Control Tower is responsible for all aircraft operations within the surrounding Class D airspace. Class E airspace begins at 700 feet above the surface and encompasses airspace adjacent to military SUA areas (Figure 3.1-1). The overall purpose of the Class E areas is to designate transitional airspace that ensures military aircraft operations around MCAS Yuma and along those flight routes to and from SUA are separated from other aircraft operating throughout this region.

SUA consists of several restricted areas and Military Operating Areas (MOAs). These areas are overlain by Air Traffic Control Assigned Airspace (ATCAA) supporting MCAS Yuma and the BSTRC. Restricted areas are established to contain hazardous air and ground-based activities, while MOAs/ATCAAs are designated strictly for nonhazardous flight activities. The restricted area (R-2301W) associated with BMGR-West (including AUX-2 and the ALF) extends from the ground surface to 80,000 feet AMSL and supports about 19,000 aircraft operations annually (DoN 2010a). The restricted areas (R-2507N and R-2507S) associated with the CMAGR extend from the ground surface to 40,000 feet AMSL and supports about 7,400 aircraft operations annually (DoN 2010a). The Abel, Kane, and Dome MOAs/ATCAAs adjacent to the restricted areas are used either separately or in conjunction with the restricted airspace and their ranges for combat scenarios involving both nonhazardous and hazardous tactics. These restricted areas and MOAs/ATCAAs are controlled and scheduled by MCAS Yuma.

Figure 3.1-1. Special Use Airspace

Non-participating military and civilian aircraft operating within the ROI cannot enter the restricted areas while active unless specifically authorized by the controlling/using agencies. MOAs do not have such restrictions; however, ATC separates any Instrument Flight Rules air traffic transiting through this airspace from any military operations. Aircraft flying under Visual Flight Rules and military aircraft are both responsible for remaining clear of each other within the MOAs. Visual Flight Rule pilots are encouraged to check the active status of all restricted areas and MOAs when planning any flights through this airspace. Additionally, several public and private airfields are located within the ROI, including Somerton, a private airport about 2.7 miles southwest of MCAS Yuma, and Rolle Field, a public airfield approximately 9 miles southwest of the air station. The established routes military aircraft fly while transitioning between the air station and the different SUA areas provide a safe operating distance from public/private airfields and their aircraft operations.

Overall, the manner in which this airspace is managed, the ATC services provided, and the standard flight routes and operating procedures military pilots adhere to while operating within this environment have collectively provided for the safe, compatible use of this airspace by all civil and military interests.

3.1.2 Environmental Consequences

The potential for any consequences the proposed action could have on the airspace environment considers if and to what extent the proposed VMX-22 aircraft operations could affect other airspace uses within the ROI. As noted in Chapter 2, *Proposed Action and Alternatives*, the proposed action would not require any changes to the current airspace structure for the airport, any SUA, or the routes currently flown between MCAS Yuma and the BSTRC training areas. Additionally, the proposed action would not affect standing MCAS Yuma operating procedures that govern how military flight activities are conducted within the airspace environment.

3.1.2.1 Alternative 1

MCAS Yuma currently serves similar types of fixed-wing aircraft, tilt-rotor aircraft, heavy lift helicopters, and light attack helicopters that are associated with proposed VMX-22 operations. Therefore, there would be no change in how the different runways are currently utilized for civil and military aircraft operations. The projected annual VMX-22 air station operations would add about 3,307[5] annual flight operations to the air station, which is less than a 3 percent increase compared to current operations. Such minimal change would have little effect on the overall operational capabilities of this airfield and the MCAS Yuma ATC services. Should any minor delays occur, schedules could be rearranged and reevaluated to minimize any conflicts.

VMX-22 use of SUA (e.g., restricted areas, MOAs, ATCAAs) would be consistent with those air and ground-based mission activities currently performed within these designated areas. UAS operations would be integrated and conducted in accordance with the FAA and USMC requirements governing the different system types and their airspace uses. The proposed VMX-22 operations in BMGR-West (R-2301W), CMAGR (R-2507N/S), and other BSTRC SUA areas would have a nominal increase in flight operations compared to current flight operations. This nominal increase would have minimal effects on the scheduled use of these areas.

Aircraft operations at nearby public and private airfields within the ROI would be unaffected by the proposed VMX-22 operations. As noted previously, the transit routes flown by military aircraft in

[5] This does not include VMX-22-related F-35B operations because these are considered to be existing operations (refer to Table 2.1-1).

conjunction with standing MCAS Yuma procedural requirements help ensure that a safe operating distance is maintained between civil and military aircraft.

The proposed operations, therefore, would have little effect on other airspace uses in the ROI. MCAS Yuma ATC services, NATOPS Instructions and MCAS Yuma Stations Orders, and other safety initiatives that regulate military flight operations throughout the area would serve to effectively and safely integrate VMX-22 aircraft operations into this high use training environment. Therefore, no significant impacts on airspace would occur.

Relocation of aircraft to MCAS Yuma would have negligible impacts on airspace at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.

3.1.2.2 Alternative 2

Aircraft operations under this alternative would be the same as those under Alternative 1. Therefore, the proposed operations would have little effect on other airspace uses in the ROI, and no significant impacts on airspace would occur. Similar to Alternative 1, relocation of aircraft to MCAS Yuma would have negligible impacts on airspace at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.

3.1.2.3 No-Action Alternative

Under the No-Action Alternative, a consolidated Marine Aviation OTEC would not be established and relocation of VMX-22 from MCAS New River to MCAS Yuma would not occur. Existing airspace conditions would remain as described in Section 3.1.1, *Affected Environment*. Therefore, no impacts on airspace would occur.

3.2 Air Quality

The following section describes the existing air quality conditions of the project region and potential air quality impacts that would occur from the proposed action.

3.2.1 Affected Environment

Air quality at a given location can be described by the concentrations of various air pollutants in the atmosphere. The significance of a pollutant concentration is determined by comparing its concentration to an appropriate national and/or state ambient air quality standard. These standards represent allowable atmospheric concentrations that protect public health and welfare and include a reasonable margin of safety to protect the more sensitive individuals in the population. The United States Environmental Protection Agency (USEPA) established the National Ambient Air Quality Standards (NAAQS) to regulate the following criteria pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than or equal to 10 microns (one millionth of a meter) in diameter (PM_{10}), particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and lead. Units of concentration for these standards are generally expressed in parts per million (ppm) or micrograms per cubic meter. The ADEQ has adopted the NAAQS to regulate sources of air pollution in Arizona. Table 3.2-1 presents the NAAQS.

Table 3.2-1. National Ambient Air Quality Standards

Pollutant	*Averaging Time*	*National Standards*[1]	
		Primary[2,3]	*Secondary*[2,4]
Ozone (O3)	8-hour	0.075 ppm (147 µg/m^3)	Same as primary
Carbon monoxide (CO)	8-hour	9 ppm (10 mg/m^3)	—
	1-hour	35 ppm (40 mg/m^3)	—
Nitrogen dioxide (NO2)	Annual	0.053 ppm (100 µg/m^3)	Same as primary
	1-hour	0.10 ppm (188 µg/m^3)	—
Sulfur dioxide (SO2)	3-hour	—	0.5 ppm (1,300 µg/m^3)
	1-hour	0.075 ppm (105 µg/m^3)	—
PM10	24-hour	150 µg/m^3	Same as primary
PM2.5	Annual	12 µg/m^3	15 µg/m^3
	24-hour	35 µg/m^3	Same as primary
Lead	Rolling 3-month period	0.15 µg/m^3	Same as primary

Notes: [1] Standards other than those based on annual averages generally are not to be exceeded more than once a year.
[2] Concentrations are expressed first in units in which they were promulgated. Equivalent units given in parenthesis.
[3] Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
[4] Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
ppm = parts per million and µg/m^3 = micrograms per cubic meter.

Air emissions produced from the proposed action would affect air quality within the immediate area of MCAS Yuma, proposed local training airspace, and aircraft flight routes between these locations within Yuma County. Identifying the ROI for air quality requires knowledge of the pollutant type, source emission rates, the proximity of project emission sources to other emission sources, and local and regional meteorology. For inert (stable) pollutants (such as CO and particulates in the form of fugitive dust), the ROI generally is limited to a few miles downwind from a source. The ROI for reactive pollutants such as O3 could extend much farther downwind than for inert pollutants. O3 is formed in the atmosphere by photochemical reactions of previously emitted pollutants called precursors. O3 precursors are mainly nitrogen oxides (NOx) and photochemically reactive volatile organic compounds (VOCs). In the presence of sunlight, the maximum effect of precursor emissions on O3 levels usually occurs several hours after they are emitted and many miles from their source.

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

3.2.1.1 Existing Air Quality

The USEPA designates all areas of the United States (U.S.) as having air quality better than (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. The USEPA classifies Yuma County as in attainment for all NAAQS, except the southwest portion of the county is in moderate nonattainment for PM10 (USEPA

2014a). The Yuma PM_{10} nonattainment area encompasses MCAS Yuma, AUX-2, and ALF. Its boundary extends from the southwest corner of the county east to the Gila Mountains, north to the intersection of Highway 95, and then west to Martinez Lake.

O_3 concentrations are highest during warmer months of the year and tend to be uniformly spread throughout a region, because 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 temperature changes inhibit dispersion of the pollutant in the atmosphere. Maximum inert pollutant concentrations are usually found closest to an emission source.

The arid conditions in the project region produce low soil moisture and a high potential for fugitive dust (PM_{10}/$PM_{2.5}$) emissions. Ambient PM_{10} concentrations within the project region occur from emissions of fugitive dust and the combustion of fuels in vehicles. Maximum PM_{10} impacts usually occur in combination with fugitive dust generated by ground-disturbing activities (such as the operation of vehicles on unpaved surfaces) and high wind events.

Air emissions from current operations at MCAS Yuma occur from: 1) stationary sources that combust fuels and release VOCs from fuels storage and transfer; 2) mobile sources such as aircraft and tactical vehicles/support equipment; and 3) fugitive dust generated by the operation of vehicles and equipment and the landing of rotary-wing and tilt-rotor aircraft on unpaved surfaces.

3.2.1.2 Applicable Rules and Regulations

The federal Clean Air Act of 1970 and its subsequent amendments establish air quality regulations and the NAAQS and delegate the enforcement of these standards to the states. The Clean Air Act establishes air quality planning processes and requires areas in nonattainment of a NAAQS to develop a State Implementation Plan that details how the state will attain the standard within mandated time frames. The requirements and compliance dates for attainment are based on the severity of the nonattainment classification of the area. The following summarizes the air quality rules and regulations that apply to the proposed action.

Federal Regulations

Section 176(c) of the Clean Air Act, as articulated in the USEPA *General Conformity Rule*, states that a federal agency cannot issue a permit or support an activity unless the agency determines that it will conform to the most recent USEPA-approved State Implementation Plan. This means that projects using federal funds or requiring federal approval in nonattainment or maintenance areas cannot 1) cause or contribute to new violations of a NAAQS, 2) increase the frequency or severity of any existing violation, or 3) delay timely attainment of any standard, interim emission reduction, or other milestone. Conformity determinations are required when the annual direct and indirect emissions from a federal action exceed an applicable *de minimis* (not significant) threshold. Applicable *de minimis* levels vary by pollutant and the severity of nonattainment conditions. Based on air quality designation of the project region, the applicable conformity *de minimis* threshold that pertains to the proposed action is 100 tons per year of PM_{10}.

State Regulations

The Air Quality Division of the ADEQ is responsible for controlling sources of air pollution within Arizona. Title 18, Chapter 2 of the Arizona Administrative Code identifies the rules used by the Air Quality Division of the ADEQ to regulate air quality (ADEQ 2015). The following summarizes the air quality rules and regulations that would apply to the project and its alternatives:

- R18-2-604. *Open Areas, Dry Washes, or Riverbeds*. This rule limits excessive amounts of particulate matter (PM) from becoming airborne due to excavation or earth-moving activities. To minimize dust emissions, the rule requires implementation of Best Management Practices, such as use of approved dust suppressants or adhesive soil stabilizers, paving, covering, landscaping, continuous wetting, detouring, barring access, or other acceptable means; and
- R18-2-606. *Material Handling*. This rule requires crushing, screening, handling, transporting or conveying of materials or other operations likely to result in significant amounts of airborne dust to take reasonable precautions, such as the use of spray bars, wetting agents, dust suppressants, covering the load, and hoods to prevent excessive amounts of particulate matter from becoming airborne.

3.2.1.3 Greenhouse Gases

It is well-documented that the Earth's climate has fluctuated throughout its history. However, scientific evidence indicates a correlation between increasing global temperatures over the past century and the worldwide proliferation of greenhouse gas (GHG) emissions by human activity. The main source of GHGs from human activities is the combustion of fossil fuels, such as crude oil and coal. Climate change associated with global warming is predicted to produce negative environmental, economic, and social consequences across the globe.

GHGs trap heat in the atmosphere by absorbing the sun's natural energy. GHGs are released from natural processes and human activities. 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 and sulfur hexafluoride.

Each GHG is assigned a global warming potential (GWP). The GWP is a measure of 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 28, which means that it has a global warming effect 28 times greater than CO_2 on an equal-mass basis (Intergovernmental Panel on Climate Change 2014), which means that CH_4 can be more detrimental to Earth's climate. To simplify GHG analyses, total GHG emissions from a source are often expressed as a CO_2 equivalent (CO_2e). The CO_2e is calculated by multiplying the emissions of each GHG by its GWP and adding the results together to produce a single, combined emission rate representing all GHGs. While CH_4 and N_2O have much higher GWPs than CO_2, CO_2 is emitted in such higher quantities that it is the overwhelming contributor to CO_2e from both natural processes and human activities.

Federal agencies address emissions of GHGs by reporting and meeting reductions mandated in federal laws, EOs, and agency policies. Some of these requirements include EO 13693 and the USEPA *Final Mandatory Reporting of Greenhouse Gases Rule*. The State of Arizona has developed the Climate Change Action Plan to reduce statewide GHG emissions. Groups of states, such as the Western Climate Initiative (with Arizona as a founding member), also have formed regionally-based collectives to jointly address GHG pollutants.

The USMC takes proactive measures to reduce their overall emissions of GHGs. In an effort to reduce energy consumption, reduce dependence on petroleum, and increase the use of renewable energy resources in accordance with the goals set by EOs and the Energy Policy Act of 2005, the Marine Corps and DoD have implemented a number of renewable energy projects (e.g., photovoltaic solar systems, geothermal power, wind generation) within the jurisdiction of Marine Corps Installations West (MCI West) (MCI West 2009, Marine Corps Expeditionary Energy Office 2011).

On 18 December 2014, the CEQ released revised draft guidance for public comment that describes how federal departments and agencies should consider the effects of GHGs and climate change in their NEPA reviews (CEQ 2014). The revised draft guidance supersedes the draft GHG and climate change guidance released by the CEQ in February 2010. This guidance explains that agencies should consider both the potential effects of a proposed action on climate change, as indicated by its estimated GHGs, and the implications of climate change for the environmental effects of a proposed action. The guidance also emphasizes that agency analyses should be commensurate with projected GHGs and climate impacts, and should employ appropriate quantitative or qualitative analytical methods to ensure useful information is developed to adequately distinguish between alternatives and mitigations. The guidance recommends that agencies consider 25,000 metric tons per year of CO_{2e} emissions as a reference point below which a quantitative analysis of GHGs is not recommended unless it is easily accomplished based on available tools and data. Similar to the 2010 guidance, the revised guidance does not propose a reference point as an indicator of a level of GHG emissions that may significantly affect the quality of the human environment.

The potential effects of proposed GHG emissions are by nature global and cumulative impacts because individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Therefore, the impact of proposed GHG emissions to climate change is discussed in the context of cumulative impacts, as presented in Chapter 4, *Cumulative Impacts*, of this EA.

3.2.2 Environmental Consequences

Air quality impacts from the alternatives were reviewed for significance relative to federal, state, and local air pollution standards and regulations. For the purposes of this analysis, if proposed emissions were projected not to exceed an applicable conformity *de minimis* threshold within the project region (100 tons per year of PM_{10}), then impacts would be less than significant. If proposed emissions were projected to exceed an applicable conformity *de minimis* threshold within a project region, further analysis would be needed to determine whether impacts were significant. In such cases, if emissions conform to the approved State Implementation Plan, then impacts would be less than significant. In the case of a criteria pollutant for which a project region attains an NAAQS, the analysis used the USEPA Prevention of Significant Deterioration (PSD) threshold for new major sources of 250 tons per year as an indicator of significance of projected air quality impacts.

3.2.2.1 Alternative 1

Construction

Air quality impacts from construction of Alternative 1 would occur from: 1) combustive emissions due to the use of fossil fuel-powered equipment and trucks; and 2) fugitive dust emissions from demolition and earth-moving activities and the use of equipment and trucks on exposed soils. Site construction, renovation, and demolition activity data associated with Alternative 1 were used to estimate combustive and fugitive dust emissions. Appendix C includes data and assumptions used to calculate emissions from these proposed activities.

Factors needed to derive source emission factors for construction activities were obtained from the Compilation of Air Pollutant Emission Factors, AP-42, Volume I (USEPA 1995), the USEPA NONROAD2008a model for nonroad construction equipment (USEPA 2009), and the USEPA MOVES2014 model for on-road trucks (USEPA 2014b). The analysis assumes that implementation of Special Conservation Measure 1 (*Fugitive Dust Control Measures*) and Special Conservation Measure 2 (*Construction Equipment Emission Control Measures*) described below would reduce fugitive dust emissions from construction activities by 50 percent from uncontrolled levels.

*Special Conservation Measure 1: Fugitive Dust Control Measures***.** The construction contractor would 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 miles per hour 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;
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; and
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.

Special Conservation Measure 2: Construction Equipment Emission Control Measures. The construction contractor would 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 a flag person, to maintain smooth traffic flow;
6. Keep construction equipment and equipment staging areas away from sensitive receptors (such as day care centers);
7. Re-route construction trucks away from congested streets or sensitive receptors;
8. Use construction equipment with engines that meet USEPA Tier 3 and 4 nonroad standards; and
9. Use alternative fuel construction equipment, such as natural gas- or electric-powered.

Table 3.2-2 summarizes the annual emissions estimated for construction, renovation, and demolition activities under Alternative 1. These data show that annual air emissions generated from these activities over a two-year construction period would be well below their applicable NEPA significance thresholds. As a result, construction of Alternative 1 would not result in significant air quality impacts.

Table 3.2-2. Annual Emissions Due to Construction and Operation of Alternative 1

Year/Activity	*Air Pollutant Emissions (Tons)*						
	VOC	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2e*
Year 2015 Construction							
Demolish Buildings	0.03	0.17	0.35	0.01	0.66	0.10	67.28
Construct Aircraft Parking Apron	0.05	0.53	0.43	0.01	0.26	0.06	80.20
Re-Stripe Aircraft Parking Apron	0.01	0.04	0.08	0.00	0.07	0.01	13.46
Year 2015 Total Emissions	0.09	0.74	0.87	0.03	0.99	0.17	160.94
Year 2016 Construction							
Construct Buildings	0.15	0.79	1.65	0.05	1.50	0.19	278.92
Pour Sidewalks/Curbs/Gutters	0.05	0.51	0.40	0.01	0.23	0.04	80.21
Pave Roadways and Parking Area	0.00	0.02	0.03	0.00	0.11	0.01	6.81
Upgrade/Repair Drainage Improvements/Utilities	0.01	0.04	0.08	0.00	0.07	0.01	13.46
Excavation/Grading Clearing/Grubbing	0.00	0.03	0.04	0.00	0.33	0.03	8.92
Year 2016 Total Emissions	0.22	1.38	2.20	0.07	2.23	0.28	388.32
Year 2021 Operations							
Aircraft Operations	3.36	13.28	26.35	2.07	4.72	3.03	9,093
Year 2021 Total Emissions	3.36	13.28	26.35	2.07	4.72	3.03	9,093
NEPA Significance Thresholds	250	250	250	250	100	250	NA
Exceed NEPA Significance Threshold?	No	No	No	No	No	No	NA

Notes: CO = carbon monoxide, CO2e = CO2 equivalent, NEPA = National Environmental Policy Act, NOx = nitrogen oxides, PM10 = particulate matter less than or equal to 10 microns in diameter, PM2.5 = particulate matter less than or equal to 2.5 in diameter, SO2 = sulfur dioxide, VOC = volatile organic compound.

Operations

Air quality impacts from Alternative 1 operations would occur from the combustion of aviation fuel by aircraft. Emissions from aircraft are based on the same data included within the noise analysis of this EA (refer to Section 3.4, *Noise*). The analyses focused on peak annual operations in 2021, when final consolidation of the proposed Marine Aviation OTEC and relocation of VMX-22 squadron aircraft and personnel to MCAS Yuma would be completed.

Factors needed to derive operational source emission rates were obtained from special studies on aircraft operations (Navy Aircraft Environmental Support Office 2000a, 2000b, 2001a, 2001b, 2009a, and 2009b) and recent NEPA documents for MCAS Yuma (DoN 2010a).

Table 3.2-2 presents an estimate of the annual operational emissions that would occur with the implementation of Alternative 1. These data show that Alternative 1 operations would generate emissions that would remain well below any applicable conformity *de minimis* or PSD threshold for the project region. Since emissions from all activities proposed under Alternative 1 would not exceed any applicable conformity *de minimis* or PSD threshold, Alternative 1 would not result in significant air quality impacts.

The results of the air quality analysis indicate that emissions from the proposed action would not exceed applicable conformity *de minimis* thresholds.

The air quality analysis determined that no significant air quality impacts would occur from implementation of Alternative 1. However, to minimize fugitive dust and equipment combustion emissions from proposed construction activities, the construction contractor would implement the Special

Conservation Measure 1 (*Fugitive Dust Control Measures*) and Special Conservation Measure 2 (*Construction Equipment Emission Control Measures*) (refer to Appendix B for details).

Relocation of aircraft and personnel to MCAS Yuma would have negligible beneficial impacts on air quality at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.

3.2.2.2 Alternative 2

Construction

Alternative 2 would include modifications to Building 408 or Building 410 interior systems (e.g., HVAC) and minor retrofitting; no other construction, renovation, or demolition activities would occur. Therefore, construction-related air quality impacts would be negligible.

Operations

Air emissions from Alternative 2 operations would be the same as those estimated for Alternative 1. Table 3.2-3 presents an estimate of the annual operational emissions that would occur with implementation of Alternative 2. These data show that Alternative 2 operations would generate emissions that would remain well below any applicable conformity *de minimis* or PSD threshold for the project region. Since emissions from all activities proposed under Alternative 2 would not exceed any applicable conformity *de minimis* or PSD threshold, Alternative 2 would not result in significant air quality impacts.

Table 3.2-3. Annual Emissions Due to Construction and Operation of Alternative 2

Year/Activity	*Air Pollutant Emissions (Tons)*						
	VOC	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2e*
Year 2021 Operations							
Aircraft Operations	3.36	13.28	26.35	2.07	4.72	3.03	9,093
Year 2021 Total Emissions	3.36	13.28	26.35	2.07	4.72	3.03	9,093
NEPA Significance Thresholds	250	250	250	250	100	250	NA
Exceed NEPA Significance Threshold?	No	No	No	No	No	No	NA

Notes: CO = carbon monoxide, CO2e = CO2 equivalent, NEPA = National Environmental Policy Act, NOx = nitrogen oxides, PM_{10} = particulate matter less than or equal to 10 microns in diameter, $PM_{2.5}$ = particulate matter less than or equal to 2.5 in diameter, SO_2 = sulfur dioxide, VOC = volatile organic compound.

Similar to Alternative 1, relocation of aircraft and personnel to MCAS Yuma would have negligible beneficial impacts on air quality at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.

3.2.2.3 No-Action Alternative

Under the No-Action Alternative, a consolidated Marine Aviation OTEC would not be established and relocation of VMX-22 from MCAS New River to MCAS Yuma would not occur. Existing air quality conditions would remain as described in Section 3.2.1, *Affected Environment*. Therefore, no impacts on air quality would occur.

3.3 Hazardous Materials and Waste

The following section described the existing hazardous materials and waste conditions in the project region and potential impacts that would occur from the proposed action.

3.3.1 Affected Environment

The affected environment for hazardous materials and waste is related to the past and present hazardous materials use and hazardous waste disposal practices within and adjacent to the project footprint. Hazardous materials are defined as chemical substances that pose a substantial hazard to human health or the environment. In general, these materials pose hazards because of their quantity, concentration, physical, chemical, or infections characteristics. Hazardous materials can be found in the form of a solid, liquid, semi-solid, or contained gaseous material that alone or in combination could: 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.

Hazardous waste is regulated under the Resource Conservation and Recovery Act (RCRA), which provides the USEPA with authority to control hazardous waste from "cradle-to-grave," including its generation, transportation, treatment, storage, and disposal. RCRA identifies hazardous sites with lists of specific wastes, and categorizes wastes that exhibit a specific characteristic (e.g., ignitable, corrosive, reactive, or toxic) in accordance with RCRA-specific definitions. The USEPA uses the term "hazardous substance" for chemicals that, if released into the environment above a certain amount, must be reported and, depending on the threat to the environment, federal involvement in handling the incident can be authorized under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

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 are used at MCAS Yuma to store hazardous waste for up to 90 days prior to being transported off-station. 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 NAVMC Directive 5800.1, Chapter 17, *Hazardous Materials Control*, and MCAS Yuma *Hazardous Waste Management Plan* (USMC 1997).

Asbestos-containing materials (ACMs) could be present in buildings or other facilities that would be demolished as part of the proposed action. The USEPA has classified ACMs as a hazardous air pollutant, in accordance with Section 112 of the Clean Air Act (USEPA 2002). Lead-based paint could also be present in buildings or other facilities proposed for demolition under the proposed action.

3.3.1.1 Installation Restoration Program Sites

In the 1980s, the DoD developed the Installation Restoration Program (IRP) to identify, assess, characterize, and clean up or control contamination from past hazardous waste disposal operations and hazardous materials spills. The DoD instructed each branch of the armed services to comply with the requirements of CERCLA. In response, the IRP was developed by the DoD to remediate contamination at military facilities caused by past use, storage, handling, and disposal of hazardous and other potential toxic substances, as required by CERCLA Section 121. The DoD's clean-up program identifies, assesses, characterizes, and cleans up or manages any contamination. The IRP also handles removal and remediation of sites under RCRA.

Installation Restoration sites that have contaminants may or may not cause short term or long term health effects. The risk of health effects is dependent upon methods of exposure (touching, breathing, or ingesting), time of exposure, and amount of material that a person was exposed to. The risk of health effects can also be dependent upon age, gender, genetics, life style, and a person's health. Thus, while a

contaminant may have potential effects, it may not necessarily lead to any type of negative health effect. Standards for exposure risks are based on the factors above and what the projected land use would be (e.g. residential, commercial, industrial). Residential health standards are typically more stringent than commercial/industrial standards. The project footprint would fall under the commercial/industrial category.

The USEPA classifies sites with a Hazard Ranking System, and those sites with the potential to pose an ecological or health risk are placed on the National Priorities List. MCAS Yuma is on the National Priorities List and as such, there is a Federal Facilities Agreement to facilitate clean-up of the IRP sites. IRP sites on National Priorities List locations are classified as Operable Units (OU) and sub classified as CERCLA Areas of Concern (CAOC). On MCAS Yuma, there are two OUs: OU-1 is the groundwater contamination plume under the station; and OU-2 consists of several surface contamination sites.

Operable Unit 1

OU-1 refers to MCAS Yuma's contaminated groundwater and soil deeper than 10 feet below the surface that has the potential to leach contaminants into the groundwater (MCAS Yuma 2014a). OU-1 was divided into smaller IRP sites for easier management. As illustrated in Figure 3.3-1, a portion of Area 1 of IRP Site 19 (part of OU-1) is located within the project footprint. Area 1 contains the largest groundwater plume on the air station, and was found to contain extensive chlorinated solvent contamination near Building 230 and extending off-station. 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. No access to groundwater is allowed and the use of untreated groundwater is prohibited in Area 1 (MCAS Yuma 2014a). Three smaller chlorinated solvent plumes are also located in IRP Site 19 (USMC 2000), but they are located outside of the project footprint.

Operable Unit 2

A remedial investigation performed on OU-2 in 1996 revealed there are 18 soil contamination sites, all of which have been addressed as part of the IRP. Of the 18 soil contamination sites, 12 have been determined to require no further action, 3 sites required institutional controls, and 3 sites required cleanup, which has been completed (MCAS Yuma 1996). These IRP sites are also referred to as CAOCs. One CAOC (IRP Site 1 - Flightline) associated with OU-2 is located within the project footprint. During the 1940s, aircraft maintenance was reportedly performed on the runways, taxiways, and aprons. It was routine at the time to drain waste aircraft oil on the ground where the aircraft were parked.

Waste oil was also used for dust suppression along runways, adjacent to hangars and at the edges of taxiways and aprons. Other contaminants made up 5 to 15 percent of the oils used for dust control and include the following: JP-4; JP-5; AVGAS; methyl ethyl ketone; paint stripper (containing methylene chloride); carbon tetrachloride; freon; paint thinner; and carburetor cleaner. This practice continued from the 1950s to 1996, when the Remedial Investigation was published (MCAS Yuma 1996). Institutional controls, which have been implemented for IRP Site 1/CAOC 1, restrict land use at the location to industrial or commercial use. No residential uses are allowed at the site. The USEPA and ADEQ must be notified and their approval must be obtained before commencing construction within IRP Site 1/CAOC 1 (MCAS Yuma 2014a).

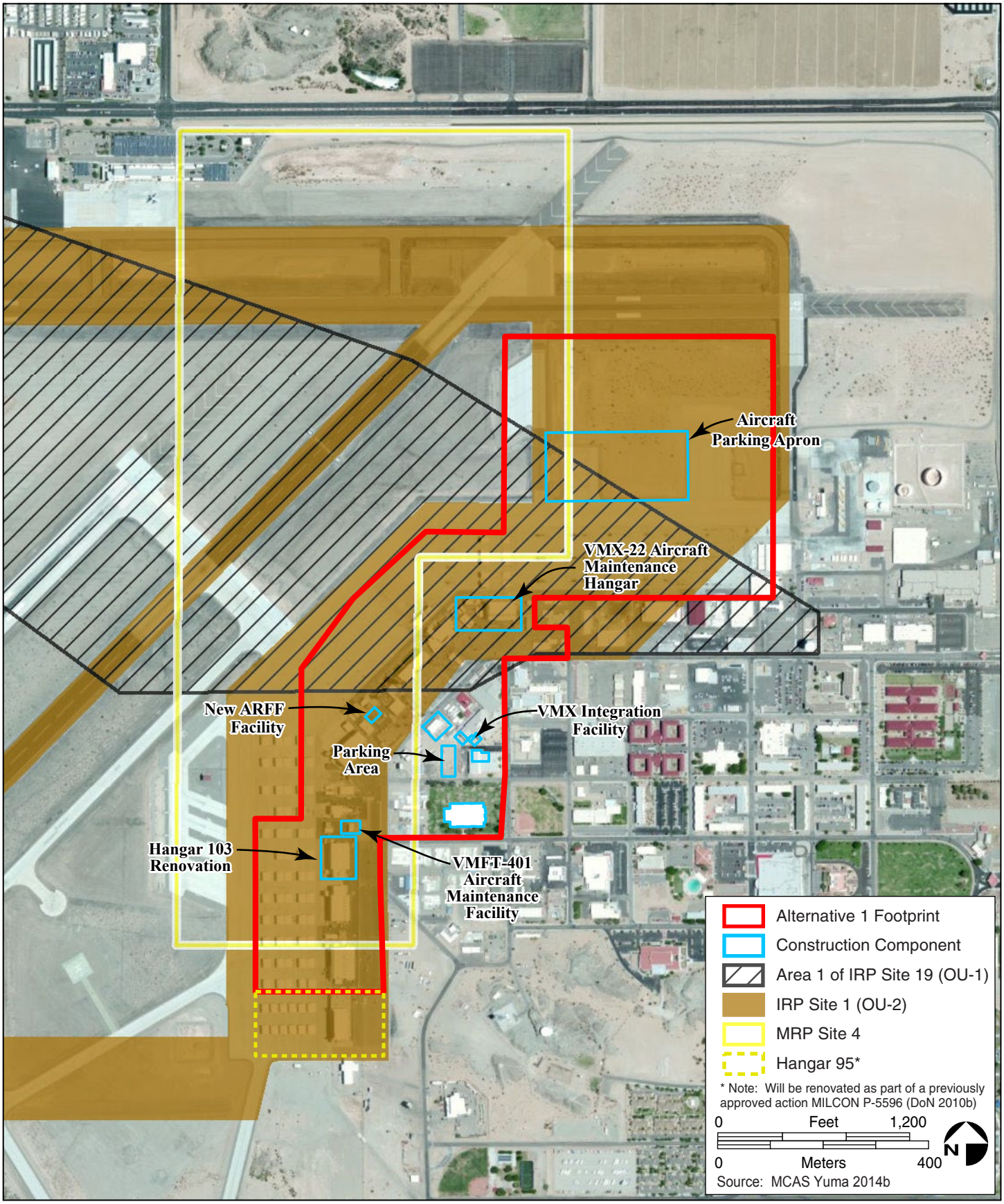


Figure 3.3-1. Installation Restoration Program Sites and Munitions Response Program Sites in Project Vicinity

3.3.1.2 Munitions Response Program Sites

The DoN's Munitions Response Program (MRP) involves response actions, including investigation and removal actions, to address the explosives safety, human health, or environmental risks presented by unexploded ordnance, discarded military munitions, or munitions constituents. Preliminary Assessments have been performed for a number of suspected MRP sites on MCAS Yuma.

The Preliminary Assessment is an integral part of the MRP to identify, assess and respond to Munitions and Explosives of Concern, munitions constituent and other incidental contaminants at other than operational ranges (e.g., closed, transferred and transferring ranges). The MRP was established in 2001 to manage the environmental, and health and safety issues presented by Munitions and Explosives of Concern, and are an element of the Defense Environmental Restoration Program. The MRP adheres to the CERCLA process. Portions of MRP Site 4 overlap with the project footprint (Figure 3.3-1). The other MRP sites at MCAS Yuma are not located within the project footprint and; therefore, will not be discussed further.

MRP Site 4

MRP Site 4 supported a small arms range (Arizona Militia Target Range), which was established in 1910 and abandoned before 1942. No fixed firing facilities were established on this 240-acre range. Most of this site has been developed as part of the current runway and aircraft parking apron (DoN 2010a). The primary hazard at this site is the potential for munition constituents (e.g., chemicals released from the use of small arms) (MCAS Yuma 2014a). A site inspection conducted in 2010 indicated that further action was required at MRP Site 4. Land use controls are planned for MRP Site 4 and all future projects considered at this site should be coordinated through the MCAS Yuma Environmental Department while formal remediation requirements are being developed (MCAS Yuma 2014a).

3.3.2 Environmental Consequences

3.3.2.1 Alternative 1

Construction

Asbestos-Containing Material

ACMs could be present in structures proposed for demolition under Alternative 1 (Buildings 105, 106, 108, 115, 116, 117, 120, 139, 141, 142, 143, 144, 145, 146, 147, 148, 155, 203, 204, and 205). Surveys would be conducted for ACMs, as required by 40 CFR 61.145, prior to demolition of structures. Any ACMs found in the structures proposed for demolition would be categorized and 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 federal and state requirements for protecting human health and safety and the environment. Therefore, no significant impacts associated with ACMs would occur.

Lead-Based Paint

Similar to ACMs, surveys for lead-based paint would be conducted prior to demolition of structures. Lead-based paint sampling would be conducted and analyzed in accordance with USEPA approved Toxicity Characteristic Leaching Procedure methodology. If lead-based paint were detected at hazardous concentrations, these materials would be removed prior to demolition. Lead-based paint would be characterized, managed, transported, and disposed according to applicable federal and state requirements

for protecting human health and safety and the environment. Therefore, no significant impacts associated with lead-based paint would occur.

Other Hazardous Materials

The removal and disposal of structures and equipment associated with the buildings proposed for demolition would occur, including the removal of hazardous materials pads. Hazardous materials would be characterized, managed, transported, and disposed according to applicable federal and state requirements for protecting human health and safety and the environment. Therefore, no significant impacts associated with other hazardous materials would occur.

Installation Restoration Program Sites

Under Alternative 1, the VMX-22 aircraft maintenance hangar, aircraft parking apron, VMX-22 Integration Facility, VMFT-401 aircraft maintenance facility, ARFF facility, and Hangar 103 renovations would be constructed within Area 1 of IRP Site 19 (part of OU-1). Remediation at OU-1 would continue, and would not conflict with proposed construction, renovation, and demolition activities. Additionally, most of the Alternative 1 footprint is within the boundaries of IRP Site 1/CAOC 1 (part of OU-2), with the exception of the VMX-22 Integration Facility. The USMC would notify USEPA and ADEQ and obtain their approval prior to commencement of proposed construction, renovation, and demolition activities within these sites. It is possible that residual contamination exists in the subsurface at these locations and could be excavated or disturbed during construction. In addition, unknown or undocumented subsurface contamination could also be encountered in construction areas located outside of designated IRP sites.

Potential impacts associated with encountering contaminated soil or groundwater during construction, renovation, or demolition activities would be minimized because removal actions, pursuant to CERCLA, would be conducted to remove hazardous substances, pollutants, or contaminants present within the Alternative 1 footprint, prior to or in conjunction with the commencement of grading and construction activities, in coordination with the USEPA and ADEQ, as appropriate. Furthermore, all removal actions and excavations would be conducted in compliance with all federal and state regulations pertaining to soil and groundwater contamination. All contaminated soil excavated or otherwise disturbed during construction, renovation, and demolition would be transported to an appropriate offsite disposal facility.

The USMC would coordinate with CERCLA program managers prior to construction, renovation, and demolition activities to ensure conformance with CERCLA requirements. In addition, construction in contaminated areas would be conducted in accordance with the National Contingency Plan (40 CFR 300, CERCLA Section 105), 29 CFR 1910.120 (regulates 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); and *EM 385-1-1 USACE Safety and Health Requirement Manual, September 2008* (regulates health and safety issues for workers handling potentially hazardous materials or waste).

Construction personnel with current Occupational Safety and Health Administration (OSHA) 40-hour training for hazardous materials would complete excavations in areas with 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 disposal. The contractor would also prepare and implement a Health and Safety Plan prior to commencement of grading/excavating to establish policies and procedures to protect workers and the public from hazards posed by potentially contaminated soil. The plan requirements are provided below in Special

Conservation Measure 3 (*Health and Safety Plan*) (refer to Appendix B for details). Therefore, no significant impacts associated with IRP sites would occur.

Special Conservation Measure 3: Health and Safety Plan. Prior to the start of construction, renovation, and demolition activities, the construction contractor would prepare and submit a Health and Safety Plan for the USMC's approval, as well as obtain all the necessary permits and approvals. The Health and Safety Plan would include detailed precautionary measures to substantially reduce potential exposure of on-site personnel to hazardous materials in the event construction, renovation, and/or demolition activities encounter contaminated soil or groundwater. The Health and Safety Plan would describe the strategy for handling and disposing of all demolition debris. Part of this strategy would be to divert as much of the demolition waste from landfills as possible using demolition deconstruction techniques to reduce, reuse, or recycle the various types of waste. The removal methods, health and safety procedures, and disposal methods would conform to the regulations of federal, state, and local regulatory agencies. The construction contractor would make the required notifications to USEPA and ADEQ.

Munitions Response Program Sites

Hanger 103, a portion of the additional aircraft parking apron, and small portions of the Alternative 1 footprint are located within the boundaries of MRP Site 4. Most of MRP Site 4 has been developed with the existing runway and aircraft parking apron. During the Preliminary Assessment for MRP Site 4 associated with the existing runway development, no Munitions and Explosives of Concern or munitions constituent was found and the potential of unearthing contamination is low (DoN 2010a). Additionally, there is potential to encounter unknown or undocumented subsurface munitions waste in construction areas located outside of designated MRP sites. For Alternative 1, the areas outside of MRP Site 4 include the VMX-22 aircraft maintenance hangar, most of the aircraft parking apron, and VMX-22 Integration Facility.

Potential impacts associated with encountering munitions waste during construction, renovation, and demolition activities would be minimized because excavations at MRP sites would be conducted in accordance with CERCLA regulations, removal activities would be conducted in accordance with CERCLA and in coordination with the USEPA and ADEQ, and no construction would occur on contaminated sites until the site has been remediated, in accordance with MCO P5090.2A. In addition, the construction contractor would prepare and implement a Health and Safety Plan prior to commencement of construction, renovation, and demolition activities (Special Conservation Measure 3). Therefore, no significant impacts associated with MRP sites would 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, Alternative 1 could 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, implementation of Best Management Practices (Special Conservation Measure 4) would be required as specified below.

Special Conservation Measure 4: Hazardous Materials Best Management Practices. The construction contractor would implement the following measures during all proposed construction, renovation, and demolition activities:

1. Maintain equipment according to manufacturer specifications;

2. Contractors would be adequately prepared to respond to 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;
3. Construction-generated petroleum and hazardous waste (e.g., gasoline, solvents, adhesives, and paint) would be managed and disposed of properly. Contractors would identify, manage, transport, and dispose of regulated wastes (solid waste, hazardous waste, recyclable waste, etc.) in accordance with Titles 40 and 49 of the CFR and Title 18 of the Arizona Administrative Code;
4. 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 MCAS Yuma Environmental Department, Hazardous Waste Management Division;
5. All excavation activities would be coordinated with the MCAS Yuma Environmental Department, Hazardous Waste Management Division to reduce potential exposure of on-site personnel to contaminated soil and groundwater within and adjacent to Area 1 of IRP Site 19 (OU-1);
6. Cleared construction and demolition materials would be recycled in accordance with the DoD Green Procurement Program; and
7. Contractors would remove excess hazardous materials from the site once work is completed.

In addition, any construction, renovation, or demolition activities that involve the storage of oils in quantities equal to or greater than 55 gallons would be subject to Spill Prevention, Control, and Countermeasures requirements, as presented in 40 CFR 112 and MCO P5090.2A, Chapter 7. These requirements pertain to containers 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. Therefore, no significant impacts associated with incidental spills and construction waste would occur.

Operations

Potential impacts to surface or groundwater quality through the accidental release of chemicals during Marine Aviation OTEC and VMX-22 operations at MCAS Yuma would be reduced with implementation of a National Pollutant Discharge Elimination System Stormwater Pollution Prevention Plan and compliance with federal, state, and local regulations regarding stormwater retention and treatment and soil and groundwater contamination. The Stormwater Pollution Prevention Plan includes a Spill Prevention, Control, and Countermeasures Plan, which provides protective and corrective measures for accidental releases of hazardous substances or petroleum products. Additionally, VMX-22 would be required to use the Hazardous Materials Management System to track hazardous material storage, usage and waste. Therefore, no significant impacts on hazardous materials and waste would occur.

The proposed training operations at the BSTRC would not include new construction or improvements at any range facility. Proposed Marine Aviation OTEC and VMX-22 operations would be incorporated into existing training scenarios aboard the range complex. Aircraft fueling at the BSTRC would be completed in established forward area refueling points, which are equipped with appropriate spill prevention and spill control features. Therefore, no significant impacts on hazardous materials and waste would occur.

Relocation of aircraft and personnel to MCAS Yuma would have negligible impacts on hazardous materials and waste at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.

3.3.2.2 Alternative 2

Alternative 2 would include modifications to Building 408 or Building 410 interior systems (e.g., HVAC) and minor retrofitting; no other construction, renovation, or demolition activities would occur. Therefore, construction-related hazardous materials and waste impacts would be negligible. Proposed Marine Aviation OTEC and VMX-22 operations under Alternative 2 would be the same as those described under Alternative 1. Implementation of a National Pollutant Discharge Elimination System Stormwater Pollution Prevention Plan and compliance with federal, state, and local regulations regarding stormwater retention and treatment and soil and groundwater contamination would minimize operational impacts at the air station or associated with airspace operations within the BSTRC. Therefore, no significant impacts on hazardous materials and waste would occur.

Similar to Alternative 1, relocation of aircraft and personnel to MCAS Yuma would have negligible impacts on hazardous materials and waste at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.

3.3.2.3 No-Action Alternative

Under the No-Action Alternative, a consolidated Marine Aviation OTEC would not be established and relocation of VMX-22 from MCAS New River to MCAS Yuma would not occur. Existing hazardous materials and waste conditions would remain as described in Section 3.3.1, *Affected Environment*. Therefore, no impacts on hazardous materials and waste would occur.

3.4 Noise

The predominant noise sources associated with the proposed action consist of aircraft operations, both at MCAS Yuma and within the BSTRC. 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. This section analyzes the potential noise generated by proposed VMX-22 aircraft operations at MCAS Yuma, AUX-2 and the ALF, including potential noise effects on representative noise-sensitive receptors in the region. It also addresses construction-related noise at MCAS Yuma.

3.4.1 Methodology

As noise from future aircraft operations cannot be physically measured in the present, a noise study was prepared to estimate the noise generated by proposed aircraft operations (Wyle Laboratories Inc. 2014). The noise study utilized the DoD NOISEMAP suite of computer programs to analyze aircraft noise exposure in the affected areas (refer to Appendix D for details). All metrics and associated noise models draw from a database of actual aircraft noise measurements and, therefore, describe and compare noise conditions without requiring on-site noise monitoring.

Noise and sound are expressed in a logarithmic unit called the decibel (dB). Environmental noise measurements are usually on an "A-weighted" scale that filters out very low and very high frequencies to replicate human sensitivity. It is common to add the "A" to the measurement unit to identify that the measurement has been performed with this filtering process (dBA). In this document, the dB unit refers to A-weighted sound levels.

In accordance with DoD guidelines and standard practice for environmental impact analysis documents, the noise analysis utilized the Day-Night Average Sound Level (DNL) (A-weighted) noise descriptor or

metric. DNL is a time-averaged metric describing the cumulative noise environment of individual noise events over longer periods, usually up to 24 hours. DNL accounts for single-event noise levels and also weight or penalize those levels depending on the time period in which they occur, weighting nighttime sounds up to 10 dB.

A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions (Figure 3.4-1). Normal speech has a sound level of approximately 60 dB. Sound levels above 120 dB begin to be felt inside the human ear as discomfort, and sound levels between 130 to 140 dB are felt as pain (Berglund and Lindvall 1995). The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. On average, a person perceives a doubling (or halving) of the sound's loudness when there is a 10 dB change in sound level.

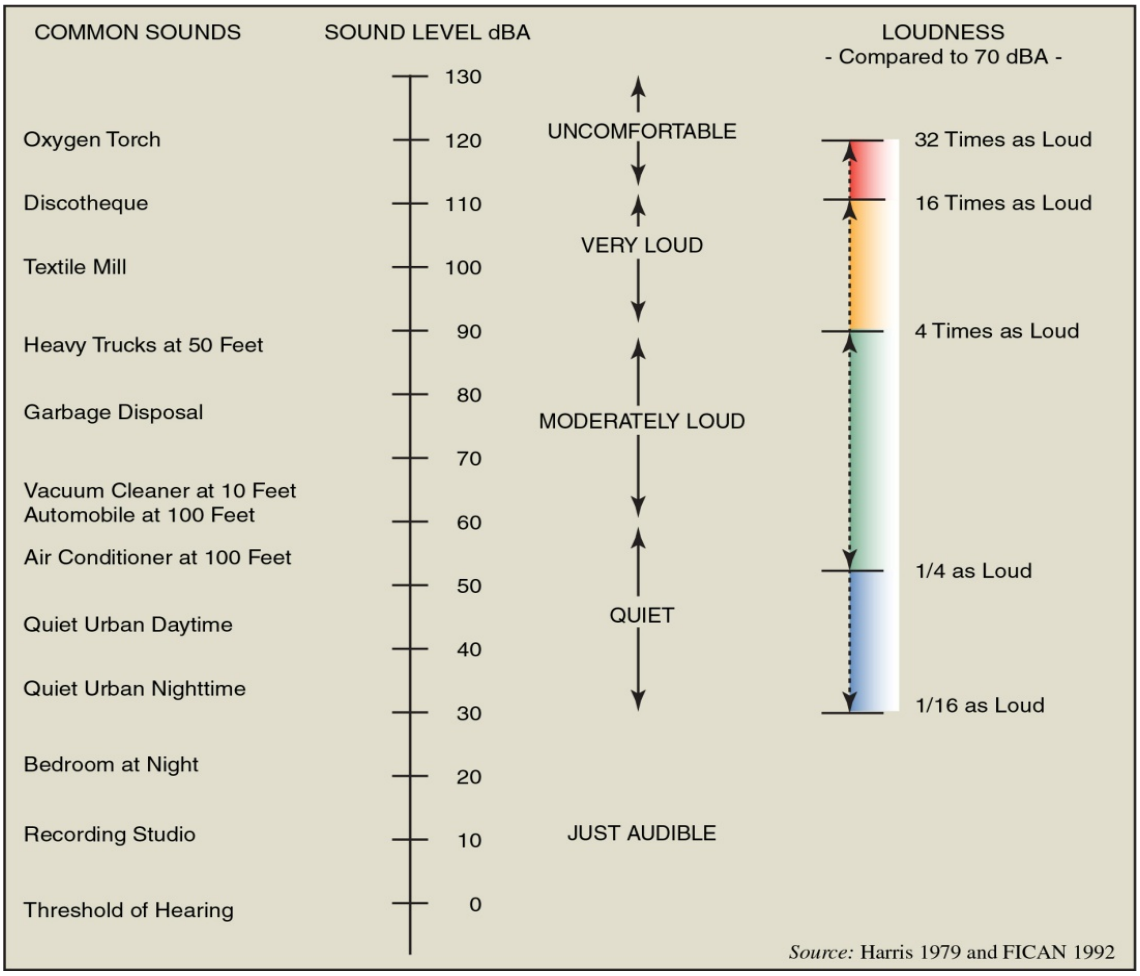


Figure 3.4-1. Typical A-Weighted Sound Levels of Common Sounds

The following analysis addresses change in the noise environment at MCAS Yuma, AUX-2 and the ALF under the proposed action compared to existing conditions. Noise exposure is presented in terms of DNL contours (i.e., 65 to 85 dB, presented in 10-dB increments), which provide a graphical depiction of the aircraft noise environment. Areas within the less than 65 dB DNL contours are essentially an area of low or no impact. Noise contours from 65 DNL to less than 75 dB DNL are an area of moderate impact where some land use controls are needed. Areas within noise contours greater than or equal to 75 dB DNL are most severely impacted and generally require the greatest degree of compatible land use controls.

The noise study also provides tabulated DNL results to address potential change at representative noise-sensitive receptors (refer to Appendix D for details).

3.4.2 Affected Environment

3.4.2.1 Noise Exposure from Existing Aircraft Operations

For this analysis, aircraft operations used to define baseline noise conditions include all current users of the airfields, the approved current and future use of the F-35B, transient military aircraft, and civil/commercial users at Yuma International Airport, which shares the airfield with MCAS Yuma (refer to Appendix D for more details). For MCAS Yuma, the baseline noise conditions are based on 129,330 flight operations, of which approximately 6 percent occur during the nighttime period (2200 to 0700). The baseline annual flight operations at AUX-2 consist of 2,776 operations (all rotary-wing and tilt-rotor aircraft) of which 12 percent would be during the nighttime periods, and the baseline annual flight operations at the ALF consist of 10,051 operations (mainly F-35B) of which 0.1 percent would be during the nighttime periods.

Figure 3.4-2 shows the 65 dB and higher DNL contours in 10-dB increments for baseline conditions at MCAS Yuma, AUX-2, and the ALF. The 65 dB DNL contour at MCAS Yuma extends approximately 2 miles south and 3.5 miles north east beyond the air station boundary. The 65 dB DNL contour for AUX-2 and the ALF falls entirely within the boundary of BMGR-West. In general, 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 ambient levels.

The noise study also looked at 22 representative noise-sensitive receptor locations near the project footprint (Figure 3.4-2). These areas represent locations like residential areas, places of worship, schools, hospitals, commercial, and public space. Under baseline conditions, 12 of the 22 sensitive receptor locations are exposed to DNL greater than or equal to 65 dB, with two commercial locations (the Fairgrounds and Saddles of Joy) exposed to DNL greater than or equal to 75 dB (Table 3.4-1).

3.4.2.2 Noise Exposure from Other Station Activities

Noise in the vicinity of MCAS Yuma results from vehicular traffic on surrounding roadways and air traffic associated with the MCAS Yuma/Yuma International Airport. Marine Corps and civilian personnel working at MCAS Yuma are exposed to a diverse range of sounds associated with the use of trucks and heavy equipment and on-going construction to support existing facility operations and facility upgrades. While these transitory sources contribute to the noise environment at MCAS Yuma, their effects rarely extend beyond the air station boundary and aircraft noise dominates the environment.

Individuals working in high noise exposure locations are subject to the occupational noise regulations in accordance with OSHA and National Institute of Occupational Safety and Health regulations, and DoD and USMC programs. USMC guidance includes MCO 5100.8 (*Marine Corps Occupational Safety and Health Program Manual*), MCO 5100.29A (*Marine Corps Safety Program*), and MCO 6260.1E (*Marine Corps Hearing Conservation Program*). On-station offices and housing are designed and modified in accordance with UFC 3-45-01 (*Noise and Vibration Control*).

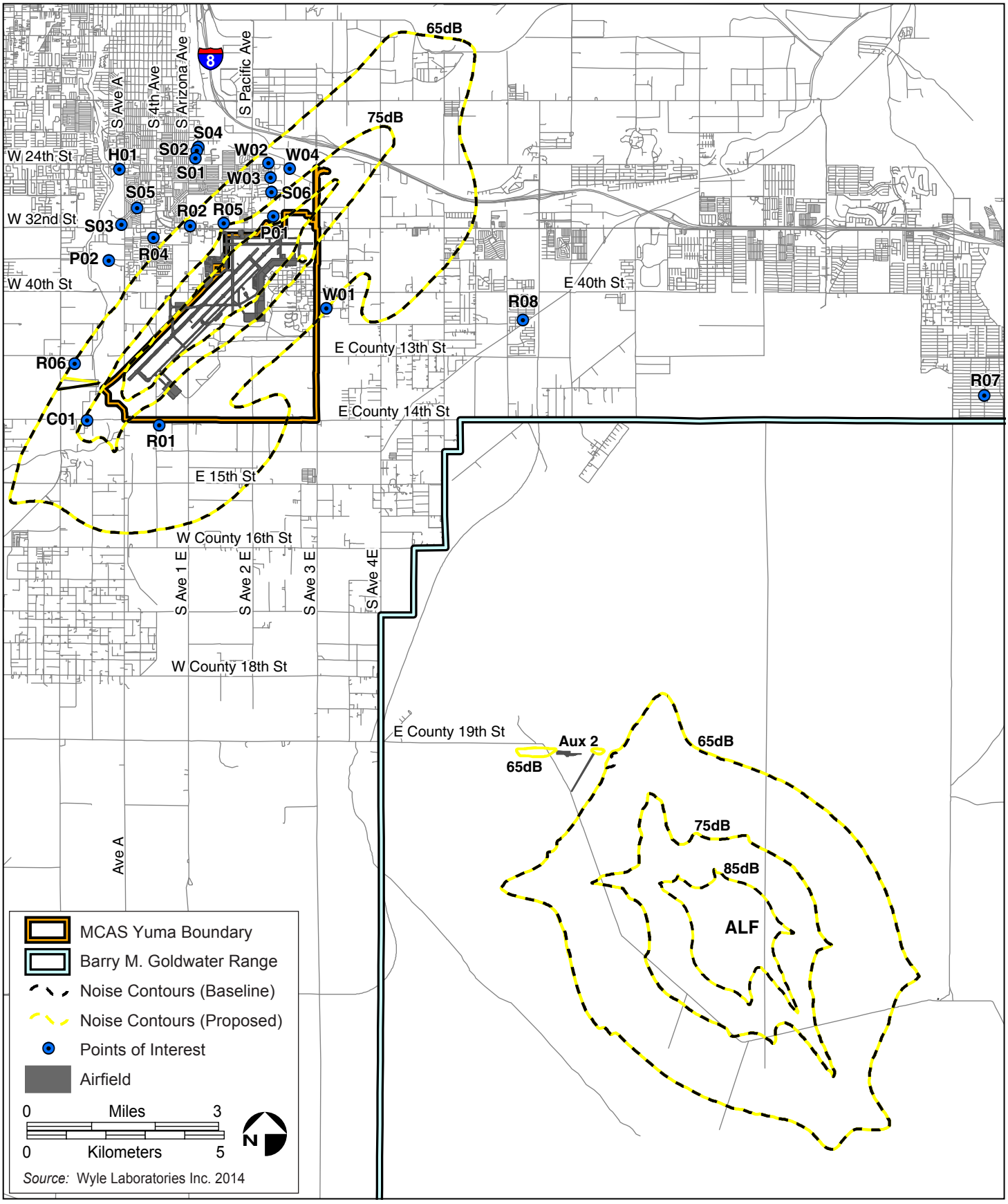


Figure 3.4-2. Comparison of Selected DNL Contours for Baseline Conditions and Proposed VMX-22 Operations

Table 3.4-1. Comparison of DNL from Baseline Conditions and Proposed Operations at Noise-Sensitive Receptor Locations

ID	*Noise-Sensitive Receptor*	*Receptor Type*	*Baseline DNL (dB)*	*Proposed DNL (dB)*	*Increase in DNL compared to Baseline*
C01	Saddles of Joy (commercial)	Commercial	76	76	<0.5
H01	Yuma Regional Medical Center	Hospital	<65	<65	<0.5
P01	Fairgrounds	Public	80	80	<0.5
P02	Yuma Civic Center	Public	<65	<65	<0.5
R01	Sun Leisure Estates	Residential	69	69	<0.5
R02	Country Club and 32nd	Residential	67	67	<0.5
R03	Bard, California	Residential	<65	<65	<0.5
R04	4th Ave Extension	Residential	<65	<65	<0.5
R05	Winsor Ave and 32nd	Residential	74	74	<0.5
R06	Community of Patricia Lane	Residential	65	65	<0.5
R07	Foothills Blvd and 53rd	Residential	<65	<65	<0.5
R08	40-48th St and 6E	Residential	<65	<65	<0.5
S01	Gwyneth Ham Elementary	School	<65	<65	<0.5
S02	Gila Vista Junior High	School	<65	<65	<0.5
S03	Kofa High School	School	<65	<65	<0.5
S04	McGraw Elementary School	School	<65	<65	<0.5
S05	Palmcroft Elementary	School	<65	<65	<0.5
S06	James Rolle Elementary	School	73	73	<0.5
W01	Generations Church	Worship	65	65	<0.5
W02	Calvary Chapel	Worship	67	67	<0.5
W03	Christ Lutheran Church & School	Worship	70	70	<0.5
W04	Mt. Zion Church & School	Worship	71	71	<0.5

Source: Wyle Laboratories Inc. 2014.
Notes: Db = Decibel, DNL = Day-Night Average Sound Level, ID = Identifier.

3.4.3 Environmental Consequences

3.4.3.1 Alternative 1

Construction

The only construction and demolition activities associated with Alternative 1 would occur at MCAS Yuma. Proposed construction equipment includes backhoes, cranes, dozers, excavators, forklifts, loaders, dump trucks, pickup trucks, concrete mixers, compactors, electrical generators, air compressors, saws, welding equipment, and miscellaneous small equipment (e.g., pumps). Short–term noise associated with construction activities could range from 80 to 90 dB at 50 feet from the source. The construction-related noise associated with this alternative would occur near the flightline, where noise would be compatible with current and ongoing activities, and would be isolated from any off-station communities. Therefore, no significant impacts on noise would occur.

Operations

The proposed VMX-22 aircraft operations under Alternative 1 would add about 3,307 rotary-wing and tilt-rotor operations at MCAS Yuma and an additional 1,796 operations at AUX-2 (refer to Appendix D

for more details). The operations at the ALF would be unchanged. Runway and flight track utilization would be unchanged from baseline conditions.

Figure 3.4-2 shows the 65 dB and higher DNL contours in 10-dB increments for proposed operations in comparison with baseline conditions for MCAS Yuma, AUX-2, and the ALF. The noise exposure under Alternative 1 at each of the airfields is almost identical to the baseline conditions. The baseline and proposed noise contours for MCAS Yuma are almost indistinguishable. Small differences can be seen for AUX-2 and the ALF, but all exposures greater than 65 dB are still well within the boundary of BMGR-West.

Table 3.4-1 shows a comparison of the DNL for the 22 representative noise-sensitive receptors between Alternative 1 and baseline conditions. The increase in DNL associated with Alternative 1 at each of the sensitive receptor locations was less than 0.5 dB compared to baseline conditions. The noise study also looked at potential change in speech interference and sleep disturbance at relevant noise-sensitive receptors, and found minimal change between baseline conditions and proposed operations (refer to Appendix D for more details). Therefore, no significant impacts on noise would occur.

Relocation of aircraft and personnel to MCAS Yuma would have negligible impacts on noise at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.

3.4.3.2 Alternative 2

Alternative 2 would include modifications to Building 408 or Building 410 interior systems (e.g., HVAC) and minor retrofitting; no other construction, renovation, or demolition activities would occur. Therefore, construction-related noise impacts would be negligible. Aircraft operations under Alternative 2 would be the same as those described under Alternative 1. Therefore, changes in noise exposure from proposed aircraft operations would be minimal, and no significant impacts on noise would occur.

Similar to Alternative 1, relocation of aircraft and personnel to MCAS Yuma would have negligible impacts on noise at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.

3.4.3.3 No-Action Alternative

Under the No-Action Alternative, a consolidated Marine Aviation OTEX would not be established and relocation of VMX-22 from MCAS New River to MCAS Yuma would not occur. Existing noise conditions would remain as described in Section 3.4.2, *Affected Environment*. Therefore, no impacts on noise would occur.

3.5 Safety and Environmental Health

The USMC practices Operational Risk Management as outlined in DoN Office of the Chief of Naval Operations 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 Yuma. Specifically, this section provides information on hazards associated with aviation safety, airfield safety zones, and explosives safety at the air station and within the BSTRC. Safety issues associated with hazardous materials and waste are discussed in Section 3.3, *Hazardous Materials and Waste*.

3.5.1 Affected Environment

3.5.1.1 Aviation Safety

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. Comprehensive operating procedures are employed by the USMC to reduce the potential for aircraft accidents and increase aviation safety. For example, flight activities must confirm with FAA-mandated restrictions, NATOPS flight instructions (e.g., Chief of Naval Operations Instruction 3710.7U), and applicable MCAS Yuma Station Orders (e.g., Station Orders 3710.6, P3710.4L, 3750.1B). In particular, MCAS Yuma Station Order P3710.4L specifies restrictions on flying over base housing, the Foothills and Mesa del Sol developments east of the station, and nearby schools and hospitals.

MCAS Yuma Station Order 3750.1B created the MCAS Yuma Bird Aircraft Strike Hazard (BASH) Reduction Program to minimize aircraft exposure to potentially hazardous bird and animal strikes through awareness, avoidance monitoring, and actively controlling bird and animal population movements. The MCAS Yuma BASH Program applies to all primary Marine Corps training airspace and ranges as they are scheduled, controlled, and utilized by MCAS Yuma personnel. Some of the procedures outlined in the program 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.

Other standard procedures include holding routine briefings for pilots and range operations personnel to review established safety practices and procedures and conducting ground inspections prior to ordnance delivery training events. Pilots are required to exercise caution to remain within approved flight routes and holding patterns. Flight leaders are assigned the responsibility for monitoring aircraft operations, correcting procedural errors, and directing aircraft to maintain safe operating procedures.

MCAS Yuma ATC also manages the airspace surrounding the station and its ranges and ensures deconfliction of both military and non-military traffic (refer to Section 3.1, *Airspace*, for more details). Therefore, controllers familiar with military aircraft capabilities and experienced at handling aircraft emergencies continuously monitor the regional airspace. Should an emergency occur, MCAS Yuma maintains detailed emergency and mishap response plans to react to an aircraft accident. These plans assign agency responsibilities and prescribe functional activities necessary to react to major mishaps, whether on- or off-station.

3.5.1.2 Airfield Safety Zones

Airfield safety clearances and Accident Potential Zones (APZs) are established around runways and identify where aircraft mishaps are most likely to occur. Land uses in these areas are limited for the protection of people and property on the ground. Three types of APZs apply to airfields based on aircraft mishap patterns: APZ I; APZ II; and the Clear Zone. 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. APZs established at MCAS Yuma, based on departure and arrival routes, are shown on Figure 3.5-1.

3.5.1.3 Explosive Safety

Siting requirements for explosive materials storage (e.g., ordnance) and handling facilities are based on safety and security criteria established by the DoD Explosive Safety Board. Specific locations on the airfield at MCAS Yuma are designed for loading and unloading of ordnance (e.g., Combat Aircraft Loading Area), and ammunition and bulk explosives are stored in magazines specifically designed, sited, and designated for this purpose. Additionally, Explosive Safety Quantity Distance (ESQDs) arcs are used to determine the distance between ordnance storage and handling facilities and inhabitable areas.

Regarding range activities, the BSTRC was developed to safely accommodate aviation ordnance use. Ordnance expenditure during training is limited to within restricted airspace on authorized target ranges. Additionally, target ranges are located only on range lands that are clearly posted as closed to the public. Range operations require that the surface area encompassing the weapon safety footprints be protected by purchase, lease, or other restriction to ensure the safety of personnel, structures, and the public from expended rockets, missiles, or target debris and hazardous operations.

3.5.2 Environmental Consequences

3.5.2.1 Alternative 1

Aviation Safety

MCAS Yuma currently serves similar types of fixed-wing aircraft, tilt-rotor aircraft, heavy lift helicopters, and light attack helicopters that are associated with proposed VMX-22 operations. The projected annual VMX-22 operations would add about 3,307[6] annual flight operations to the air station, which is less than a 3 percent increase compared to current operations. Such minimal change would have little effect on overall aviation safety at the air station.

Current aviation safety procedures, including BASH prevention, would continue to be implemented and additional airfield and training range flight operations would adhere to established safety procedures. In addition, the emergency and mishap response plans would be updated, as needed, to include procedures and response actions necessary to address a mishap involving any new aircraft platforms. With this update, safety conditions at MCAS Yuma and within the BSTRC would be similar to existing conditions. Therefore, no significant impacts associated with aircraft mishaps or mishap response would occur.

Airfield Safety Zones

Proposed construction activities related to Alternative 1 would also be consistent with established safety clearances and APZs. A portion of the proposed aircraft parking apron is located within the "State Clear Zone" (Figure 3.5-1). No other portions of the Alternative 1 footprint are located within an APZ or Clear Zone. Development within these areas would comply with all applicable federal and state regulations. Therefore, construction activities would not result in any greater safety risks than existing conditions, and no significant impacts related to APZs would occur.

Alternative 1 would result in a small (less than 3 percent) increase in aircraft operations at the air station. However, aircraft operations would follow established approach and departure patterns, and no new flight tracks would be established. Therefore, proposed Marine Aviation OTEC and VMX-22 operations at MCAS Yuma would not affect or create a need to change the established safety clearances and APZs. Therefore, no significant impacts on safety and environmental health would occur.

[6] This does not include VMX-22-related F-35B operations because these are considered to be existing operations (refer to Table 2.1-1).

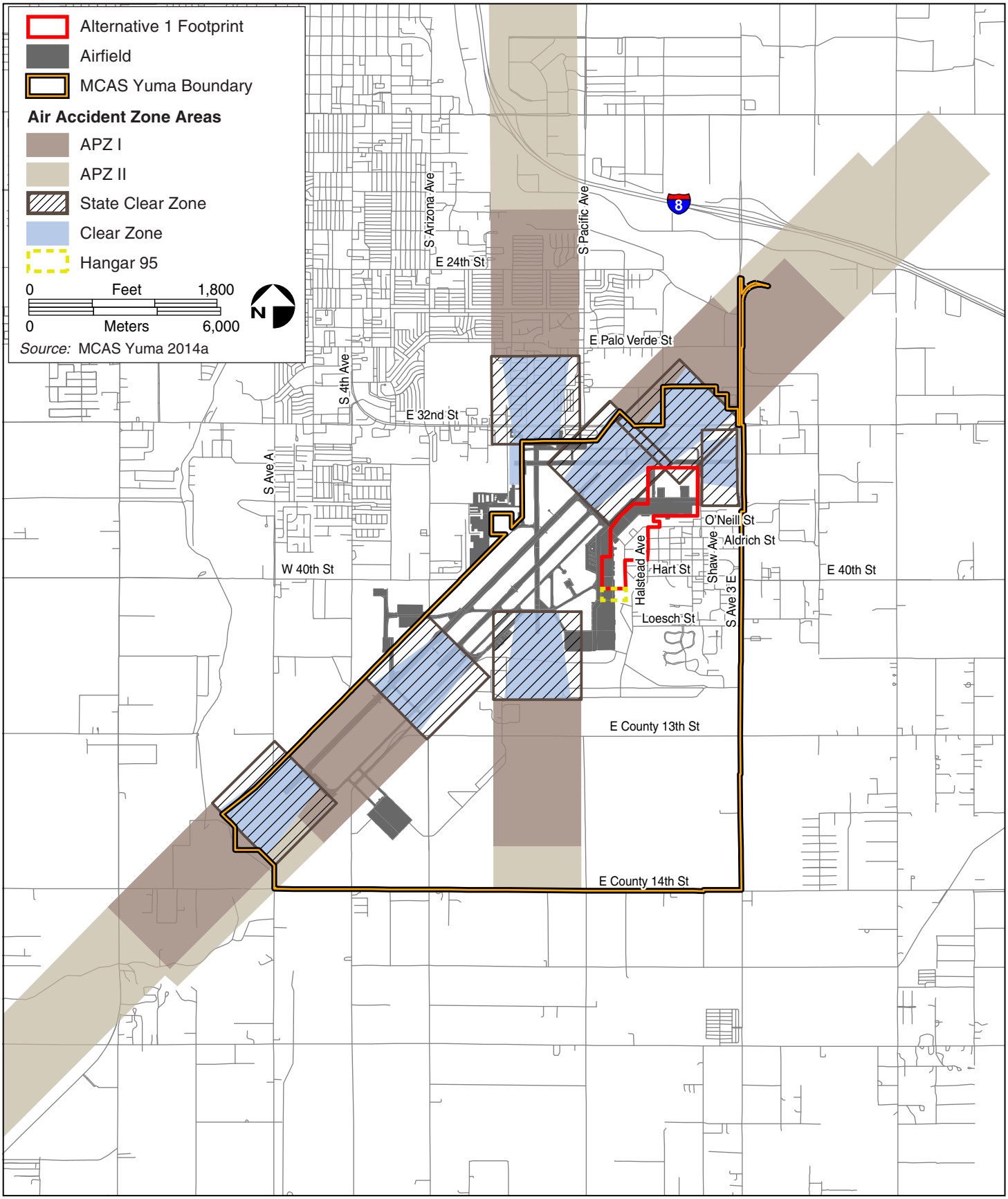


Figure 3.5-1. MCAS Yuma Accident Potential Zones and Clear Zones

Explosive Safety

Proposed ordnance storage and loading/unloading of aircraft would occur within existing facilities along the flightline designated for those purposes. No new ordnance storage facilities are proposed. The Alternative 1 footprint is not located within an established ESQD arc, and proposed construction, renovation, and infrastructure improvements related to Alternative 1 would be consistent with established ESQD siting requirements. Therefore, construction activity and subsequent operations at the air station would not result in any greater risks, and no significant impacts on safety and environmental health would occur.

Ordnance expenditures associated with training exercises would only occur within designated BSTRC airspace and training ranges specifically designed for air-to-ground delivery. These ranges and targets have standard procedures (e.g., weapons safety footprints, entrance restrictions) in place to ensure safety of personnel on the ground during range exercises and during ordnance clean-up and clearance activities. Alternative 1 would result in a slight increase in operations over existing conditions. However, the associated safety risk would not be substantially greater than existing conditions. Therefore, no significant impacts related to ordnance expenditure would occur.

Relocation of aircraft and personnel to MCAS Yuma would have negligible impacts on safety and environmental health at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.

3.5.2.2 Alternative 2

Alternative 2 would include modifications to Building 408 or Building 410 interior systems (e.g., HVAC) and minor retrofitting; no other construction, renovation, or demolition activities would occur. Therefore, construction-related safety and environmental impacts would be negligible. Proposed operations under Alternative 2 would be the same as those described under Alternative 1. Although Alternative 2 would result in a slight increase in operations over existing conditions, the associated safety risk would not be substantially greater than existing conditions. Therefore, no significant impacts on safety and environmental health would occur.

Similar to Alternative 1, relocation of aircraft and personnel to MCAS Yuma would have negligible impacts on safety and environmental health at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.

3.5.2.3 No-Action Alternative

Under the No-Action Alternative, a consolidated Marine Aviation OTEC would not be established and relocation of VMX-22 from MCAS New River to MCAS Yuma would not occur. Existing safety and environmental health conditions would remain as described in Section 3.5.1, *Affected Environment*. Therefore, no impacts on safety and environmental health would occur.

3.6 Community Facilities and Services

Community facilities and services include housing, health services, security services, fire protection, education, and parks and recreational services. The following section evaluates whether increased military personnel and their families associated with the proposed action would have an effect on community services available in the Yuma area.

3.6.1 Affected Environment

3.6.1.1 Housing

Military family housing at MCAS Yuma includes 821 units, the majority of which are located on the air station (DoN 2010a). As of January 2009, 780 units (95 percent) were occupied by 823 military personnel and 1,646 family members. In addition, a total of 1,832 permanent and transient personnel live in barracks on the station (DoN 2010a). Outside of the air station, there were 74,140 housing units in Yuma County in 2000, 72.6 percent of which were occupied (DoN 2010a). This is compared to 76.2 percent for the City of Yuma and 86.8 percent for Arizona (DoN 2010a).

3.6.1.2 Health Services

Health services on MCAS Yuma are provided by the Branch Health Clinic, an outpatient ambulatory healthcare facility, which provides services to active duty service members and their family members. Services provided at the clinic include radiology, immunizations, optometry, physical therapy, mental and occupational health, laboratory services, and dental services (Branch Health Clinic 2010, NHCP 2014). The Yuma Regional Medical Center, a not-for-profit hospital, provides medical services for the City of Yuma and surrounding communities. The hospital is complemented by other outpatient clinics, long-term retirement homes, and assisted living complexes (DoN 2010a, YRMC 2015).

3.6.1.3 Security Services

At MCAS Yuma, the Provost Marshal's Office provides law enforcement and security. The Provost Marshal's Office advises the Commanding Officer on physical security and law enforcement at MCAS Yuma and coordinates with the Naval Criminal Investigative Service in security and counterintelligence matters. The jurisdiction of the Provost Marshal's Office extends from MCAS Yuma to the local training ranges (DoN 2010a). Law enforcement and security in the region surrounding MCAS Yuma is provided by the Yuma County Sheriff's Office and the Yuma Police Department. The Yuma County Sheriff's Office is comprised of three bureaus: the Administration Bureau; the Detention Bureau; and the Patrol Bureau. The Yuma Police Department, which has 266 certified peace officers, provides law enforcement and security within the 112 square mile area of the city of Yuma (City of Yuma 2015a).

3.6.1.4 Fire Protection

The MCAS Yuma Fire Station and Search and Rescue are located in the flightline area of MCAS Yuma and maintain fire protection mutual assistance agreements with the City of Yuma, Somerton, San Luis, Niland, and Wellton in Arizona, as well as with the City of Winterhaven and Imperial County in California (DoN 2010a). The Yuma Fire Department provides fire protection services for the City of Yuma, including emergency medical services, training, prevention, emergency management, support, and administrative services. The Yuma Fire Department operates six stations with six companies staffed with seven emergency apparatus strategically located throughout the city (City of Yuma 2015b).

3.6.1.5 Education

There are 50 K-12 schools in Yuma County, including 43 public schools and 7 private schools. In the eleven public school districts in Yuma, there are 32 elementary schools, 17 middle schools, 13 high schools and 44 pre-schools (Education.com 2015). Students residing on-station usually attend public schools located in the City of Yuma, including Palmcroft and Rolle Elementary Schools, Woodard Junior High School, and Kofa High School (DoN 2010a). Northern Arizona University and the University of

Phoenix have branch campuses in Yuma. Southern Illinois University and University of Phoenix have off-campus education programs at MCAS Yuma (DoN 2010a).

3.6.1.6 Park and Recreation Facilities

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. The Marine Corps Community Services manages the Lake Martinez Recreation Area, which offers activities including camping, fishing, boating, water sports, and wildlife viewing, located 39 miles north of MCAS Yuma (DoN 2010a). The City of Yuma and Yuma County offer numerous parks and recreational features, golf courses, and multiple sports facilities, including tennis complexes, swimming pools, handball and racquetball facilities, and baseball, softball, and soccer fields (DoN 2010a).

3.6.2 Environmental Consequences

3.6.2.1 Alternative 1

MCAS Yuma is required to proactively plan for and assess all essential services to ensure that the existing community facilities and services are adequate to accommodate military personnel and their families. MCAS Yuma routinely evaluates community facilities and services to account for fluctuations associated with new units assigned to the air station, deployment of existing units, and large-scale training events (e.g., Weapons and Tactics Instructor training) (DoN 2010a). Under Alternative 1, there would an increase of about 246 military personnel (32 officers and 214 enlisted), with an estimated 589 dependents and 50 contractor-support personnel. This increase in military personnel and dependents would represent a 0.4 percent increase in the general population of Yuma County (estimated population of 201,201 in 2013 [U.S. Census Bureau 2015]). Alternative 1 would result in a 4.8 percent increase in military personnel at MCAS Yuma (estimated population of 6,100 active duty personnel, civilian employees, and contractors [MCAS Yuma 2014a]). Approximately 67 percent of the additional military personnel and their dependents and all 50 contractor-support personnel would be required to live off-station. The small increase in military personnel and dependents and contractor-support personnel associated with Alternative 1 would have little effect on housing, health services, security services, fire protection, education, or parks and recreation. In addition, Alternative 1 would be consistent with surges in demands for community facilities and services at MCAS Yuma during large-scale training events. Therefore, no significant impacts on community facilities and services would occur.

Relocation of personnel to MCAS Yuma would have negligible impacts on community facilities and services at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.

3.6.2.2 Alternative 2

Proposed changes in military personnel and dependents under Alternative 2 would be the same as those described under Alternative 1. Although Alternative 2 would result in a slight increase in military personnel over existing conditions, this would have little effect on housing, health services, security services, fire protection, education, or parks and recreation. Therefore, no significant impacts on community facilities and services would occur.

Similar to Alternative 1, relocation of personnel to MCAS Yuma would have negligible impacts on community facilities and services at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.

3.6.2.3 No-Action Alternative

Under the No-Action Alternative, a consolidated Marine Aviation OTEC would not be established and relocation of VMX-22 from MCAS New River to MCAS Yuma would not occur. Existing community facilities and services conditions would remain as described in Section 3.6.1, *Affected Environment*. Therefore, no impacts on community facilities and services would occur.

3.7 Transportation

Transportation infrastructure includes the public roadway network, public transportation systems, airports, railroads, pedestrian/bicycle facilities, and waterborne transportation required for the movement of people, materials, and goods. The following section evaluates whether the proposed action would have the potential to impact pubic roadways that provide access to MCAS Yuma, station access control points or gates, and the internal roadway system.

3.7.1 Affected Environment

3.7.1.1 Local and Regional Traffic Circulation

MCAS Yuma is bordered by South Avenue 3E to the east, County 14th Street to the south, South 4th Avenue to the west, and 32nd Street (Business Highway 8) to the north. Regional access is provided from the east and west via Interstate 8 and Route 95 from the north and south (DoN 2010a). South Avenue 3E is a four-lane principal arterial between 32nd Street and East 40th Street that serves as an access point for MCAS Yuma; South Avenue 3E is a two-lane minor arterial between East 40th Street and County 13th Street. County 14th Street is a two-lane major collector between South Avenue A and South Avenue 3E. County 13th Street is a two-lane major collector that serves as an access point for the southern portion of MCAS Yuma. The level of service (LOS) of the roadway network serving MCAS Yuma and its vicinity is generally operating at LOS C or better (City of Yuma 2013). However, the segment of South Avenue 3E that provides access to MCAS Yuma currently operates at LOS F (DoN 2010a).

3.7.1.2 Traffic Circulation at MCAS Yuma

The primary entrance to MCAS Yuma (Main Gate) is located where Quilter and Hart Streets converge at South Avenue 3E. A second gate (North Gate) is on South Avenue 3E at the intersection of South Avenue 3E and O'Neill Street. A third gate, for ordnance movements only, is located at the southern boundary of the station. The Main Gate presently does not meet security requirements or have sufficient room for vehicle queuing and inspection. The major constraints affecting potential alterations to the Main Gate are its alignment with the existing traffic signal and the nearby Parade Deck. The North Gate also does not meet security requirements or have adequate truck inspection/turn around. Truck inspection is currently accomplished by utilizing the adjacent parking lot to the north, which impacts parking availability (MCAS Yuma 2014a).

The existing street network at MCAS Yuma consists mostly of low-speed two-lane roads that are well connected and generally sufficient. Vehicle circulation issues are primarily related to the streets leading to and from the gates, particularly during morning and afternoon peak periods (MCAS Yuma 2014a). Regular hours of operation at MCAS Yuma are 7:30 a.m. to 10:30 p.m. Mountain Standard Time, Monday through Friday and 10:00 a.m. to 6:00 p.m. Mountain Standard Time Saturday and Sunday. According to the 2008 Circulation & Parking Study, the station could add two additional squadrons and maintain an acceptable LOS on all streets except Quilter Street near the Main Gate (MCAS Yuma 2014a).

The MCAS Yuma street network includes the following:

- *Quilter Street and Cycle Track* – connects the Main Gate with the flight line. It is one of the major circulation routes on the station and serves high volumes of vehicle traffic and large numbers of pedestrians and cyclists on the separated cycle track;
- *O'Neill Circulator* – serves as the primary route for accessing the hangars and the North Gate. It is intended for relatively high vehicle volumes with low to moderate use by pedestrians and cyclists;
- *Secondary Streets* – are the most common type of streets on MCAS Yuma and are intended to serve moderate volumes of vehicle, pedestrian, and cycle traffic;
- *Residential Streets* – are located exclusively within the Family Housing district and are intended to serve mostly local residents; and
- *Service Streets* – provide access to special purpose areas on MCAS Yuma. They are used by trucks and other heavy vehicles. They are not ideal for use by pedestrians or cyclists.

3.7.2 Environmental Consequences

To assess the potential environmental consequences associated with transportation, increased utilization of the existing roadway system and access gates due to the potential increase of personnel is analyzed, as well as potential effects from construction activities. Impacts could occur from physical changes to circulation, construction-related traffic delays, and changes in traffic volumes. Adverse impacts on roadway capacities would be significant if roads with no history of capacity exceedance had to operate at or above their full design capacity as a result of implementation of the proposed action.

3.7.2.1 Alternative 1

Construction

Construction, renovation, and demolition activities would require the delivery of materials to and removal of construction-related debris from the Alternative 1 footprint. Trucks associated with these activities, along with construction crews, would either access the station via the North Gate using the O'Neill circulator or two secondary gates (open as needed) located off of South Avenue 3E at Loesch Street and North Ordnance Loop. Construction-related traffic would comprise only a small portion of the total existing traffic volume in the area and at MCAS Yuma. Increased traffic associated with these activities could contribute to short-term increased congestion at the entry gates, delays in the processing of access passes, and degradation of the affected road surfaces.

Additionally, intermittent traffic delays and temporary road closures could result in the immediate vicinity of the Alternative 1 footprint. Potential congestion impacts could be avoided or minimized by scheduling truck deliveries outside the peak inbound traffic time and using the secondary gates. Also, many of the heavy construction vehicles could be kept on-site or at existing construction staging/lay-down areas for the duration of the construction, renovation, and demolition activities, resulting in fewer additional trips. Potential traffic delays would be temporary, ending once construction activities have ceased. Therefore, no significant impacts on transportation would occur.

Operations

Under Alternative 1 there would be an additional 246 military personnel (32 officers and 214 enlisted) and 50 contractor-support personnel working at MCAS Yuma. Approximately 67 percent of the

additional military personnel and all 50 contractor-support personnel would be required to live off-station. This would equate to an increase of approximately 215 daily commuting trips to and from the station, assuming all personnel drive individually to the station. This increase in daily commuting traffic trips could increase congestion and queuing at the Main Gate during morning and evening rush hours. Should an issue arise, MCAS Yuma would coordinate with City of Yuma staff to adjust the timing of traffic lights to improve traffic flow. Because South Avenue 3E has a history of capacity exceedance, the marginal contribution of operations-related traffic to that exceedance would not be significant. Regional and local access roads as well as the MCAS Yuma street network have adequate capacity to accommodate the amount of additional traffic without major impacts on traffic flow, circulation, or LOS. Therefore, no significant impacts on transportation would occur.

Relocation of personnel to MCAS Yuma would have negligible impacts on transportation at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.

3.7.2.2 Alternative 2

Alternative 2 would include modifications to Building 408 or Building 410 interior systems (e.g., HVAC) and minor retrofitting; no other construction, renovation, or demolition activities would occur. Therefore, construction-related transportation impacts would be negligible. Proposed changes in military personnel and dependents under Alternative 2 would be the same as those described under Alternative 1. Regional and local access roads as well as the MCAS Yuma street network have adequate capacity to accommodate the small amount of additional traffic associated with the change in personnel without major impacts on traffic flow, circulation, or LOS. Therefore, no significant impacts on transportation would occur.

Similar to Alternative 1, relocation of personnel to MCAS Yuma would have negligible impacts on transportation at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.

3.7.2.3 No-Action Alternative

Under the No-Action Alternative, a consolidated Marine Aviation OTEC would not be established and relocation of VMX-22 from MCAS New River to MCAS Yuma would not occur. Existing transportation conditions would remain as described in Section 3.7.1, *Affected Environment*. Therefore, no impacts on transportation would occur.

3.8 Utilities and Infrastructure

Utilities and infrastructure include electricity, natural gas, water systems, sanitary sewer, solid waste disposal, and storm water drainage. The following section evaluates whether construction, renovation, and demolition activities and increased military personnel associated with the proposed action would have an effect on existing utilities and infrastructure in the Yuma area. Proposed BSTRC operations would not affect utilities or infrastructure on associated military ranges and; therefore, are not addressed further.

3.8.1 Affected Environment

3.8.1.1 Electricity

In 2010, eighty-four percent of the electrical power supplied to MCAS Yuma was provided by Arizona Public Service, with the remaining 16 percent provided by hydroelectric power through the Western Area Power Administration (DoN 2010a). Arizona Public Service is planning construction of the North Gila – Orchard 230 kV Line, with construction beginning in 2016. This project serves the need for electric

energy, improved reliability, and continuity of service for the greater Yuma area. The North Gila-Orchard line is expected to be in service in 2018 (Arizona Public Service 2014). Power for MCAS Yuma is distributed through Arizona Public Service lines to the MCAS Yuma substation, located near the water tower, and distributed throughout the station via five electrical distribution circuits (MCAS Yuma 2014a). A majority of the overhead lines at MCAS Yuma were replaced from 1990 through 2000 and the system is considered to be reliable (MCAS Yuma 2000). Electrical cables are present throughout MCAS Yuma, including along the flightline, and in the immediate project vicinity (MCAS Yuma 2014a). In addition, nineteen photovoltaic (solar) projects have been installed, with a capacity of 964 kilowatts (MCAS Yuma 2014a). The photovoltaic projects are typically located on parking shades and shed structures. A comparison of energy usage shows a 20 percent reduction in electricity usage from fiscal year 2003 to fiscal year 2012 (MCAS Yuma 2014a).

3.8.1.2 Natural Gas

Natural gas is provided to MCAS Yuma by a private utility, Southwest Gas Corporation (DoN 2010a). Natural gas used on-station is obtained through the Defense Fuel Support Contract Program allowing the station to competitively purchase natural gas at reduced rates from various suppliers. There are two gas meters located on-station, one south of the Main Gate and one north of the North Gate (DoN 2010a). Natural gas is distributed through Southwest Gas Corporation lines to the on-station distribution system, with distribution lines maintaining a constant pressure of 25 pounds per square inch (MCAS Yuma 2014a). Natural gas lines are located near the project footprint, generally south and east of O'Neill Street (MCAS Yuma 2014a).

3.8.1.3 Water System

The water supply system at MCAS Yuma provides the station with water for industrial and domestic consumption and fire suppression. The potable water supply for MCAS Yuma is obtained from the U.S. Bureau of Reclamation and on-station wells. The U.S. Bureau of Reclamation provides water sourced from the Colorado River downstream of the Davis Dam (Bureau of Reclamation 2015).

The MCAS Yuma Water Treatment Plant is comprised of three settling basins with a combined total capacity of 7.5 million gallons of water. After treatment, water is stored in various covered reservoirs and elevated storage tanks throughout the station and distributed to users through main and lateral distribution lines (MCAS Yuma 2014a). Water storage on-station includes one 500,000-gallon elevated water storage tank; two 750,000-gallon elevated tanks; two clear wells with a water storage capacity of 1.2 million gallons; a backwater tank with a capacity of 300,000 gallons; and an underground well that pumps water from below the station to provide an alternative backup source of water for the water treatment plant. This water is dispersed to various substations located throughout MCAS Yuma (MCAS Yuma 2014a). Existing water supplies at MCAS Yuma are adequate and accommodate surges in demands during large-scale training events.

3.8.1.4 Sanitary Sewer

MCAS Yuma generates wastewater from sanitary and industrial processes, including vehicle, equipment, and aircraft washing; fuels and aircraft component testing; and vehicle, aerospace ground equipment, and aircraft maintenance (DoN 2010a). The wastewater system on-station operates using a gravity flow system with three sanitary sewer lift stations. The wastewater is collected through a series of clay, poly vinyl chloride, and polyethylene pipes, ranging from 6 to 18 inches in diameter, and is delivered to the City of Yuma's interceptor line via Avenue 3E which is owned and maintained by MCAS Yuma (MCAS Yuma 2014a). Wastewater generated by MCAS Yuma is disposed of at the Figueroa Wastewater Treatment Facility within the City of Yuma. The City of Yuma provides wastewater treatment at the

Figueroa Avenue Water Pollution Control Facility and the Desert Dunes Water Reclamation Facility, which began service in June 2005 (City of Yuma 2012). The Figueroa Avenue Water Pollution Control Facility has the capacity to treat 12 million gallons a day and the Desert Dunes Water Reclamation Facility currently has the capacity to treat 3 million gallons a day. The Desert Dunes Water Reclamation Facility buildout capacity would handle twelve million gallons per day, with expansion occurring in three million gallon modules (City of Yuma 2012).

All wastewater discharges from MCAS Yuma are regulated under Sections 301, 304(b)(c)(e)(g), 306(b)(c), 307(b)(c), 308, and 501 of the Clean Water Act. The applicable regulations are found in 40 CFR Part 433.10, Subpart A, Metal Finishing. This permit is administered by the City of Yuma Pretreatment Division. MCAS Yuma is regulated as a significant industrial user, under Permit Number 0001. The permit requires MCAS Yuma to conduct monitoring for compliance at eight industrial outfall locations within the MCAS Yuma sanitary sewer collection system (MCAS Yuma 2015a). The outfalls consist of one recreational vehicle dump site and seven outfalls that are sampled including five wash rack discharges and two sewer manholes that discharge into the City of Yuma wastewater collection system (DoN 2010a).

3.8.1.5 Solid Waste Disposal

Municipal solid waste at MCAS Yuma is managed in accordance with the guidelines specified in the MCO P5090.2A (*Environmental Compliance and Protection Manual)*, Station Order P6280.3G (*Environmental Compliance and Protection Standard Operating Procedures)*, Station Order 4010.2E (*Solid Waste [Non-Hazardous] Recyclable Materials Program Standard Operating Procedure)*, and other applicable federal regulations, MCOs, and DoD Directives. In general, these regulations establish the requirement for installations to have a solid waste management program that incorporates the following: a solid waste management plan; procedures for handling, storage, collection, recycling, and disposal of solid waste; recordkeeping and reporting; and pollution prevention.

MCAS Yuma generates solid waste in the form of office trash, non-hazardous industrial wastes, normal municipal waste, and construction debris. These nonhazardous solid wastes are collected in dumpsters located throughout the station and are picked up by a contractor for disposal off-station. Solid waste collection and disposal are handled by a private contractor (currently Allied Waste Company) and delivered to one of five residential transfer sites managed by Yuma County: North Gila Valley; Dome Valley; Wellton; Tacna; and Dateland. The existing solid waste contract with Allied Waste Company will meet the needs of city residents and MCAS Yuma for the next 15 to 25 years (DoN 2010a). Commercial, industrial, and large load wastes not accepted at the transfer sites are delivered to Cocopah or Copper Mountain landfills. Hazardous waste is disposed under a separate contract through Defense Reutilization Management Organization. Industrial waste is managed by I&L Contracts Division (MCAS Yuma 2014a).

3.8.1.6 Stormwater Drainage

Stormwater drainage at MCAS Yuma consists of a series of dry wells, catch basins, retention basins, and inlets. Drainage primarily occurs by overland flow to storm drain inlets connected to a series of underground pipes, or percolates into the groundwater system via subsurface soils. Given the unique nature of the desert environment, including a low annual rainfall of approximately 1.75 inches (per year average from 1996 through 2008), rapid soil absorption rates, and relatively flat topography (slopes on-station are less than 2 percent), for a majority of the year demands on the storm drainage system are minimal (Western Regional Climate Center 2015). However, when rainfall does occur, localized flooding inundates the station's limited stormwater capacity (DoN 2009).

In general, the station is composed of four general drainage areas (watersheds) and three corresponding outfalls. Drainage from a majority of the station discharges to Parade Field or to the retention basins located between the runways and percolates into the ground. If overflow occurs at the Parade Field, stormwater runoff flows east through Outfall 2 into catch basins that discharge into the City of Yuma municipal separate storm sewer system. Outfall 1 collects runoff from the southwest portion of the station into a natural drainage swale. Outfall 3 collects stormwater runoff from the northern portion of the station where it joins runoff from the Yuma County Airport Authority's property line and discharges as overland flow into Yuma County-owned retention basins (MCAS Yuma 2006).

3.8.2 Environmental Consequences

3.8.2.1 Alternative 1

Under Alternative 1, there would an increase of about 246 military personnel (32 officers and 214 enlisted), with an estimated 589 dependents and 50 contractor-support personnel. This increase in military personnel and dependents would represent a 0.4 percent increase in the general population of Yuma County (estimated population of 201,201 in 2013 [U.S. Census Bureau 2015]). Alternative 1 would result in a 4.8 percent increase in military personnel at MCAS Yuma (estimated population of 6,100 active duty personnel, civilian employees, and contractors [MCAS Yuma 2014a]). Approximately 67 percent of the additional personnel and their dependents and all 50 contractor-support personnel would be required to live off-station. The small increase in personnel associated with Alternative 1 would have little effect on existing utilities and infrastructure. In addition, Alternative 1 would be consistent with surges in demands for utilities and infrastructure use at MCAS Yuma during large-scale training events.

Alternative 1 also would result in an increase in building facilities at MCAS Yuma, resulting in an incremental increase of utilities at MCAS Yuma. MCAS Yuma contains just over 400 buildings (excluding family housing), with total square footage in excess of 2,850,000 square feet. The increase in square footage under Alternative 1 would equate to a nominal percent increase in overall facility square footage on the station. Additionally, utility system modifications would be implemented to support the VMX-22 aircraft maintenance hangar, VMX-22 Integration Facility, VMFT-401 aircraft maintenance facility, ARFF facility, Hangar 103 renovations, and upgrades to existing buildings. Electrical and communication system improvements would include provisions for transformers and telecommunications infrastructure. Alternative 1 would also include exterior lighting for safety purposes to illuminate building areas. Additional utilities including HVAC, water (potable and fire protection systems), and sewer would also be installed to support construction and renovation of airfield facilities. All new utility lines would connect directly to existing infrastructure and systems within the Alternative 1 footprint, and existing utilities are considered adequate to accommodate the small increase in demands resulting from construction of new facilities.

Construction, renovation, and demolition activities would generate debris (e.g., steel, siding, concrete) that would require disposal. All materials would be disposed of in compliance with federal, state, local, and Marine Corps regulations for the collection and disposal of municipal solid waste from the station. Much of this material would be recycled or reused, or otherwise diverted from landfills. All non-recyclable construction and demolition waste would be collected in a dumpster until removal off-site and would be hauled away by the contractor to local landfills. All construction would comply with MCAS Yuma Solid Waste Management Plan, the *Environmental Compliance and Protection Manual* (MCOP5090.2A), and other applicable federal regulations, MCOs, Station Orders, and DoD Directives. In addition, all construction, renovation, and demolition materials would be recycled in accordance with the DoD Green Procurement Program and DoN Green Procurement Implementation Guide (2009).

The proposed aircraft parking apron and vehicle parking area would result in new impervious surfaces, potentially increasing stormwater runoff volume and peak discharge rates. This potential increase in stormwater runoff would be managed such that discharge exiting the Alternative 1 footprint post-construction would be equal to or less than existing conditions through the use of appropriately designed conveyance structures and implementation of stormwater Best Management Practices. Additionally, proposed construction, renovation, and demolition activities could temporarily affect the quality of stormwater runoff through potential increases in soil erosion. These activities can expose soils and during storm events, increasing sediment loading of the stormwater runoff. Alternative 1 would include Best Management Practices to manage stormwater runoff during construction, renovation, and demolition activities, including but not limited to the use of well-maintained silt fences or straw wattles, minimizing the surface area disturbed, stabilization of cut/fill slopes, minimization of earth-moving activities during wet weather, and covering soil stockpiles, as appropriate. Following construction, disturbed areas not covered with impervious surface would be reestablished with appropriate vegetation and native seed mixtures and managed to minimize future erosion potential. In accordance with the Clean Water Act Section 402 Arizona Pollutant Discharge Elimination System Program, Best Management Practices would be implemented during construction, renovation, and demolition to minimize runoff. A Notice of Intent would be filed with the ADEQ to obtain coverage under the Construction General Permit and a site-specific Storm Water Pollution Prevention Plan and associated Best Management Practices would be implemented for construction sites where one or more acres would be disturbed.

Construction, renovation, and demolition activities could result in short-term interruptions of utility services (e.g., electricity, water, gas) in the immediate project vicinity during construction activities. These interruptions would be temporary and are typical of construction activities. There could be a slight increase in utility demands during construction, renovation, and demolition activities. The energy supply on-station and in the region is adequate and would not be affected by temporary increases in demands related to construction, renovation, and demolition activities. Therefore, no significant impacts on utilities and infrastructure would occur.

Relocation of aircraft and personnel to MCAS Yuma would have negligible impacts on utilities and infrastructure at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.

3.8.2.2 Alternative 2

Alternative 2 would include modifications to Building 408 or Building 410 interior systems (e.g., HVAC) and minor retrofitting; no other construction, renovation, or demolition activities would occur. Therefore, construction-related utility and infrastructure impacts would be negligible. Proposed changes in military personnel and dependents under Alternative 2 would be the same as those described under Alternative 1. Existing station utilities are considered adequate to accommodate the nominal increase in demand resulting from increased military personnel and associated day-to-day operational activities. Therefore, no significant impacts on utilities and infrastructure would occur.

Similar to Alternative 1, relocation of aircraft and personnel to MCAS Yuma would have negligible impacts on utilities and infrastructure at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.

3.8.2.3 No-Action Alternative

Under the No-Action Alternative, a consolidated Marine Aviation OTEC would not be established and relocation of VMX-22 from MCAS New River to MCAS Yuma would not occur. Existing utility and

infrastructure conditions would remain as described in Section 3.8.1, *Affected Environment*. Therefore, no impacts on utilities and infrastructure would occur.

3.9 Cultural Resources

Cultural resources is an inclusive label used to encompass historic properties or traditional cultural properties and sacred sites valued by traditional communities (often, but not necessarily, Native American groups). Cultural resources are finite, nonrenewable resources, whose salient characteristics are easily diminished by physical disturbance; certain types of cultural resources also may be negatively affected by visual, auditory, and atmospheric intrusions.

Historic properties are defined in the federal regulations outlining Section 106 of the NHPA (54 USC §300101 *et seq.*), as amended, 36 CFR 800, as prehistoric and historic sites, buildings, structures, districts, or objects listed or eligible for listing on the National Register of Historic Places (NRHP), as well as artifacts, records, and remains related to such properties. 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). A traditional cultural property can be defined generally as one that is eligible for inclusion in the NRHP because of its association with cultural practices or beliefs of a living community that are rooted in that community's history and are important in maintaining the continuing cultural identity of the community.

In order to be eligible for the NRHP, a property must possess integrity of location, design, setting, workmanship, feeling, and association, and meet the criteria for evaluation in at least one area of significance as defined by the *Secretary of the Interior's Standards for Evaluation* (36 CFR 60):

a. associated with events that have made a significant contribution to the broad patterns of American history; or

b. associated with the lives of persons significant in our past; or

c. embody the distinctive characteristic of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value, or that represent a significant or distinguishable entity whose components may lack individual distinction; or

d. have yielded, or may likely yield, information important in prehistory or history.

Once the NRHP-eligibility of the properties has been determined, the federal agency must assess the effects that the undertaking or proposed action may have on any historic properties (i.e., finding of effect). Through consultation with federally recognized tribes who assert ancestral ties to the area, the federal agency attempts to identify any traditional cultural properties and sacred sites that may be affected by the undertaking. The agency then seeks concurrence from the State Historic Preservation Officer (SHPO) on their determinations and findings.

3.9.1 Affected Environment

The ROI, and therefore the affected environment, for the proposed action includes the construction, renovation, and demolition footprint at MCAS Yuma. In addition, this analysis incorporates a 200-foot buffer around the ground disturbance to account for any direct or indirect effects caused by the ground disturbing activities. Proposed VMX-22 operations within the BSTRC would be consistent with existing, approved training activities within the BSTRC and, therefore, are not addressed further.

3.9.1.1 Prehistoric and Historic Setting

The following discussion of prehistory and history of the Sonoran Desert region of southwestern Arizona is condensed from the overview in the *Barry M. Goldwater Range Integrated Cultural Resources Management Plan – Part I* (56th Range Management Office [RMO] and MCAS Yuma 2008), the *Phase I Cultural Resources Survey for the Proposed Consolidated Club at Marine Corps Air Station Yuma* (Apple 1996) and site forms for two archaeological sites.

Regional Prehistory

The regional prehistory is divided into the Paleo-Indian (or Early), Archaic, and Late Prehistoric periods.

The Paleo-Indian period ranges from approximately 12,000 Before Christ (BC) to 5000 BC. It is represented by an artifact assemblage known as the San Dieguito complex that consists almost entirely of flaked stone tools associated with a hunting and gathering economy, including the hunting of big game. Sites typically are located on terraces near water-bodies such as washes and now extinct Pliestocene Lakes (Apple 1996, MCAS Yuma 2010).

The Archaic period ranges from 5000 BC to Anno Domini (AD) 700. It is a period generally characterized as a time when regional adaptations became well established within diverse local conditions, but is not well represented in the Sonoran Desert region. Potential causes for the paucity of Archaic-period sites in the region include climatic conditions unfavorable to human exploitation and occupation, or destruction or obscuration of sites by later natural or human processes.

The Late Prehistoric period in the Sonoran Desert is represented by the Patayan I cultural complex, which dates roughly from AD 700 to the historic period. This period is characterized by marked changes in human settlement patterns, economic system, and the artifact assemblage. Artifacts typically encountered from this period include paddle and anvil ceramics and small projectile points indicative of adoption of the bow and arrow. Subsistence included floodplain horticulture featuring maize, beans, squash, and other crops, possibly introduced from peoples to the south in what is now Mexico. During the Patayan II Phase, Lake Cahuilla (950 AD) covered a large amount of the nearby Imperial Valley in California. Approximately 500 AD the Lake began to recede and a third phase began; Patayan III. Traits of Patayan II continued, however kinship systems, rock art, and trading networks became increasingly complex (Apple 1996, 56th RMO and MCAS Yuma 2008).

History of the MCAS Yuma Area

As early as 1539, the Spanish began to explore parts of the Southwest, and were the first Europeans to venture into the area around the lower Colorado River. Spanish exploration for the next 200 years was intermittent in this area as it was considered remote and difficult to access. A transportation route called Camino del Diablo, or the Devil's Highway followed various routes throughout the course of history that stretched between Mexico and California. The route was established prior to 1540. This route would be used by Melchior Diaz in 1540, and later by Father Eusebio Kino in 1699 and 1701 as he traveled to establish missions in the Southwest (Arizona State Parks 1976, Apple 1996, MCAS Yuma 2010).

In the late 1700s, various Spanish expeditions led by Father Francisco Garcés (1771), Pedro Fages (1772), and Captain Juan Bautista de Anza (1774) established overland routes to travel between missions, thus, opening up the region to travel through the area that is now Yuma. Two missions were established near the confluence of the Gila and Colorado rivers. Attacks on these missions by the Quechan caused the Spanish to abandon their overland routes. Development in the Sonoran Desert was largely dependent on transportation and water. With the transfer of portions of Mexico to the U.S. and the discovery of gold in

California in 1848, an influx of immigrants from the east into California led to the establishment of wagon roads, a mail route, and a stage line along Anza's route (Apple 1996, MCAS Yuma 2010).

When gold and silver was discovered along the Colorado River and throughout the western portions of Arizona and with the influx of people and the demand for supplies, Yuma became a hub for supplies from ships and wagons that would load the supplies and bring them to smaller mining camps. The Camino del Diablo route reopened around the 1840s and 1850s to accommodate the rush of people searching for gold. The route was unsafe causing people to start using the Santa Cruz-Gila River Route. Transportation to and through the area advanced further with the 1872 construction of the Southern Pacific Railroad from Los Angeles to present-day Indio and Yuma, and the 1881 linking of the Southern Pacific and the Atchison, Topeka, and Santa Fe railroads (Arizona State Parks 1976, Apple 1996, MCAS Yuma 2010).

MCAS Yuma began as a municipal airfield, Fly Field, and continued as such for over 10 years until World War II. Fly Field was taken over by the Army Air Force to develop an advanced flying school for training purposes. The field was renamed Yuma Army Air Base. The increase in military activity in the region began to strengthen regional economies until after World War II when Yuma was declared surplus. Most of the buildings were sold and many people moved into the neighboring towns. The airfield was reopened to civilian flights. In 1951, during the Cold War, Yuma Air Base was reactivated. The base was renamed two times after reactivation: in 1956 to Vincent Air Force Base; and in 1959 to Marine Corps Auxiliary Air Station. MCAS Yuma continues to host military training and civilian flights out of the airfield (Apple 1996, MCAS Yuma 2010, MCAS Yuma 2015b).

3.9.1.2 Cultural Resources within the Affected Environment

The ROI is defined within this analysis as the construction, renovation, and demolition footprint and a 200-foot buffer around the ground disturbance footprint[7]. MCAS Yuma staff conducted a record search of a 1-mile radius around the project footprint to determine if there were any historic properties that could be affected by the proposed action. The air station is underlain by native soils that have been disturbed to the point that a survey would not produce any intact evidence of previous use.

Traditional Cultural Resources

There are no known traditional cultural resources within the ROI.

Archaeological Resources

A records search, conducted by MCAS Yuma staff, identified four sites within a 1-mile radius of the ROI, two of which are located on MCAS Yuma. The four sites include a quartz excavation site, a historic debris scatter, historic State Route 80, and a World War II railroad spur. None of the sites are located within or immediately adjacent to the ROI and, therefore, they are not discussed further.

Historic Buildings and Structures

There are 112 permanent and semi-permanent buildings and structures within the ROI. The buildings all support military operations. Of these buildings, 81 are either greater than 50 years old, and/or built within the Cold War Era (1946-1989).

[7] The ROI for Alternative 2, therefore, is smaller than the ROI for Alternative 1, because of its smaller project footprint.

3.9.2 Environmental Consequences

The regulations implementing Section 106 of the NHPA require that federal agencies take into account the effects (impacts) of their undertakings (proposed actions) on historic properties (cultural resources that are eligible for nomination to the NRHP). Impacts on cultural resources are considered significant if a historic property, as defined in 36 CFR 60.4, would be physically damaged or altered, would be isolated from the context considered significant, or would be affected by project elements that would be out of character with the significant property or its setting.

3.9.2.1 Alternative 1

It is anticipated that no buildings outside of the construction and demolition footprint (footprint) for Alternative 1 would be directly or indirectly impacted by the proposed action; visually, aesthetically, or otherwise. The demolition and construction would be completed in a manner that is consistent with other recent facility erections in the vicinity, such as Building 157 – a recently constructed hangar on the property adjacent to the proposed VMX-22 aircraft maintenance hangar. Of the 78 buildings within the ROI that are greater than 50 years old, or were built within the Cold War Era (1946-1989), 16 are located between the perimeter of the Alternative 1 footprint and the extent of the ROI, eliminating the need for impact assessment on those 16 buildings and structures in this EA (refer to Appendix E for details). Out of the 62 potentially affected buildings, those that are eligible for the NRHP will be assessed for direct and indirect impacts that would result from the implementation of Alternative 1.

In addition to the significance criteria a-d listed above, a building that is less than 50 years old – built after 1965 for the purposes of this assessment – can be eligible for the NRHP if it possesses exceptional importance (Criteria Consideration g) under the Cold War theme (1946-1989). A 1996 historic buildings inventory (Van Wormer et al. 1996) evaluated several World War II and Cold War Era buildings, and concluded that the Cold War era buildings on MCAS Yuma are not eligible for the NRHP under Criteria Consideration g. Twenty-seven buildings within the footprint fall into this category. Three buildings within the footprint are considered eligible for the NRHP, and effects to these buildings have been mitigated through the Advisory Council on Historic Preservation 2006 Program Comment for World War II and Cold War Era (1939-1974) Ammunition Storage Facilities (ACHP 2006). A 2010 inventory conducted for the F-35B West Coast Basing EIS (Thursby 2010) evaluated seven Cold War Era structures within the current footprint as not eligible for the NRHP. In addition, a 2011 historic context study (JRP Consulting) concluded that certain structure types (e.g., hazardous waste pads, canopies, shelters, and utility related structures) are not eligible for the NRHP because they possess virtually no potential for significance; there are five such structures within the footprint. SHPO concurrence has been received for the eligibility determinations on these 42 buildings and structures.

The other 20 buildings out of the 62 within the footprint were recently evaluated as part of a station wide study; eight were recommended not eligible and 12 recommendations are pending but anticipated to be not eligible. MCAS Yuma has determined that the eight buildings are not eligible for the NRHP and anticipates the same for the remaining 12. As part of the NHPA Section 106 consultation for the proposed project, MCAS Yuma will seek SHPO concurrence prior to authorization of construction (Special Conservation Measure 5) (refer to Appendix B for details).

Special Conservation Measure 5: SHPO Concurrence. MCAS Yuma Range Management Department would obtain concurrence from SHPO on their determinations prior to authorization of construction in accordance with 36 CFR 800.

While there are no known traditional cultural resources or archaeological sites within the ROI, and nothing in the literature review and consultation efforts indicates a potential for subsurface deposits, the

possibility for unanticipated discoveries exists. Potential impacts to possible post-review discoveries would be reduced by implementing Special Conservation Measure 6 (*Post Review Discovery Procedures*) (refer to Appendix B for details).

Special Conservation Measure 6: Post Review Discovery Procedures. While not anticipated, in the event that previously unrecorded archaeological resources, cultural items, or human remains are encountered during ground disturbing activities, MCAS Yuma would manage these resources in accordance with the NHPA and other federal laws and regulations, Marine Corps and DoD regulations and instructions and orders, and DoD American Indian and Alaska Native Policy.

Relocation of aircraft and personnel to MCAS Yuma would have no impacts on cultural resources at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.

3.9.2.2 Alternative 2

Alternative 2 would include modifications to Building 408 or Building 410 interior systems (e.g., HVAC) and minor retrofitting; no other construction, renovation, or demolition activities would occur. Building 408 and Building 410 are not eligible for the NRHP and, therefore, there would be no construction-related impacts to cultural resources. The minor increases in operations would be consistent with current conditions and would not cause an adverse effect to any historic properties within the ROI or the 1-mile radius outside of the ROI. Therefore, no impacts on cultural resources would occur.

Similar to Alternative 1, relocation of aircraft and personnel to MCAS Yuma would have no impacts on cultural resources at MCAS New River, Edwards Air Force Base, and Naval Air Weapons Station China Lake.

3.9.2.3 No-Action Alternative

Under the No-Action Alternative, a consolidated Marine Aviation OTEC would not be established and relocation of VMX-22 from MCAS New River to MCAS Yuma would not occur. Existing cultural resources conditions would remain as described in Section 3.9.1, *Affected Environment*. Therefore, no impacts on cultural resources would occur.

4 Cumulative Impacts

4.1 Introduction

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

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

CEQ's guidance for considering cumulative effects states that NEPA documents "should compare the cumulative effects of multiple actions with appropriate national, regional, state, or community goals to determine whether the total effect is significant" (CEQ 1997).

The first step in assessing cumulative effects, therefore, involves identifying and defining the scope of other actions and their interrelationship with the proposed action or alternatives. The assessment must consider other projects that are near or coincide, spatially or temporally, with the proposed action and other actions. Section 4.2, *Projects Considered in the Cumulative Analysis*, identifies relevant past, present, and reasonably foreseeable future actions. Projects were selected because they are either similar to the proposed action, large enough to have far reaching effects, or in proximity to the proposed action. Section 4.4, *Cumulative Impact Analysis*, provides an analysis of cumulative impacts for relevant environmental resources, and further defines the ROI and relevant projects for each resource area.

4.2 Projects Considered in the Cumulative Analysis

Information on past, present, and reasonably foreseeable future projects and their associated anticipated impacts was gathered through a review of available environmental documentation (conducted in February 2015) and in coordination with the Marine Corps. The majority of reasonably foreseeable future projects are construction, renovation, and/or demolition of air station facilities and support infrastructure identified in the MCAS Yuma Master Plan (MCAS Yuma 2014a). One proposed cumulative project, Unmanned Aerial Vehicle Squadron 1 (VMU-1) Relocation to MCAS Yuma, would include the transition of aircraft and personnel from MCAGCC to MCAS Yuma and construction/demolition of airfield facilities. Another proposed cumulative project includes taxiway improvements for rotary wing aircraft. A list of the cumulative projects, summary information, and their associated impacts are presented in Appendix F.

4.3 Methodology

4.3.1 Geographic Scope of the Cumulative Effects

For this analysis, a geographic scope, or ROI, for each cumulative effects issue was established. The ROI is generally based on the natural boundaries of the resources affected, rather than jurisdictional boundaries. The geographic scope may be different for each cumulative effects issue. The geographic scope of cumulative effects often extends beyond the scope of the direct effects, but not beyond the scope of the direct and indirect effects of the proposed action and alternatives. However, if the proposed action and alternatives are determined to have no direct or indirect effects on a resource, no future cumulative

effects analysis is necessary. ROIs are defined in Section 4.4, *Cumulative Impact Analysis*, for each resource listed below. Because ROIs vary for different resources, not all of the cumulative projects would be located within the ROIs defined for a particular resource.

4.3.2 Time Frame of the Cumulative Effects Analysis

A time frame for each issue related to cumulative effects has been determined. The time frame is defined as the duration of the effects anticipated. Time frames, like geographic scope, can vary by resource. Each project in a region has its own implementation schedule, which may or may not coincide or overlap with the schedule for implementing the proposed action. This is a consideration for short-term impacts from the proposed action. However, to be conservative, the cumulative analysis assumes that all projects in the cumulative scenario are built and operating during the operating lifetime of the proposed action.

Past actions are projects that have been approved and/or permitted, and that have either very recently completed construction/implementation or have yet to complete construction/be implemented. Present actions are actions that are ongoing at the time of the analysis. Reasonably foreseeable future actions are those for which there are existing decisions, funding, or formal proposals, or which are highly probable based on known opportunities or trends. However, these are limited to within the designated geographic scope and time frame. Reasonably foreseeable future actions are not limited to those that are approved for funding. However, this analysis does not speculate about future actions that are merely possible, but not highly probable based on information available at the time of this analysis.

For this cumulative effects analysis, the time frame considered for cumulatively considerable projects includes projects recently approved or completed that are not yet addressed as part of the existing conditions of the area, projects under construction, and projects that are in the environmental review or planning process and for which enough information is available to discern their potential impacts. Projects for which no or insufficient information is known, or for which substantial uncertainty exists regarding the project, are considered speculative and are not evaluated as part of this analysis.

4.4 Cumulative Impact Analysis

This section addresses the potential cumulative impacts of the proposed action in conjunction with the aforementioned cumulative projects. These projects represent past, present, and reasonably foreseeable actions with the potential for cumulative impacts when considered in conjunction with the potential impacts from the proposed action. However, if a project would not result in direct or indirect impacts on a resource area, it would not contribute to a cumulative impact on that resource area and no further evaluation from a cumulative impact perspective is warranted. The cumulative impact analysis focuses on 1) those resource areas with the potential to be significantly impacted by the proposed action; and/or 2) those resource areas currently in poor or declining health or at risk even if impacts associated with the proposed action would be relatively small (less than significant). The resources that do not meet these criteria are hazardous materials and waste (Section 3.3), safety and environmental health (Section 3.5), community facilities and services (Section 3.6), transportation (Section 3.7), and utilities and infrastructure (Section 3.8). Therefore, the proposed action would not cumulatively contribute to impacts to these resources areas, and they are not evaluated further in this section.

4.4.1 Airspace

The geographic scope of the airspace cumulative analysis includes the airspace over much of southern California and western Arizona. This regional airspace (and elsewhere) is becoming more and more crowded due to increasing commercial, private, and military aviation demands. The FAA has to consider multiple and sometimes competing demands, while managing airspace conditions to satisfy all aviation

users. Regarding the proposed action, the change in proposed aircraft operations under Alternatives 1 and 2 would not alter any airspace configurations, and it would not impact current or future military and general aviation uses of the airspace. One proposed military project could affect airspace use: the relocation of VMU-1 from MCAGCC to MCAS Yuma. This project would likely increase UAS operations within the BSTRC. Similar to the proposed action, VMU-1 UAS operations would be integrated and conducted in accordance with the FAA and USMC requirements governing the different system types and their airspace uses. Therefore, the cumulative impacts identified for airspace from the proposed action, in conjunction with other projects on and in the regional vicinity, would not be cumulatively significant.

4.4.2 Air Quality

4.4.2.1 Criteria Pollutants

The ROI for the criteria air pollutant cumulative analysis is primarily Yuma County. As described in Section 3.2, *Air Quality*, construction and operation of the alternatives would produce emissions that would remain below all emission significance thresholds. Emissions from cumulative projects potentially would contribute to ambient pollutant impacts generated from proposed activities. However, these emissions would occur far enough away from the locations of proposed construction and operational activities such that they would produce low ambient pollutant impacts in proximity to the project footprint. Therefore, air quality impacts from proposed construction and operational emissions, in combination with emissions from cumulative projects, would not be substantial enough to contribute to an exceedance of an ambient air quality standard. Implementation of standard fugitive dust and construction equipment emission control measures (Special Conservation Measures 1 and 2; Appendix B) would ensure that air emissions from proposed construction activities would produce less than significant impacts. As a result, proposed construction, renovation, and demolition activities would not produce cumulatively significant impacts on criteria pollutant levels.

4.4.2.2 Greenhouse Gases

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

Currently, there are no formally adopted or published NEPA thresholds of significance for GHG emissions. Therefore, in the absence of an adopted or science-based NEPA significance threshold for GHGs, this EA compares the maximum amount of combined construction and operational GHG emissions that would occur from both alternatives to the U.S. net GHG emissions inventory of 2012 (USEPA 2014c) to determine the relative increase in proposed GHG emissions. Appendix C presents estimates of GHG emissions generated by the alternatives.

Table 4.4-1 summarizes the maximum annual GHG emissions generated from both alternatives. These data show that the ratio of CO_2e emissions from the alternatives to the CO_2e emissions associated with the net U.S. sources in 2012 is approximately 0.009/5,547 million metric tons, or about 0.0002 percent of the U.S. CO_2e emissions inventory. Since GHG emissions from the alternatives would equate to minimal amounts of the U.S inventory, they would not substantially contribute to global climate change. Therefore, GHG emissions from the alternatives would not produce cumulatively significant impacts to global climate change.

Table 4.4-1. Maximum Annual GHG Emissions from the Alternatives

Scenario	*Metric Tons per Year* [1]			
	CO_2	*CH_4*	*N_2O*	*CO_2e*
Emissions from Alternatives	-	-	-	8,973
U.S. 2012 Net Emissions (10^6 metric tons)[2]	-	-	-	5,547
Emissions as a percent of U.S. Emissions	-	-	-	0.0002

Source: USEPA 2014c.
Notes: CO_2 = carbon dioxide; CH_4 = methane; N_2O = nitrogen dioxide; CO_2e = carbon dioxide equivalent
$CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 296)$.

Although the alternatives would not produce significant cumulative impacts to global climate change, the new buildings proposed under Alternative 1 would include sustainable design principles and energy conservation measures, including LEED® standards to the extent feasible. These design measures are consistent with the broad-based programs the USMC and DoN implement to reduce energy consumption and to shift to renewable and alternative fuels, thereby reducing overall emissions of GHGs.

Renewable energy projects currently implemented and planned within the jurisdiction of MCI West would reduce emissions of GHGs by about 250,000 metric tons from current operations over a 25-year life cycle (MCI West 2009). These projects include thermal and photovoltaic solar systems, geothermal power plants, and wind generators. These renewable energy initiatives are not proposed as emission reductions to directly offset GHG emissions produced by either action alternative, but rather demonstrate initial responses for DoN compliance with EO 13693 and to factor GHG management into DoN proposals and impact analyses.

Climate Change Adaptation

In addition to assessing whether the alternatives would potentially impact climate change, the following considers how climate change could impact these actions and what adaptation strategies, if any, would be required to respond to these future conditions. For projects within southwest Arizona, the main effect of climate change to consider is increased aridity, as documented in *Climate Change Impacts in the United States: The Third National Climate Assessment* (USGCRP 2014). This report predicts that in the future, this region will experience increased droughts, temperatures, wildfires, and scarcities of water supplies. Current operations at MCAS Yuma have adapted to droughts, high temperatures, and scarce water supplies in the area. Exacerbation of these conditions in the future could impede proposed activities during extreme events. Due to its desert surroundings and sparse vegetation, an increase in wildfires in the region would have little to no effect on activities at MCAS Yuma or the adjacent auxiliary airfields. No other substantial effects from future climate change would impact proposed construction and operational activities.

4.4.3 Noise

The ROI for potential cumulative impacts to noise consists of the project footprint and adjacent areas on MCAS Yuma and surrounding communities. Development throughout MCAS Yuma and the surrounding areas would result in intermittent, short-term noise impacts throughout the region. The duration of these localized impacts would be limited to the construction phases of the individual projects and confined to the immediate construction area. Cumulative projects would comply with applicable federal, state, and local regulations and/or requirements. Proposed construction, renovation, and demolition activities associated with Alternative 1 would occur at MCAS Yuma. Short–term noise associated with construction activities could range from 80 to 90 dB at 50 feet from the source. However, construction-related noise associated with this alternative would occur near the flightline, where noise would be

compatible with current and ongoing activities, and would be isolated from any off-station communities. Similar to Alternative 1, noise impacts from other proposed construction projects near the flightline that may coincide in time with the proposed action would be compatible with current and ongoing military activities at the air station, and would be isolated from any off-station communities. Therefore, cumulative construction-related noise impacts from Alternative 1, in conjunction with other projects in the regional vicinity, would not be cumulatively significant.

Alternative 2 would include modifications to Building 408 or Building 410 interior systems (e.g., HVAC) and minor retrofitting; no other construction, renovation, or demolition activities would occur. Therefore, cumulative construction-related noise impacts from Alternative 2, in conjunction with other projects in the regional vicinity, would not be cumulatively significant.

One proposed military project (relocation of VMU-1 to MCAS Yuma) would generate increased levels of aircraft activity at MCAS Yuma and within the BSTRC that could increase noise levels affecting adjacent sensitive noise receptors (although smaller UAS aircraft are notably quieter than other aircraft). The proposed VMX-22 aircraft operations under both alternatives also would increase aircraft operations at MCAS Yuma and within the BSTRC. However, the noise exposure under both alternatives is similar to baseline conditions, and the increase in noise levels associated with the alternatives at sensitive receptor locations would be minimal (i.e., less than 0.5 dB) compared to baseline conditions. Even with an increase in UAS operations associated with VMU-1, it is anticipated that the existing F-35B would be the dominant source for defining noise impacts at MCAS Yuma and within the BSTRC. Therefore, the cumulative operations-related noise impacts from either alternative, in conjunction with other cumulative projects, would not be cumulatively significant.

4.4.4 Cultural Resources

The ROI for potential cumulative impacts on cultural resources consists of MCAS Yuma and adjacent communities. Regional development and urbanization in southwestern Arizona has resulted in extensive impacts on cultural resources, especially the destruction of archaeological sites and historic buildings. These types of cultural resources are limited, which is one of the reasons why strict federal and state regulations have been implemented to provide management and regulatory oversight.

Present and reasonably foreseeable projects at MCAS Yuma that involve ground disturbing activities and/or modification or demolition of buildings or structures could result in impacts to cultural resources. Federal projects that have the potential to affect historic properties (assuming the presence of such properties) would undergo NHPA Section 106 review to consider any effects that the project may have on historic properties (as defined at 36 CFR 800.16). The significance of any effects would also be reviewed under NEPA.

As discussed in Section 3.9, *Cultural Resources,* 62 buildings would be directly or indirectly impacted from the construction, renovation, and demolition activities. Of these 62 buildings, 42 have been previously determined not eligible for the NRHP, and the SHPO has concurred with those determinations. MCAS Yuma anticipates SHPO concurrence on pending not eligible determinations for the other 20 buildings, as well as a finding of No Historic Properties Affected. Implementation of Special Conservation Measure 5 (*SHPO Concurrence*) would require SHPO concurrence prior to authorization of construction. The potential to impact previously unrecorded cultural resources during ground disturbing activities would be reduced by implementing Special Conservation Measure 6 (*Post Review Discovery Procedures*). Similarly, other cumulative projects would be subject to Section 106 review to consider their potential impacts to cultural resources as is required for Alternative 1. As a result, Alternative 1, combined with other cumulative projects, would not result in significant cumulative impacts to cultural resources.

Alternative 2 would include modifications to Building 408 or Building 410 interior systems (e.g., HVAC) and minor retrofitting; no other construction, renovation, or demolition activities would occur. Building 408 and Building 410 are not eligible for the NRHP and, therefore, there would be no construction-related impacts to cultural resources. Therefore, Alternative 2, combined with other cumulative projects, would not result in significant cumulative impacts to cultural resources.

5 List of Preparers

Lead Agency

Marine Corps
MCAS Yuma
Yuma, Arizona
Dave Rodriguez, Project Leader

This EA was prepared for the USMC under the direction of the Naval Facilities Engineering Command Southwest by Leidos and Helix. Members of Leidos's and Helix's professional staff who contributed to the preparation of this document are listed below.

Name	***Title***	***Degree***	***Years of Experience***	***Project Participation***
Karen Foster	Project Manager/ Cultural Resources Manager	Ph.D., Anthropology	16	Project Manager; QA/QC
Jessica Degner	Project Manager/ Environmental Planner	B.A., Environmental Studies	13	Deputy Project Manager; Abstract; Executive Summary; Chapters 1 and 2; QA/QC
Robert Thompson	Airspace Management Specialist	M.S., Human Resources Management	26	Airspace
Chris Crabtree	Air Quality Specialist	B.A., Environmental Studies	27	Air Quality
Sheryl Horn (Helix)	Environmental Planner	B.S. Environmental Science	10	Hazardous Materials and Waste; Utilities and Infrastructure
Catrina Gomez	Environmental Planner	MSEM, Environmental Science and Management	10	Noise; Safety and Environmental Health
Mike Deacon	Environmental Scientist	B.S., Environmental Studies and Environmental Health	22	Transportation
Daniel Dehn	Environmental Analyst	M.A., English	9	Public Services
Bonnie McClure	Production Coordinator	B.A., English	5	Word Processing
Catherine FitzGerald	Graphic Artist	A.A., Fine Arts	35	Graphic Design
Chris Woods	GIS Analyst	B.A., Geography	17	GIS

This page intentionally left blank.

6 Persons and Agencies Contacted

United States Government

United States Navy

Rachelle Hill, NAVFAC SW Project Manager/Environmental Planner

Scott Mattingly, NAVFAC SW Archaeologist

John Rogers, NAVFAC SW Marine Corps Program Manager

Edith Sinclair, NAVFAC SW Military Construction Project Manager

United States Marine Corps

Brad Chittenden, Headquarters USMC (HQMC) Aviation

Major Patrick Williams, HQMC Aviation

Ron Lamb, HQMC Aviation

Susan Goodfellow, HQMC Aviation

Major Kenneth Karcher, VMX-22

MGySgt Joshua Powell, VMX-22

Captain Andrew Hascall, MCAS Yuma Director of Installations and Logistics

Richard Samrah, MCAS Yuma Installation & Logistics Planner

Ron Kruse, MCAS Yuma Installation & Logistics Planner

Dave Rodriguez, MCAS Yuma Environmental Director

Karla James, MCAS Yuma Archaeologist

Major Julio Gonzalez, MCAS Yuma Air Traffic Control Facility Officer

Greg McShane, MCAS Yuma Airfield Operations Officer

This page intentionally left blank.

7 References

56th Range Management Office, Luke Air Force Base, and Marine Corps Air Station Yuma. 2008. Barry M. Goldwater Range Integrated Cultural Resources Management Plan – Part I: Background and Rangewide Management Issues.

Advisory Council on Historic Preservation. 2006. Program Comment for World War II and Cold War Era (1939-1974) Ammunition Storage Facilities.

Apple. 1996. Phase I Cultural Resources Survey for the Proposed Consolidated Club at Marine Corps Air Station Yuma. Prepared for Kenneth Balk and Associates by KEA Environmental Inc. Author: Rebecca McCorkle Apple.

Arizona Department of Environmental Quality (ADEQ). 2015. Arizona Administrative Code - Title 18, Environmental Quality, Chapter 2, Department of Environmental Quality - Air Pollution Control. Website: http://www.azsos.gov/public_services/Title_18/18_table.htm.

Arizona Public Service. 2014. Integrated Resource Plan. April.

Arizona State Parks. 1976. National Register of Historic Places Inventory Nomination Form: El Camino del Diablo. Website: http://pdfhost.focus.nps.gov/docs/NRHP/Text/78000560.pdf. Accessed 22 February 2015.

Branch Health Clinic 2010. Branch Health Clinic MCAS Yuma, Your Guide to Services. April.

Bureau of Reclamation. 2015. Yuma, Arizona Area Office. Website: http://www.usbr.gov/lc/yuma. Accessed 5 February 2015.

_____. 2013. Literature Synthesis on Climate Change Implications for Water and Environmental Resources, Third Edition. Technical Memorandum 86-68210-2013-06, prepared by Bureau of Reclamation, U.S. Department of the Interior.

California Climate Change Center. 2012. Our Changing Climate 2012 – Vulnerability and Adaptation to the Increasing Risks from Climate Change in California: A Summary Report on the third Assessment from the California Climate Center. Publication number CEC-500-2012-007. Website: http://www.climatechange.ca.gov/adaptation/third_assessment/.

City of Yuma 2015a. Yuma Police Department. Website: http://www.ci.yuma.az.us/1370.htm. Accessed 12 February 2015.

_____. 2015b. About the Yuma Fire Department. Website: http://www.ci.yuma.az.us/3057.htm. Accessed 12 February 2015.

_____. 2013. City of Yuma Transportation Master Plan. Working Paper No. 1 Existing and Future Conditions. Prepared for City of Yuma, Arizona and Arizona Department of Transportation. Prepared by Wilson & Company in association with TRA, Inc. February.

_____. 2012. General Plan. 6 June.

Council on Environmental Quality (CEQ). 2014. Revised Draft Guidance for Greenhouse Gas Emissions and Climate Change Impacts. Website: http://www.whitehouse.gov/administration/eop/ceq/initiatives/nepa/ghg-guidance.

_____ .1997. CEQ Handbook: Considering Cumulative Effects under the National Environmental Protection Act. January.

Department of Navy (DoN). 2010a. Final United States Marine Corps F-35B West Coast Basing Environmental Impact Statement. October 2010.

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

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

_____. 2001. Yuma Training Range Complex Supplement Environmental Impact Statement.

_____. 1997. Yuma Training Range Complex Final Environmental Impact Statement. Cooperating Agencies: U.S. Department of Defense, Air Force; U.S. Bureau of Land Management; U. S. Fish and Wildlife Service. January.

Education.com. 2015. Schools in Yuma, AZ. Website: http://www.education.com/schoolfinder/us/arizona/yuma/. Accessed on 12 February 2015.

Intergovernmental Panel on Climate Change (IPCC). 2014. Fifth Assessment Report (AR5). Website: http://www.ipcc.ch/report/ar5/index.shtml.

JRP Consulting. 2011. Historic Context Study for Marine Corps Air Station (MCAS) Yuma. Copy available from Range Management Department, MCAS Yuma.

Marine Corps Air Station (MCAS) Yuma. 2015a. "Our Sanitary Sewer System." Website: http://www.mcasyumaenvironmental.com/docs/waterdocs_our_sanitary_sewer_system.pdf. Accessed 5 February 2015.

_____ . 2015b. The History of MCAS Yuma. Website: http://www.mcasyuma.marines.mil/About/History.aspx. Accessed 22 February 2015.

_____ . 2014a. MCAS Yuma Installation Master Plan. For Official Use Only (FOUO). March. Prepared under Contract N62473-11-D-0010 #13. Prepared by MAKERS architecture and urban design, LLP.

_____ . 2014b. GIS datasets (Contoursp.mdb, MCASYuma1.mdb, MCASYumaInL.mdb, MCASYumaInLContours.mdb, nonSDE_data_from_range.mdb, and data_from_range.mdb) provided by MCAS Yuma. January and February.

_____ . 2010. Integrated Cultural Resources Management Plan for the Chocolate Mountain Aerial Gunnery Range, California.

_____ . 2006. Storm Water Discharge Management Plan for MCAS Yuma, Arizona. January.

_____ . 2000. Final Report for Utility Privatization at Marine Corps Air Station, Yuma, Arizona. Southwest Division Naval Facilities Engineering Command. October.

_____ . 1996. Operable Unit 2 Remedial Investigation Report Final. March.

Marine Corps Expeditionary Energy Office. 2011. Expeditionary Energy Strategy and Implementation Plan – "Bases-to-Battlefield." Headquarters, U.S. Marine Corps.

Marine Corps Installation (MCI) West. 2009. MCI West Regional Greenhouse Gas Assessment (2008-2009).

Naval Hospital Camp Pendleton (NHCP). 2014. Branch Health Clinic Yuma. Website: http://www.med.navy.mil/sites/cpen/services/Pages/BHCY.aspx. Accessed 12 February 2015.

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

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

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

_____. 2001b. Aircraft Emission Estimates: V-22 Mission Operations Using JP-5. AESO Memorandum Report No. 9965 Revision B, January 2001.

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

_____. 2000b. AESO Memorandum Report No. 9960, Revision B, Aircraft Emissions Estimates: H-53 Mission Operations Using JP-5.Southwest Climate Alliance. 2013. Assessment of Climate Change in the Southwest United States: A Report Prepared for the National Climate Assessment. Washington, DC: Island Press. Website: http://gdo-dcp.ucllnl.org/downscaled_cmip_projections/techmemo/BCSD5HydrologyMemo.pdf.

Thursby, Lori. 2010. Architectural Survey Marine Corps Air Station Yuma, Yuma, AZ. Copy available from Range Management Department, MCAS Yuma.

U.S. Census. 2015. State & County QuickFacts, Yuma County, Arizona. Website: http://quickfacts.census.gov/qfd/states/04/04027.html. Accessed 12 February 2015.

United States Environmental Protection Agency (USEPA). 2014a. The Green Book Nonattainment Areas for Criteria Pollutants. Website: http://www.epa.gov/air/oaqps/greenbk/index.html.

_____. 2014b. Motor Vehicle Emission Simulator (MOVES) Model. Website: http://www.epa.gov/otaq/models/moves.

_____ . 2014c. National Greenhouse Gas Emissions Data - Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2012. Website: http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html.

_____ . 2009. NONROAD2008a Model. Website: http://www.epa.gov/otaq/nonrdmdl.htm.

_____ . 2006. Compilation of Air Pollutant Emission Factors, AP-42, Volume I. Section 13.2.5, Industrial Wind Erosion. Website: http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s0202.pdf.

_____ . 2002. Compilation of Air Pollutant Emission Factors, AP-42, Volume I. Website: http://www.epa.gov/ttn/chief/ap42/index.html. Accessed 5 February 2015.

_____ . 1995. Compilation of Air Pollutant Emission Factors, AP-42, Volume I. Section 13.2.3, Heavy Construction Operations. Website: http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s02-3.pdf.

United States Marine Corps (USMC). 2014. *Marine Aviation Plan 2015*.

_____ . 2013. Final Environmental Assessment for the Unites States Marine Corps Rotary Wing and Tilt-Rotor Training Operations on Public Lands within Southern California.

_____. 2000. MCAS Yuma Environmental Restoration Program.

_____. 1997. Hazardous Waste Management Plan, MCAS Yuma.

Van Wormer, Stephen R., Andrew Pigniolo, and Rebecca McCorkle Apple. 1996. Archeological Records Search and Historic Structures and Buildings Inventory Report for the Marine Corps Air Station Yuma. Copy available from Range Management Department, MCAS Yuma.

Western Regional Climate Center. 2015. Local Climate Data Summaries for the Western United States. Website: http://www.wrcc.dri.edu/local-climate-data/. Accessed 5 February 2015.

Wyle Laboratories, Inc. 2014. Noise Analysis in Support of an Operational Test and Evaluation Center at Marine Corps Air Station Yuma, Yuma, *AZ*. Final. Technical Note 1403; Job Number A40052.0001. Prepared for Leidos. June.

Yuma Regional Medical Center (YRMC). 2015. Yuma Regional Medical Center webpage. Website: http://www.yumaregional.org/. Accessed 12 February 2015.

Appendix A

Applicable Federal Regulations, Instructions, and Public Law

This page intentionally left blank.

Applicable Federal Regulations, Instructions, and Public Law

Name	*Regulation*
National Environmental Policy Act of 1969	42 USC §§ 4321–4370h
Council on Environmental Quality Regulations for Implementing the Procedural Provisions of National Environmental Policy Act	40 CFR Parts 1500–1508
Department of the Navy Procedures for Implementing National Environmental Policy Act	32 CFR Part 775
Environmental Compliance and Protection Manual Chapter 12	Marine Corps Order P5090.2A, Change 3
National Historic Preservation Act	54 USC §300101 *et seq*
Clean Water Act	33 USC §§ 1251–1387
Clean Air Act, as amended, including 1990 General Conformity Rule	USC §§ 7401–7671q
Comprehensive Environmental Response, Compensation, and Liability Act	42 USC §§ 9601–9675
Resource Conservation and Recovery Act	42 USC §§ 6901–6992k
Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations, 11 February 1994	Executive Order 12898
Protection of Children from Environmental Health Risks and Safety Risks, 23 April 1997	Executive Order 13045
Endangered Species Act	16 USC §§ 1531–1544
Migratory Bird Treaty Act	16 USC §§ 703–712
Responsibility of Federal Agencies to Protect Migratory Birds, 11 January 2001	Executive Order 13186
Invasive Species	Executive Order 13112
Native Americans Graves Protection and Repatriation Act	25 USC §§ 3001–3013 and 40 CFR Part 10
Federal Compliance with Pollution Control Standards	Executive Order 12088
Greening the Government through Waste Prevention, Recycling, and Federal Acquisition	Executive Order 13101
Greening the Government through Efficient Energy Management	Executive Order 13123
Greening the Government through Leadership in Environmental Management	Executive Order 13148
Planning For Federal Sustainability in the Next Decade	Executive Order 13693
United Facilities Criteria for Low Impact Development	United Facilities Criteria 3-210-10
American Indian Religious Freedom Act	PL 95-341; 42 USC §§ 1996 and 1996a
Archaeological Resource Protection Act	16 USC §§ 470aa–470mm; PL 96-95 and Amendments
Federal Leadership in Environmental, Energy and Economic Performance	Executive Order 13514
Federal Aviation Administration Order 7400.2	49 USC § 40103(b)
Operation Risk Management	Marine Corps Order 3500.27A
Range Regulations for Activities Scheduled by MCAS Yuma	MCAS Yuma Station Order 3710.6

Applicable Federal Regulations, Instructions, and Public Law

Name	*Regulation*
National Register of Historic Places	36 CFR Part 60
Operational Risk Management	Office of the Chief of Naval Operations 3500.39A
Pollution Prevention Act of 1990	42 USC §§ 13101–13109
Sikes Act	16 USC §§ 670–670f, 74 Stat. 1052, as amended, PL 86-797, approved 15 September 1960
Waste Discharge Requirements for Discharge of Storm Water Runoff Associated with Construction and Land Disturbance Activities	State of California Water Resources Control Board Order No. 2009-0009-DWQ; National Pollutant Discharge Elimination System General Permit No. CAS000002
Notes: CFR = Code of Federal Regulations; MCAS = Marine Corps Air Station; PL = Public Law; USC = United States Code.	

Appendix B

Minimization, Mitigation, Monitoring, and Reporting (MMMR) Tracking Sheet

This page intentionally left blank.

MINIMIZATION, MITIGATION, MONITORING, AND REPORTING (MMMR) TRACKING SHEET *Operational Test and Evaluation Center at MCAS Yuma*							
SCM #	***Minimization, Mitigation, Monitoring, Reporting Measures***	***Environmental Assessment Section***	***Implementation Procedure or Action***	***Responsible Organization***	***Deliverable/ Report***	***Compliance Schedule***	***Verification of Compliance***
1	The construction contractor would 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 miles per hour 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. 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.	Section 3.2	Implement fugitive dust control measures.	Contractor	None	During Construction	Verified by: Date:

MINIMIZATION, MITIGATION, MONITORING, AND REPORTING (MMMR) TRACKING SHEET ***Operational Test and Evaluation Center at MCAS Yuma (continued)***							
SCM #	***Minimization, Mitigation, Monitoring, Reporting Measures***	***Environmental Assessment Section***	***Implementation Procedure or Action***	***Responsible Organization***	***Deliverable/ Report***	***Compliance Schedule***	***Verification of Compliance***
2	The construction contractor would 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 a 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. 7. Re-route construction trucks away from congested streets or sensitive receptor areas. 8. Use construction equipment with engines that meet USEPA Tier 3 and 4 nonroad standards. 9. Use alternative fuel construction equipment, such as natural gas- or electric-powered.	Section 3.2	Implement construction equipment emission control measures	Contractor	None	During Construction	Verified by: Date:

MINIMIZATION, MITIGATION, MONITORING, AND REPORTING (MMMR) TRACKING SHEET *Operational Test and Evaluation Center at MCAS Yuma (continued)*							
SCM #	***Minimization, Mitigation, Monitoring, Reporting Measures***	***Environmental Assessment Section***	***Implementation Procedure or Action***	***Responsible Organization***	***Deliverable / Report***	***Compliance Schedule***	***Verification of Compliance***
3	Prior to the start of construction/renovation and demolition activities, the construction contractor would prepare and submit a Health and Safety Plan for the United States Marine Corps (USMC)'s approval, as well as obtain all the necessary permits and approvals. The Health and Safety Plan would include detailed precautionary measures to substantially reduce potential exposure of on-site personnel to hazardous materials in the event construction, renovation, and/or demolition activities encounter contaminated soil or groundwater. The Health and Safety Plan would describe the strategy for handling and disposing of all demolition debris. Part of this strategy would be to divert as much of the demolition waste from landfills as possible using demolition deconstruction techniques to reduce, reuse, or recycle the various types of waste. The removal methods, health and safety procedures, and disposal methods would conform to the regulations of federal, state, and local regulatory agencies. The construction contractor would make the required notifications to United States Environmental Protection Agency (USEPA) and ADEQ. Additional information is available at http://www.epa.gov/superfund/cleanup/index.htm and http://www.azdeq.gov/environ/waste/sps/.	Section 3.3	Implement precautionary measures stipulated in the approved Health and Safety Plan. Obtain permits and approvals (if required).	Contractor	Health and Safety Plan	During Construction	Verified by: Date:
4	The construction contractor would implement the following measures during all proposed construction/renovation and demolition activities: 1. Maintain equipment according to manufacturer specifications. 2. Contractors would be adequately prepared to respond to 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	Section 3.3	Implement Best Management Practices	Contractor	None	During Construction	Verified by: Date:

MINIMIZATION, MITIGATION, MONITORING, AND REPORTING (MMMR) TRACKING SHEET *Operational Test and Evaluation Center at MCAS Yuma (continued)*							
SCM #	***Minimization, Mitigation, Monitoring, Reporting Measures***	***Environmental Assessment Section***	***Implementation Procedure or Action***	***Responsible Organization***	***Deliverable / Report***	***Compliance Schedule***	***Verification of Compliance***
	maintenance areas. 3. Construction-generated petroleum and hazardous waste (e.g., gasoline, solvents, adhesives, and paint) would be managed and disposed of properly. Contractors would identify, manage, transport, and dispose of regulated wastes (solid waste, hazardous waste, recyclable waste, etc.) in accordance with Titles 40 and 49 of the Code of Federal Regulations (CFR) and Title 18 of the Arizona Administrative Code. 4. 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 MCAS Yuma Environmental Department, Hazardous Waste Management Division. 5. All excavation activities would be coordinated with the MCAS Yuma Environmental Department, Hazardous Waste Management Division to reduce potential exposure of on-site personnel to contaminated soil and groundwater within and adjacent to Area 1 of IRP Site 19 (OU-1); 6. Cleared construction and demolition materials would be recycled in accordance with the Department of Defense (DoD) Green Procurement Program. Additional information is available at http://www.public.navy.mil/nsw/Documents/EngBulletins/2009-03%20DoD%20Green%20Procurement%20Program%20Strategy%20Updated%20November%202008.pdf. 7. Contractors would remove excess hazardous materials from the site once work is completed.						
5	MCAS Yuma Range Management Department would obtain concurrence from the State Historic Preservation Officer on their determinations prior to authorization of	Section 3.9	Obtain SHPO Concurrence Letter prior to	MCAS Yuma Range Management	None	During Construction	Verified by: Date:

MINIMIZATION, MITIGATION, MONITORING, AND REPORTING (MMMR) TRACKING SHEET *Operational Test and Evaluation Center at MCAS Yuma (continued)*							
SCM #	***Minimization, Mitigation, Monitoring, Reporting Measures***	***Environmental Assessment Section***	***Implementation Procedure or Action***	***Responsible Organization***	***Deliverable / Report***	***Compliance Schedule***	***Verification of Compliance***
	construction in accordance with 36 CFR 800.		construction. If it is determined during consultation that buildings are eligible, MCAS Yuma would follow any required mitigation to minimize impacts.	Department			
6	While not anticipated, in the event that previously unrecorded archaeological resources, cultural items, or human remains are encountered during ground disturbing activities, MCAS Yuma would manage these resources in accordance with the National Historic Preservation Act (NHPA) and other federal laws and regulations, Marine Corps and DoD regulations and instructions and orders, and DoD American Indian and Alaska Native Policy.	Section 3.9	If potential cultural resources are discovered during ground disturbing activities, work shall stop in the immediate vicinity of the discovery and the area shall be protected from further disturbance. The contractor shall immediately contact MCAS Yuma Environmental Division.	Contractor	None	During Construction	Verified by: Date:

This page intentionally left blank

Appendix C

Air Quality Technical Data

This page intentionally left blank.

Appendix C - Emission Calculations for Construction of the OTEC Project Alternative 1 at MCAS Yuma

	A	B	C	D	E	F	G	H	I
1	Table C-1. Emission Source Data for Construction of the OTEC Project Alternative 1 at MCAS Yuma - Year 2015.								
2		*Hp*	*Ave. Daily*	*Number*	*Hourly*	*Hours/*	*Daily*	*Work*	*Total*
3	*Construction Activity/Equipment Type*	*Rating*	*Load Factor*	*Active*	*Hp-Hrs*	*Day*	*Hp-Hrs*	*Days*	*Hp-Hrs*
4	*Demolish All Buildings*								
5	Backhoe	160	0.37	2	118	8	947	18	16,903
6	Bulldozer	310	0.43	2	267	8	2,133	18	38,060
7	Concrete/Industrial Saw	84	0.42	1	35	4	141	18	2,518
8	Crane w/Wrecking Ball	180	0.29	1	52	8	418	18	7,452
9	Loader	215	0.36	3	232	8	1,858	18	33,149
10	Haul Truck - Debris (1)	NA	NA	15	NA	20	300	18	5,354
11	Building Demolition (2)	NA	NA	NA	NA	8	NA	18	1,590,188
12	Fugitive Dust (3)	NA	NA	0.2	NA	8	NA	105	21
13	*Aircraft Parking Apron - Concrete*								
14	Concrete Paver	25	0.42	2	21	4	84	52	4,354
15	Concrete Pump Truck, 110' Boom	285	0.42	1	120	5	599	52	31,022
16	Concrete Vibrator	8	0.42	1	3	5	17	52	871
17	Grader	180	0.41	1	74	8	590	10	6,120
18	Loader	215	0.36	1	77	6	464	21	9,628
19	Vibratory Compactor - CB 355D	105	0.42	2	88	6	529	21	10,972
20	Water Truck - 5000 Gallons	175	0.38	1	67	6	399	73	28,954
21	Concrete Trucks (1)	NA	NA	15	NA	20	305	52	15,799
22	Supply Trucks (1)	NA	NA	20	NA	2	40	3	120
23	Fugitive Dust (3)	NA	NA	0	NA	8	NA	52	16
24	*Aircraft Parking Apron - Renovate/Re-Stripe*								
25	Air Compressor - 100 CFM	50	0.42	1	21	6	126	19	2,394
26	Concrete/Industrial Saw	84	0.42	1	35	6	212	19	4,022
27	Crane	190	0.29	1	55	6	331	19	6,281
28	Forklift	94	0.20	1	19	4	75	19	1,429
29	Generator	45	0.42	1	19	6	113	19	2,155
30	Loader	215	0.36	1	77	4	310	12	3,715
31	Concrete Trucks (1)	NA	NA	15	NA	5	75	2	150
32	Haul Truck - Debris (1)	NA	NA	10	NA	5	50	3	150
33	Supply Trucks (1)	NA	NA	20	NA	3	60	4	240
34	Fugitive Dust (3)	NA	NA	0	NA	8	NA	19	5
35	Notes: (1) Number Active = miles/roundtrip, Hours/Day = daily truck trips, Daily Hp-Hrs = daily miles, and Total Hp-Hrs = total miles.								
36	(2) Total Hp-Hrs = total cubic feet (cf) of demolished buildings.								
37	(3) Number Active is acres disturbed at one time and Total Hp-Hrs is acre-days for the entire activity.								

	K	L	M	N	O	P	Q	R	S	T
1	Table C-2. Air Emission Factors for Construction of the OTEC Project Alternatives at MCAS Yuma									
2		*Fuel*	*Emission Factors (Grams/Horsepower-Hour)*							
3	*Project Year/Source Type*	*Type*	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*	*References*
4	*Year 2015*									
5	Nonroad Equipment - 25-40 Hp	D	0.60	2.97	4.72	0.13	0.44	0.40	609	(1)
6	Nonroad Equipment - 41-50 Hp	D	0.36	1.66	4.22	0.12	0.34	0.31	610	(1)
7	Nonroad Equipment - 51-75 Hp	D	0.34	1.60	4.15	0.12	0.33	0.30	611	(1)
8	Nonroad Equipment - 76-100 Hp	D	0.42	2.84	4.12	0.12	0.43	0.40	608	(1)
9	Nonroad Equipment - 101-175 Hp	D	0.42	3.03	3.49	0.12	0.50	0.46	608	(1)
10	Nonroad Equipment - 176-300 Hp	D	0.31	1.26	3.02	0.11	0.32	0.29	547	(1)
11	Nonroad Equipment - 301-600 Hp	D	0.23	0.82	2.57	0.10	0.22	0.20	539	(1)
12	Nonroad Equipment - <12 Hp	G	5.36	298.63	1.94	0.22	0.12	0.12	1,046	(1)
13	Short Haul Truck >33k Lb. - 10 mph	D	1.21	3.30	8.65	0.02	0.38	0.35	2,173	(2)
14	Short Haul Truck >33k Lb. - 25 mph	D	0.35	1.88	6.19	0.01	0.27	0.24	1,283	(2)
15	Short Haul Truck >33k Lb. - 55 mph	D	0.23	1.29	3.32	0.01	0.13	0.12	758	(2)
16	Composite - Short Haul Truck >33k Lb.	D	0.40	1.84	5.57	0.01	0.24	0.22	1,214	(3)
17	*Year 2016*									
18	Nonroad Equipment - 25-40 Hp	D	0.57	2.86	4.67	0.13	0.13	0.12	609	(1)
19	Nonroad Equipment - 41-50 Hp	D	0.32	1.40	3.99	0.11	0.11	0.10	610	(1)
20	Nonroad Equipment - 51-75 Hp	D	0.30	1.33	3.92	0.11	0.11	0.10	611	(1)
21	Nonroad Equipment - 76-100 Hp	D	0.38	2.57	3.96	0.12	0.12	0.11	608	(1)
22	Nonroad Equipment - 101-175 Hp	D	0.38	2.75	3.11	0.12	0.12	0.11	608	(1)
23	Nonroad Equipment - 176-300 Hp	D	0.29	1.12	2.67	0.10	0.10	0.09	547	(1)
24	Nonroad Equipment - 301-600 Hp	D	0.21	0.71	2.24	0.10	0.10	0.09	539	(1)
25	Nonroad Equipment - <12 Hp	G	5.18	296.43	1.81	0.22	0.22	0.22	1,046	(1)
26	Short Haul Truck >33k Lb. - 10 mph	D	1.21	3.30	8.65	0.02	0.38	0.35	2,173	(2)
27	Short Haul Truck >33k Lb. - 25 mph	D	0.35	1.88	6.19	0.01	0.27	0.24	1,283	(2)
28	Short Haul Truck >33k Lb. - 55 mph	D	0.23	1.29	3.32	0.01	0.13	0.12	758	(2)
29	Composite - Short Haul Truck >33k Lb.	D	0.40	1.84	5.57	0.01	0.24	0.22	1,214	(3)
30	All Years									
31	Building Demolition (Lbs/1000 cf)						0.42	0.04		(4)
32	Disturbed Ground - Fugitive Dust						27.50	2.75		(5)
33	Notes: (1) Emissions factors estimated with the use of the EPA NONROAD2008a model for Yuma County, Arizona.									
34	(2) Estimated with the use of the EPA MOVES2014 model and based upon annual default parameters for Yuma County.									
35	(3) Equal to 10/60/30% 10/25/55 mph factors.									
36	(4) URBEMIS2007 (Jones&Stokes Ass. 2007).									
37	(5) Units in lbs/acre-day from section 11.2.3 of AP-42 (USEPA 1995). Emissions reduced by 50% from uncontrolled levels to simulate									
38	implementation of best management practices (BMPs) for fugitive dust control									

	V	W	X	Y	Z	AA	AB	AC
1	Table C-3. Emissions from Construction of the OTEC Project Alternative 1 at MCAS Yuma - Year 2015.							
2		*Tons*						
3	*Construction Activity/Equipment Type*	*VOC*	*CO*	*NOx*	*SOx*	*PM10*	*PM2.5*	*CO2*
4	*Demolish All Buildings*							
5	Backhoe	0.01	0.06	0.06	0.00	0.01	0.01	11.33
6	Bulldozer	0.01	0.03	0.11	0.00	0.01	0.01	22.62
7	Concrete/Industrial Saw	0.00	0.01	0.01	0.00	0.00	0.00	1.69
8	Crane w/Wrecking Ball	0.00	0.01	0.02	0.00	0.00	0.00	4.49
9	Loader	0.01	0.05	0.11	0.00	0.01	0.01	19.98
10	Haul Truck - Debris	0.00	0.01	0.03	0.00	0.00	0.00	7.17
11	Building Demolition					0.33	0.03	
12	Fugitive Dust					0.29	0.03	
13	Subtotal	0.03	0.17	0.35	0.01	0.66	0.10	67.28
14	*Aircraft Parking Apron - Concrete*							
15	Concrete Paver	0.00	0.01	0.02	0.00	0.00	0.00	2.92
16	Concrete Pump Truck, 110' Boom	0.01	0.04	0.10	0.00	0.01	0.01	18.70
17	Concrete Vibrator	0.01	0.29	0.00	0.00	0.00	0.00	1.00
18	Grader	0.00	0.01	0.02	0.00	0.00	0.00	3.69
19	Loader	0.00	0.01	0.03	0.00	0.00	0.00	5.80
20	Vibratory Compactor - CB 355D	0.01	0.04	0.04	0.00	0.01	0.01	7.36
21	Water Truck - 5000 Gallons	0.01	0.10	0.11	0.00	0.02	0.01	19.42
22	Concrete Trucks	0.01	0.03	0.10	0.00	0.00	0.00	21.15
23	Supply Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.16
24	Fugitive Dust					0.21	0.02	
25	Subtotal	0.05	0.53	0.43	0.01	0.26	0.06	80.20
26	*Aircraft Parking Apron - Renovate/Re-Stripe*							
27	Air Compressor - 100 CFM	0.00	0.00	0.01	0.00	0.00	0.00	1.61
28	Concrete/Industrial Saw	0.00	0.01	0.02	0.00	0.00	0.00	2.70
29	Crane	0.00	0.01	0.02	0.00	0.00	0.00	3.79
30	Forklift	0.00	0.00	0.01	0.00	0.00	0.00	0.96
31	Generator	0.00	0.01	0.01	0.00	0.00	0.00	1.44
32	Loader	0.00	0.01	0.01	0.00	0.00	0.00	2.24
33	Concrete Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.20
34	Haul Truck - Debris	0.00	0.00	0.00	0.00	0.00	0.00	0.20
35	Supply Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.32
36	Fugitive Dust					0.07	0.01	
37	Subtotal	0.01	0.04	0.08	0.00	0.07	0.01	13.46
38	Total Emissions - Year 2015	0.09	0.74	0.87	0.03	0.99	0.17	160.94

	A	B	C	D	E	F	G	H	I
1	Table C-4. Emission Source Data for Construction of the OTEC Project Alternative 1 at MCAS Yuma - Year 2016 (page 1 of 2).								
2		*Hp*	*Ave. Daily*	*Number*	*Hourly*	*Hours/*	*Daily*	*Work*	*Total*
3	*Construction Activity/Equipment Type*	*Rating*	*Load Factor*	*Active*	*Hp-Hrs*	*Day*	*Hp-Hrs*	*Days*	*Hp-Hrs*
4	*Building Construction*								
5	Air Compressor - 100 CFM	50	0.42	2	42	5	210	260	54,600
6	Concrete/Industrial Saw	84	0.42	2	71	5	353	260	91,728
7	Crane	190	0.29	2	110	5	551	260	143,260
8	Forklift	94	0.20	2	38	5	188	260	48,880
9	Generator	45	0.42	2	38	7	265	260	68,796
10	Concrete Trucks (1)	NA	NA	15	NA	4	60	70	4,200
11	Supply Trucks (1)	NA	NA	20	NA	3	60	120	7,200
12	Fugitive Dust (3)	NA	NA	1	NA	8	NA	105	105
13	*Concrete Work - Sidewalks/Curbs/Gutters*								
14	Concrete Paver	25	0.42	2	21	4	84	52	4,354
15	Concrete Pump Truck, 110' Boom	285	0.42	1	120	5	599	52	31,022
16	Concrete Vibrator	8	0.42	1	3	5	17	52	871
17	Grader	180	0.41	1	74	8	590	10	6,120
18	Loader	215	0.36	1	77	6	464	21	9,628
19	Vibratory Compactor - CB 355D	105	0.42	2	88	6	529	21	10,972
20	Water Truck - 5000 Gallons	175	0.38	1	67	6	399	73	28,954
21	Concrete Trucks (1)	NA	NA	15	NA	20	305	52	15,799
22	Supply Trucks (1)	NA	NA	20	NA	2	40	3	120
23	Fugitive Dust (3)	NA	NA	0	NA	8	NA	52	16
24	*Asphalt Paving - Roadways and Parking Area*								
25	Paving Machine	200	0.36	1	72	8	576	2	620
26	Water Truck - 5000 Gallons	175	0.38	1	67	8	532	4	2,082
27	Compactive Roller	165	0.38	2	125	8	1,003	2	1,610
28	Grader	180	0.41	1	74	8	590	2	1,051
29	Loader	215	0.36	1	77	8	619	2	1,103
30	Backhoe	160	0.37	1	59	8	474	1	593
31	Bulldozer - D6	165	0.43	1	71	8	568	1	711
32	Haul Truck - Paving (1)	NA	NA	10	NA	73	729	1	729
33	Haul Truck - Base (1)	NA	NA	10	NA	55	552	1	552
34	Supply Trucks (1)	NA	NA	10	NA	3	30	1	53
35	Fugitive Dust (3)	NA	NA	2	NA	8	NA	4	8
36	*Drainage Improvements/Utilities (Upgrades/Repairs)*								
37	Air Compressor - 100 CFM	50	0.42	1	21	6	126	19	2,394
38	Concrete/Industrial Saw	84	0.42	1	35	6	212	19	4,022
39	Crane	190	0.29	1	55	6	331	19	6,281
40	Forklift	94	0.20	1	19	4	75	19	1,429
41	Generator	45	0.42	1	19	6	113	19	2,155
42	Loader	215	0.36	1	77	4	310	12	3,715
43	Concrete Trucks (1)	NA	NA	15	NA	5	75	2	150
44	Haul Truck - Debris (1)	NA	NA	10	NA	5	50	3	150
45	Supply Trucks (1)	NA	NA	20	NA	3	60	4	240
46	Fugitive Dust (3)	NA	NA	0	NA	8	NA	19	5
47	Notes: (1) Number Active = miles/roundtrip, Hours/Day = daily truck trips, Daily Hp-Hrs = daily miles, and Total Hp-Hrs = total miles.								
48	(2) Total Hp-Hrs = total cubic feet (cf) of demolished buildings.								
49	(3) Number Active is acres disturbed at one time and Total Hp-Hrs is acre-days for the entire activity.								

	A	B	C	D	E	F	G	H	I
53	Table C-4. Emission Source Data for Construction of the OTEC Project Alternative 1 at MCAS Yuma - Year 2016 (page 2 of 2).								
54		*Hp*	*Ave. Daily*	*Number*	*Hourly*	*Hours/*	*Daily*	*Work*	*Total*
55	*Construction Activity/Equipment Type*	*Rating*	*Load Factor*	*Active*	*Hp-Hrs*	*Day*	*Hp-Hrs*	*Days*	*Hp-Hrs*
56	*Excavation/Grading, Clearing/Grubbing*								
57	Backhoe	160	0.37	1	59	8	474	2.0	947
58	Bulldozer - D7	310	0.43	1	133	8	1,066	2.0	2,133
59	Compactive Roller	165	0.38	2	125	8	1,003	2.0	2,006
60	Dump truck - Cat D25D - 18 CY	260	0.38	2	198	8	1,581	2.0	3,162
61	Grader	180	0.50	1	90	8	720	3.0	2,160
62	Loader	215	0.50	1	108	4	430	4.0	1,720
63	Water Truck - 5000 Gallons	175	0.38	1	67	4	266	8.0	2,128
64	Fugitive Dust (3)	NA	NA	3	NA	8	NA	8.0	24

	V	W	X	Y	Z	AA	AB	AC
1	Table C-5. Emissions from Construction of the OTEC Project Alternative 1 at MCAS Yuma - Year 2016 (page 1 of 2).							
2		*Tons*						
3	*Construction Activity/Equipment Type*	*VOC*	*CO*	*NOx*	*SOx*	*PM10*	*PM2.5*	*CO2*
4	*Building Construction*							
5	Air Compressor - 100 CFM	0.02	0.08	0.24	0.01	0.01	0.01	36.72
6	Concrete/Industrial Saw	0.04	0.26	0.40	0.01	0.01	0.01	61.53
7	Crane	0.05	0.18	0.42	0.02	0.02	0.01	86.36
8	Forklift	0.02	0.14	0.21	0.01	0.01	0.01	32.79
9	Generator	0.02	0.11	0.30	0.01	0.01	0.01	46.27
10	Concrete Trucks (1)	0.00	0.01	0.03	0.00	0.00	0.00	5.62
11	Supply Trucks (1)	0.00	0.01	0.04	0.00	0.00	0.00	9.64
12	Fugitive Dust					1.44	0.14	
13	Subtotal	0.15	0.79	1.65	0.05	1.50	0.19	278.92
14	*Concrete Work - Sidewalks/Curbs/Gutters*							
15	Concrete Paver	0.00	0.01	0.02	0.00	0.00	0.00	2.92
16	Concrete Pump Truck, 110' Boom	0.01	0.04	0.09	0.00	0.00	0.00	18.70
17	Concrete Vibrator	0.00	0.28	0.00	0.00	0.00	0.00	1.00
18	Grader	0.00	0.01	0.02	0.00	0.00	0.00	3.69
19	Loader	0.00	0.01	0.03	0.00	0.00	0.00	5.80
20	Vibratory Compactor - CB 355D	0.00	0.03	0.04	0.00	0.00	0.00	7.36
21	Water Truck - 5000 Gallons	0.01	0.09	0.10	0.00	0.00	0.00	19.42
22	Concrete Trucks (1)	0.01	0.03	0.10	0.00	0.00	0.00	21.15
23	Supply Trucks (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.16
24	Fugitive Dust					0.21	0.02	
25	Subtotal	0.05	0.51	0.40	0.01	0.23	0.04	80.21
26	*Asphalt Paving - Roadways and Parking Area*							
27	Paving Machine	0.00	0.00	0.00	0.00	0.00	0.00	0.37
28	Water Truck - 5000 Gallons	0.00	0.01	0.01	0.00	0.00	0.00	1.40
29	Compactive Roller	0.00	0.00	0.01	0.00	0.00	0.00	1.08
30	Grader	0.00	0.00	0.00	0.00	0.00	0.00	0.63
31	Loader	0.00	0.00	0.00	0.00	0.00	0.00	0.66
32	Backhoe	0.00	0.00	0.00	0.00	0.00	0.00	0.40
33	Bulldozer - D6	0.00	0.00	0.00	0.00	0.00	0.00	0.48
34	Haul Truck - Paving (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.98
35	Haul Truck - Base (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.74
36	Supply Trucks (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.07
37	Fugitive Dust					0.11	0.01	
38	Subtotal	0.00	0.02	0.03	0.00	0.11	0.01	6.81
39	*Drainage Improvements/Utilities (Upgrades/Repairs)*							
40	Air Compressor - 100 CFM	0.00	0.00	0.01	0.00	0.00	0.00	1.61
41	Concrete/Industrial Saw	0.00	0.01	0.02	0.00	0.00	0.00	2.70
42	Crane	0.00	0.01	0.02	0.00	0.00	0.00	3.79
43	Forklift	0.00	0.00	0.01	0.00	0.00	0.00	0.96
44	Generator	0.00	0.00	0.01	0.00	0.00	0.00	1.45
45	Loader	0.00	0.00	0.01	0.00	0.00	0.00	2.24
46	Concrete Trucks (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.20
47	Haul Truck - Debris (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.20
48	Supply Trucks (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.32
49	Fugitive Dust					0.07	0.01	
50	Subtotal	0.01	0.04	0.08	0.00	0.07	0.01	13.46

	V	W	X	Y	Z	AA	AB	AC
54	Table C-5. Emissions from Construction of the OTEC Project Alternative 1 at MCAS Yuma - Year 2016 (page 1 of 2).							
55		*Tons*						
56	*Construction Activity/Equipment Type*	*VOC*	*CO*	*NOx*	*SOx*	*PM10*	*PM2.5*	*CO2*
57	*Excavation/Grading, Clearing/Grubbing*							
58	Backhoe	0.00	0.00	0.00	0.00	0.00	0.00	0.64
59	Bulldozer - D7	0.00	0.00	0.01	0.00	0.00	0.00	1.27
60	Compactive Roller	0.00	0.01	0.01	0.00	0.00	0.00	1.35
61	Dump truck - Cat D25D - 18 CY	0.00	0.00	0.01	0.00	0.00	0.00	1.91
62	Grader	0.00	0.00	0.01	0.00	0.00	0.00	1.30
63	Loader	0.00	0.00	0.01	0.00	0.00	0.00	1.04
64	Water Truck - 5000 Gallons	0.00	0.01	0.01	0.00	0.00	0.00	1.43
65	Fugitive Dust					0.33	0.03	
66	Subtotal	0.00	0.03	0.04	0.00	0.33	0.03	8.92
67	Total Emissions - Year 2016	0.22	1.38	2.20	0.07	2.23	0.28	388.32

Table C-6. Summary of Annual Construction Emissions for the VMX-22 Project Alternative 1 at MCAS Yuma.

Year/Construction Activity	*Tons*						
	VOC	*CO*	*NOx*	*SOx*	*PM10*	*PM2.5*	*CO_2e*
2015							
Demolish All Buildings	0.03	0.17	0.35	0.01	0.66	0.10	67.28
Aircraft Parking Apron - Concrete	0.05	0.53	0.43	0.01	0.26	0.06	80.20
Aircraft Parking Apron - Renovate/Re-Stripe	0.01	0.04	0.08	0.00	0.07	0.01	13.46
Total Emissions - Year 2015	0.09	0.74	0.87	0.03	0.99	0.17	160.94
2016							
Building Construction	0.15	0.79	1.65	0.05	1.50	0.19	278.92
Concrete Work - Sidewalks/Curbs/Gutters	0.05	0.51	0.40	0.01	0.23	0.04	80.21
Asphalt Paving - Roadways and Parking Area	0.00	0.02	0.03	0.00	0.11	0.01	6.81
Drainage Improvements/Utilities (Upgrades/Repairs)	0.01	0.04	0.08	0.00	0.07	0.01	13.46
Excavation/Grading, Clearing/Grubbing	0.00	0.03	0.04	0.00	0.33	0.03	8.92
Total Emissions - Year 2016	0.22	1.38	2.20	0.07	2.23	0.28	388.32
Total Construction Emissions	0.31	2.12	3.06	0.09	3.22	0.46	549.26

	A	B	C	D	E	F	G	H	I
1	Table C-7. Proposed Aircraft Operations for the OTEC Project Alternatives at MCAS Yuma.								
2									
3		*Annual*					*Annual*	*Round Trip Distance from*	*Cruise Mode/ Sortie at Project*
4	*Location/Aircraft Type*	*Operations*	*LTOs*	*TGOs*	*GCA Box*	*FCLP*	*Sorties*	*MCASY (nm)*	*Site (Hours)*
5	*MCAS Yuma*								
6	AH-1W/Z	708	281	60	16				
7	CH-53E/K	1,137	551		35				
8	F-35B	2,611	Ratioed F-35B EIS Operations						
9	MV-22B	1,462	See MV-22 Ops Table C-						
10	MQ-21								
11	*AUX-2*								
12	AH-1W/Z	630		560			35	20	7.00
13	CH-53E/K	784		530		50	102	20	17.00
14	F-35B								
15	MV-22B	382		250		50	41	20	5.86
16	MQ-21								
17	*ALF*								
18	AH-1W/Z								
19	CH-53E/K								
20	F-35B	326				280	23	30	3.29
21	MV-22B								
22	MQ-21								
23	Notes: (1) From Noise Study Table C-s 4-1, 4-2, and 4-3.								
24									
25									
26	Table C-8. Annual MV-22 Aircraft Operations - OTEC Project Alternatives at MCAS Yuma.								
27		*Annual*							
28	*Activity/Mode*	*Operations*							
29	*Flight Operations*								
30	Vertical Departure	52							
31	Short Departure	649							
32	Short Arrival	303							
33	Vertical Arrival								
34	Arrival (with Break)	398							
35	Touch and Go								
36	GCA Box Pattern	60							
37	Total Operations	1,462							
38	Notes: (1) From Noise Study Table C-s 4-1.								
39									
40									
41									
42	Table C-9. Aircraft Transit Speeds between MCAS Yuma and AUX-2/ALF - OTEC Project Alternatives at MCAS Yuma.								
43		*Cruising*							
44	*Aircraft Type*	*Speed (Kts)*							
45	AH-1	100							
46	CH-53	120							
47	MV-22	140							
48	F-35B	210							

Table C-10. Annual Emissions from Aircraft Operations - OTEC Project Alternatives at MCAS Yuma.

	Annual Emissions (Tons)						
Aircraft Type/Operation	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
AH-1W/Z							
LTO	0.05	0.99	0.29	0.02	0.25	0.25	119.71
TGO	0.00	0.02	0.01	0.00	0.01	0.01	4.46
GCA Box	0.00	0.02	0.01	0.00	0.01	0.01	5.37
Subtotal	0.05	1.03	0.31	0.03	0.27	0.26	129.54
CH-53E/K							
LTO	3.10	6.30	2.44	0.19	1.04	1.03	1,544.08
GCA Box	0.00	0.03	0.08	0.00	0.02	0.02	31.74
Subtotal	3.10	6.32	2.52	0.20	1.06	1.05	1,575.82
F-35B							
Combined Operations (1)	0.11	3.22	16.22	1.45	0.14	0.14	4,617.24
Subtotal	0.11	3.22	16.22	1.45	0.14	0.14	4,617.24
MV-22B							
Vertical Departure	0.00	0.06	0.18	0.01	0.03	0.03	67.05
Short Departure	0.01	0.77	1.75	0.09	0.31	0.31	719.12
Short Arrival	0.01	0.45	0.59	0.04	0.12	0.12	293.12
Arrival (with Break)	0.01	0.61	1.22	0.06	0.21	0.21	497.24
GCA Box	0.00	0.01	0.16	0.00	0.02	0.02	38.49
Subtotal	0.03	1.90	3.88	0.20	0.69	0.68	1,615.03
MQ-21							
Subtotal	-	-	-	-	-	-	-
Total Combustive Emissions - MCAS Yuma	3.29	12.47	22.94	1.87	2.15	2.12	7,937.63

Table C-11. Annual Emissions from Aircraft Operations at AUX-2 - OTEC Project Alternatives at MCAS Yuma.

	Annual Emissions (Tons)						
Aircraft Type/Operation	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
AH-1W/Z							
TGO	0.01	0.15	0.07	0.01	0.05	0.05	41.64
Fugitive Dust - TGO					0.11	0.02	
Transit between MCAS Yuma and AUX-2	0.00	0.06	0.03	0.00	0.02	0.02	19.14
Subtotal	0.01	0.21	0.10	0.01	0.19	0.09	60.77
CH-53E/K							
TGO	0.03	0.20	0.56	0.03	0.16	0.16	233.08
Fugitive Dust - TGO					0.67	0.10	
FCLP	0.00	0.04	0.11	0.01	0.03	0.03	45.34
Transit between MCAS Yuma and AUX-2	0.02	0.24	0.92	0.05	0.25	0.25	365.40
Subtotal	0.06	0.48	1.59	0.08	1.11	0.54	643.82
F-35B							
Subtotal							
MV-22B							
TGO	0.00	0.02	0.45	0.01	0.06	0.05	112.38
Fugitive Dust - TGO					1.17	0.18	
FCLP	0.00	0.01	0.12	0.00	0.01	0.01	27.98
Transit between MCAS Yuma and AUX-2	0.00	0.01	0.16	0.00	0.02	0.02	35.90
Subtotal	0.00	0.04	0.72	0.02	1.26	0.26	176.25
MQ-21							
Subtotal	-	-	-	-	-	-	-
Total Combustive Emissions	0.07	0.73	2.41	0.11	0.61	0.60	880.84
Total Fugitive Dust Emissions					1.96	0.29	
Total Emissions - MCAS Yuma	0.07	0.73	2.41	0.11	2.57	0.90	880.84

Table C-12. Annual Emissions from Aircraft Operations at ALF - OTEC Project Alternatives at MCAS Yuma.

	Annual Emissions (Tons)						
Aircraft Type/Operation	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*
AH-1W/Z							
Subtotal	-	-	-	-	-	-	-
CH-53E/K							
Subtotal	-	-	-	-	-	-	-
F-35B							
FCLP	0.00	0.06	0.76	0.06	0.01	0.01	211.68
Transit between MCAS Yuma and AUX-2	0.00	0.02	0.25	0.02	0.00	0.00	62.87
Subtotal	0.00	0.08	1.01	0.08	0.01	0.01	274.55
MV-22B							
Subtotal	-	-	-	-	-	-	-
MQ-21							
Subtotal	-	-	-	-	-	-	-
Total Emissions - MCAS Yuma	0.00	0.08	1.01	0.08	0.01	0.01	274.55

Table C-13. F-35B Emission Factors - OTEC Project Alternatives at MCAS Yuma.

Operation Type	Engine Power Setting	Fuel Flow Rate/ Aircraft (Lb/Hr)	VOC	CO	NOx	SO2	PM10	PM2.5	CO2	References
			Engine Emission Factors - Pounds/1000 Pounds Fuel							
Cruise-Transit	55% ETR	11,971	0.02	0.82	12.54	0.98	0.08	0.08	3,197	1
		Operations	Emissions per Operation - Pounds							
F-35B - Total Ops		37,847	1.63	46.64	235.15	21.02	1.99	1.97	66,928	2
F-35B - 1 Generic Op		1	0.09	2.46	12.43	1.11	0.11	0.10	3,537	
P21- Low Approach to a Closed Traffic Pattern			0.01	0.43	5.43	0.46	0.04	0.04	1,512	1

Notes: The F-35B has 1 F135-PW-100 engine.

(1) Karnes 3 Profiles (Wyle Labs 2011).

(2) Equal to the total annual F-35B emissions that would occur at MCAS Yuma for Alternative 1 of the F-35B West Coast Basing DEIS (USMC 2010).

Table C-14. AH-1 Aircraft Emission Factors - OTEC Project Alternatives at MCAS Yuma.

Operation Type	Engine Power Setting	Fuel Flow Rate/ Aircraft (Lb/Hr)	VOC	CO	NOx	SO2	PM10	PM2.5	CO2	References
			Engine Emission Factors - Pounds/1000 Pounds Fuel							
Cruise	38% Q	850	0.56	10.54	5.55	0.40	4.20	4.16	3,216	1
		Fuel/Operation (Lb)	Emissions per Operation - Pounds							
LTO		428	0.33	7.08	2.09	0.17	1.80	1.78	852	1
TGO		46	0.03	0.54	0.25	0.02	0.19	0.19	149	2
GCA Box		209	0.12	2.46	1.12	0.08	0.88	0.87	671	2

Notes: The AH-1W/Z helicopters have 2 T700-GE-401C engines.

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

CO CO2 NOx HC SO2 PM10

(2) AESO Memorandum Report No. 9961, Revision A, Aircraft Emissions Estimates: AH-1 Mission Operations Using JP-5, November 2009.

Table C-15. CH-53 Aircraft Emission Factors - OTEC Project Alternatives at MCAS Yuma.

Operation Type	Engine Power Setting	Fuel Flow Rate/ Aircraft (Lb/Hr)	VOC	CO	NOx	SO2	PM10	PM2.5	CO2	References
			Engine Emission Factors - Pounds/1000 Pounds Fuel							
Cruise	70% Qeng	4,464	0.15	2.13	8.08	0.40	2.21	2.19	3,210	1
		Fuel/Aircraft Op (Lb)	Emissions per Operation - Pounds							
LTO		1,746	11.24	22.86	8.86	0.70	3.76	3.72	5,605	1
TGO		274	0.13	0.77	2.11	0.11	0.61	0.60	880	2
GCA Box		565	0.19	1.44	4.44	0.23	1.25	1.24	1,814	2

Notes: The CH-53 helicopter has 3 T64-GE-415 engines.

(1) AESO Memorandum Report No. 9822, Revision C, Aircraft Emissions Estimates: H-53 Takeoff and Landing Cycle and In-Frame, Maintenance Testing Using JP-5, February 2000, except CO2 emissions based upon a factor of 3,210 lb/1000 lb fuel.

(2) AESO Memorandum Report No. 9960, Revision B, Aircraft Emissions Estimates: H-53 Mission Operations Using JP-5, April 2000, except CO2 emissions based on a factor of 3,210 lb/1000 lb fuel.

Table C-16. MV-22 Aircraft Emission Factors - OTEC Project Alternatives at MCAS Yuma.

Operation Type	*Engine Power Setting*	*Fuel Flow Rate/ Aircraft (Lb/Hr)*	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*	*References*
			Engine Emission Factors - Pounds/1000 Pounds Fuel							
FW (0°) CRUISE	CRUISE	1,910	0.01	0.52	14.09	0.40	1.58	1.56	3,209	1
HELO (16°) CRUISE	CRUISE	1,530	0.01	0.79	11.64	0.40	1.58	1.56	3,212	1
Operation Type			*Emissions per Operation - Pounds*							
Vertical Departure Total - Pounds			0.04	2.45	6.79	0.32	1.13	1.12	2,579	1
Short Departure Total - Pounds			0.03	2.37	5.38	0.28	0.95	0.94	2,216	1
Short Arrival Total - Pounds			0.05	2.96	3.87	0.24	0.78	0.77	1,935	1
Vertical Arrival Total - Pounds			0.05	2.96	3.87	0.24	0.78	0.77	1,935	1
Arrival (with Break) Total - Pounds			0.05	3.07	6.13	0.31	1.06	1.05	2,499	1
T&G Total - Pounds			0.003	0.19	3.57	0.11	0.44	0.44	899	2
GCA Box Pattern Total - Pounds			0.004	0.26	5.20	0.16	0.63	0.62	1,283	2
FCLP Total - Pounds			0.003	0.22	4.61	0.14	0.55	0.54	1,119	2

Notes: The MV-22 aircraft has 2 T406-AD-400 engines.

(1) AESO Memorandum Report No. 9946, Revision E, Aircraft Emissions Estimates: V-22 Landing and Takeoff Cycle and In-Frame, Engine Maintenance Testing Using JP-5, January 2001. LTO data based on a short landing (airplane mode).

(2) AESO Memorandum Report No. 9965, Revision B, Aircraft Emissions Estimates: V-22 Mission Operations Using JP-5, January 2001.

	A	B	C	D	E	F	G	H	I	J	K
1	Table C-17. Fugitive Dust Emission Factors for One Rotary/Tilt-Wing Aircraft Pad Landing - OTEC Project Alternatives at MCAS Yuma.										
2		*Total Engine Hp*	*Rotor Diameter*	*Disturbed Area*	*U_{10} (m/s)*	*Threshold Friction*	*Friction Velocity*	*P*	*Pounds/LTO (7)*		
3	*Aircraft*	*Rating*	*(Ft) (1)*	*(m^2) (2)*	*(3)*	*Velocity u_t (m/s) (4)*	*u* (m/s) (5)*	*(Gm/m^2) (6)*	*PM*	*PM10*	*PM2.5*
4	AH-1W/Z	3,380	48.0	1,513	32.3	1.70	1.710	0.24	0.82	0.41	0.06
5	CH-53	7,850	79.0	4,098	32.5	1.70	1.721	0.56	5.06	2.53	0.38
6	MV-22	12,300	84.0	4,633	32.7	1.70	1.732	0.87	8.87	4.43	0.66
7	UH-1N	2,500	48.0	1,513	32.2	1.70	1.707	0.18	0.61	0.31	0.05
8	UH-1Y	3,656	49.0	1,576	32.3	1.70	1.710	0.27	0.92	0.46	0.07
9	Notes: (1) Due to rotor overlap, actual diameters for CH-46 and MV-22 used in the calculations = 84.3' and 84', respectively.										
10	(2) Equal to 3 times the rotor diameter - the area of disturbance expected from rotary wing aircraft during a desert landing and take-off.										
11	(3) Wind speeds at 10 meter level (U_{10}) for the MV-22 based upon wind speeds measured at 1 meter above ground when this aircraft hovered at 20' AGL (Bell Boeing 2008).										
12	Equates to equation #5 presented in AP-42 Section 13.2.5 (EPA 2006). This approach assumes that the maximum aircraft downdraft approaches the fastest mile wind speed.										
13	Wind speeds for all other aircraft estimated by multiplying U_{10} for the MV-22 times the ratio of the horsepower rating of each aircraft divided by the horsepower rating of the MV-22.										
14	This approach was taken, as data are not available to adequately estimate the down draft wind speeds for these aircraft, yet aircraft horsepower rating is proportional to										
15	potential thrust or the ability of an aircraft to generate down draft.										
16	(4) Threshold friction velocity value chosen from values listed for surface types identified in Table C- 8-3 in the WRAP Fugitive Dust Handbook (Countess Environmental 2006).										
17	Data on climatic, soil, and vegetation conditions described in Archaeological and Biological surveys for proposed landing zones (LZs) and observations of										
18	dust emissions generated by a CH-46 landing at the existing Canary LZ in Imperial County, CA were used in this selection process (SAIC 2011 and 2012b).										
19	(5) Equates to equation #4 presented in AP-42 Section 13.2.5.										
20	(6) Equates to equation #3 presented in AP-42 Section 13.2.5.										
21	(7) Equal to Disturbed Area times P. These values are annual averages.										

Table C-18. Annual Construction and Operational Emissions - OTEC Project Alternative 1 at MCAS Yuma.

	Annual Emissions (Tons per Year)							*MT*
Activity/Source	*VOC*	*CO*	*NO_X*	*SO_X*	*PM_{10}*	*$PM_{2.5}$*	*CO_2*	*CO_2*
Construction								
Construction Total Emissions	0.31	2.12	3.06	0.09	3.22	0.46	549	498
Aircraft Operations								
Aircraft Combustive Emissions	3.36	13.28	26.35	2.07	2.76	2.74	9,093	8,251
Fugitive Dust					1.96	0.29		
Annual Aircraft Emissions	3.36	13.28	26.35	2.07	4.72	3.03	9,093	8,251
Total GHG Emissions							9,642	8,750
NEPA Thresholds - Tons per Year	250	250	250	250	100	250	NA	NA
Exceed De Minimis Thresholds?	No	No	No	No	No	No	NA	NA

US Inventory	5,547,000,000
Alt 1 % of US Inventory	0.0002

This page intentionally left blank.

Appendix D

Noise Analysis in Support of an Operational Test and Evaluation Center at Marine Corps Air Station Yuma, Yuma, AZ

This page intentionally left blank.

NOISE ANALYSIS IN SUPPORT OF AN OPERATIONAL TEST AND EVALUATION CENTER AT MARINE CORPS AIR STATION YUMA YUMA, AZ

wyle

June 2014
FINAL

TN 14-03

Prepared for:
Leidos

Noise Analysis in Support of an Operational Test and Evaluation Center at Marine Corps Air Station Yuma, Yuma, AZ

FINAL

Technical Note 14-03

Job No. A40052.0001

June 2014

Prepared for:

Leidos
5464 Carpinteria Avenue, Suite K
Carpinteria, CA 93013

Prepared by:

Wyle Laboratories, Inc.
Environment and Energy Sector

200 12TH Street S, Suite 900
Arlington, VA 22202
703.413.4700

121B Maryland Street
El Segundo, CA 90245
310.563.6628

Project Team:

Project Manager:	Joseph J. Czech, P.E.
Engineer:	Joe Demers, P.E.

Intentionally left blank

Contents

Figure

Table

List of Acronyms

ID	Definition
°F	degrees Fahrenheit
AAD	Annual Average Daily
AAM	Advanced Acoustic Model
ALF	Auxiliary Landing Field
AUX2	Auxiliary Field 2
AZ	Arizona
CY	Calendar Year
dB	Decibel
dBA	A-Weighted Decibels
DNL	Day-Night Average Sound Level
DNL	Day-Night Average Sound Level (US cumulative noise metric)
DOD	Department of Defense
EIS	Environmental Impact Statement
ELV	Elevation
FCLP	Field Carrier Landing Practice
FICON	Federal Interagency Committee on Noise
ft	Feet
FY	Fiscal Year
GCA	Ground Controlled Approach
GA	General Aviation
ID	Identification
IFR	Instrument Flight Rules
IMP	Impedance
in Hg or inHg	inches of mercury
in-lbs	inch pounds (torque)
kts	Knots
LBS	pounds (thrust)
L_{dn}	Day-Night Average Sound Level
L_{eq}	Equivalent Sound Level
$L_{eq(16)}$	Equivalent Sound Level over 16 hours
L_{max}	Maximum Sound Level
LZ	Landing Zone
MCAS	Marine Corps Air Station
MSL	Mean Sea Level
NA	Number of Events At or Above a Selected Threshold
NLR	Noise Level Reduction
NMAP	NOISEMAP
NYL	MCAS Yuma / Yuma International Airport
OTEC	Operational Test and Evaluation Center
PA	Probability of Awakening
Pa	Pascal
POI	Point of Interest
RNM	Rotorcraft Noise Model
ROC	Rate of Climb
RPM	Revolutions Per Minute
SEL	Sound Exposure Level
SFO	Simulated Flame-Out
SFTI	Strike Fighter Tactics Instructor
T&G	Touch-and-Go
TACAN	Tactical Area Navigation
TN	Technical Note
U.S. or US	United States
USAF	United States Air Force
USMC	United States Marine Corps
VFR	Visual Flight Rules

Intentionally left blank

1.0 Introduction

The United States Marine Corps (USMC) proposes to establish a Marine Aviation Operational Test and Evaluation Center (OTEC) and relocation of the Aviation Test and Evaluation Center of Excellence (VMX-22) at MCAS Yuma. VMX-22 would become part of the OTEC. The USMC is preparing an Environmental Assessment (EA), which this noise study supports. The action would require additional rotorcraft assets to be based at MCAS Yuma, namely, CH-53E/K, AH-1 and MV-22 aircraft.

This noise study considers two scenarios: Baseline and Proposed. For this analysis, the Baseline scenario reflects Fiscal Year 2022, updated from the Cumulative scenario of the F-35B West Coast Basing Environmental Impact Statement (EIS) (USMC 2010), primarily accounting for the introduction of the F-35B aircraft to MCAS Yuma. The Proposed scenario is for FY2023 when the OTEC is fully operational.

Section 2 describes the methodology of this study. Section 3 includes the modeling data used in the Baseline scenario, and section 4 includes the modeling data used for the Proposed scenario.

2.0 Methodology

Table 2-1 summarizes the noise model and its parameters relative to this work. This analysis utilizes the Department of Defense (DOD) NOISEMAP suite of computer programs (Czech and Plotkin 1998; Wasmer and Maunsell 2006a; Wasmer and Maunsell 2006b) containing the core computational program called "NMAP", version 7.2, and the Rotorcraft Noise Model (RNM) version 7.2.4.0.

Table 2-1. Noise Modeling Parameters

Software	Analysis	Version
NMAP	Fixed wing aircraft	7.2
RNM	Rotorcraft	7.2.4.0
Parameter	**Description**	
Receiver Grid Spacing	500 ft in x and y	
Metric	DNL (dBA)	
Basis	Annual Average Daily Operations (AAD)	
Topography		
Elevation Data Source	1 arc-second NED	
Elevation (ELV) and Impedance (IMP) Grid spacing	200 ft in x and y	
Flow Resistivity of Ground (soft)	200 kPa-s/m^2	
Modeled Weather (CY 2007; April)		
Temperature	72 °F	
Relative Humidity	29%	
Barometric Pressure	29.63 inHg	

2.1 Primary Noise Metric and Modeling

Day-Night Average Sound Level (DNL) is the relevant noise metric for this study and is based on annual average daily aircraft operations. DNL has two time periods of interest: daytime and nighttime. Daytime hours are from 0700 to 2200 local. Nighttime hours are from 2200 to 0700 local. DNL weighs operations occurring during its nighttime period by adding 10 decibels (dB) to their single-event sounds level. Noise exposure is presented in

terms of contours, i.e., lines of equal value, of DNL. DNL contours of 65 to 85 dB, presented in 5-dB increments, provide a graphical depiction of the aircraft noise environment. For the plotting of DNL contours, a grid point spacing of 500 feet was utilized. NOISEMAP's ability to account for the effects of sound propagation includes two different ground impedance conditions: "soft ground" (e.g., grass-covered ground) with a flow resistivity of 200 kPa-s/m^2 or "hard ground" (e.g., between asphalt and water) with a flow resistivity of 1,000,000 kPa-s/m^2. This study considered all areas in and around MCAS Yuma as soft ground for modeling purposes, consistent with the EIS. The modeling does not include the effect of shielding of on-base buildings.

Noise exposure is also presented in terms of DNL at representative Points of Interest (POI), such as hospitals, schools, places of worship and other noise-sensitive locations. The set of POI for this study is similar to the POI modeled in the EIS and was provided by the USMC (Backs 2013). The 22 POI are listed in Table 2-2 and shown in Figures 2-1 and 2-2. For consistency with the F-35B West Coast Basing EIS, POI with DNL less than 65 dB are listed as "< 65".

Table 2-2. Points of Interest for MCAS Yuma

ID	Description
C01	Saddles of Joy (commercial)
H01	Yuma Regional Medical Center
P01	Fairgrounds
P02	Yuma Civic Center
R01	Sun Leisure Estates
R02	Country Club and 32nd
R03	Bard, California
R04	4th Ave extension
R05	Winsor Ave and 32nd
R06	community of Patricia Lane
R07	Foothills Blvd and 53rd St
R08	40-48th St and 6E
S01	Gwyneth Ham Elementary
S02	Gila Vista Junior High
S03	Kofa High School
S04	McGraw Elementary School
S05	Palmcroft Elementary
S06	James Rolle Elementary
W01	Generations Church
W02	Calvary Chapel
W03	Christ Lutheran Church and School
W04	Mt. Zion Church and School

Figure 2-1. Points of Interest Nearest MCAS Yuma

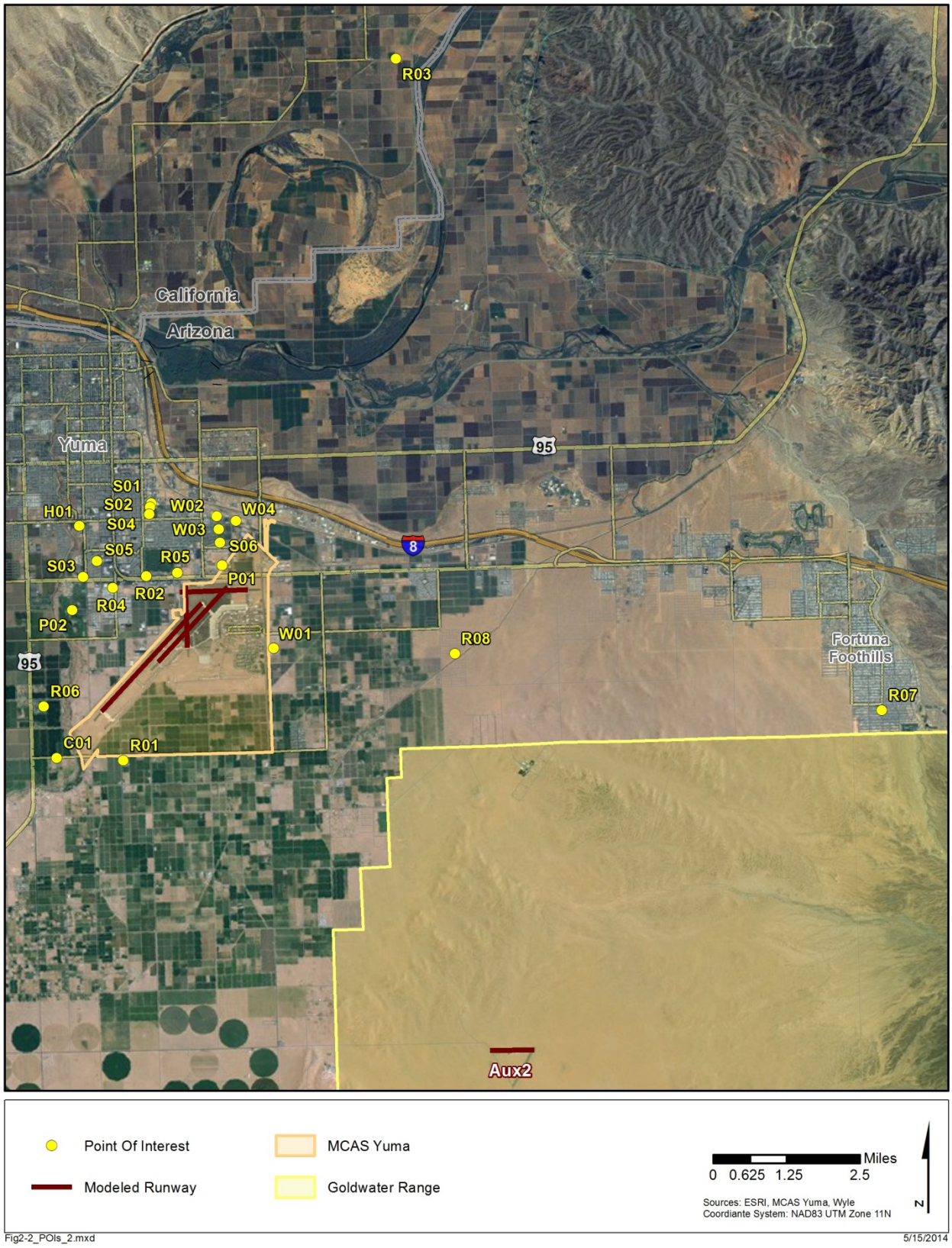


Figure 2-2. Points of Interest Farthest from MCAS Yuma

For each scenario, aircraft operations are considered at three airfields: MCAS Yuma (whose airfield also serves Yuma International Airport), Auxiliary Field 2 (Aux2), and the same Proposed Auxiliary Landing Field (ALF) considered in the EIS. Aux2 and the ALF are located wholly within the Barry M. Goldwater Range (BMGR) southeast of MCAS Yuma. The airport identifier for MCAS Yuma/Yuma International Airport is KNYL, shortened for brevity in this study to "NYL".

2.2 Supplemental Metrics Analyses

In addition to DNL, this noise study examined the potential for sleep disturbance and speech interference using metrics of Probability of Awakening (PA) and Numbers of Events At or Above a Selected Threshold (NA). The methodologies for these two analyses are described in the following subsections.

Common to these supplemental analyses is the determination of indoor sound levels. The noise models compute the outdoor noise levels which must be converted to interior noise levels. For the purpose of this analysis typical Noise Level Reductions (NLR) of 15 dB and 25 dB were used to account for the effect of a typical home with windows open and windows closed, respectively (FICON 1992).

All POI are considered to be at or near residential areas and relevant to sleep disturbance and speech interference analyses.

2.2.1 Potential for Sleep Disturbance

For sleep disturbance, the DOD guidelines (DNWG 2009) recommend the methodology and standard developed by the American National Standards Institute (ANSI) and the Acoustical Society of America (ASA) in 2008 to compute the PA associated with outdoor noise events heard in homes and is a function of indoor Sound Exposure Level (SEL) (ANSI 2008). In NOISEMAP and RNM, SEL only pertains to flight events thus the PA is only associated with flight events and not run-up events. Consistent with the EIS, only annual average daily DNL nighttime (10 p.m. to 7 a.m.) flight events were considered and only for residential locations.

2.2.2 Potential for Indoor Speech Interference

For the analysis for the potential for indoor speech interference at each POI, the Number-of Events At or Above a Selected Noise Threshold (NA) metric was computed for flight and run-up events during DNL daytime (7 a.m. to 10 p.m.) period and the resultant NAs were summed. For NMAP aircraft, NA was computed with a proprietary version of the software.

The NA metric provides the total number of noise events greater than or equal to the selected noise level threshold during a specified period of time. The period of time can be an average 24-hour day, daytime, nighttime, school day, or any other time period appropriate to the nature and application of the analysis. The selected noise threshold for NA was indoor 50 dB L_{max} (DNWG 2009). L_{max} pertains to flight and run-up events.

Consistent with the EIS, only hospitals, schools and residential POI were included in the speech interference analysis. Commercial locations and places of worship without an associated educational facility were excluded.

3.0 Baseline Scenario

The following two subsections detail the modeling data and the resultant noise exposure for the Baseline scenario. The Baseline scenario is mostly based on the EIS's Cumulative scenario for FY2022 (USMC 2010) with a few minor updates or modifications.

3.1 Modeling Data

Tables 3-1 through 3-3 detail the annual flight operations at MCAS Yuma, Aux2 and the ALF, respectively. Regarding Table 3-1 and consistent with the Cumulative scenario of the EIS, the Baseline scenario of this study consists of 129,330 flight operations, of which approximately 6% occur during the DNL nighttime period (2200-0700). Approximately 40% of the total flight operations would be based military aircraft, of which F-35B is the majority type. Approximately 45% of the total flight operations would be civilian aircraft operating at the Yuma International Airport. The remaining flight operations would be transient aircraft not based at MCAS Yuma.

As shown in Table 3-2, Aux2 flight operations would be unchanged from the EIS's Cumulative scenario and include an annual total of 2,776 flight operations. All of the flight operations at Aux2 would be from transient aircraft detaching to or visiting MCAS Yuma, and none of the operations would be from NYL-based aircraft. The modeled operations would consist entirely of rotorcraft. The most frequent type of operation at Aux2 would be Field Carrier Landing Practice (FCLP). Of the total flight operations at Aux2, 12% would be during the DNL nighttime period.

As shown in Table 3-3, the flight operations at the ALF would also be unchanged from the EIS's Cumulative scenario, with an annual total of 10,051 flight operations. Except for 32 annual flight operations by C-130 aircraft, all ALF flight operations would be NYL-based F-35B and 85% of these operations would be FCLP. Because it is anticipated the F-35B would be the primary and dominant contributor of the noise exposure at the ALF, the relatively few C-130 operations were not modeled.

Based fixed wing aircraft would utilize the primary runway, Runway 03/21, for nearly all flight operations as presented in Table 3-4. Directional use of Runway 03/21 depends upon wind conditions resulting in approximately 70% of arrivals and departures occurring on Runway 03 with the remaining 30% occurring on Runway 21. Rotorcraft split between runway direction 03 and 21 evenly, and also use runways 08/26 and 17/35 for approximately 10% of departures and 50% of arrivals.

The civilian aircraft would utilize Runways 17/35 approximately 75% of the time, and 08/26 the remaining 25% of the time, each splitting both directions evenly.

The next step in the noise modeling process determines distinct flight tracks or paths to reflect how aircraft travel to and from MCAS Yuma. Only a few flight tracks from the EIS required updating per USMC guidance (USMC 2013). The modified flight tracks are shown in Figure 3-1. Relative to the EIS, additional flight tracks were required for OTEC operations (USMC 2013). Figures 3-2 through 3-4 show additional rotary-wing flight tracks.

Table 3-1. Baseline Annual Flight Operations at MCAS Yuma

Group	Squadron Name	Notes	Aircraft Type	Departure			Interfacility to ALF or Aux2 (1)			Instrument Straight-In Arrival (3)			Overhead Break Arrival to RUNWAY (4)			Overhead Break Arrival to PADS (2)			Non-Break Visual Arrival to RUNWAY (4)			Non-Break Visual Arrival to PADS (2)			Interfacility from ALF or Aux2			Visual Touch and Go (Conventional) (5)			Visual Touch & Go (Non-conventional) (6)			GCA Box (6)			TOTAL		
				Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total
Based	Alt 1: Active-Duty (135 pilots)	7	F-35B	15,576	157	15,733	315	-	315	779	8	787	10,631	8	10,639	1,051	-	1,051	2,835	142	2,977	280	-	280	312	3	315	755	-	755	1,762	-	1,762	623	-	623	34,919	318	35,237
Based	Alt 1: OT&E (10 pilots)	7	F-35B	1,154	12	1,166	23	-	23	58	1	59	787	1	788	78	-	78	210	10	220	21	-	21	23	-	23	56	-	56	131	-	131	46	-	46	2,587	24	2,611
Based	OT&E		MV-22			-			-			-			-			-			-			-			-			-			-			-	-	-
Based	OT&E CH-53E/K		CH-53E			-			-			-			-			-			-			-			-			-			-			-	-	-
Based	OT&E UH-1Y		AH-1W			-			-			-			-			-			-			-			-			-			-			-	-	-
Based	Alt 1: Reserve (0 pilots)		F-35B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Based	4 squadrons @ 14 aircraft ea		AV-8B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Based	F5_VMFT401		F-5E	4,299	-	4,299	-	-	-	194	-	194	3,900	-	3,900			-	205	-	205			-	-	-	-	800	-	800	-	-	-	-	-	-	9,398	-	9,398
Based	NYL_HH-1		UH-1	1,001	-	1,001	-	-	-	-	-	-	-	-	-			-	1,001	-	1,001			-	-	-	-	-	-	-	-	-	-	-	-	-	2,002	-	2,002
Based	NYL_UC-12		C-12	1,356	31	1,387	-	-	-	-	-	-	-	-	-			-	1,209	178	1,387			-	-	-	-	-	-	-	-	-	-	-	-	-	2,565	209	2,774
Civil	YUM_AIR_CARRIER		DASH-8	3,021	86	3,107	-	-	-	295	36	331	-	-	-			-	2,536	240	2,776			-	-	-	-	-	-	-	-	-	-	-	-	-	5,852	362	6,214
Civil	YUM_AIR_CARRIER		CRJ-200	3,021	85	3,106	-	-	-	295	36	331	-	-	-			-	2,535	240	2,775			-	-	-	-	-	-	-	-	-	-	-	-	-	5,851	361	6,212
Civil	YUM_GENERAL_AVIATION		GASEPF	3,252	310	3,562	-	-	-	178	9	187	-	-	-			-	3,088	280	3,368			-	-	-	-	22,819	2,446	25,265	-	-	-	-	-	-	29,337	3,045	32,382
Civil	YUM_GENERAL_AVIATION	8	King Air	949	90	1,039	-	-	-	52	2	54	-	-	-			-	901	82	983			-	-	-	-	6,656	713	7,369	-	-	-	-	-	-	8,558	887	9,445
Civil	YUM_GENERAL_AVIATION		Citation	316	30	346	-	-	-	18	1	19	-	-	-			-	300	27	327			-	-	-	-	2,219	238	2,457	-	-	-	-	-	-	2,853	296	3,149
Transient	MAWTS1_FA-18		F-35B	1,234	126	1,360	-	-	-	-	-	-	948	207	1,155	-	-	-	167	37	204	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,349	370	2,719
Transient			F-35C	12	1	13	-	-	-	-	-	-	10	2	12	-	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24	3	27
Transient	MAWTS1_FA-18		FA-18E/F	13	1	14	-	-	-	-	-	-	10	2	12			-	2	-	2			-	-	-	-	-	-	-	-	-	-	-	-	-	25	3	28
Transient	MAWTS1_AV-8B		F-35B	871	54	925	-	-	-	-	-	-	637	149	786			-	112	26	138			-	-	-	-	-	-	-	-	-	-	-	-	-	1,620	229	1,849
Transient	MAWTS1_EA-6B		EA-6B	-	-	-	-	-	-	-	-	-	-	-	-			-	-	-	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	MAWTS1_KC-130		C-130	491	37	528	12	4	16	-	-	-	-	-	-			-	449	80	529			-	12	4	16	-	-	-	-	-	-	-	-	-	964	125	1,089
Transient	MAWTS1_CH-46		CH-46E			-			-			-			-			-			-			-			-	-	-	-	-	-	-	-	-	-	-	-
Transient	MAWTS1_CH-46	9	MV-22 (Partial)	1,022	64	1,086	38	15	53	-	-	-	-	-	-			-	914	172	1,086			-	38	15	53	-	-	-	-	-	-	-	-	-	2,012	266	2,278
Transient	MAWTS1_CH-53	9	CH-53E (Partial)	823	31	854	34	12	46	-	-	-	-	-	-			-	725	130	855			-	34	12	46	-	-	-	-	-	-	-	-	-	1,616	185	1,801
Transient	MAWTS1_AH-1W	9	AH-1W (Partial)	849	53	902	43	17	60	-	-	-	-	-	-			-	777	125	902			-	43	17	60	-	-	-	-	-	-	-	-	-	1,712	212	1,924
Transient	MAWTS1_UH-1	9	H-1 (Partial)	1,194	110	1,304	24	10	34	-	-	-	-	-	-			-	1,066	238	1,304			-	24	10	34	-	-	-	-	-	-	-	-	-	2,308	368	2,676
Transient	NYL_DET_		F-35B	666	38	704	-	-	-	-	-	-	704	-	704	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,370	38	1,408
Transient			F-35C	7	-	7	-	-	-	-	-	-	7	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	14
Transient	NYL_DET_		FA-18E/F	7	-	7	-	-	-	-	-	-	7	-	7			-	-	-	-			-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	14
Transient	NYL_DET_		F-35B	1,052	27	1,079	-	-	-	-	-	-	1,079	-	1,079			-	-	-	-			-	-	-	-	-	-	-	-	-	-	-	-	-	2,131	27	2,158
Transient	NYL_DET_		EA-6B	-	-	-	-	-	-	-	-	-	-	-	-			-	-	-	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	NYL_DET_		C-5	8	-	8	-	-	-	7	-	7	-	-	-			-	1	-	1			-	-	-	-	-	-	-	-	-	-	-	-	-	16	-	16
Transient	NYL_DET_ C-130		C-130	74	-	74	-	-	-	68	3	71	-	-	-			-	2	-	2			-	-	-	-	-	-	-	-	-	-	-	-	-	144	3	147
Transient	NYL_DET_		CH-46E			-			-			-			-			-			-			-			-	-	-	-	-	-	-	-	-	-	-	-
Transient	NYL_DET_	9	MV-22 (Partial)	426	8	434	24	12	36	-	-	-	-	-	-			-	436	-	436			-	24	12	36	-	-	-	-	-	-	-	-	-	910	32	942
Transient	NYL_DET_	9	CH-53E (Partial)	220	-	220	16	8	24	-	-	-	-	-	-			-	220	-	220			-	16	8	24	-	-	-	-	-	-	-	-	-	472	16	488
Transient	NYL_DET_ H-60		H-60	112	-	112	-	-	-	-	-	-	-	-	-			-	112	-	112			-	-	-	-	-	-	-	-	-	-	-	-	-	224	-	224
Transient	NYL_DET_	9	H-1 (Partial)	27	-	27	25	-	25	-	-	-	-	-	-			-	27	-	27			-	25	-	25	-	-	-	-	-	-	-	-	-	104	-	104
SUBTOTAL TRANSIENT BY AIRCRAFT TYPE																																						
Transient			*F-35B*	*3,823*	*245*	*4,068*	-	-	-	-	-	-	*3,368*	*356*	*3,724*	-	-	-	*279*	*63*	*342*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*7,470*	*664*	*8,134*
Transient			*F-35C*	*19*	*1*	*20*	-	-	-	-	-	-	*17*	*2*	*19*	-	-	-	*2*	-	*2*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*38*	*3*	*41*
Transient			*FA-18E/F*	*20*	*1*	*21*	-	-	-	-	-	-	*17*	*2*	*19*	-	-	-	*2*	-	*2*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*39*	*3*	*42*
Transient			*EA-6B*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient			*C-5*	*8*	-	*8*	-	-	-	*7*	-	*7*	-	-	-	-	-	-	*1*	-	*1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*16*	-	*16*
Transient			*C-130*	*565*	*37*	*602*	*12*	*4*	*16*	*68*	*3*	*71*	-	-	-	-	-	-	*451*	*80*	*531*	-	-	-	*12*	*4*	*16*	-	-	-	-	-	-	-	-	-	*1,108*	*128*	*1,236*
Transient			*CH-46E*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient			*MV-22 (Partial)*	*1,448*	*72*	*1,520*	*62*	*27*	*89*	-	-	-	-	-	-	-	-	-	*1,350*	*172*	*1,522*	-	-	-	*62*	*27*	*89*	-	-	-	-	-	-	-	-	-	*2,922*	*298*	*3,220*
Transient			*CH-53E (Partial)*	*1,043*	*31*	*1,074*	*50*	*20*	*70*	-	-	-	-	-	-	-	-	-	*945*	*130*	*1,075*	-	-	-	*50*	*20*	*70*	-	-	-	-	-	-	-	-	-	*2,088*	*201*	*2,289*
Transient			*AH-1W (Partial)*	*849*	*53*	*902*	*43*	*17*	*60*	-	-	-	-	-	-	-	-	-	*777*	*125*	*902*	-	-	-	*43*	*17*	*60*	-	-	-	-	-	-	-	-	-	*1,712*	*212*	*1,924*
Transient			*H-1 (Partial)*	*1,221*	*110*	*1,331*	*49*	*10*	*59*	-	-	-	-	-	-	-	-	-	*1,093*	*238*	*1,331*	-	-	-	*49*	*10*	*59*	-	-	-	-	-	-	-	-	-	*2,412*	*368*	*2,780*
Transient			*H-60*	*112*	-	*112*	-	-	-	-	-	-	-	-	-	-	-	-	*112*	-	*112*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*224*	-	*224*
Based				23,386	200	23,586	338	-	338	1,031	9	1,040	15,318	9	15,327	1,129	-	1,129	5,460	330	5,790	301	-	301	335	3	338	1,611	-	1,611	1,893	-	1,893	669	-	669	51,471	551	52,022
Civil				10,559	601	11,160	-	-	-	838	84	922	-	-	-	-	-	-	9,360	869	10,229	-	-	-	-	-	-	31,694	3,397	35,091	-	-	-	-	-	-	52,451	4,951	57,402
Transient				9,108	550	9,658	216	78	294	75	3	78	3,402	360	3,762	-	-	-	5,012	808	5,820	-	-	-	216	78	294	-	-	-	-	-	-	-	-	-	18,029	1,877	19,906
Modeled				36,806	1,048	37,854	542	74	616	1,869	93	1,962	18,720	369	19,089	1,129	-	1,129	14,102	1,262	15,364	301	-	301	539	77	616	33,305	3,397	36,702	1,893	-	1,893	669	-	669	109,875	6,320	115,639
Not Modeled				6,247	303	6,550	12	4	16	75	3	78	-	-	-	-	-	-	5,730	745	6,475	-	-	-	12	4	16	-	-	-	-	-	-	-	-	-	12,076	1,059	13,691
TOTAL				43,053	1,351	44,404	554	78	632	1,944	96	2,040	18,720	369	19,089	1,129	-	1,129	19,832	2,007	21,839	301	-	301	551	81	632	33,305	3,397	36,702	1,893	-	1,893	669	-	669	**121,951**	**7,379**	**129,330**

Source: F-35B WCB EIS, Cumulative Scenario

Notes:

1 Interfacilities are modeled to and from runways (no pad usage); All F-35B interfacilities are STO and VL; counted as 1 operation per one-way trip.
2 All F-35B arrivals to Pads modeled as VL.
3 All non-F-35 TACAN arrivals modeled as conventional landing to runways; see F-35 sheet for landing type %s
4 see F-35 utilization sheet for landing type %s
5 F-35B modeled with Conventional takeoff and landing on runways (no pad usage); counted as 2 operations per circuit.
6 Counted as 2 operations per circuit; See F-35 sheet for landing/takeoff type %s
7 see F-35 utilization sheet for takeoff type %s
8 Modeled King Air as a C-12.
9 Only interfacility traffic modeled.
10 Counted as two operations each circuit
11 modeled H-1 as AH-1W
12 "Departures from Pad" modeled from Runway
13 "Other Arrivals to Pad" modeled as Non-Break Arrivals to Runway

Table 3-2. Baseline Annual Flight Operations at Aux 2

Group	Squadron Name	Notes	Aircraft Type	Interfacility Arrivals from NYL or NKX/NFG			Touch and Go (10)			FCLP (10)			Interfacility to NYL or NKX/NFG			TOTAL		
				Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total
NYL-based	Active-Duty (135 pilots)		F-35B			-			-			-			-	-	-	-
NYL-based	OT&E (10 pilots)		F-35B			-			-			-			-	-	-	-
NYL-based	OT&E		MV-22			-			-			-			-	-	-	-
NYL-based	OT&E CH-53E/K		CH-53E			-			-			-			-	-	-	-
NYL-based	OT&E UH-1Y		AH-1W			-			-			-			-	-	-	-
NYL-based	Reserve (0 pilots)		F-35B			-			-			-			-	-	-	-
NKX-based	Active-Duty (162 pilots)		F-35B			-			-			-			-	-	-	-
NKX-based	OT&E (0 pilots)		F-35B			-			-			-			-	-	-	-
NKX-based	Reserve (0 pilots)		F-35B			-			-			-			-	-	-	-
NYL-based	4 Sqns @ 14 A/C ea		AV-8B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	MAWTS		C-130			-			-			-			-	-	-	-
Transient			CH-46E			-			-			-			-	-	-	-
Transient			MV-22	38	15	53			-			-	38	15	53	76	30	106
Transient			CH-53E	34	12	46			-			-	34	12	46	68	24	92
Transient			AH-1W	43	17	60			-			-	43	17	60	86	34	120
Transient		11	H-1	24	10	34			-			-	24	10	34	48	20	68
Transient	NYL_DET_		CH-46E			-			-			-			-	-	-	-
Transient			MV-22	24	12	36			-			-	24	12	36	48	24	72
Transient	direct from NKX/NFG		MV-22	148	16	164			-	1,478	164	1,642	148	16	164	1,774	196	1,970
Transient			CH-53E	16	8	24			-			-	16	8	24	32	16	48
Transient		11	H-1	25	-	25	250	-	250			-	25	-	25	300	-	300
SUBTOTAL BY AIRCRAFT TYPE																		
			F-35B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			AV-8B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			C-130	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CH-46E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			MV-22	*210*	*43*	*253*	-	-	-	*1,478*	*164*	*1,642*	*210*	*43*	*253*	*1,898*	*250*	*2,148*
			CH-53E	*50*	*20*	*70*	-	-	-	-	-	-	*50*	*20*	*70*	*100*	*40*	*140*
			AH-1W	*43*	*17*	*60*	-	-	-	-	-	-	*43*	*17*	*60*	*86*	*34*	*120*
		11	*H-1*	*49*	*10*	*59*	*250*	-	*250*	-	-	-	*49*	*10*	*59*	*348*	*20*	*368*
NYL-Based				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NKX-Based	(F-35 only)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Civil				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient				352	90	442	250	-	250	1,478	164	1,642	352	90	442	2,432	344	2,776
Modeled				352	90	442	250	-	250	1,478	164	1,642	352	90	442	2,432	344	2,776
Not Modeled				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL				**352**	**90**	**442**	**250**	**-**	**250**	**1,478**	**164**	**1,642**	**352**	**90**	**442**	**2,432**	**344**	**2,776**

Notes:

1 Interfacilities are modeled to and from runways (no pad usage); All F-35B interfacilities are STO and VL; counted as 1 operation per one-
2 All F-35B arrivals to Pads modeled as VL.
3 All non-F-35 TACAN arrivals modeled as conventional landing to runways; see F-35 sheet for landing type %s
4 see F-35 utilization sheet for landing type %s
5 F-35B modeled with Conventional takeoff and landing on runways (no pad usage); counted as 2 operations per circuit.
6 Counted as 2 operations per circuit; See F-35 sheet for landing/takeoff type %s
7 see F-35 utilization sheet for takeoff type %s
8 Modeled King Air as a C-12.
9 Only interfacility traffic modeled.
10 Counted as two operations each circuit
11 modeled H-1 as AH-1W
12 "Departures from Pad" modeled from Runway
13 "Other Arrivals to Pad" modeled as Non-Break Arrivals to Runway

Table 3-3. Baseline Annual Flight Operations at ALF

Group	Squadron Name	Notes	Aircraft Type	Interfacility Arrivals from NYL or NKX/NFG			Touch and Go (10)			FCLP (10)			Interfacility to NYL or NKX/NFG			TOTAL		
				Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total
NYL-based	Alt 1: Active-Duty (135 pilots)		F-35B	315	-	315	-	-	-	3,776	-	3,776	312	3	315	4,403	3	4,406
NYL-based	Alt 1: OT&E (10 pilots)		F-35B	23	-	23	-	-	-	280	-	280	23	-	23	326	-	326
NYL-based	OT&E		MV-22			-			-			-			-			
NYL-based	OT&E CH-53E/K		CH-53E			-			-			-			-			
NYL-based	OT&E UH-1Y		AH-1W			-			-			-			-			
NYL-based	Alt 1: Reserve (0 pilots)		F-35B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NKX-based	Alt 1: Active-Duty (162 pilots)		F-35B	378	-	378	-	-	-	4,531	-	4,531	374	4	378	5,283	4	5,287
NKX-based	Alt 1: OT&E (0 pilots)		F-35B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NKX-based	Alt 1: Reserve (0 pilots)		F-35B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NYL-based	4 Sqns @ 14 A/C ea		AV-8B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	MAWTS1_KC-130		C-130	12	4	16			-			-	12	4	16	24	8	32
Transient	MAWTS1_CH-46		CH-46E			-			-			-			-	-	-	-
Transient			MV-22			-			-			-			-	-	-	-
Transient	MAWTS1_CH-53		CH-53E			-			-			-			-	-	-	-
Transient	MAWTS1_AH-1W		AH-1W			-			-			-			-	-	-	-
Transient	MAWTS1_UH-1		H-1			-			-			-			-	-	-	-
Transient	NYL_DET_		CH-46E			-			-			-			-	-	-	-
Transient			MV-22			-			-			-			-			
Transient	direct from NKX/NFG		MV-22			-			-			-			-	-	-	-
Transient			CH-53E			-			-			-			-	-	-	-
Transient			H-1			-			-			-			-	-	-	-
SUBTOTAL BY AIRCRAFT TYPE																		
			F-35B	*716*	-	*716*	-	-	-	*8,587*	-	*8,587*	*709*	*7*	*716*	*10,012*	*7*	*10,019*
			AV-8B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			C-130	*12*	*4*	*16*	-	-	-	-	-	-	*12*	*4*	*16*	*24*	*8*	*32*
			CH-46E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			MV-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CH-53E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			AH-1W	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			H-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NYL-Based				338	-	338	-	-	-	4,056	-	4,056	335	3	338	4,729	3	4,732
NKX-Based				378	-	378	-	-	-	4,531	-	4,531	374	4	378	5,283	4	5,287
Civil				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient				12	4	16	-	-	-	-	-	-	12	4	16	24	8	32
Modeled				716	-	716	-	-	-	8,587	-	8,587	709	7	716	10,012	7	10,019
Not Modeled				12	4	16	-	-	-	-	-	-	12	4	16	24	8	32
TOTAL				**728**	**4**	**732**	**-**	**-**	**-**	**8,587**	**-**	**8,587**	**721**	**11**	**732**	**10,036**	**15**	**10,051**

Source: F-35B WCB EIS, Cumulative Scenario

Notes:

1 Interfacilities are modeled to and from runways (no pad usage); All F-35B interfacilities are STO and VL; counted as 1 operation per one-way
2 All F-35B arrivals to Pads modeled as VL.
3 All non-F-35 TACAN arrivals modeled as conventional landing to runways; see F-35 sheet for landing type %s
4 see F-35 utilization sheet for landing type %s
5 F-35B modeled with Conventional takeoff and landing on runways (no pad usage); counted as 2 operations per circuit.
6 Counted as 2 operations per circuit; See F-35 sheet for landing/takeoff type %s
7 see F-35 utilization sheet for takeoff type %s
8 Modeled King Air as a C-12.
9 Only interfacility traffic modeled.
10 Counted as two operations each circuit
11 modeled H-1 as AH-1W
12 "Departures from Pad" modeled from Runway
13 "Other Arrivals to Pad" modeled as Non-Break Arrivals to Runway

Table 3-4. Runway and Direction Utilization

Op Type	Rwy ID	Pad or Runway Side	Based						Based and Transient MV-22		Proposed Based OT&E H-1 and H_53,		Transient FA-18E/F		Civil Aircraft	
			F-35B		F-5		C-12									
			Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)
Departure	03	03L	80%	80%	20%	20%	20%	20%							20%	20%
		03R	20%	20%	80%	80%	80%	80%	100%	100%	100%	100%			80%	80%
	21	21L	20%	20%	80%	80%	80%	80%	100%	100%	100%	100%			80%	80%
		21R	80%	80%	20%	20%	20%	20%							20%	20%
	08	N/A							100%	100%	100%	100%	100%	100%		
	26	N/A							100%	100%	100%	100%	100%	100%		
	17	N/A							100%	100%	100%	100%	100%	100%		
	35	N/A							100%	100%	100%	100%	100%	100%		
Non-break Arrival to Runways	03	03L	90%	90%	10%	10%	10%	10%	100%	100%	100%	100%			10%	10%
		03R	10%	10%	90%	90%	90%	90%							90%	90%
	21	21L	10%	10%	70%	70%	70%	70%	100%	100%	100%	100%			70%	70%
		21R	90%	90%	30%	30%	30%	30%							30%	30%
	08	N/A							100%	100%	100%	100%	100%	100%		
	26	N/A							100%	100%	100%	100%	100%	100%		
	17	N/A							100%	100%	100%	100%	100%	100%		
	35	N/A							100%	100%	100%	100%	100%	100%		
Non-break Arrival to Pads	03	Pad 1	20%	20%												
		Pad 2	20%	20%												
		Pad 3	20%	20%												
		Pad 4	20%	20%												
		Pad 5	20%	20%												
	21	Pad 1	20%	20%												
		Pad 2	20%	20%												
		Pad 3	20%	20%												
		Pad 4	20%	20%												
		Pad 5	20%	20%												
TACAN Arrival to Runways	03	03R														
		03L	100%	100%	100%	100%										
	21	21L			5%	5%										
		21R	100%	100%	95%	95%							100%	100%		
	35	N/A											100%	100%		
TACAN Arrivals to Pads	03	Pad 1	20%	20%												
		Pad 2	20%	20%												
		Pad 3	20%	20%												
		Pad 4	20%	20%												
		Pad 5	20%	20%												
	21	Pad 1	20%	20%												
		Pad 2	20%	20%												
		Pad 3	20%	20%												
		Pad 4	20%	20%												
		Pad 5	20%	20%												
Overhead Break Arrival to Runways	03	03L	10%	10%	10%	10%									10%	10%
		03R	90%	90%	90%	90%									90%	90%
	21	21L	90%	90%	90%	90%									90%	90%
		21R	10%	10%	10%	10%									10%	10%
Overhead Break Arrival to Pads	03	Pad 1	20%	20%												
		Pad 2	20%	20%												
		Pad 3	20%	20%												
		Pad 4	20%	20%												
		Pad 5	20%	20%												
	21	Pad 1	20%	20%												
		Pad 2	20%	20%												
		Pad 3	20%	20%												
		Pad 4	20%	20%												
		Pad 5	20%	20%												

Table 3-4. Runway and Direction Utilization (*concluded*)

Op Type	Rwy ID	Pad or Runway Side	Based						Based and Transient MV-22		Proposed Based OT&E H-1 and H_53,		Transient FA-18E/F		Civil Aircraft	
			F-35B		F-5		C-12									
			Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)
Touch and Go Conventional	03	03L	90%	90%	14%	14%										
		03R	10%	10%	86%	86%										
	21	21L	10%	10%	91%	91%										
		21R	90%	90%	9%	9%										
Touch and Go Non-Conventional to Runways	03	03L	90%	90%												
		03R	10%	10%												
	21	21L	10%	10%												
		21R	90%	90%												
Touch and Go Non-Conventional to Pads	03	Pad 1	20%	20%												
		Pad 2	20%	20%												
		Pad 3	20%	20%												
		Pad 4	20%	20%												
		Pad 5	20%	20%												
	21	Pad 1	20%	20%												
		Pad 2	20%	20%												
		Pad 3	20%	20%												
		Pad 4	20%	20%												
		Pad 5	20%	20%												
SFO Pattern	03	03L	99%	99%												
		03R	1%	1%												
	21	21L	1%	1%												
		21R	99%	99%												
GCA Box to Runways	03	03L	99%	99%												
		03R	1%	1%												
	21	21L	1%	1%												
		21R	99%	99%												
GCA Box to Pads	03	Pad 1	20%	20%												
		Pad 2	20%	20%												
		Pad 3	20%	20%												
		Pad 4	20%	20%												
		Pad 5	20%	20%												
	21	Pad 1	20%	20%												
		Pad 2	20%	20%												
		Pad 3	20%	20%												
		Pad 4	20%	20%												
		Pad 5	20%	20%												
Interfacility to Aux2	03	03L							100%	100%	100%	100%				
		03R														
	21	21L									100%	100%				
		21R														
FCLP (at Aux2)	09	N/A							100%	100%	100%	100%				
Interfacility from Aux2	09	N/A							100%	100%	100%	100%				
Interfacility to EAF	03	03L														
		03R	100%	100%												
	21	21L	100%	100%												
		21R														

Intentionally left blank

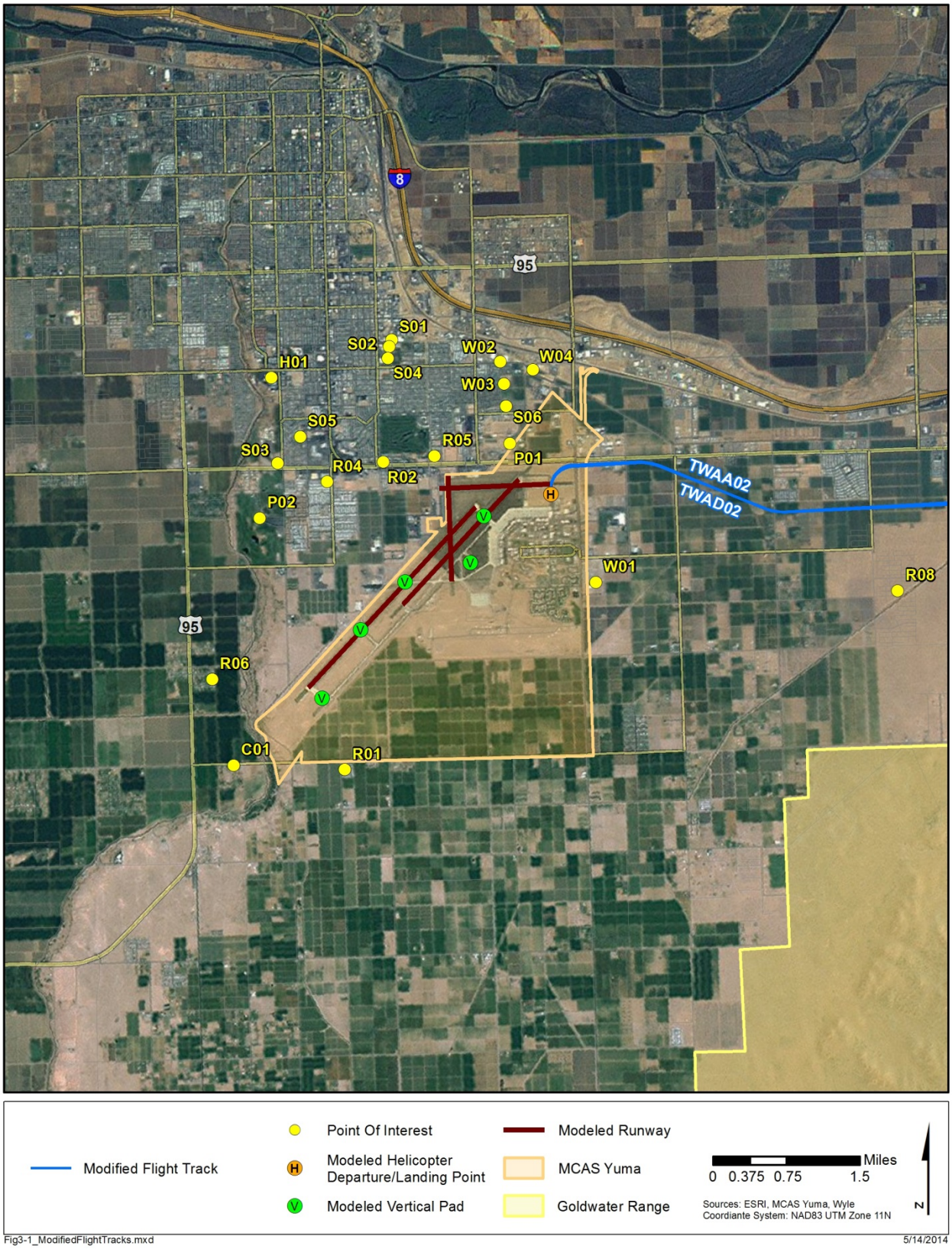


Figure 3-1. Modified Flight Tracks for MCAS Yuma

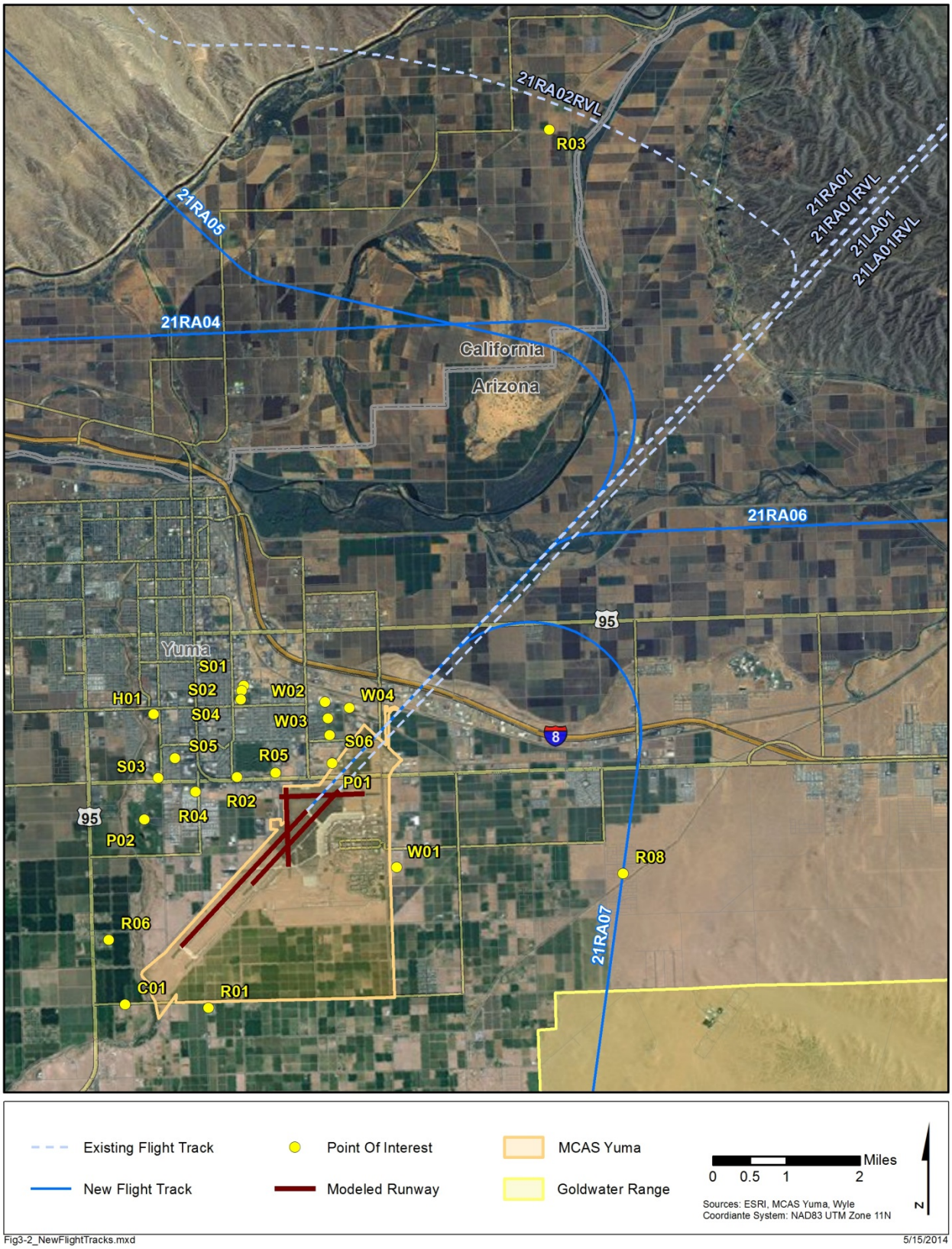


Figure 3-2. Newly Modeled Arrival Flight Tracks for MCAS Yuma

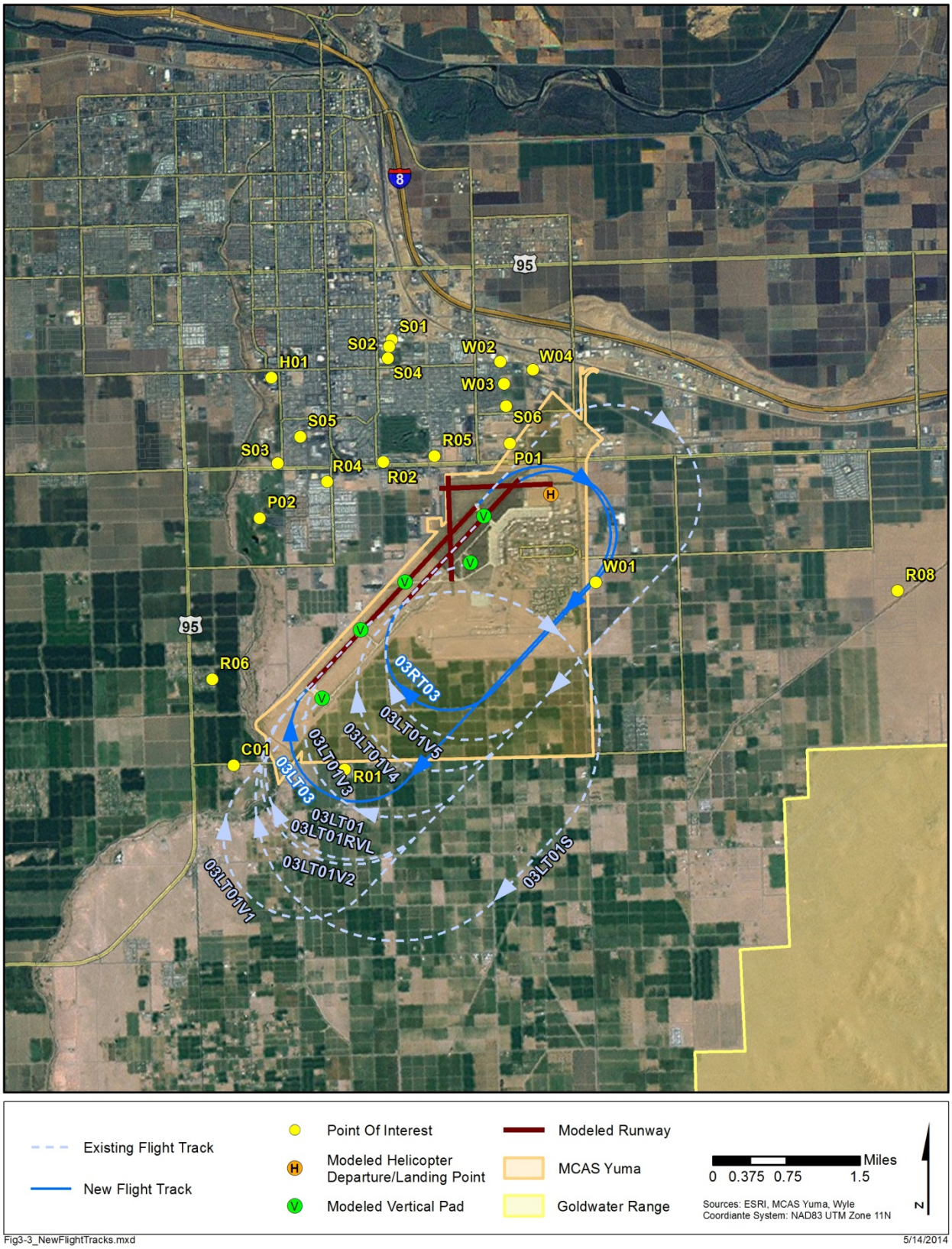


Figure 3-3. Newly Modeled Closed Pattern Flight Tracks on runway 03 for MCAS Yuma

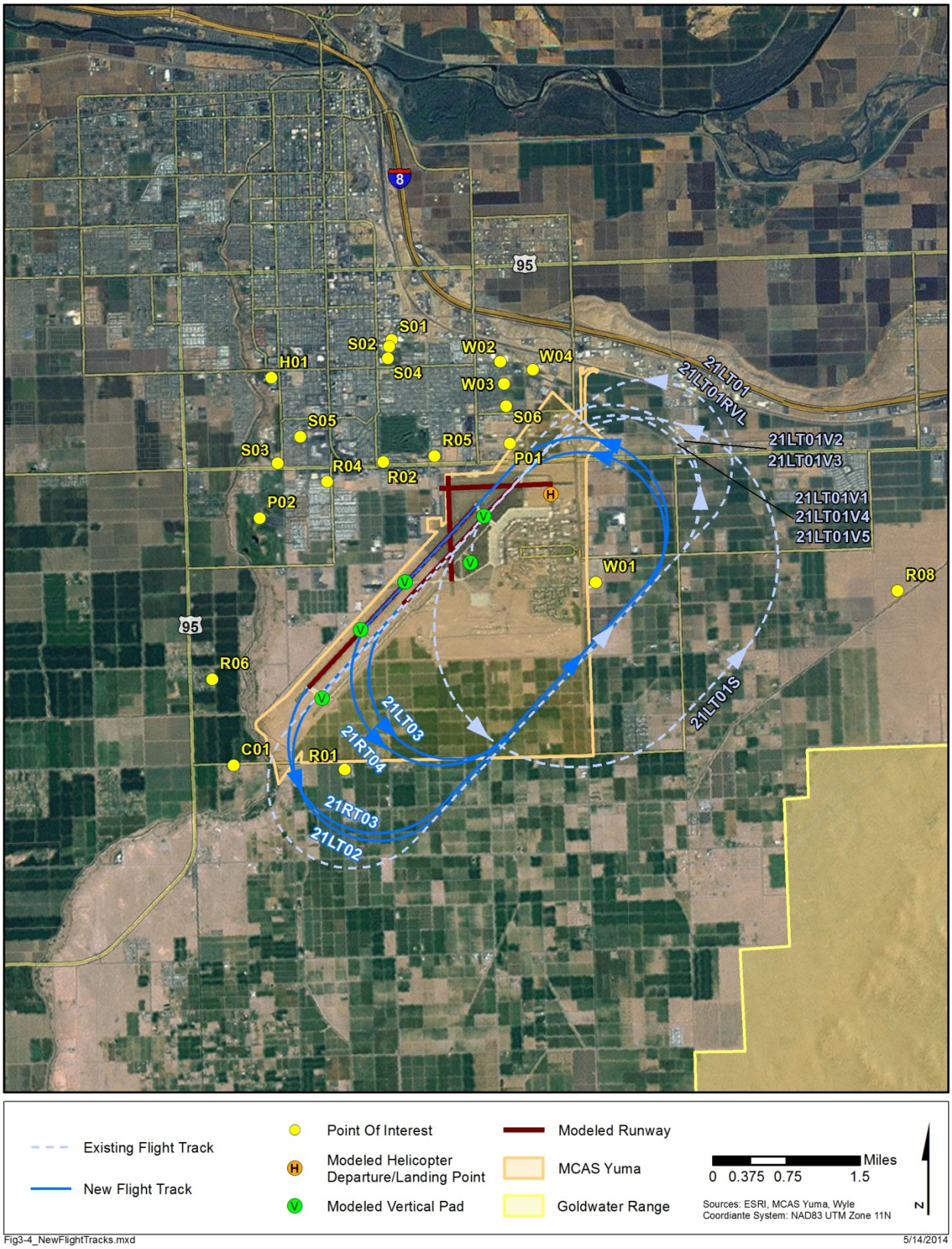


Figure 3-4. Newly Modeled Closed Pattern Flight Tracks on runway 21 for MCAS Yuma

Figure 3-5 shows all of the modeled Baseline maintenance run-up locations and the aircraft orientation typically used for these run-up events. Consistent with the flight operations, maintenance run-up activity was modeled on an annual average daily basis, i.e., annual operations divided by 365 operating days per year. Table 3-5 presents the modeled run-up operations in detail.

Table 3-5. Static Run-up Operations

Aircraft Type	Squadron	Location	Magnetic Heading (deg)	Runup Profile					Annual Events			
				Description	# Engines Running	Power Condition	Reported Power Setting	Power Unit	Duration (minutes)	Total Number	% Day	% Night
F-5 (J85-GE-21C)	VMFT	HPR	180	In-frame engine trim	2	Idle	50	% RPM	45	18	100%	0%
						Military	100	% RPM	30	18	100%	0%
						Afterburner	100	% RPM	15	18	100%	0%
				In-frame Functional	1	Idle	50	% RPM	30	11	100%	0%
						Military	100	% RPM	15	11	100%	0%
						Afterburner	100	% RPM	5	11	100%	0%
	Power plant	Bldg 310	180	Out-of-Frame	1	Idle	50	% RPM	25	39	100%	0%
						Military	100	% RPM	45	39	100%	0%
						Afterburner	100	% RPM	20	39	100%	0%
		ELBOW	180	Lo power @ parking	2	Low Power	80	% RPM	20	11	100%	0%
UC-12B (PT6A-38)	H&HS	Elbow	170		2	100% Torque	98	% RPM	2	131	100%	0%
		RUNUP	260		1	100% Torque	98.1	% RPM	1	44	100%	0%
		Elbow	350		2	Idle	60	% RPM	1	131	100%	0%
F-35B		Runup Pad	290	Low thrust, High rpm	1	Low	32	% ETR	30	1742	50%	50%
		Runup Pad	290	Post Maint MBIT	1	Low	10	% ETR	5	621	90%	10%
							10	% ETR	3			
							10	% ETR	5			
		Runup Pad	290	High RPM/Low Thrust Expeditionary	1	Low cycle	10	% ETR	5	119	90%	10%
							31	% ETR	3			
							10	% ETR	5			
		Runup Pad	290	High RPM/Low Thrust Expeditionary Lift Fan System	1	Low cycle	10	% ETR	5	76	90%	10%
							31	% ETR	3			
							10	% ETR	5			
		Runup Pad	290	High RPM/Low Thrust Expeditionary Lift Fan Drive Shaft	1	Low cycle	10	% ETR	5	86	90%	10%
							31	% ETR	3			
							10	% ETR	5			

3.2 Noise Exposure

Figure 3-6 shows the resultant 65 dB to 85 dB DNL contours in 5 dB increments for Baseline daily aircraft events. The 65 dB DNL contour would extend approximately 2 miles south and 3.5 miles north east beyond the MCAS Yuma installation boundary. The noise exposure would be driven largely by the F-35B operations.

The hooks that extend from the end of Runway 21 to the southeast are a result of closed patterns and break patterns that overfly the southeast corner of MCAS Yuma.

Figure 3-7 is a large scale map showing MCAS Yuma, Aux2 and the ALF. The 65 dB DNL contour for Aux2 and the ALF would fall entirely with the boundary of the BMGR.

The computed DNL for the 22 POI in Table 3-6 show twelve locations would be exposed to DNL greater than or equal to 65 dB with two of those exposed to DNL greater than or equal to 75 dB – the Fairgrounds and Saddles of Joy (both commercial locations).

Figure 3-5. Baseline Maintenance Run-up Locations

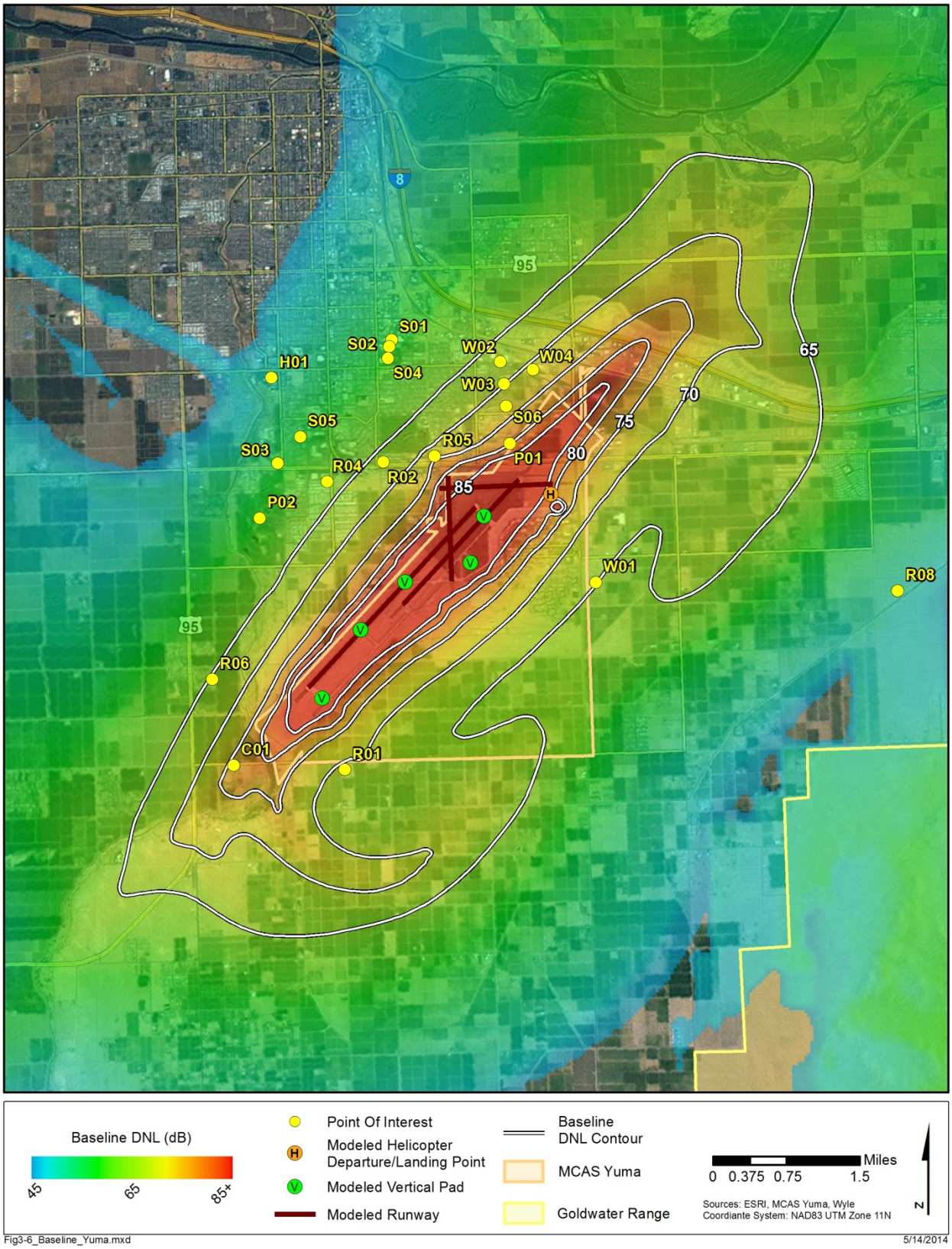


Figure 3-6. DNL Contours for Annual Average Daily Aircraft Operations at MCAS Yuma for the Baseline Scenario

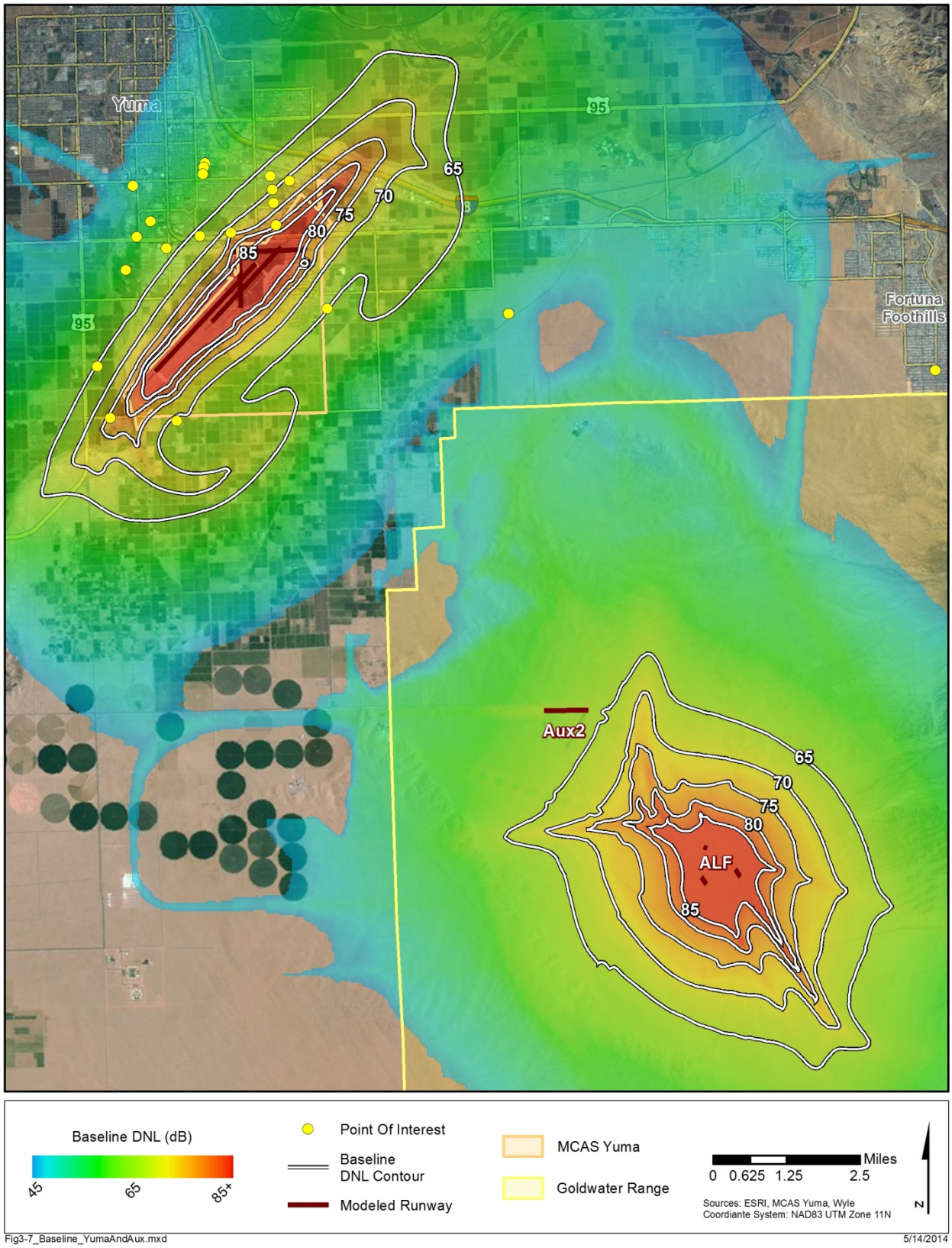


Figure 3-7. DNL Contours for Annual Average Daily Aircraft Operations at MCAS Yuma and Associated Training Airfields for the Baseline Scenario

Table 3-6. Baseline DNL at Points of Interest

ID	Description	DNL (dB)
C01	Saddles of Joy (commercial)	76
H01	Yuma Regional Medical Center	<65
P01	Fairgrounds	80
P02	Yuma Civic Center	<65
R01	Sun Leisure Estates	69
R02	Country Club and 32nd	67
R03	Bard, California	<65
R04	4th Ave extension	<65
R05	Winsor Ave and 32nd	74
R06	community of Patricia Lane	65
R07	Foothills Blvd and 53rd St	<65
R08	40-48th St and 6E	<65
S01	Gwyneth Ham Elementary	<65
S02	Gila Vista Junior High	<65
S03	Kofa High School	<65
S04	McGraw Elementary School	<65
S05	Palmcroft Elementary	<65
S06	James Rolle Elementary	73
W01	Generations Church	65
W02	Calvary Chapel	67
W03	Christ Lutheran Church and School	70
W04	Mt. Zion Church and School	71

Table 3-7 presents the results of the speech interference analysis for the Baseline scenario for the applicable POIs. For the Baseline scenario, all but 2 of the applicable sites have more than one speech interfering event per daytime hour for windows open with the maximum of 12 events per hour occurring at POI R05, a residential area near Winsor Ave and 32nd. Thirteen of the 17 applicable POIs have more than one speech interfering event per daytime hour for the windows closed condition. F-35B operations account for the majority of the speech interfering events at all applicable POIs.

Table 3-8 presents the results of the sleep disturbance analysis for the 8 residential POIs. For Baseline, the PA ranges from 0 percent to 10 percent with windows closed and ranges from 1 percent to 18 percent with windows open. The F-35B operations are the primary contributor to the PA at all 8 POI except R02 (Country Club & 32nd) and R05 (Winsor Ave & 32nd). At R02 with windows open, the F-35B operations account for 54 percent of the PA while the General Aviation (GA) aircraft accounts for 20 percent of the PA. At R02 with windows closed, the F-35B operations are the primary contributor to the PA. At R05 with windows open or closed, the F-35B accounts for nearly half of the PA while the GA aircraft are the secondary contributors to the PA.

Table 3-7. Potential Indoor Speech Interference for Applicable Representative Locations at MCAS Yuma for Baseline

Point of Interest		Average Daily Indoor Daytime (7am - 10pm) Events per Hour*	
ID	Description	Windows Open	Windows Closed
H01	Yuma Regional Medical Center	4	1
R01	Sun Leisure Estates	8	5
R02	Country Club and 32nd	8	5
R03	Bard, California	1	0
R04	4th Ave extension	8	5
R05	Winsor Ave and 32nd	12	7
R06	community of Patricia Lane	7	5
R07	Foothills Blvd and 53rd St	1	0
R08	40-48th St and 6E	4	0
S01	Gwyneth Ham Elementary	5	3
S02	Gila Vista Junior High	5	4
S03	Kofa High School	6	3
S04	McGraw Elementary School	5	4
S05	Palmcroft Elementary	6	4
S06	James Rolle Elementary	8	6
W03	Christ Lutheran Church and School	7	6
W04	Mt. Zion Church and School	7	5
Number of Sites Exceeding 1 Intrusive Event per Hour		15	13
Minimum Number of Intrusive Events per Hour if Exceeding 1		4	3
Maximum Number of Intrusive Events per Hour if Exceeding 1		12	7

* Number of Annual Average Daily DNL Daytime Events At or Above an Indoor Maximum (single-event) Sound Level (Lmax) of 50 dB; NLRs of 15 dB and 25 dB for windows open and closed, respectively

Table 3-8. Indoor Potential for Sleep Disturbance for Residential Representative Locations at MCAS Yuma for Baseline

Point of Interest		Average Nightly Probability of Awakening (%)	
ID	Description	Windows Open	Windows Closed
R01	Sun Leisure Estates	8%	5%
R02	Country Club and 32nd	12%	5%
R03	Bard, California	1%	0%
R04	4th Ave extension	8%	4%
R05	Winsor Ave and 32nd	18%	10%
R06	community of Patricia Lane	7%	4%
R07	Foothills Blvd and 53rd St	1%	0%
R08	40-48th St and 6E	4%	2%

* assumes 15 dB and 25 dB of Noise Level Reductions for windows open and closed, respectively.

4.0 Proposed Scenario

The following two subsections detail the modeling data and the resultant noise exposure for the Proposed scenario, which includes the basing of MV-22, CH-53 and AH-1 aircraft at MCAS Yuma and additional use of Aux2 by these aircraft. All other aircraft operations are unchanged.

4.1 Modeling Data

Tables 4-1 through 4-3 detail the annual flight operations at MCAS Yuma, Aux2 and the ALF under the Proposed scenario. The annual flight operations would be similar to the Baseline scenario (Tables 3-1 through 3-3), except they include 3,307 additional rotorcraft operations at MCAS Yuma, and an additional 1,796 operations at Aux2 due to establishing the OTEC, per data provided by the USMC (Miller 2013a, Miller 2013b, Ibarra 2013). The operations at the ALF would be unchanged.

Runway and track utilization would be identical to the Baseline scenario.

Intentionally left blank

Table 4-1. Proposed Annual Flight Operations for MCAS Yuma

Group	Squadron Name	Notes	Aircraft Type	Departure			Departure from Pad			Interfacility to ALF or Aux2 (1)			Other Arrival to Pad (2)			Instrument Straight-In Arrival (3)			Overhead Break Arrival to RUNWAY (4)			Overhead Break Arrival to PADS (2)			Non-Break Visual Arrival to RUNWAY (4)			Non-Break Visual Arrival to PADS (2)			Interfacility from ALF or Aux2			Visual Touch and Go (Conventional) (5)			Visual Touch & Go (Non-conventional) (6)			GCA Box (6)			TOTAL		
				Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total
Based	Alt 1: Active-Duty (135 pilots)	7	F-35B	15,576	157	15,733	-	-	-	315	-	315	-	-	-	779	8	787	10,631	8	10,639	1,051	-	1,051	2,835	142	2,977	280	-	280	312	3	315	755	-	755	1,762	-	1,762	623	-	623	34,919	318	35,237
Based	Alt 1: OT&E (10 pilots)	7	F-35B	1,154	12	1,166	-	-	-	23	-	23	-	-	-	58	1	59	787	1	788	78	-	78	210	10	220	21	-	21	23	-	23	56	-	56	131	-	131	46	-	46	2,587	24	2,611
Based	OT&E	12	MV-22	596	12	608	52		52	39	2	41			-	150	6	156	392	6	398			-	100	6	106			-	39	2	41			-			-	60		60	1,428	34	1,462
Based	OT&E CH-53E/K	12, 13	CH-53E	45	-	45	401	3	404	100	2	102	429	3	432	15	2	17	-	-	-	-	-	-			-			-	100	2	102	-	-	-			-	35		35	1,125	12	1,137
Based	OT&E UH-1Y	12	AH-1W	229	52	281			-	23	12	35			-	23	12	35			-			-	206	40	246			-	23	12	35	48	12	60			-	10	6	16	562	146	708
Based	Alt 1: Reserve (0 pilots)		F-35B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Based	4 squadrons @ 14 aircraft ea		AV-8B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Based	F5_VMFT401		F-5E	4,299	-	4,299	-	-	-	-	-	-	-	-	-	194	-	194	3,900	-	3,900			-	205	-	205			-	-	-	-	800	-	800	-	-	-	-	-	-	9,398	-	9,398
Based	NYL_HH-1		UH-1	1,001	-	1,001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			-	1,001	-	1,001			-	-	-	-	-	-	-	-	-	-	-	-	-	2,002	-	2,002
Based	NYL_UC-12		C-12	1,356	31	1,387	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			-	1,209	178	1,387			-	-	-	-	-	-	-	-	-	-	-	-	-	2,565	209	2,774
Civil	YUM_AIR_CARRIER		DASH-8	3,021	86	3,107	-	-	-	-	-	-	-	-	-	295	36	331	-	-	-			-	2,536	240	2,776			-	-	-	-	-	-	-	-	-	-	-	-	-	5,852	362	6,214
Civil	YUM_AIR_CARRIER		CRJ-200	3,021	85	3,106	-	-	-	-	-	-	-	-	-	295	36	331	-	-	-			-	2,535	240	2,775			-	-	-	-	-	-	-	-	-	-	-	-	-	5,851	361	6,212
Civil	YUM_GENERAL_AVIATION		GASEPF	3,252	310	3,562	-	-	-	-	-	-	-	-	-	178	9	187	-	-	-			-	3,088	280	3,368			-	-	-	-	22,819	2,446	25,265	-	-	-	-	-	-	29,337	3,045	32,382
Civil	YUM_GENERAL_AVIATION	8	King Air	949	90	1,039	-	-	-	-	-	-	-	-	-	52	2	54	-	-	-			-	901	82	983			-	-	-	-	6,656	713	7,369	-	-	-	-	-	-	8,558	887	9,445
Civil	YUM_GENERAL_AVIATION		Citation	316	30	346	-	-	-	-	-	-	-	-	-	18	1	19	-	-	-			-	300	27	327			-	-	-	-	2,219	238	2,457	-	-	-	-	-	-	2,853	296	3,149
Transient	MAWTS1_FA-18		F-35B	1,234	126	1,360	-	-	-	-	-	-	-	-	-	-	-	-	948	207	1,155	-	-	-	167	37	204	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,349	370	2,719
Transient			F-35C	12	1	13	-	-	-	-	-	-	-	-	-	-	-	-	10	2	12	-	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24	3	27
Transient	MAWTS1_FA-18		FA-18E/F	13	1	14			-	-	-	-			-	-	-	-	10	2	12			-	2	-	2			-	-	-	-	-	-	-	-	-	-	-	-	-	25	3	28
Transient	MAWTS1_AV-8B		F-35B	871	54	925	-	-	-	-	-	-	-	-	-	-	-	-	637	149	786			-	112	26	138			-	-	-	-	-	-	-	-	-	-	-	-	-	1,620	229	1,849
Transient	MAWTS1_EA-6B		EA-6B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			-	-	-	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	MAWTS1_KC-130		C-130	491	37	528	-	-	-	12	4	16	-	-	-	-	-	-	-	-	-			-	449	80	529			-	12	4	16	-	-	-	-	-	-	-	-	-	964	125	1,089
Transient	MAWTS1_CH-46		CH-46E			-	-	-	-			-	-	-	-	-	-	-	-	-	-			-			-			-			-	-	-	-	-	-	-	-	-	-	-	-
Transient	MAWTS1_CH-46	9	MV-22 (pa	1,022	64	1,086	-	-	-	38	15	53	-	-	-	-	-	-	-	-	-			-	914	172	1,086			-	38	15	53	-	-	-	-	-	-	-	-	-	2,012	266	2,278
Transient	MAWTS1_CH-53	9	CH-53E (p	823	31	854	-	-	-	34	12	46	-	-	-	-	-	-	-	-	-			-	725	130	855			-	34	12	46	-	-	-	-	-	-	-	-	-	1,616	185	1,801
Transient	MAWTS1_AH-1W	9	AH-1W (pa	849	53	902	-	-	-	43	17	60	-	-	-	-	-	-	-	-	-			-	777	125	902			-	43	17	60	-	-	-	-	-	-	-	-	-	1,712	212	1,924
Transient	MAWTS1_UH-1	9, 11	H-1 (partia	1,194	110	1,304	-	-	-	24	10	34	-	-	-	-	-	-	-	-	-			-	1,066	238	1,304			-	24	10	34	-	-	-	-	-	-	-	-	-	2,308	368	2,676
Transient	NYL_DET_		F-35B	666	38	704	-	-	-	-	-	-	-	-	-	-	-	-	704	-	704	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,370	38	1,408
Transient			F-35C	7	-	7	-	-	-	-	-	-	-	-	-	-	-	-	7	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	14
Transient	NYL_DET_		FA-18E/F	7	-	7			-	-	-	-			-	-	-	-	7	-	7			-	-	-	-			-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	14
Transient	NYL_DET_		F-35B	1,052	27	1,079	-	-	-	-	-	-	-	-	-	-	-	-	1,079	-	1,079			-	-	-	-			-	-	-	-	-	-	-	-	-	-	-	-	-	2,131	27	2,158
Transient	NYL_DET_		EA-6B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			-	-	-	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	NYL_DET_		C-5	8	-	8	-	-	-	-	-	-	-	-	-	7	-	7	-	-	-			-	1	-	1			-	-	-	-	-	-	-	-	-	-	-	-	-	16	-	16
Transient	NYL_DET_		C-130	74	-	74	-	-	-	-	-	-	-	-	-	68	3	71	-	-	-			-	2	-	2			-	-	-	-	-	-	-	-	-	-	-	-	-	144	3	147
Transient	NYL_DET_		CH-46E			-	-	-	-			-	-	-	-	-	-	-	-	-	-			-			-			-			-	-	-	-	-	-	-	-	-	-	-	-
Transient	NYL_DET_	9	MV-22 (pa	426	8	434	-	-	-	24	12	36	-	-	-	-	-	-	-	-	-			-	436	-	436			-	24	12	36	-	-	-	-	-	-	-	-	-	910	32	942
Transient	NYL_DET_	9	CH-53E (p	220	-	220	-	-	-	16	8	24	-	-	-	-	-	-	-	-	-			-	220	-	220			-	16	8	24	-	-	-	-	-	-	-	-	-	472	16	488
Transient	NYL_DET_ H-60		H-60 (parti	112	-	112	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			-	112	-	112			-	-	-	-	-	-	-	-	-	-	-	-	-	224	-	224
Transient	NYL_DET_	9, 11	H-1 (partia	27	-	27	-	-	-	25	-	25	-	-	-	-	-	-	-	-	-			-	27	-	27			-	25	-	25	-	-	-	-	-	-	-	-	-	104	-	104
SUBTOTAL TRANSIENT BY AIRCRAFT TYPE																																												
Transient			*F-35B*	*3,823*	*245*	*4,068*	-	-	-	-	-	-	-	-	-	-	-	-	*3,368*	*356*	*3,724*	-	-	-	*279*	*63*	*342*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*7,470*	*664*	*8,134*
Transient			*F-35C*	*19*	*1*	*20*	-	-	-	-	-	-	-	-	-	-	-	-	*17*	*2*	*19*	-	-	-	*2*	-	*2*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*38*	*3*	*41*
Transient			*FA-18E/F*	*20*	*1*	*21*	-	-	-	-	-	-	-	-	-	-	-	-	*17*	*2*	*19*	-	-	-	*2*	-	*2*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*39*	*3*	*42*
Transient			*EA-6B*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient			*C-5*	*8*	-	*8*	-	-	-	-	-	-	-	-	-	*7*	-	*7*	-	-	-	-	-	-	*1*	-	*1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*16*	-	*16*
Transient			*C-130*	*565*	*37*	*602*	-	-	-	*12*	*4*	*16*	-	-	-	*68*	*3*	*71*	-	-	-	-	-	-	*451*	*80*	*531*	-	-	-	*12*	*4*	*16*	-	-	-	-	-	-	-	-	-	*1,108*	*128*	*1,236*
Transient			*CH-46E*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient			*MV-22 (pa*	*1,448*	*72*	*1,520*	-	-	-	*62*	*27*	*89*	-	-	-	-	-	-	-	-	-	-	-	-	*1,350*	*172*	*1,522*	-	-	-	*62*	*27*	*89*	-	-	-	-	-	-	-	-	-	*2,922*	*298*	*3,220*
Transient			*CH-53E (p*	*1,043*	*31*	*1,074*	-	-	-	*50*	*20*	*70*	-	-	-	-	-	-	-	-	-	-	-	-	*945*	*130*	*1,075*	-	-	-	*50*	*20*	*70*	-	-	-	-	-	-	-	-	-	*2,088*	*201*	*2,289*
Transient			*AH-1W (pa*	*849*	*53*	*902*	-	-	-	*43*	*17*	*60*	-	-	-	-	-	-	-	-	-	-	-	-	*777*	*125*	*902*	-	-	-	*43*	*17*	*60*	-	-	-	-	-	-	-	-	-	*1,712*	*212*	*1,924*
Transient			*H-1 (partia*	*1,221*	*110*	*1,331*	-	-	-	*49*	*10*	*59*	-	-	-	-	-	-	-	-	-	-	-	-	*1,093*	*238*	*1,331*	-	-	-	*49*	*10*	*59*	-	-	-	-	-	-	-	-	-	*2,412*	*368*	*2,780*
Transient			*H-60*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Based				24,256	264	24,520	453	3	456	500	16	516	429	3	432	1,219	29	1,248	15,710	15	15,725	1,129	-	1,129	5,766	376	6,142	301	-	301	497	19	516	1,659	12	1,671	1,893	-	1,893	774	6	780	54,586	743	55,329
Civil				10,559	601	11,160	-	-	-	-	-	-	-	-	-	838	84	922	-	-	-	-	-	-	9,360	869	10,229	-	-	-	-	-	-	31,694	3,397	35,091	-	-	-	-	-	-	52,451	4,951	57,402
Transient				9,108	550	9,658	-	-	-	216	78	294	-	-	-	75	3	78	3,402	360	3,762	-	-	-	5,012	808	5,820	-	-	-	216	78	294	-	-	-	-	-	-	-	-	-	18,029	1,877	19,906
Modeled				37,676	1,112	38,788	453	3	456	704	90	794	429	3	432	2,057	113	2,170	19,112	375	19,487	1,129	-	1,129	14,408	1,308	15,716	301	-	301	701	93	794	33,353	3,409	36,762	1,893	-	1,893	774	6	780	112,990	6,512	118,946
Not Modeled				6,247	303	6,550	-	-	-	12	4	16	-	-	-	75	3	78	-	-	-	-	-	-	5,730	745	6,475	-	-	-	12	4	16	-	-	-	-	-	-	-	-	-	12,076	1,059	13,691
TOTAL				43,923	1,415	45,338	453	3	456	716	94	810	429	3	432	2,132	116	2,248	19,112	375	19,487	1,129	-	1,129	20,138	2,053	22,191	301	-	301	713	97	810	33,353	3,409	36,762	1,893	-	1,893	774	6	780	**125,066**	**7,571**	**132,637**

Source: F-35B WCB EIS, Cumulative Scenario

Notes:

1 Interfacilities are modeled to and from runways (no pad usage); All F-35B interfacilities are STO and VL; counted as 1 operation per one-way trip.
2 All F-35B arrivals to Pads modeled as VL.
3 All non-F-35 TACAN arrivals modeled as conventional landing to runways; see F-35 sheet for landing type %s
4 see F-35 utilization sheet for landing type %s
5 F-35B modeled with Conventional takeoff and landing on runways (no pad usage); counted as 2 operations per circuit.
6 Counted as 2 operations per circuit; See F-35 sheet for landing/takeoff type %s
7 see F-35 utilization sheet for takeoff type %s
8 Modeled King Air as a C-12.
9 Only interfacility traffic modeled.
10 Counted as two operations each circuit
11 modeled H-1 as AH-1W
12 "Departures from Pad" modeled from Runway
13 "Other Arrivals to Pad" modeled as Non-Break Arrivals to Runway

Table 4-2. Proposed Annual Flight Operations for Aux2

Group	Squadron Name	Notes	Aircraft Type	Interfacility Arrivals from NYL or NKX/NFG			Touch and Go (10)			FCLP (10)			Interfacility to NYL or NKX/NFG			TOTAL		
				Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total
NYL-based	Active-Duty (135 pilots)		F-35B			-			-			-			-	-	-	-
NYL-based	OT&E (10 pilots)		F-35B			-			-			-			-	-	-	-
NYL-based	OT&E		MV-22	39	2	41	230	20	250	50	-	50	39	2	41	358	24	382
NYL-based	OT&E CH-53E/K		CH-53E	100	2	102	500	30	530	50	-	50	100	2	102	750	34	784
NYL-based	OT&E UH-1Y		AH-1W	23	12	35	368	192	560	-	-	-	23	12	35	414	216	630
NYL-based	Reserve (0 pilots)		F-35B			-			-			-			-	-	-	-
NKX-based	Active-Duty (162 pilots)		F-35B			-			-			-			-	-	-	-
NKX-based	OT&E (0 pilots)		F-35B			-			-			-			-	-	-	-
NKX-based	Reserve (0 pilots)		F-35B			-			-			-			-	-	-	-
NYL-based	4 Sqns @ 14 A/C ea		AV-8B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	MAWTS		C-130			-			-			-			-	-	-	-
Transient			CH-46E			-			-			-			-	-	-	-
Transient			MV-22	38	15	53			-			-	38	15	53	76	30	106
Transient			CH-53E	34	12	46			-			-	34	12	46	68	24	92
Transient			AH-1W	43	17	60			-			-	43	17	60	86	34	120
Transient		11	H-1	24	10	34			-			-	24	10	34	48	20	68
Transient	NYL_DET_		CH-46E			-			-			-			-	-	-	-
Transient			MV-22	24	12	36			-			-	24	12	36	48	24	72
Transient	direct from NKX/NFG		MV-22	148	16	164			-	1,478	164	1,642	148	16	164	1,774	196	1,970
Transient			CH-53E	16	8	24			-			-	16	8	24	32	16	48
Transient		11	H-1	25	-	25	250	-	250			-	25	-	25	300	-	300
SUBTOTAL BY AIRCRAFT TYPE																		
			F-35B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			AV-8B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			C-130	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CH-46E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			MV-22	*249*	*45*	*294*	*230*	*20*	*250*	*1,528*	*164*	*1,692*	*249*	*45*	*294*	*2,256*	*274*	*2,530*
			CH-53E	*150*	*22*	*172*	*500*	*30*	*530*	*50*	-	*50*	*150*	*22*	*172*	*850*	*74*	*924*
			AH-1W	*66*	*29*	*95*	*368*	*192*	*560*	-	-	-	*66*	*29*	*95*	*500*	*250*	*750*
		11	*H-1*	*49*	*10*	*59*	*250*	-	*250*	-	-	-	*49*	*10*	*59*	*348*	*20*	*368*
NYL-Based				162	16	178	1,098	242	1,340	100	-	100	162	16	178	1,522	274	1,796
NKX-Based	(F-35 only)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Civil				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient				352	90	442	250	-	250	1,478	164	1,642	352	90	442	2,432	344	2,776
Modeled				514	106	620	1,348	242	1,590	1,578	164	1,742	514	106	620	3,954	618	4,572
Not Modeled				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL				**514**	**106**	**620**	**1,348**	**242**	**1,590**	**1,578**	**164**	**1,742**	**514**	**106**	**620**	**3,954**	**618**	**4,572**

Source: F-35B WCB EIS, Cumulative Scenario

Notes:

1 Interfacilities are modeled to and from runways (no pad usage); All F-35B interfacilities are STO and VL; counted as 1 operation per one-
2 All F-35B arrivals to Pads modeled as VL.
3 All non-F-35 TACAN arrivals modeled as conventional landing to runways; see F-35 sheet for landing type %s
4 see F-35 utilization sheet for landing type %s
5 F-35B modeled with Conventional takeoff and landing on runways (no pad usage); counted as 2 operations per circuit.
6 Counted as 2 operations per circuit; See F-35 sheet for landing/takeoff type %s
7 see F-35 utilization sheet for takeoff type %s
8 Modeled King Air as a C-12.
9 Only interfacility traffic modeled.
10 Counted as two operations each circuit
11 modeled H-1 as AH-1W
12 "Departures from Pad" modeled from Runway
13 "Other Arrivals to Pad" modeled as Non-Break Arrivals to Runway

Table 4-3. Proposed Annual Flight Operations for ALF

Group	Squadron Name	Notes	Aircraft Type	Interfacility Arrivals from NYL or NKX/NFG			Touch and Go (10)			FCLP (10)			Interfacility to NYL or NKX/NFG			TOTAL		
				Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total	Day (0700-2159)	Night (2200-0659)	Total
NYL-based	Alt 1: Active-Duty (135 pilots)		F-35B	315	-	315	-	-	-	3,776	-	3,776	312	3	315	4,403	3	4,406
NYL-based	Alt 1: OT&E (10 pilots)		F-35B	23	-	23	-	-	-	280	-	280	23	-	23	326	-	326
NYL-based	OT&E		MV-22			-			-			-			-			
NYL-based	OT&E CH-53E/K		CH-53E			-			-			-			-			
NYL-based	OT&E UH-1Y		AH-1W			-			-			-			-			
NYL-based	Alt 1: Reserve (0 pilots)		F-35B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NKX-based	Alt 1: Active-Duty (162 pilots)		F-35B	378	-	378	-	-	-	4,531	-	4,531	374	4	378	5,283	4	5,287
NKX-based	Alt 1: OT&E (0 pilots)		F-35B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NKX-based	Alt 1: Reserve (0 pilots)		F-35B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NYL-based	4 Sqns @ 14 A/C ea		AV-8B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	MAWTS1_KC-130		C-130	12	4	16			-			-	12	4	16	24	8	32
Transient	MAWTS1_CH-46		CH-46E			-			-			-			-	-	-	-
Transient			MV-22			-			-			-			-	-	-	-
Transient	MAWTS1_CH-53		CH-53E			-			-			-			-	-	-	-
Transient	MAWTS1_AH-1W		AH-1W			-			-			-			-	-	-	-
Transient	MAWTS1_UH-1		H-1			-			-			-			-	-	-	-
Transient	NYL_DET_		CH-46E			-			-			-			-	-	-	-
Transient			MV-22			-			-			-			-			
Transient	direct from NKX/NFG		MV-22			-			-			-			-	-	-	-
Transient			CH-53E			-			-			-			-	-	-	-
Transient			H-1			-			-			-			-	-	-	-
SUBTOTAL BY AIRCRAFT TYPE																		
			F-35B	*716*	*-*	*716*	*-*	*-*	*-*	*8,587*	*-*	*8,587*	*709*	*7*	*716*	*10,012*	*7*	*10,019*
			AV-8B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			C-130	*12*	*4*	*16*	*-*	*-*	*-*	*-*	*-*	*-*	*12*	*4*	*16*	*24*	*8*	*32*
			CH-46E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			MV-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CH-53E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			AH-1W	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			H-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NYL-Based				338	-	338	-	-	-	4,056	-	4,056	335	3	338	4,729	3	4,732
NKX-Based				378	-	378	-	-	-	4,531	-	4,531	374	4	378	5,283	4	5,287
Civil				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient				12	4	16	-	-	-	-	-	-	12	4	16	24	8	32
Modeled				716	-	716	-	-	-	8,587	-	8,587	709	7	716	10,012	7	10,019
Not Modeled				12	4	16	-	-	-	-	-	-	12	4	16	24	8	32
TOTAL				**728**	**4**	**732**	**-**	**-**	**-**	**8,587**	**-**	**8,587**	**721**	**11**	**732**	**10,036**	**15**	**10,051**

Source: F-35B WCB EIS, Cumulative Scenario

Notes:

1 Interfacilities are modeled to and from runways (no pad usage); All F-35B interfacilities are STO and VL; counted as 1 operation per one-way trip.
2 All F-35B arrivals to Pads modeled as VL.
3 All non-F-35 TACAN arrivals modeled as conventional landing to runways; see F-35 sheet for landing type %s
4 see F-35 utilization sheet for landing type %s
5 F-35B modeled with Conventional takeoff and landing on runways (no pad usage); counted as 2 operations per circuit.
6 Counted as 2 operations per circuit; See F-35 sheet for landing/takeoff type %s
7 see F-35 utilization sheet for takeoff type %s
8 Modeled King Air as a C-12.
9 Only interfacility traffic modeled.
10 Counted as two operations each circuit
11 modeled H-1 as AH-1W
12 "Departures from Pad" modeled from Runway
13 "Other Arrivals to Pad" modeled as Non-Break Arrivals to Runway

Intentionally left blank

4.2 Noise Exposure for Proposed Scenario

Figure 4-1 shows the resultant 65 dB to 85 dB DNL contours in 5 dB increments for Proposed daily flight events. The noise exposure is almost identical to the Baseline scenario, as the contours would be largely driven by the F-35B operations accounted for under the Baseline scenario, and the total number of operations for all aircraft types would only increase by approximately 4% compared Baseline conditions.

Figure 4-2 shows a comparison of the Baseline and Proposed 65 dB and 75 dB DNL contours for MCAS Yuma, showing that they are almost indistinguishable. Similarly, Figure 4-3 shows a comparison of nearly identical 65 dB and 75 dB DNL contours for Aux2 and ALF for the Baseline and Proposed scenarios.

Table 4-4 shows the twelve POI exposed to DNL greater than or equal to 65 dB. Two POI exposed to DNL greater than or equal to 75 dB are Fairgrounds and Saddles of Joy, similar to the Baseline scenario. Both have a commercial land use. Increase in DNL at all of the POI was less than 0.5 dB compared to Baseline conditions.

Table 4-5 enumerates the average daily indoor daytime (7:00 p.m. to 10:00 p.m.) events generating indoor maximum sound levels of at least 50 dB for the 17 applicable representative receptors with windows closed and open. For windows closed and open, the mean number of speech interfering events across the applicable receptors would be 4 and 6 per hour, respectively, without an increase in events per hour, relative to Baseline. Yuma Regional Medical Center would average 1 and 4 events per hour with windows closed and open, respectively, without an increase from the Baseline condition. The schools would average 4 and 6 events per hour with windows closed and open, respectively, without an increase in events per hour, relative to Baseline. The residential areas would average 3 and 6 events per hour with windows closed and open, respectively, without an increase in events per hour, relative to Baseline.

Table 4-6 lists the probabilities of indoor awakening from average daily nighttime (10:00 p.m. to 7:00 a.m.) events for the 8 applicable representative residential receptors with windows closed and open. For windows closed and open, the probability of awakening (expressed as percentage) would range between 0 and 10 percent and 1 and 18 percent, respectively. Relative to the Baseline scenario, the probability of awakening would not change more than 0.5% among the 8 receptors.

5.0 Conclusion

The USMC proposal to establish the OTEC and relocate VMX-22 to MCAS Yuma would base additional aircraft at MCAS Yuma, namely CH-53E/K, AH-1 and MV-22 aircraft. These aircraft would operate at MCAS Yuma and at Aux2.

Using the cumulative scenario of the F-35B West Coast Basing EIS as the Baseline for this study, the Proposed action would cause increases in DNL of less than 0.5 dB to the overall noise exposure at MCAS Yuma and at the Aux2 and the ALF. Noise exposure of 65 dB DNL or greater for Aux2 and the ALF would be contained within the boundary of the BMGR.

The potential for indoor daytime speech interference at the applicable POI, expressed as the number of average daily indoor daytime (7:00 p.m. to 10:00 p.m.) events generating indoor maximum sound levels of at least 50 dB, would not change by more than 0.5 event per hour, relative to the Baseline condition. The probability for indoor awakening at the residential POI would not increase more than 0.5 percent due to the Proposed Action, relative to the Baseline condition.

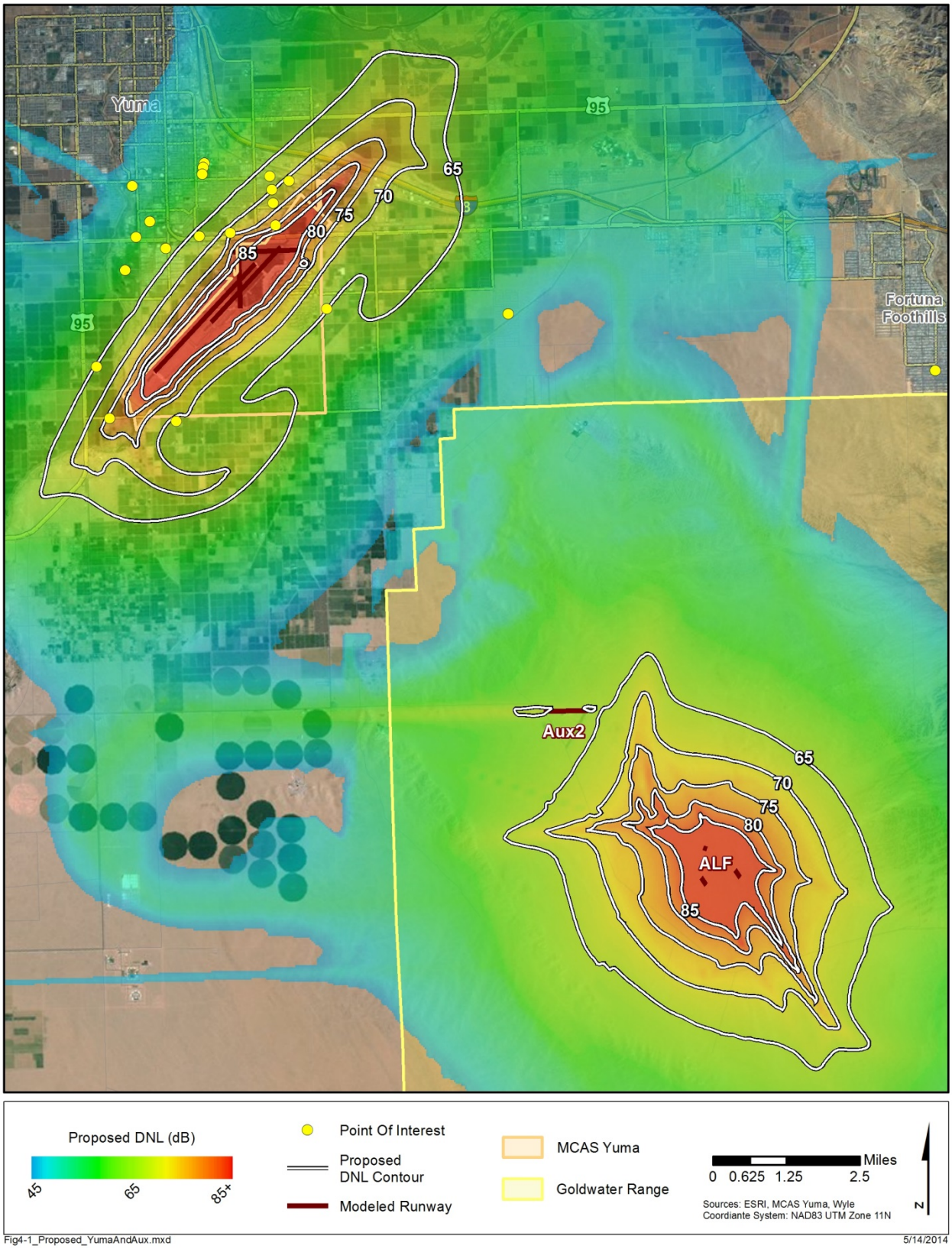


Figure 4-1. DNL Contours for Annual Average Daily Aircraft Operations at MCAS Yuma for the Proposed Scenario

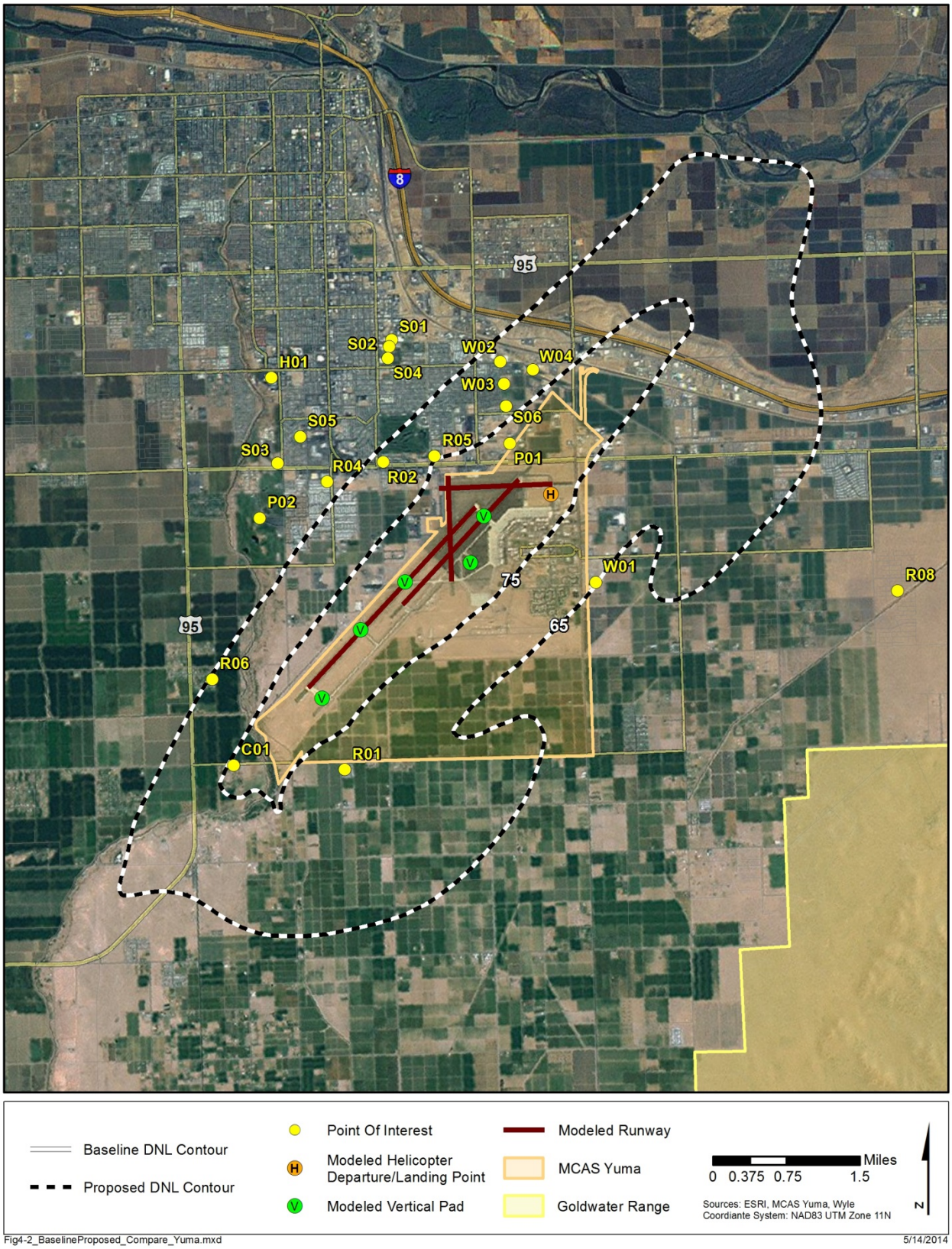


Figure 4-2. Comparison of Selected DNL Contours for Baseline and Proposed Scenarios at MCAS Yuma

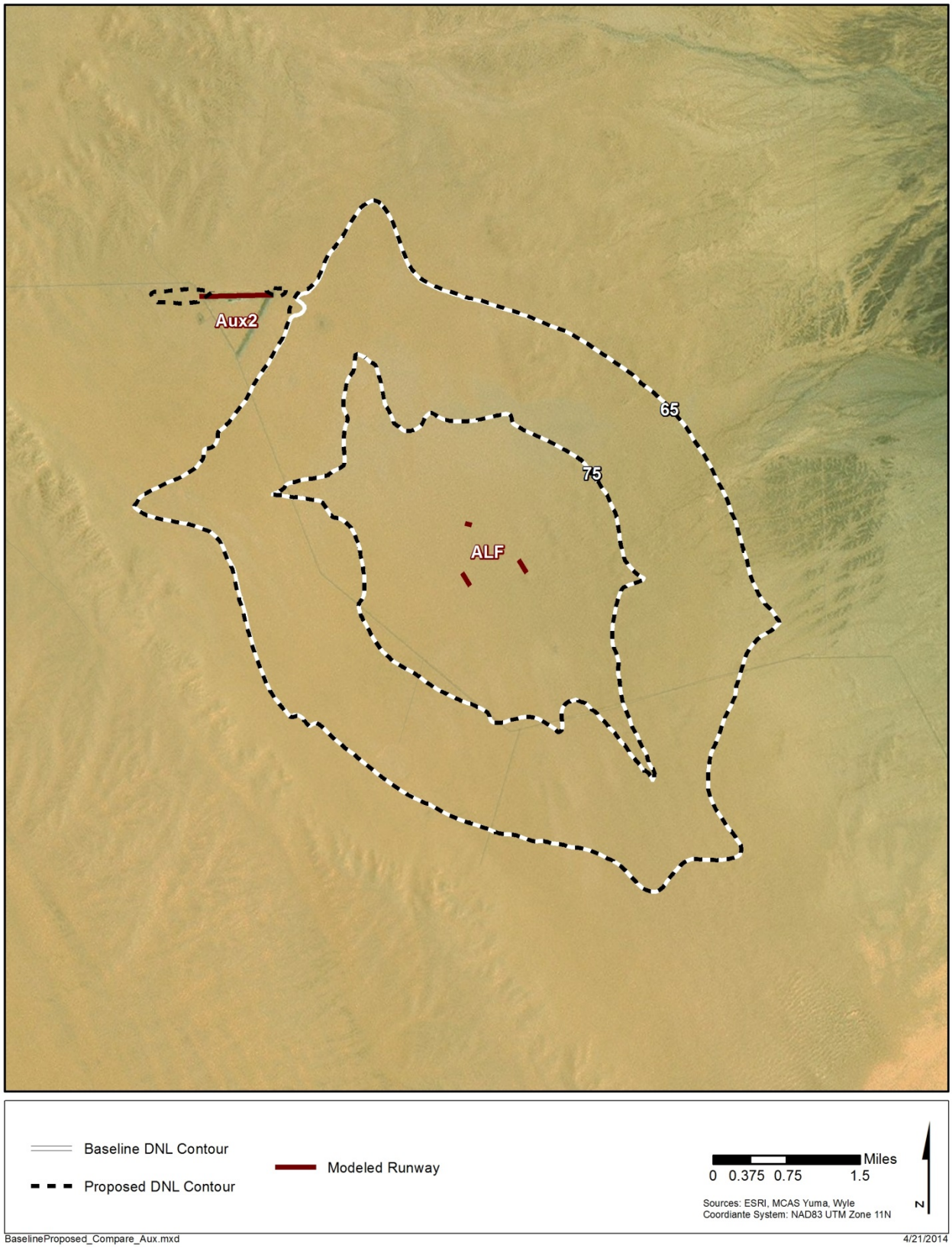


Figure 4-3. Comparison of Selected DNL Contours for Baseline and Proposed Scenarios at Aux2/ALF

Table 4-4. Proposed DNL at Points of Interest

ID	Description	DNL (dB)	Increase in DNL compared Baseline (dB)
C01	Saddles of Joy (commercial)	76	<0.5
H01	Yuma Regional Medical Center	<65	<0.5
P01	Fairgrounds	80	<0.5
P02	Yuma Civic Center	<65	<0.5
R01	Sun Leisure Estates	69	<0.5
R02	Country Club and 32nd	67	<0.5
R03	Bard, California	<65	<0.5
R04	4th Ave extension	<65	<0.5
R05	Winsor Ave and 32nd	74	<0.5
R06	community of Patricia Lane	65	<0.5
R07	Foothills Blvd and 53rd St	<65	<0.5
R08	40-48th St and 6E	<65	<0.5
S01	Gwyneth Ham Elementary	<65	<0.5
S02	Gila Vista Junior High	<65	<0.5
S03	Kofa High School	<65	<0.5
S04	McGraw Elementary School	<65	<0.5
S05	Palmcroft Elementary	<65	<0.5
S06	James Rolle Elementary	73	<0.5
W01	Generations Church	65	<0.5
W02	Calvary Chapel	67	<0.5
W03	Christ Lutheran Church and School	70	<0.5
W04	Mt. Zion Church and School	71	<0.5

Table 4-5. Potential Indoor Speech Interference for Applicable Representative Locations at MCAS Yuma for the Proposed Scenario

Point of Interest		Average Daily Indoor Daytime (7am - 10pm) Events per Hour*			
		Proposed		Increase re Baseline	
ID	Description	Windows Open	Windows Closed	Windows Open	Windows Closed
H01	Yuma Regional Medical Center	4	1	0	0
P01	Fairgrounds	11	7	0	0
P02	Yuma Civic Center	7	3	0	0
R01	Sun Leisure Estates	8	5	0	0
R02	Country Club and 32nd	8	5	0	0
R03	Bard, California	1	0	0	0
R04	4th Ave extension	8	5	0	0
R05	Winsor Ave and 32nd	12	7	0	0
R06	community of Patricia Lane	7	5	0	0
R07	Foothills Blvd and 53rd St	1	0	0	0
R08	40-48th St and 6E	4	0	0	0
S01	Gwyneth Ham Elementary	5	3	0	0
S02	Gila Vista Junior High	5	4	0	0
S03	Kofa High School	6	3	0	0
S04	McGraw Elementary School	5	4	0	0
S05	Palmcroft Elementary	6	4	0	0
S06	James Rolle Elementary	8	6	0	0
W03	Christ Lutheran Church and School	7	6	0	0
W04	Mt. Zion Church and School	7	5	0	0
Number of Sites Exceeding 1 Intrusive Event per Hour		17	15		
Minimum Number of Intrusive Events per Hour if Exceeding 1		4	3		
Maximum Number of Intrusive Events per Hour if Exceeding 1		12	7		

* Number of Annual Average Daily DNL Daytime Events At or Above an Indoor Maximum (single-event) Sound Level (Lmax) of 50 dB; NLRs of 15 dB and 25 dB for windows open and closed, respectively

Table 4-6. Indoor Potential for Sleep Disturbance for Residential Representative Receptors at MCAS Yuma for the Proposed Scenario

Point of Interest		Average Nightly Probability of Awakening (%)			
		Proposed		Increase re Baseline	
ID	Description	Windows Open	Windows Closed	Windows Open	Windows Closed
R01	Sun Leisure Estates	8%	5%	-	-
R02	Country Club and 32nd	12%	5%	-	-
R03	Bard, California	1%	0%	-	-
R04	4th Ave extension	8%	4%	-	-
R05	Winsor Ave and 32nd	18%	10%	-	-
R06	community of Patricia Lane	7%	4%	-	-
R07	Foothills Blvd and 53rd St	1%	0%	-	-
R08	40-48th St and 6E	4%	2%	-	-

* assumes 15 dB and 25 dB of Noise Level Reductions for windows open and closed, respectively.

References

ANSI 2008. American National Standard, Quantities and Procedures for Description and Measurement of Environmental Sound — Part 6: Methods for Estimation of Awakenings Associated with Outdoor Noise Events Heard in Homes , American National Standard Institute, Inc. / Acoustical Society of America, ANSI/ASA S12.9-2008 / Part 6.

Czech, J.J. and K.J. Plotkin. 1998. "NMAP 7.0 User's Manual. Wyle Research Report WR 98-13," Wyle, November.

DNWG 2009. Technical Bulletin: *Using Supplemental Noise Metrics and Analysis Tools*, Department of Defense Noise Working Group.

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

Ibarra 2013. Electronic mail from Maj Jaime A. Ibarra to Kelly L. Finn, NAVFACSW, re: VMX-22 relocation noise data collection meeting/interviews in Yuma, 22 October.

Miller 2013a. Electronic mail from LtCol Alex N. Miller to Patrick Kester, Wyle Laboratories, Inc., re: VMX-22 Noise Data Package, 16 December.

Miller 2013b. Electronic mail from LtCol Alex N. Miller to Joseph Czech, Wyle Laboratories, Inc., re: CH-53 data validation package for Yuma OT&E EA, 23 December.

Wasmer Consulting 2006a. "BaseOps 7.3 User's Guide," Fred Wasmer and Fiona Maunsell, Wasmer Consulting.

Wasmer Consulting 2006b. "NMPlot 4.955 User's Guide," Fred Wasmer and Fiona Maunsell, Wasmer Consulting.

USMC 2010. United States Marine Corps F-35B West Coast Basing Environmental Impact Statement (EIS), Final, October.

USMC 2013. Electronic mail from Maj. Julio C. Gonzalez to Kelly Finn, NAVFAC, re: "Yuma flight ops for Navy/USMC validation", attachments: "Yuma ModifiedHeloTracks (2).pdf", "YumaNew HeloTracks.pdf", 17 December.

Environment and Energy (E&E)

200 12th Street S, Suite 900
Arlington, VA 22202

121B Maryland Street
El Segundo, CA 90245

www.wyle.com

Appendix E

State Historic Preservation Officer (SHPO) Consultation Letter

This page intentionally left blank.

UNITED STATES MARINE CORPS
MARINE CORPS AIR STATION YUMA
BOX 99100
YUMA, ARIZONA 85369-9100

5090
YRMD/KJ
May 12, 2015

Mr. William Collins
Historian
State Historic Preservation Office
1300 W. Washington Street
Phoenix, AZ 85007

Dear Mr. Garrison:

Under the National Historic Preservation Act (NHPA) of 1966 as amended, Section 106, and its regulations 36 C.F.R. 800, Marine Corps Air Station (MCAS) Yuma is initiating consultation for a proposed undertaking on the installation. The United States Marine Corps (USMC) proposes to establish a Marine Aviation Operational Test and Evaluation Center (OTEC) at MCAS Yuma and relocate the Marine Operational Test and Evaluation Squadron 22 (VMX-22) from MCAS New River to MCAS Yuma, collectively referred to as the VMX-22 Relocation undertaking.

In addition to Section 106 consultation, MCAS Yuma has prepared an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA). The EA analyzed potential impacts from the implementation of two action alternatives that are identical in scope concerning the relocation of personnel and aircraft. The difference between the two action alternatives is that Alternative 1, the preferred alternative, would result in the demolition and renovation of 20 extant buildings and structures (buildings), as well as construction of new buildings and ancillary facilities. For the purposes of Section 106, the area of potential effects (APE) for the undertaking is defined as the buildings and structures proposed for demolition or renovation within the Alternative 1 footprint plus a 200-foot buffer.

A Class I records search and literature review of the APE and surrounding one-mile radius revealed four archaeological sites, which are described in the table below. Two of the sites are considered eligible for the National Register of Historic Places (NRHP), and two are not eligible; however, none of the sites are within the APE and none will be impacted by the proposed VMX-22 Relocation. A Class III archaeological survey was not performed based on the fact that the ground surface had been completely disturbed as early as 1968, as can be seen on the enclosed aerial imagery. Additionally, Dr. Shereen Lerner, Arizona State Historic Preservation Officer in 1988, concurred that the MCAS Yuma main facility possessed no archaeological potential due to previous large scale land disturbance.

Site Number	Description	NRHP Eligibility	In APE	Reference
AZ X:6:78(ASM)	Historic period depression, berm	Not Eligible	No	Apple 1996
AZ X:6:79(ASM)	Historic period trash scatter	Not Eligible	No	Apple 1996
AZ X:6:95(ASM)	Railroad track bed	Eligible	No	Jensen 1999
AZ FF:9:17(ASM)	State Route 80	Eligible	No	Jensen 1999

In addition to archaeological sites, the built environment within the APE was assessed for possible historic properties that may be impacted by the undertaking. The proposed demolition and construction will be completed in a manner that is consistent with other recent facilities in the vicinity and will not directly or indirectly affect any buildings that are not proposed for demolition or renovation. There are 78

buildings within the APE that are greater than 50 years old, or were built within the Cold War era. Sixteen of these buildings, located between the perimeter of the footprint and the extent of the APE (the 200-foot buffer), will not be affected by the VMX-22 Relocation undertaking and, therefore, were not evaluated for NRHP eligibility.

MCAS Yuma buildings have been the subject of various inventories, evaluations, and studies over the years and 41 of the buildings within the project footprint have been previously determined not eligible for the NRHP (Enclosed table). A 1996 study evaluated several World War II and Cold War era buildings, and concluded that the Cold War era buildings (built between 1946 and 1989) at MCAS Yuma are not eligible for the NRHP under Criteria Consideration g (Van Wormer et al. 1996). Although the Cold War era buildings may require subsequent evaluations upon reaching the 50-year threshold, 29 buildings within the VMX-22 Relocation footprint are under that threshold and considered not eligible for the NRHP for this undertaking. In addition, Van Wormer evaluated two World War II-era buildings within the footprint that were determined not eligible for the NRHP. Three buildings within the footprint are Ready Service Lockers, which are considered eligible for the NRHP with effects previously mitigated under the Advisory Council on Historic Preservation (ACHP) Ammunition Storage Program Comment (2006). A 2010 architectural survey for the West Coast Basing of the F-35B inventoried and evaluated 10 buildings as not eligible for the NRHP, seven of which are within the VMX-22 Relocation footprint (Thursby 2010).

The remaining 21 buildings were recently inventoried and evaluated by Scott Thompson, Architectural Historian with Statistical Research, Inc. Based on the enclosed Historic Property Inventory Forms and a 2011 Historic Context Study (JRP Historical [JRP]), MCAS Yuma has determined that these buildings are not eligible for the NRHP individually or as part of a potential district.

MCAS Yuma has made a finding of No Adverse Effect for the VMX-22 Relocation undertaking. MCAS Yuma sent a letter on March 28, 2015, to the tribes with whom we consult and a consultation matrix is enclosed. If any significant comments are received concerning this proposed undertaking, we will notify your office via email. MCAS Yuma respectfully requests your concurrence with our delineation of the APE, our eligibility determinations, and our finding of No Adverse Effect. If you have any questions regarding consultation on this undertaking, please contact Karla James, MCAS Yuma Archaeologist, at (928) 269-2288 or karla.james@usmc.mil.

Respectfully,

WILLIAM R. SELLARS
By direction of the
Commanding Officer

Enclosures: 1. Map of the Proposed VMX-22 Relocation Location and APE
2. 1968 Aerial Imagery of the VMX-22 Relocation APE
3. Table of Buildings within APE
4. Consultation Matrix

References:

Advisory Council on Historic Preservation (ACHP) 2006
Program Comment for World War II and Cold War Era (1939-1974) Ammunition Storage Facilities.

Apple, Rebecca McCorkle 1996
Phase I Cultural Resources Survey for the Proposed Consolidated Club at Marine Corps Air Station Yuma.

Jensen, Carolyn Jackman 1999
A Cultural Resource Survey of Two Parcels at the SR 80 (MP 0.0-0.15) and I-8 (MP 6.38-6.75) Intersection, Yuma, Yuma County, Arizona.

JRP Consulting 2011
Historic Context Study for Marine Corps Air Station (MCAS) Yuma.

Thursby, Lori 2010
Architectural Survey Marine Corps Air Station Yuma, Yuma, AZ.

Van Wormer, Stephen R., Andrew Pigniolo, and Rebecca McCorkle Apple 1996
Archeological Records Search and Historic Structures and Buildings Inventory Report for the Marine Corps Air Station Yuma.

VMX-22 Relocation Buildings List
Marine Corps Air Station Yuma

Building Number	Description	Year Built	NRHP Eligibility Determination	Van Wormer (1996)	ACHP (2006)	Thursby (2010)	Thompson (2015)	Demolition
110	Stand-by Generator Plant	1943	Not Eligible	X				
227	Maintenance Hangar	1943	Not Eligible	X				
92	Line Maintenance Shelter	1983	Not Eligible (g)	X				
94	Line operations	1973	Not Eligible (g)	X				
96	Hazardous Waste Pad	1989	Not Eligible (g)	X				
100	Hazardous Waste Pad	1989	Not Eligible (g)	X				
108	Ready Service Locker	1982	Not Eligible (g)	X				X
116	Paint shop	1983	Not Eligible (g)	X				X
119	Line Operational Building	1974	Not Eligible (g)	X				
120	Equipment Canopy	1983	Not Eligible (g)	X				X
122	ACFT LN OP Building	1984	Not Eligible (g)	X				
125	Storage Shed	1988	Not Eligible (g)	X				
126	Ready Magazine (RSL)	1988	Not Eligible (g)	X				
133	Covered Canopy	1983	Not Eligible (g)	X				
134	Airfield Electrical Vault	1972	Not Eligible (g)	X				
141	Utility substation	1973	Not Eligible (g)	X				X
143	Maintenance shelter	1983	Not Eligible (g)	X				X
145	Maintenance canopy	1977	Not Eligible (g)	X				X
149	Fire station	1969	Not Eligible (g)	X				
151	Range Management/Air Passenger Terminal	1977	Not Eligible (g)	X				
205	Storage building	1983	Not Eligible (g)	X				X
229	Maintenance Shop	1981	Not Eligible (g)	X				
404	Radio facility	1972	Not Eligible (g)	X				
406	MAWTS-1 Headquarters	1987	Not Eligible (g)	X				
408	Operational Trainer Facility	1987	Not Eligible (g)	X				
421	Cryogenic Storage Shed	1983	Not Eligible (g)	X				
422	Cryogenics Maintenance Building	1980	Not Eligible (g)	X				
106	Hazardous Waste Pad	1989	Not Eligible (g)	X				X
114	Line Maintenance Shelter	1968	Not Eligible (g)	X				
127	Hazardous Waste Pad	1989	Not Eligible (g)	X				
402	Demineralized Water Facility	1988	Not Eligible (g)	X				
104	Ready Ammo Service Locker	1964	Eligible		X			
105	Ready Ammo Service Locker	1964	Eligible		X			X
142	Ready Ammo Service Locker	1964	Eligible		X			X

Italics indicate new determination; Red indicates building proposed for demolition

Building Number	Description	Year Built	NRHP Eligibility Determination	Van Wormer (1996)	ACHP (2006)	Thursby (2010)	Thompson (2015)	Demolition
90	Line Maintenance Shelter	1978	Not Eligible			X		
97	Aircraft Maintenance Hangar	1973	Not Eligible			X		
98	Storage VMA-211	1972	Not Eligible			X		
99	Squadron Ordnance	1970	Not Eligible			X		
103	Maintenance hangar	1965	Not Eligible			X		
118	Line Maintenance Shelter	1968	Not Eligible			X		
123	Line maintenance	1982	Not Eligible			X		
139	*Covered Canopy*	*1961*	*Not Eligible*				*X*	*X*
101	*Aircraft Maintenance Hangar*	*1965*	*Not Eligible*				*X*	
109	*Aircraft Maintenance Hangar*	*1961*	*Not Eligible*				*X*	
111	*Line Maintenance Shelter*	*1961*	*Not Eligible*				*X*	
112	*Line Operations Building*	*1956*	*Not Eligible*				*X*	
113	*Line Maintenance Building*	*1961*	*Not Eligible*				*X*	
115	*Maintenance shop*	*1961*	*Not Eligible*				*X*	*X*
117	*Maintenance Facility*	*1968*	*Not Eligible*				*X*	*X*
132	*Storage Shed*	*1956*	*Not Eligible*				*X*	
136	*NATEC*	*1956*	*Not Eligible*				*X*	
137	*Line Maintenance Shop*	*1961*	*Not Eligible*				*X*	
138	*ACFT LN OP Building*	*1961*	*Not Eligible*				*X*	
144	*Fire training*	*1956*	*Not Eligible*				*X*	*X*
146	*Maintenance hangar*	*1961*	*Not Eligible*				*X*	*X*
147	*Line operations*	*1961*	*Not Eligible*				*X*	*X*
148	*Line operations*	*1961*	*Not Eligible*				*X*	*X*
153	*Base Ops/Afterburner*	*1966*	*Not Eligible*				*X*	
155	*Repair shop*	*1962*	*Not Eligible*				*X*	*X*
203	*Aviation armament*	*1954*	*Not Eligible*				*X*	*X*
204	*Airframes*	*1956*	*Not Eligible*				*X*	*X*
420	*Liquid Oxygen Transfer Building*	*1960*	*Not Eligible*				*X*	

Italics indicate new determination; Red indicates building proposed for demolition

This page intentionally left blank.

Appendix F

Cumulative Projects List

This page intentionally left blank.

Cumulative Projects

Project Name	*Project Location*	*Project Description*	*Project Timeframe*	*Relevant Areas of Potential Cumulative Impact*
VMU-1 Relocation to MCAS Yuma	MCAS Yuma (Flight Line District) and Cannon Air Defense Center (BMGR-West)	Construction, demolition, and renovation of facilities associated with relocating VMU-1 to MCAS Yuma	2015-2020s	Airspace, Air Quality/GHGs, Noise, Cultural Resources
MILCON P-587 Taxiway Improvements	MCAS Yuma (Flight Line District)	Construct a taxiway for rotary wing aircraft to access runways west of Hangar 76.	2015-2017	Air Quality/GHGs, Noise
MALS-13 Facilities Renovation	MCAS Yuma (Flight Line District)	Renovate MALS-13 facilities to accommodate the F-35B (86,000 sf)	2013-2017	Air Quality/GHGs, Noise, Cultural Resources
Hangar 95 Renovation	MCAS Yuma (Flight Line District)	Renovate Hangar 95 for F-35B (39,000 sf)	2013-2017	Air Quality/GHGs, Noise, Cultural Resources
Hangar 101 Demolition	MCAS Yuma (Flight Line District)	Demolish Hangar 101 and related facilities to construct F-35B maintenance facility (5,000 sf)	2018-2022	Air Quality/GHGs, Noise, Cultural Resources
Hangar 97 Demolition	MCAS Yuma (Flight Line District)	Demolish Hangar 97 and related facilities to construct F-35B squadron hangar (53,000 sf)	2018-2022	Air Quality/GHGs, Noise, Cultural Resources
MAG-13 Headquarters	MCAS Yuma (Mission Support & Training District)	Construct MAG-13 Headquarters; demolish Buildings 495, 500, 505, and 507; build consolidated parking lot A (Phase 1) (21,000 sf)	2013-2017	Air Quality/GHGs, Noise, Cultural Resources
Unit Marshalling Area	MCAS Yuma (Mission Support & Training District)	Construct unit marshalling area (7 acres)	2013-2017	Air Quality/GHGs, Noise, Cultural Resources
Fire Station Relocation	MCAS Yuma (Mission Support & Training District)	Relocate fire station	2013-2017	Air Quality/GHGs, Noise, Cultural Resources
Arizona Adventures Relocation	MCAS Yuma (Mission Support & Training District)	Relocate Arizona Adventures, upgrade car wash, and construct indoor recreational shooting range	2013-2017	Air Quality/GHGs, Noise, Cultural Resources
MAWTS-1 SCIF/SAPF/ Tactical Command	MCAS Yuma (Mission Support & Training District)	Construct MAWTS-1 SCIF/SAPF/Tactical Command; demolish Building 510; relocate contractor trailers; construct interim recreational field; and expand parking lot (16,700 sf)	2018-2022	Air Quality/GHGs, Noise, Cultural Resources
Armory Consolidation	MCAS Yuma (Mission Support & Training District)	Consolidate armory; demolish Building 480, 490, and 491 (Existing use relocated to CADC) (12,900 sf)	2018-2022	Air Quality/GHGs, Noise, Cultural Resources
Hart Street Expansion	MCAS Yuma (Mission Support & Training District)	Extend Hart Street; close/remove Vaupell Avenue, Frazier Avenue, and Smedley Street (3,000 linear feet)	2018-2022	Air Quality/GHGs, Noise, Cultural Resources

Cumulative Projects

Project Name	*Project Location*	*Project Description*	*Project Timeframe*	*Relevant Areas of Potential Cumulative Impact*
Water Survival Tank Construction	MCAS Yuma (Mission Support & Training District)	Construct water survival tank/pool and demolish softball field (18,200 sf)	2018-2022	Air Quality/GHGs, Noise, Cultural Resources
MCCS Operations Facility	MCAS Yuma (Mission Support & Training District)	Construct MCCS operations and grounds maintenance facility (4,000 sf)	2018-2022	Air Quality/GHGs, Noise, Cultural Resources
Consolidated Parking Lot A (Phase 2)	MCAS Yuma (Mission Support & Training District)	Demolish Building 610 and build consolidated Parking Lot A (Phase 2) (4 acres)	2018-2022	Air Quality/GHGs, Noise, Cultural Resources
Fitness Center Renovation	MCAS Yuma (Community Support District)	Renovate fitness center (22,788 sf)	2013-2017	Air Quality/GHGs, Noise, Cultural Resources
Enlisted Dining Facility	MCAS Yuma (Community Support District)	Construct an enlisted dining facility (39,000 sf)	2013-2017	Air Quality/GHGs, Noise, Cultural Resources
Consolidated Parking Lot C (Phase 1)	MCAS Yuma (Community Support District)	Build consolidated Parking Lot C (Phase 1) (1 acre)	2013-2017	Air Quality/GHGs, Noise, Cultural Resources
Construct MCX mini mart	MCAS Yuma (Community Support District)	Construct MCX mini mart (MCCS) (5,000 sf)	2013-2017	Air Quality/GHGs, Noise, Cultural Resources
Construct New Path	MCAS Yuma (Community Support District)	Build a new path from the Consolidated Club to the Ramada Complex (1,700 linear feet)	2013-2017	Air Quality/GHGs, Noise, Cultural Resources
Ramada Complex Field House	MCAS Yuma (Community Support District)	Construct field house and storage for Ramada Complex fields; relocate RV storage to southeast corner of North Ordnance Look and S Avenue 3E (83,000 sf)	2013-2017	Air Quality/GHGs, Noise, Cultural Resources
MCCS Operations Consolidation	MCAS Yuma (Community Support District)	Consolidate MCCS operations, services, and educational facility (40,000 sf)	2018-2022	Air Quality/GHGs, Noise, Cultural Resources
Air Station Headquarters	MCAS Yuma (Community Support District)	Construct Air Station Headquarters, administrative facility, and auditorium; demolish Buildings 850 and 852 (50,000 sf)	2018-2022	Air Quality/GHGs, Noise, Cultural Resources
Retail Expansion	MCAS Yuma (Community Support District)	Build retail expansion; demolish Building 691 (15,000 sf)	2018-2022	Air Quality/GHGs, Noise, Cultural Resources
Consolidated Parking Lot C (Phase 2)	MCAS Yuma (Community Support District)	Build consolidated Parking Lot C (Phase 2)	2018-2022	Air Quality/GHGs, Noise, Cultural Resources
Construct Cycle Track	MCAS Yuma (Community Support District)	Develop cycle track on Quilter Street (4,000 linear feet)	2018-2022	Air Quality/GHGs, Noise, Cultural Resources

Cumulative Projects

Project Name	*Project Location*	*Project Description*	*Project Timeframe*	*Relevant Areas of Potential Cumulative Impact*
Quilter-to-Hart pedestrian promenade	MCAS Yuma (Community Support District)	Construct a pedestrian promenade between Quilter Street and Hart Street	2018-2022	Air Quality/GHGs, Noise, Cultural Resources
Recreational Facility	MCAS Yuma (Barracks District)	Construct a Marine recreation facility (7,000 sf)	2013-2017	Air Quality/GHGs, Noise, Cultural Resources
Retail Pavilion and Plaza	MCAS Yuma (Barracks District)	Develop retail pavilion and plaza; demolish Building 662 (5,000 sf)	2013-2017	Air Quality/GHGs, Noise, Cultural Resources
Consolidated Parking Lot B	MCAS Yuma (Barracks District)	Build consolidated parking lot B; demolish Building 633 (2.5 acres).	2018-2022	Air Quality/GHGs, Noise, Cultural Resources
Transient Barracks	MCAS Yuma (Barracks District)	Construct transient barracks (Phase 1); demolish Building 740; close Thomas Avenue between Aldrich and Worley Streets (98,000 sf)	2018-2022	Air Quality/GHGs, Noise, Cultural Resources
Recreational Courts	MCAS Yuma (Barracks District)	Build recreation courts and shade canopy; demolish Building 920 (1.5 acres)	2018-2022	Air Quality/GHGs, Noise, Cultural Resources
Pedestrian Promenade	MCAS Yuma (Barracks District)	Construct Aldrich Street pedestrian promenade (720 linear feet)	2018-2022	Air Quality/GHGs, Noise, Cultural Resources
Building 328 Renovation	MCAS Yuma (Logistics District)	Renovate MALS-13 (portion of Building 328) to accommodate the F-35B	2013-2017	Air Quality/GHGs, Noise, Cultural Resources
New Gas Station	MCAS Yuma (Logistics District)	Construct a new gas station (DLA)	2013-2017	Air Quality/GHGs, Noise, Cultural Resources

Source: MCAS Yuma 2014.
Notes: BMGR = Barry M. Goldwater Range-West, CADC = Cannon Air Defense Complex, DLA = Defense Logistics Agency, GHG = greenhouse gas, MCAS = Marine Corps Air Station, MCCS = Marine Corps Community Service, MCX = Marine Corps Exchange, SAPF = Special Access Program Facility, SCIF = Sensitive Compartmented Information Facility, sf = square feet, VMU-1 = Marine Unmanned Aerial Vehicle Squadron 1.

This page intentionally left blank.