Replacement of QF-4 Full-Scale Aerial Targets (FSATs) with QF-16 FSATs at Holloman Air Force Base, New Mexico

Final Environmental Assessment

Prepared by

United States Air Force

In Cooperation with the National Park Service

April 2015

ERRATA SHEET
REPLACEMENT OF QF-4 FULL-SCALE AERIAL TARGETS (FSATs)
WITH QF-16 FSATs AT HOLLOMAN AIR FORCE BASE, NEW MEXICO
ENVIRONMENTAL ASSESSMENT

PAGE	SECTION	REVISION
Global		Changed document from Draft to Final.
Global		Changed date from September 2014 to April 2015.
1-4	1.3.4	Updated section to reflect the public comment period.
2-5	2.3.2	Changed “similar” to “similarly” in the following sentence: The QF-16 aircraft would use existing runways and operate in airspace similar to the way the QF-4 aircraft do today. The number of operations would remain constant through the transition of QF-4 to QF-16s.
3-27	3.5.1.1	Corrected the area of dune fields in White Sands National Monument to 115 square miles.
3-41	3.6.2.1	Clarified statement discussing the Preservation Brief No. 5 by replacing “those structures” with “adobe structures”
5-2	5.4	Deleted “requirements” in the following sentence: In addition, by 2016, the Air Force plans to cost-effectively acquire 50 percent of contiguous U.S. aviation fuel via a synthetic fuel blend, utilizing domestic feedstocks and produced in the U.S., with the intent requirements that the synthetic fuel purchases be sourced from suppliers with manufacturing facilities that engage in carbon dioxide capture and effective reuse.

FINAL
FINDING OF NO SIGNIFICANT IMPACT

REPLACEMENT OF QF-4 FULL-SCALE AERIAL TARGETS (FSATS) WITH QF-16 FSATS AT HOLLOMAN AIR FORCE BASE (AFB), NEW MEXICO

Pursuant to provisions of the National Environmental Policy Act (NEPA), 42 United States Code (USC) 4321 to 4270d, implementing Council on Environmental Quality (CEQ) Regulations, 40 Code of Federal Regulations (CFR) 1500-1508, and 32 CFR Part 989, Environmental Impact Analysis Process, the United States Air Force (USAF) assessed the potential environmental consequences associated with replacing QF-4 FSAT aircraft with quieter QF-16 FSAT aircraft under the command of Detachment 1 (Det 1), 82 Aerial Target Squadron (ATRS) at Holloman AFB, Otero County, New Mexico.

The USAF has developed, tested and employed manned and unmanned aircraft as target systems for fighter pilot and aircrew training since 1959. Currently, the F-4 serves as the only FSAT used within the USAF; they are designated QF-4s. In use since the late 1990s, the QF-4 production run has drawn to a close and the current FSAT inventory will eventually be depleted. It would neither be cost effective nor practicable to "upgrade" QF-4s with technological advances given their production run has halted; therefore, the USAF plans to replace QF-4 FSATS with QF-16s to support this continuing mission. Also, pilots and aircrews are facing new combat threats with the transition to more technologically advanced aircraft (such as the Sukhoi T-50 and Chengdu J-20) and thus need training with advanced target systems. The USAF seeks to maximize the use of its current assets and capitalizes on existing support capabilities by replacing QF-4 FSATs with retired F-16 aircraft, modified for Target System use (designated QF-16).

The Environmental Assessment (EA), incorporated by reference into this finding, analyzes the potential environmental consequences of activities associated with replacement of QF-4 FSATs with QF-16 FSATs and provides environmental protection measures to avoid or reduce adverse environmental impacts.

The EA considers all potential impacts of the Proposed Action/Preferred Alternative and the No-Action Alternative. The EA also considers cumulative environmental impacts with other projects at Holloman AFB and the Proposed Action airspace.

PROPOSED ACTION/PREFERRED ALTERNATIVE

The Proposed Action/Preferred Alternative would replace the total complement of 35 of the ATRS QF-4 FSATs with QF-16 FSATs at Holloman AFB. The QF-16 would use the same regional airspace that QF-4s operate in now, at the same number of operations, and would train with defensive chaff and flares in airspace units where use of such materials is currently permitted. Within the base boundaries, five infrastructure upgrade/repair projects involving two buildings, one hangar, and 28,100 square yards of asphalt replacement for the airstrips are also included in the Proposed Action/Preferred Alternative. No change in manning levels for military, civilian or contractor personnel is anticipated to result from the transition from QF-4s to QF-16s.

NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the Proposed Action would not be implemented. The QF-4s, third-generation fighter aircraft, are reaching the end of their operational life, production has ceased, and they cannot be replaced. The inventory of QF-4 FSATs will eventually be depleted and the 82 ATRS would no longer be able to meet its mission of providing FSATs for US Department of Defense training and Allied Forces research, development and test projects.

SUMMARY OF FINDINGS

The Air Force has concluded that no significant adverse effects would result to the following resources as a result of the Proposed Action/Preferred Alternative: air quality, greenhouse gases, biological resources, cultural and traditional resources, geology and earth resources (soils), land use, recreation and visual resources, noise, aircraft and public safety, hazardous materials and waste, and water resources (storm water). No significant adverse cumulative impacts would result from activities associated with the Proposed Action/Preferred Alternative when considered with past, present or reasonably foreseeable future projects at Holloman AFB. In addition, the EA concluded that the Proposed Action/Preferred Alternative would not affect airspace management and use, earth resources (topography and geology), water resources (floodplains and quality/quantity), socioeconomics (including economics, environmental justice, provision for persons with disabilities and protection of children), traffic/transportation and public services.

The USAF determined that implementing the Proposed Action/Preferred Alternative would result in imperceptible, minor decreases in noise levels. No changes would occur in land use, access, visual context, availability of recreation sites or changes in the desired qualities of an area that contribute to recreational opportunities. Air emissions of criteria pollutants would experience a minor decrease, with the exception of nitrogen oxides (NOx); however, the region surrounding Holloman AFB is in attainment and the increase of NOx would not change that status. Short-term impacts would occur during demolition and repair activities; however, with best management practices and implementation of the Storm Water Pollution Prevention Plan, impacts to soil and water resources from erosion and off-site sedimentation would be negligible. Infrastructure projects would occur in previously disturbed areas within the base boundaries and no known threatened and endangered species occur on Holloman AFB. Impacts to biological resources are not expected to species occurring under the airspace as no changes in airspace use and operations would occur under the Proposed Action/Preferred Alternative. No ground-disturbing activities in previously undisturbed or unevaluated areas are contemplated as a part of this undertaking, and a slight decrease in noise levels and theoretical accident potential would occur. Therefore, the Proposed Action/Preferred Alternative is not expected to affect known or undiscovered/unevaluated archeological sites or districts listed or eligible for listing in the National Register of Historic Places, and would have no adverse effect on historic properties. No substantive changes to the quantities of hazardous materials and petroleum substances used at the installation would occur; therefore, Holloman AFB's status as a large quantity generator pursuant to the Resource Conservation and Recovery Act would not change. Mishap rates for QF-16s are expected to be slightly lower than for QF-4s, and detailed mishap response plans and procedures maintained by the 49th Wing are expected to be effective in reducing the potential for mishaps as well as any damage from mishaps.

FINDING OF NO SIGNIFICANT IMPACT

Based on my review of the facts and analyses contained in the attached EA, conducted under the provisions of NEPA, CEQ Regulations, and 32 CFR Part 989, I conclude that the Preferred Alternative to replace QF-4 FSATs with QF-16 FSATs, when considered cumulatively with other projects at or near HAFB, will not impose significant impacts on the quality of the human or natural environment. Accordingly, an Environmental Impact Statement is not required. The signing of this Finding of No Significant Impact completes the environmental impact analysis process.

/S/ APR 2 2 2015

ROBERT E. KIEBLER
Colonel, USAF
Commander, 49th Wing

Date

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ABBREVIATION / ACRONYM LIST

$\mu g/m^3$	micrograms per cubic meter
ABA	Architectural Barriers Act
ACM	asbestos-containing materials
ADA	Americans with Disabilities Act
AFB	Air Force Base
AFI	Air Force Instruction
AGL	above ground level
AICUZ	Air Installation Compatible Use Zone
AOC	Area of Concern
APE	area of potential effect
APZ	Accident Potential Zone
AQCR	Air Quality Control Region
ATCAA	Air Traffic Control Assigned Airspace
ATRS	Aerial Target Squadron
BASH	Bird/Wildlife Aircraft Strike Hazard
BLM	Bureau of Land Management
CATEX	Categorical Exclusion
CDNL	C-weighted DNL
CEMP	Comprehensive Emergency Management
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CES	Civil Engineering Squadron
CFR	*Code of Federal Regulations*
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
CZ	Clear Zone
dB	decibels
dBA	A-weighted decibels
dBC	C-weighted decibels
Det	Detachment
DNL	Day-Night Average Sound Level
DoD	Department of Defense
DPE	Drone Peculiar Equipment
EA	environmental assessment
EIS	environmental impact statement
EIAP	Environmental Impact Analysis Process
EO	Executive Order
ERP	Environmental Restoration Program
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FONPA	Finding of No Practicable Alternative
FONSI	Finding of No Significant Impact
FSAT	full-scale aerial target
FTS	Flight Termination System
FY	Fiscal Year
GAF	German Air Force
GHG	greenhouse gas
GWP	global warming potential
HWMP	Hazardous Waste Management Plan

IAP	Initial Accumulation Point
ICRMP	Integrated Cultural Resources Management Plan
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
INRMP	Integrated Natural Resources Management Plan
IOT&E	Initial Operational Test & Evaluation
IRP	Installation Restoration Program
JP-8	jet propellant 8
L_{dnmr}	Onset-Rate Adjusted Monthly Day-Night Average Sound Level
Lmax	Maximum Sound Level
LBP	lead based paint
LQG	large quantity generator
MBTA	Migratory Bird Treaty Act
mg/m^3	milligrams per cubic meter
MMRP	Military Munitions Response Program
MOA	military operations area
MSL	mean sea level
MTR	Military Training Route
NA	Number of Events Above
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
nm	nautical miles
NMDGF	New Mexico Department of Game and Fish
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NULLO	Not Under Live Local Operations
O_3	ozone
OSHA	Occupational Safety and Health Administration
PL	Public Law
PM	particulate matter
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to 10 micrometers
ppb	parts per billion
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
SEL	Sound Exposure Level
SHPO	State Historic Preservation Office
SWMU	Solid Waste Management Unit
SO_2	sulfur dioxide
SPCCP	Spill Prevention, Control, and Countermeasures Plan
SWPPP	Storm Water Pollution Prevention Plan
SWQB	Surface Water Quality Bureau
sy	square yard
TA	Time Above
TG	Test Group
THPO	Tribal Historic Preservation Officer
TSCA	Toxic Substances Control Act
USAF	U.S. Air Force

USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VAS	Visual Augmentation System
VOC	volatile organic compound
WEG	Weapons Evaluation Group
WG	Wing
WHSA	White Sands National Monument
WIC	Weapons Instructor Course
WSEP	Weapons System Evaluation Program
WSMR	White Sands Missile Range
Wyle	Wyle Laboratories, Inc.

1.0 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.1 Introduction

The United States Air Force (Air Force or USAF) has developed, tested, and employed manned and unmanned aircraft as target systems for fighter pilot and aircrew training since 1959 (as prescribed in Title 10 of the United States Code [USC] Section 2366). Currently, the F-4 serves as the only full-scale aerial target (FSAT) in the Air Force; they are designated QF-4s. The 82nd Aerial Target Squadron (82 ATRS) operates the Department of Defense's (DoD's) only FSAT program, maintaining modified QF-4 aircraft for aerial targeting purposes at Tyndall Air Force Base (AFB) (Eglin AFB 2002). The 82 ATRS is located at Tyndall AFB in Florida and Detachment 1 (Det 1) of the 82 ATRS is located at Holloman AFB in New Mexico (Figure 1-1). Both provide target support for the Air Force's Weapon System Evaluation Program (WSEP) and Weapons Instructor Course (WIC). At Tyndall AFB, this includes supporting DoD users in the Gulf of Mexico ranges and airspace. At Holloman AFB, Det 1 supports the Air Force WSEP and White Sands Missile Range (WSMR) research, development, and test projects in its ranges and airspace. The 82 ATRS and Det 1 fall under the command of the 53rd Weapons Evaluation Group (WEG) at Tyndall AFB, which is in turn, a subordinate element of the 53rd Wing (53 WG) at Eglin AFB.

In use since the late 1990s, the QF-4 production run has drawn to a close and the FSAT inventory will soon be depleted. Replacement FSAT aircraft are needed. In addition, pilots and aircrews are facing new combat threats with the transition to more technologically advanced aircraft (such as the Sukhoi T-50 and Chengdu J-20) and thus need training with more advanced target systems. Effective and efficient use of available resources is of primary importance; therefore, the Air Force seeks to maximize the use of its current assets and capitalize on existing support capabilities by replacing QF-4 FSATs with retired F-16 aircraft modified for Target System use (designated QF-16 FSATs).

1.2 Purpose of and Need for the Action

The ***purpose*** of this action is to field a high-performance and readily available FSAT for land-based pilot and aircrew training using more technologically advanced aircraft. The ***need*** for the Proposed Action is to replace the nearly depleted and outmoded QF-4 FSATs beginning in 2016. By meeting this need, the Air Force's mission of providing manned and unmanned target systems for pilot and aircrew training would continue to be met.

Full-scale Aerial Target (FSAT)

QF-4 – F-4 Phantom aircraft are converted to drones, hence the "Q" designation, for remote controlled manned and unmanned aerial targets. These full-scale, supersonic-capable, afterburning aerial targets are capable of all-altitude, high "g" maneuvering flight. Full-scale targets are important for testing weapons systems to ensure failures of systems do not occur during real combat missions.

QF-16 – F-16 aircraft converted into manned or unmanned aircraft (remotely-controlled drone), for aerial target uses are called QF-16s. The Air Force has identified the QF-16 as being able to meet the advanced munitions and aircraft training and testing requirements and of replicating current and future threats. These drones are intended to provide U.S. fighter pilots with a realistic adversary to train against.

Production of the QF-4 has drawn to a close and the number of available FSATs will soon be depleted. While careful management of QF-4 target losses (or "kills") could support continued live fire/lethality testing for a few years, eventually the QF-4 inventory will be exhausted. As the Air Force contemplated the future of the FSAT program, the QF-4's technological and programmatic gaps were primary considerations when identifying their replacement.

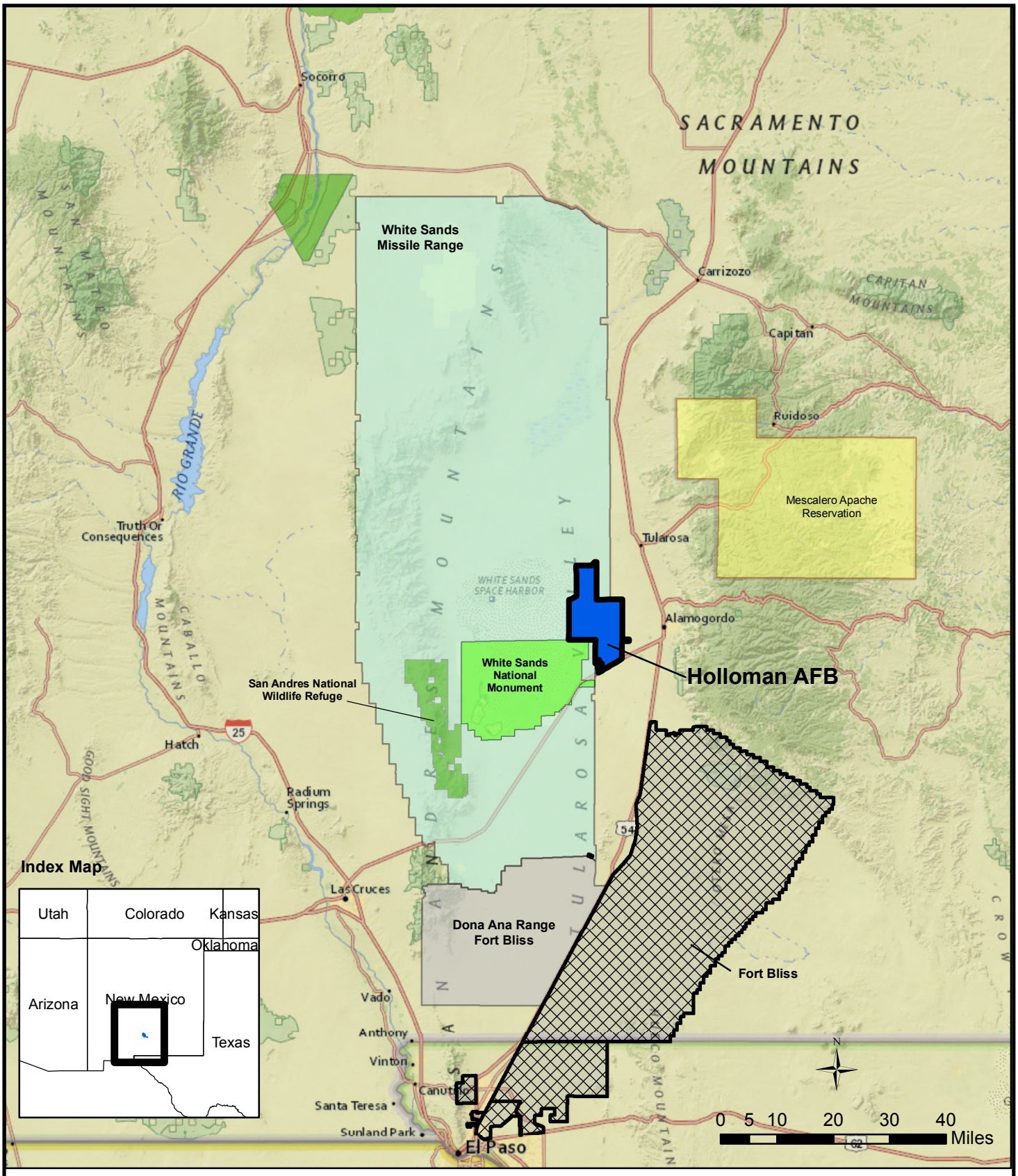


Figure 1-1. Holloman AFB Location Map

Technological gains over the last 15 to 20 years have made it more difficult for the QF-4 to meet the training and testing requirements of more advanced munitions and aircraft. Existing QF-4 capabilities and technology do not replicate the advancements found in fourth (e.g., F-16) or fifth (e.g., F-22) generation fighter aircraft performance. It would neither be cost effective nor practicable to "upgrade" QF-4s with technological advances given their production run has halted; therefore, the Air Force plans to replace QF-4 FSATS with QF-16s. These fourth generation aircraft can support the full-scale target capabilities required to meet WSEP, WIC, and WSMR research, development, and test missions.

1.3 The Environmental Review Process

1.3.1 The National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires consideration of environmental issues in federal agency planning and decision making. Under NEPA, federal agencies must prepare an environmental assessment (EA) or environmental impact statement (EIS) for any major federal action, except those actions that may be "categorically excluded" from further analysis. An EA is a concise public document that provides sufficient analysis for determining whether the potential environmental impacts of a Proposed Action are significant, resulting in the preparation of an EIS; or if not significant, resulting in the preparation of a Finding of No Significant Impact (FONSI), and where applicable, a Finding of No Practicable Alternative (FONPA). This EA was prepared in accordance with NEPA (42 USC 4321-4317), the Council on Environmental Quality (CEQ) regulation of 1978 [40 *Code of Federal Regulations* (CFR) §§ 1500-1508], and 32 CFR Part 989. 32 CFR Part 989 establishes the Environmental Impact Analysis Process (EIAP), which addresses the Air Force implementation of NEPA and Air Force Instruction (AFI) 32-7061 that directs Air Force officials to consider the environmental consequences of any action prior to implementation.

In accordance with CEQ regulations for implementing NEPA, and with the intent of reducing the size of this document, this EA summarizes and incorporates by reference relevant material from the following NEPA document: *Final Environmental Assessment, Recapitalization of the 49th WG Combat Capabilities and Capacities – Holloman AFB, New Mexico* (HAFB 2011a), referred to in this EA as the Holloman AFB 2011 Recapitalization EA. In that EA, the Air Force analyzed the impacts from the relocation of two F-16 training squadrons to Holloman AFB. Specifically, impacts related to airspace use for the F-16 and the use of chaff and flares for defensive countermeasures were analyzed in the Holloman AFB 2011 Recapitalization EA and are relevant to this EA as well. Such information will be incorporated by reference where applicable to the current Proposed Action. In addition, the 2011 Categorical Exclusion (CATEX) for Initial Operational Test & Evaluation (IOT&E) testing for short-term activity of QF-16s at Holloman is incorporated by reference and included in Appendix A.

1.3.2 Lead and Cooperating Agencies

The Air Force is the proponent for the replacement of QF-4 with QF-16 FSATs and is the lead agency for the preparation of the EA. The National Park Service (NPS) is responsible for the protection and preservation of the White Sands National Monument (WHSA) located under the Proposed Action airspace. NPS, as a federal agency, in order to fulfill its regulatory responsibilities, requested to be a cooperating agency on this EA (letter dated 29 October 2012). A cooperating agency is defined by CEQ regulations as any federal agency other than a lead agency having jurisdiction by law or special expertise with respect to any environmental issue involved in a proposal (40 CFR 1508.5). In a 29 August 2013 letter, the NPS was invited to be a cooperating agency on the EA planned to evaluate the QF-4 to QF-16 replacement at Holloman AFB (USAF 2013). The NPS responded with a letter dated 5 November 2013 accepting that invitation to participate as a cooperating agency (NPS 2013).

1.3.3 Interagency and Intergovernmental Coordination for Environmental Planning and Scoping

Scoping is an early and open process for developing the breadth of issues to be addressed in the EA and for identifying significant concerns related to a Proposed Action. Through the Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) process (AFI 32-7060), the Air Force notified relevant federal, state, and local agencies of the Proposed Action in September 2012. In addition, the Air Force notified federally-recognized American Indian Tribes (Tribes) that might have an interest in the Proposed Action. At the time of notification in September 2012, it was the Air Force's intent to prepare one EA addressing the replacement of QF-4 FSATs with QF-16 FSATs at both Tyndall AFB, FL and Holloman AFB, NM. After the initial scoping requests/notifications, the Air Force decided to pursue separate NEPA documentation for each AFB. The NEPA analysis for Tyndall AFB is complete and the FONSI signed. Thus, the Air Force has sent an additional round of scoping letters on 9 January 2014 notifying relevant federal, state, local agencies, and Tribes that might have an interest in the Proposed Action at Holloman AFB.

Comments from scoping, responses to consultation from the agencies, and any concerns identified by Tribes were addressed and subsequently incorporated into the EA. Appendix B contains the mailing list, IICEP correspondence, agency coordination, and project specific government-to-government consultation letters and any responses received.

1.3.3.1 Regulatory Consultation

In accordance with Section 7 of the Endangered Species Act (ESA), the U.S. Fish and Wildlife Service (USFWS) was consulted. Per Section 106 of the National Historic Preservation Act (NHPA), the New Mexico State Historic Preservation Office (SHPO) and NPS Intermountain Region were also consulted.

Two letters were received in response to the September 2012 notification: the State of New Mexico Department of Game & Fish (NMDGF) and the NPS Intermountain Region. The NMDGF indicated that they do not anticipate adverse effects to wildlife or important wildlife habitats from the Proposed Action. The NPS indicated its continued concern for the WHSA, including: aircraft noise-induced damage to historic structures; resource damage and visitor safety from falling chaff, flares, and target debris; night skies degradation (light pollution) due to AFB construction or related upgrades; aircraft noise and visual intrusions at the monument; wildlife impacts; degradation of the visitor experience; and overnight camper awakenings or alarm. The NPS requested impact assessments related to these concerns be included in the EA. A summary of findings, request for concurrence, and supporting documentation have been transmitted to the SHPO, Tribal Historic Preservation Officer (THPO), and USFWS (Appendix B).

1.3.3.2 Government-to-Government

Pursuant to Executive Order (EO) 13175, *Consultation and Coordination with Indian Tribal Governments*, the Air Force initiated government-to-government, project-specific consultation with federally-recognized American Indian Tribes. The Air Force has contacted the Mescalero Tribal Government (see Appendix B) to initiate government-to-government project-specific consultation. This Tribe was identified as having potential interest in areas of New Mexico where the action is proposed.

1.3.4 Public Review Process

Copies of the Draft EA were distributed to IICEP recipients including American Indian Tribes and regulatory agencies. Hard copies of the Draft EA were also made available in the Alamogordo, Las Cruces, and El Paso public libraries for public access. An electronic copy of the Draft EA was posted on the Holloman AFB website at www.holloman.af.mil. A Notice of Availability was published in the Alamogordo Daily News, Las Cruces Sun-News, and El Paso Times notifying the public of the availability of the Draft EA on the website and in the libraries and initiating the public comment period.

Appendix C contains the Notice of Availability for the Draft EA. The Air Force received two comments requesting that the comment period be extended. The comment period was extended by one week. A notice was emailed to the two commenters and posted on the Holloman AFB website.

1.3.5 Decision to be Made

Based on the analysis in this EA, the Air Force will make one of three decisions regarding the Proposed Action:

1) Choose the alternative that best meets the purpose and need and sign a FONSI or FONSI/FONPA, allowing implementation of the selected alternative;
2) Initiate preparation of an EIS if it is determined that significant impacts would occur with implementation of the Proposed Action; or
3) Select the No Action Alternative, whereby the Proposed Action would not be implemented.

1.4 Organization of the Environmental Assessment

Chapter 1 presents the purpose and need for the Proposed Action. It explains the background of and need for the action. It also discusses the public involvement and scoping process.

Chapter 2 describes the Proposed Action and alternatives, including a detailed discussion of the alternative identification process. It also addresses alternatives considered but not carried forward and provides a comparative summary of the effects of the Proposed Action and alternatives for the various environmental resources.

Chapter 3 presents definitions of the resources and outlines the methodology used in the analysis. It also describes baseline conditions for the affected area and environmental impacts for the Proposed Action and alternatives.

Chapter 4 presents cumulative effects.

Chapter 5 discusses other NEPA considerations, such as Unavoidable Adverse Environmental Effects; Relationship between Short-Term Use of Man's Environment and Maintenance and Enhancement of Long-Term Productivity; and Irreversible and Irretrievable Commitments of Resources.

Chapter 6 provides references cited in the EA (persons or agencies contacted during the course of preparing this EA are cited as personal communications and also listed in this section).

Chapter 7 lists the preparers and contributors.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

Air Force regulations (32 CFR Part 989) implementing NEPA (40 CFR Section 1502.14) require rigorous exploration and objective evaluation of all reasonable alternatives for a federal action. Each of the alternatives must be feasible, reasonable, and meet the stated purpose and need of the Proposed Action.

The following section details the elements of the Proposed Action; identifies alternatives that meet the purpose and need; and in accordance with CEQ regulations (40 CFR Section 1502.14[d]), includes a No Action Alternative that serves as a baseline against which environmental impacts of the Proposed Action and alternatives are measured.

2.1 Introduction

Located near Alamogordo, NM, Holloman AFB is home to the 49 WG. The 49 WG supports several missions including Det 1 of 82 ATRS, the German Air Force (GAF), and other Air Force units. Currently, F-16s, GAF Tornados, and remotely piloted aircraft (QF-4, MQ-1, and MQ-9) operate from the base. Det 1 maintains an inventory of 35 QF-4s to service customer requests. Unmanned flight of QF aircraft only occurs in restricted (R-) airspace associated with WSMR and McGregor Range (Figure 2-1). Manned flights may use military operations areas (MOAs) (Figure 2-1), Air Traffic Control Assigned Airspace, and Military Training Routes (MTRs).

The 82 ATRS Det 1 FSAT aircraft are maintained and operated under contract (Air Combat Command 2012). The contract is based on a fixed number of annual QF-4 operations; therefore, regardless of the inventory, or how many QF-4s are parked at an airfield, the number of operations remains consistent. The Air Force could modify the contract but would only do so if there were a need (expressed by its customers) to support an increase in FSAT test operations. Currently, no such need is anticipated, so the number of FSAT operations would remain the same whether they are QF-4s or QF-16s.

2.2 Selection Standards

Effective and efficient use of available resources is of primary importance; therefore, the Air Force seeks to maximize the use of its assets and capitalize on existing full-scale target missions and support capabilities. Currently, QF-4 FSATs, in support of the Air Force WSEP and WIC and WSMR research, development, and test projects, are located at Holloman AFB. As such, the base already has the assets such as infrastructure, airspace, and ranges required to operate manned and unmanned QF-4 target aircraft, and has the potential for upgrading to accommodate the QF-16 FSATs.

The Air Force selected F-16s to replace QF-4s at Holloman AFB because:

- F-16s, as fourth generation fighter aircraft, approximate the performance of current and future generations of threat aircraft.
- There are adequate numbers of F-16 in the Air Force inventory to support the FSAT program into the future.
- There is an existing cadre of pilots who have the skills and knowledge to operate the aircraft and available support personnel and equipment to maintain them.

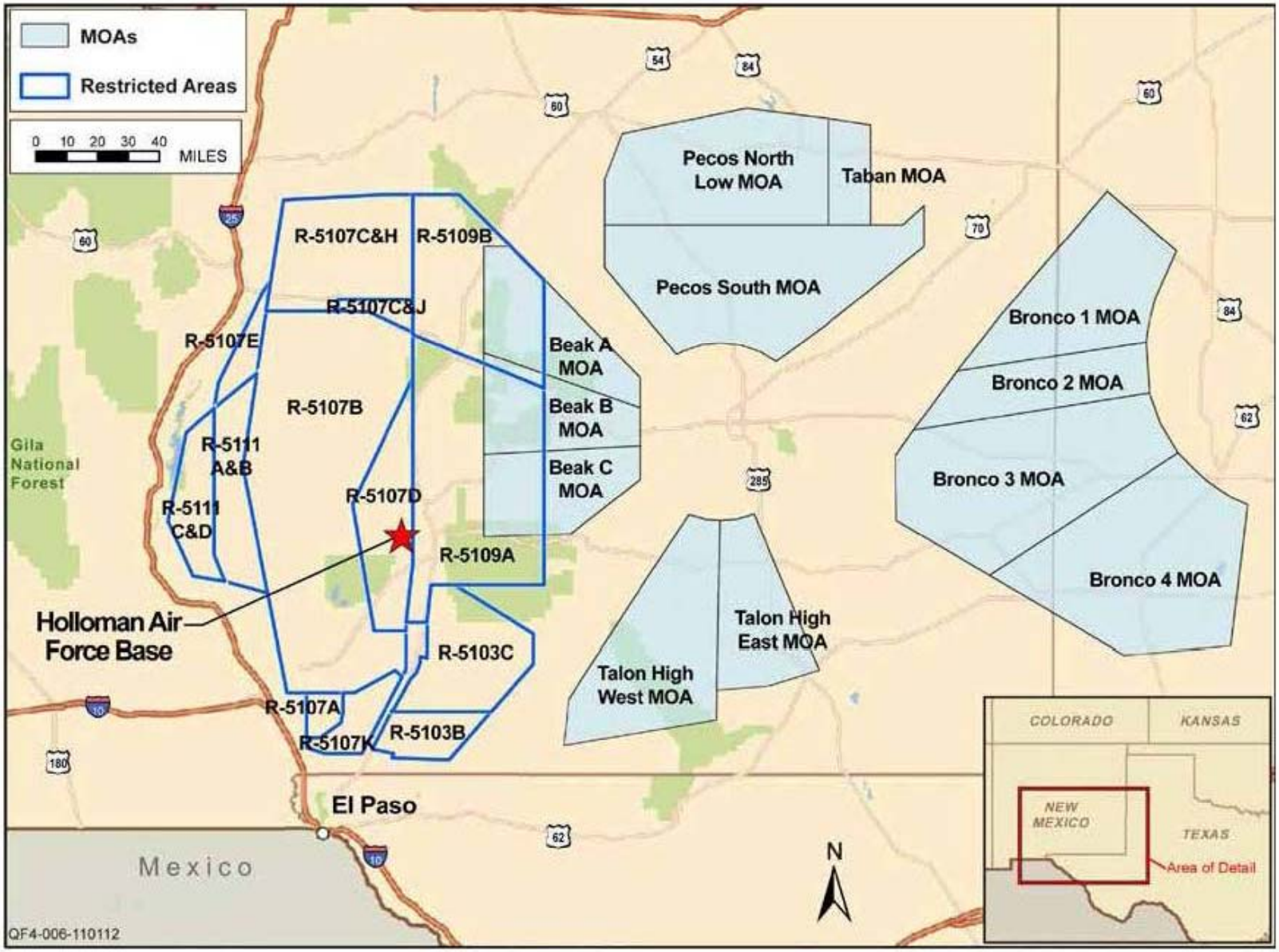


Figure 2-1. Holloman AFB QF-4 Airspace

Base assets available to accommodate the QF-16s must include:

- A runway that supports unmanned (drone) operations during launch and recovery so that drone operations do not conflict with other based aircraft operations.
- Sufficient existing ancillary facilities (and/or facilities that can be expanded or upgraded to accommodate the QF-16 FSATs).
- Communications and command/control infrastructure to safely and productively operate FSATs. Direct access for drone aircraft into restricted airspace.
- An airfield that is situated so as not to have unmanned, drone aircraft flying over populated areas.
- Ability to support the 82 ATRS mission to provide FSAT and sub-scale aerial targets.
- Runway Clear Zones of sufficient size to accommodate recovery when targets are damaged during training.
- Airspace of sufficient size and isolation to accommodate drone target, research, development, and battle training requirements.

Other than Tyndall AFB, the only other existing QF-4 base that meets all of the above standards is Holloman AFB in New Mexico. Therefore, for this proposed action, the Air Force has selected Holloman AFB as the location to base QF-16 FSATs. Basing the QF-16 FSATs at any location other than Tyndall AFB and Holloman AFB would be both costly and an inefficient use of existing Air Force assets. The Air Force completed a separate NEPA action for Tyndall AFB. The action at Holloman AFB is the subject of this EA.

2.3 Proposed Action

The Proposed Action would replace 35 ATRS QF-4 FSATs with QF-16 FSATs at Holloman AFB and support QF-16 integrated testing and beddown at Holloman AFB. The Proposed Action is described in this section in terms of the following: aircraft replacement, flight operations, facilities, personnel changes, logistics and maintenance, and communications and command/control infrastructure.

2.3.1 Aircraft Replacement

Aircraft replacement would occur over 2 years, starting in Fiscal Year 2016 (FY16). Table 2-1 outlines the transition phases for Holloman AFB in addition to providing information on the primary aircraft inventory which is not expected to change over the next several years. The table shows conservative, maximum number of aircraft in any given year.

Table 2-1. QF-4 to QF-16 Transition Schedule and Holloman AFB Aircraft Inventory

Primary Aircraft Inventory	Number of Aircraft					
	FY14	FY15	FY16	FY17	Proposed Action	No Action Alternative
QF-16[a]	*0*	*0*	*20*	*35*	*35*	*0*
QF-4[a]	*35*	*35*	*30*	*0*	*0*	*35*
F-16	50	50	50	50	50	50
T-38A	4	4	4	4	4	4
F-22	0	0	0	0	0	0
Other 49 WG[b]	49	49	49	49	49	49
Total Aircraft	**138**	**138**	**153**	**138**	**138**	**138**
Change from Baseline (FY 14)	*0*	*0*	*+15*	*0*	*0*	*0*

a Aircraft related to the Proposed Action evaluated in this environmental assessment.
b Aircraft considered in the "other" category include C-12, OH-58, Tornados (GAF), MQ-1 (predator), and MQ-9 (reaper)
AFB Air Force Base GAF German Air Force
FY fiscal year WG Wing

The QF-16, like its QF-4 predecessor, is a manned or unmanned (remotely-controlled drone), full-scale, supersonic-capable, after-burning aerial target, capable of all-altitude, high "g" maneuvering flight. Table 2-2 provides a brief comparison of QF-4 and QF-16 characteristics. The QF-16 is a modified F-16 that can be flown by a pilot or remotely controlled via Drone Peculiar Equipment (DPE). When airborne, the remotely-controlled drone is flown using a fixed ground control station through a command telemetry link. The QF-16 provides representative threat presentations for developmental, operational, and live-fire tests of U.S. and foreign weapon systems. It can simulate fourth generation fighter threats, aircraft agility, and performance, as well as infrared and radio frequency signatures. It will carry Electronic Attack and Electronic Counter Countermeasures expendable payloads; be capable of formation flight with other unmanned aircraft; be equipped with a Flight Termination System (FTS), scoring system, Identification Friend or Foe; and be able to provide target position, performance, and health information via data link. The QF-4s will continue to be used until they are no longer able to be flown, and will then either be scrapped/salvaged, or will be used as targets and deliberately shot down during exercises at WSMR. The QF-4s would not be deliberately shot down over WHSA.

Table 2-2. Comparison of FSAT Aircraft Characteristics

Aircraft	Engines	Speed	Flight Ceiling (feet MSL)	Defensive Counter Measures
QF-16	1 at 27,000 pounds thrust	Mach 2	Above 50,000	Chaff and flares
QF-4	2 at 17,845 pounds thrust	Mach 2.23	60,000	Chaff and flares

FSAT full-scale aerial target
MSL mean sea level

2.3.2 Flight Operations

This EA uses two terms to describe different components of aircraft flying activities: *sortie and operation.* Each has a distinct meaning and commonly applies to a specific set of activities in a particular airspace environment. These terms also provide a means to quantify activities for the purposes of analysis. At an airfield, an operation comprises one action such as a landing, take-off, or closed-pattern flight. For airspace and ranges, an operation comprises the use of one

Aircraft Activities

sortie – consists of a single military aircraft from a take-off through a landing and includes a flying mission. For this EA, the term *sortie* is commonly used when summarizing an amount of flight activity from a base. A sortie can include more than one *operation.*

operation – the single movement or individual portion of a flight. The term can apply to both airfield and airspace activities, and represents the primary analytical and descriptive quantifier of aircraft flight activities presented in this EA.

airspace unit (e.g., MOA, restricted area, or Warning Area) by one aircraft. Each time a single aircraft flies in a different airspace unit, one operation is counted for the unit.

The QF-16 aircraft would use existing runways and operate in airspace similarly to the way the QF-4 aircraft do today. The number of operations would remain constant through the transition of QF-4 to QF-16s.

Airfield. Table 2-3 presents baseline and proposed annual airfield operations by aircraft based at Holloman AFB. Baseline operations are provided as a benchmark against which proposed activities can be assessed. In this EA, baseline airfield operations (FY 14) are those conditions that will be found before the QF-16s would begin arriving and operating at the base in FY 16. Namely, F-16s from the 56FW-DET1 were included while F-22s from the 49FW, which departed in early-2014, were not included. Operations presented in the table were derived using the best available information from previous NEPA documents where the actions have already been approved and would be implemented (refer to Section 1.3.1). At Holloman AFB, baseline airfield operations are those presented in the Final EIS for F-35A Training Basing (USAF 2012). All QF-4 operations occur during environmental daytime hours, between 7 a.m. and 10 p.m.; none occur between the hours of 10 p.m. and 7 a.m. (or environmental night).

Table 2-3. Baseline QF-4 and Proposed QF-16 Annual Airfield Operations

Location	Baseline	Proposed Action	No-Action Alternative
Based QF-4	2,402	0	2,402
Proposed QF-16	0	2,400	0
Other Based and Transient Aircraft	97,561	97,561	97,561
Total Airfield Operations	99,963	99,961	99,963
Percent Change	0	0	0

SOURCE: Wyle 2014

As presented in Table 2-3, there are 99,963 annual baseline airfield operations at Holloman AFB (Wyle 2014). Other based and transient aircraft operations were assumed to remain unchanged under the Proposed Action. As is currently the case, QF-16s would conduct no airfield operations during environmental nighttime hours between 10 p.m. and 7 a.m. All unmanned (or what is termed Not Under Live Local Operations [NULLO]) take-offs and landings would occur at the drone runways. Manned operations would use any of the available runways.

Airspace. Currently, QF-4s do not have a planned flying hour program. Exact number and type (test support, training, and operational requirements) of sorties are forecast annually in response to DoD customer and unit training requirements. The training flights are not forecast far in advance and vary year-to-year. However, to ensure that enough FSATs are available to meet customer demand, logistics and maintenance activities are contracted for an annual fixed number of operations. The QF-16s would be operated in the same manner as QF-4s and the contracted annual operational numbers would remain unchanged (Air Combat Command 2012).

The QF-16 would use the same regional airspace that QF-4s operate in now, at the same number of operations. A complete description of the airspace and uses for the F-16 operations can be found in the Holloman AFB 2011 Recapitalization EA. No modifications or enhancements to airspace are proposed. The same procedures and processes in place for coordinating and scheduling airspace for QF-4 operations would be maintained for the QF-16s. As is currently the case, the majority of QF-16 manned, and all unmanned operations, would occur in R-5107. Restricted airspace is managed by the Army at WSMR and at Fort Bliss (McGregor Range). Procedures and processes currently in place for coordinating and scheduling airspace would ensure individual test, training, and operational requirements are met, as necessary including those required to complete F-16 syllabus training (HAFB 2011a). Manned QF-16 aircraft could operate in any of the other local airspace units (refer to Figure 2-1); however, operations

would not exceed the number or duration conducted by QF-4s under baseline conditions. The ratio of manned to unmanned flights for the FSATs is approximately 50:1.

Defensive Countermeasures. QF-16s would dispense chaff and flares for defensive countermeasures in the same settings and situations as the QF-4s. Chaff and flares would be used to avoid detection or attack by air defense systems such as surface-to-air missiles, anti-aircraft artillery, or another aircraft.

A bundle of chaff consists of approximately 5 to 5.6 million fibers (each thinner than a human hair) that are cut to reflect radar signals and, when dispensed from aircraft, form an electronic "cloud" that breaks the radar signal and temporarily hides the maneuvering aircraft from radar detection. The RR-188 chaff used by the F-16 aircraft for training is currently authorized for use over WSMR. Chaff may be deployed in WSMR airspace subject to the limitations of WSMR's authorization and not within 60 nautical miles (nm) of radar facilities for El Paso or Albuquerque air traffic control (HAFB 2011a).

Flares ejected from aircraft provide high-temperature heat sources that mislead heat-sensitive or heat-seeking targeting systems and burn for three to four seconds at a temperature in excess of 2,000 degrees Fahrenheit (°F) to simulate a jet exhaust. During each flare burn, the flare burns for 3 to 4 seconds and descends approximately 400 feet. The burning magnesium flare pellet is completely consumed and three approximately 2-inch by 2-inch plastic or nylon pieces, one 4-inch by 11-inch aluminum coated Mylar wrapping material, and one or two 2-inch by 2-inch felt spacers fall to the ground. Holloman AFB restricts flare use during very high or extreme fire danger and this restriction would automatically apply to the QF-16 mission. Flares may be dropped from a minimum altitude of 2,000 feet above ground level (AGL) within WSMR airspace. The minimum release altitude over the Red Rio and Oscura Ranges is 500 feet AGL. Flares may not be deployed in WSMR airspace during very high or extreme fire danger conditions (HAFB 2011a).

Effective use of chaff and flares in combat requires frequent training by aircrews to master the timing of deployment and the capabilities of the defensive countermeasure and by ground crews to ensure safe and efficient handling of chaff and flares. Defensive countermeasures deployment in Holloman AFB authorized airspace is governed by a series of regulations based on safety, environmental considerations, and defensive countermeasure limitations. These regulations establish procedures governing the use of chaff and flares over ranges, other government-owned and controlled lands, and nongovernment-owned or controlled areas. The use of chaff and flares by the Proposed Action, is incorporated within the annual use analyzed in the Holloman AFB 2011 Recapitalization EA which includes 7,680 bundles of RR-188 type chaff and the same number of M-206 or MJU-7A/B flares per year (HAFB 2011a).

2.3.3 Facilities

Five infrastructure upgrade/improvement projects were identified to adequately support conversion from QF-4s to QF-16s at Holloman AFB (Table 2-4). The proposed projects are either repair or upgrades to existing infrastructure and facilities. By the time the QF-16s arrive at Holloman AFB, a hydrazine storage facility will already have been built and the action analyzed (under another unassociated project, HAFB 2011a) and could be used for QF-16 purposes. Figure 2-2 illustrates where these infrastructure upgrades are planned. An increase in the size of the North Ramp and Apron Access would increase impervious surfaces by 1.15 acres. It is anticipated that construction would occur within an approximately 6-month timeframe beginning in FY15.

Table 2-4. Proposed Infrastructure Upgrades/Improvements for QF-16

Description	Project Size	Project Detail
Hangar 1080	not applicable	Replace roof. Upgrade fire protection, electrical, and heating/air conditioning systems.
Building 1072	not applicable	Repair backshop and storage area
Building 1073	not applicable	Repair backshop and storage area
North Ramp	26,400 sy	Demolish asphalt and replace with medium load concrete
Apron Access	1,700 sy	Demolish asphalt and replace with medium load concrete

sy square yard

Prior to facility repair/renovation, Holloman AFB would contract to have any asbestos-containing materials (ACMs) properly disposed of in accordance with federal and state regulations. Site preparation would include establishing a buffer zone around the involved facilities. The proposed renovation would include dismantling and removing all excess facility equipment and machinery in accordance with applicable regulatory requirements to ensure proper handling and disposition of the waste. Utilities would be capped or disconnected (as necessary) and materials from all facilities proposed for renovation would be recycled to the greatest extent practicable.

Prior to demolition or renovation at any site, a construction laydown area and a haul route would be established. The repair/renovation would involve minimal ground disturbance and any areas that may be disturbed would be restored to prevent any long-term soil erosion. Frequent spraying of water during demolition and on exposed soil, proper soil stockpiling methods, and prompt replacement of pavement are standard construction procedures that could be used to minimize the amount of dust generated. Appropriate erosion and siltation controls would be implemented and maintained in effective operating condition prior to, and throughout all demolition/renovation activities. In all cases where infrastructure upgrades/improvements disturb the existing vegetation or other ground surface, the contractor would revegetate or restore the area as directed by the base.

The concrete, sand and gravel materials are expected to come through the “La Luz Gate” approximately 7 miles (2 miles off base, 5 miles on base) from a local plant/quarry, to a batch plant on base where it would be mixed and hauled approximately 1 mile from the batch plant to the Apron Expansion project for the QF-16. This route uses a low traffic northeast gate onto the base, and passes through the relatively unoccupied north area. The traffic would not pass through the cantonment/business/residential area of the base.

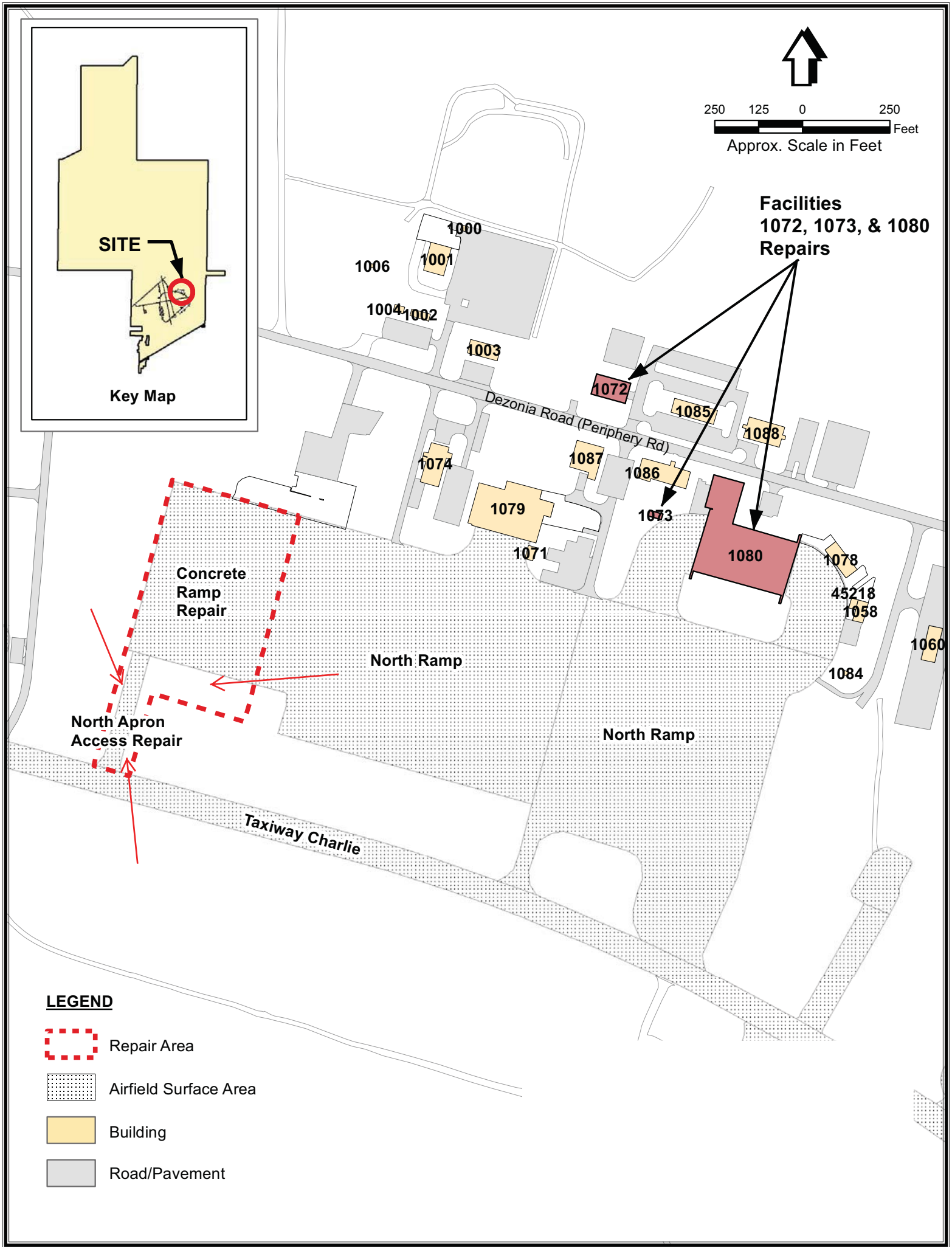
The contractor would dispose of the materials removed into an approved landfill in accordance with state and local regulations and would utilize an established haul route for equipment delivery and debris removal. All development activities would be performed in accordance with current security and force protection requirements.

2.3.4 Personnel Changes

Personnel changes associated with QF-16 replacement would be negligible. The majority of current QF-4 staff would remain and be retrained on the new QF-16 system. No change in manning levels for military, civilian or contractor personnel is anticipated to result from the transition from QF-4s to QF-16s. Personnel assignment actions (i.e., rotation cycles) are also anticipated to be minimal.

2.3.5 Logistics and Maintenance

For QF-16s, logistics and maintenance activities would be done under a fixed-price contract, similar to what is provided for QF-4s. All these activities are essentially similar for the QF-4 and QF-16, except that manned QF-16 aircraft would fly with fully functional hydrazine systems which use an aqueous mixture of 70 percent hydrazine (Chemical Abstract Service No. 302-01-2), known as H-70.


SITE
Key Map
250 125 0 250
Feet
Approx. Scale in Feet
Facilities
1072, 1073, & 1080
Repairs
1000
1001
1006
1004
1002
1003
1072
1085
1088
Dezonia Road (Periphery Rd)
1074
1087
1086
1079
1073
1071
1080
1078
45218
1058
1060
1084
Concrete
Ramp
Repair
North Ramp
North Apron
Access Repair
North Ramp
Taxiway Charlie
LEGEND
Repair Area
Airfield Surface Area
Building
Road/Pavement

The hydrazine is used for emergency backup power generation in the event primary power is lost due to engine failure. This backup power is provided by an Emergency Power Unit that contains 6.7 gallons of H-70. Due to its volatility, a specialized facility is required for hydrazine storage. Hydrazine storage requirements will not be analyzed in this EA as the QF-16 mission would use the existing F-16 hydrazine handling and storage facility that currently serves F-16s at Holloman AFB and was previously analyzed in the Holloman AFB 2011 Recapitalization EA (HAFB 2011a). Hydrazine tanks are removed from the QF-16s prior to all unmanned flights. Response plans in the event of a manned or unmanned QF-16 mishap are described in Section 3.4.1 of this EA.

2.3.6 Communications and Command/Control Infrastructure

Converting from QF-4 to QF-16 FSATs would be seamless. The QF-16 FSAT would use the same systems now being used for QF-4 FSAT operations. The base has the fixed ground control stations integrated via a command telemetry link to safely operate manned and unmanned FSATs. In addition, support equipment such as the Automated System Test Set and Portable Flight-line Tester are already in place and would be used for QF-16 operations. As with the QF-4s, the QF-16s are equipped to be destructed by remote control in the event of any critical system failure during drone flight.

2.4 Description of Alternatives

The only bases considered for basing QF-16 FSATs were Tyndall AFB and Holloman AFB. Basing the QF-16s at any other location would not meet the selection criteria presented in Section 2.2. The Air Force completed a separate NEPA analysis for basing QF-16 FSATs at Tyndall AFB (TAFB 2013).

2.4.1 Proposed Action/Preferred Alternative – Basing QF-16 FSATS at Holloman

At Holloman AFB, there is the capability to store/park up to 35 QF-16s. Due to the maintenance and logistics contract, there would be no changes in operational numbers if 35 QF-16 FSATs were based at Holloman AFB. The Proposed Action, as described above in Section 2.3, is the USAF's Preferred Alternative.

2.4.2 No Action Alternative

Under the No Action Alternative, QF-4 FSATs would not be replaced with QF-16 FSATs; QF-4s would continue operating as described under baseline conditions. The number of operations would remain constant. However, these third-generation fighter aircraft are reaching the end of their operational life, are not able to fully meet the mission needs with advanced technology, production has ceased, and they cannot be replaced. If this alternative were adopted, the inventory of QF-4 FSATs would eventually be depleted and the 82 ATRS would no longer be able to meet its mission of providing FSATs for DoD and Allied Forces research, development, and test projects.

2.5 Comparison of Impacts

The analysis in this EA established that the proposed replacement of QF-4 with QF-16 FSAT aircraft would result in minimal effects (positive and negative) on resources; however, none of these impacts would be of sufficient magnitude to require mitigation. Table 2-5 summarizes potential environmental impacts for each resource area for the Proposed Action/Preferred Alternative and the No Action Alternative.

Table 2-5. Summary and Comparison of Impacts

Resources	No Action Alternative	Proposed Action/Preferred Alternative
Noise	No change when compared to baseline conditions	In general, QF-16 operations are slightly quieter than the older QF-4. Slight reduction in the extent of the DNL contours from baseline conditions, most noticeably to the north of the airfield and in the WHSA. Slight decrease in L_{dnmr} relative to baseline and no changes in sonic booms from the low baseline (established after the departure of F-22s).
Air Quality	No change when compared to baseline conditions	A temporary but minor increase in emissions generated by construction, contributing less than 0.01 percent of regional emissions. Once all QF-4s have been replaced, there would be emissions reductions in four criteria pollutants and GHGs.
Aircraft and Public Safety	No change when compared to baseline conditions	The number of aircraft operations would be the same as baseline conditions. For F-16 aircraft, the historic mishap rate is 3.55 versus 4.64 for the F-4; therefore, a minor decrease in the probability of mishaps would occur. Mishap rates are calculated per 100,000 flying hours. No increases in the number of BASH incidents are anticipated.
Land Use, Recreation, and Visual Resources	No change when compared to baseline conditions	No changes in land use, access, visual context, availability of recreation sites, or changes in the desired qualities of an area that contribute to recreational opportunities. The WHSA Visitor Center would experience no change in subsonic noise levels from baseline conditions, and the High Use Visitor Areas within the monument would range from no change to a 2-dB reduction compared to baseline conditions.
Cultural Resources	No change when compared to baseline conditions	No adverse effects to archeological, historic architectural, or traditional resources from subsonic or supersonic activity. The WHSA Historic District (including the Visitor Center) would experience no changes in subsonic noise levels from baseline conditions and noise from aircraft operations would continue to have no adverse effect on visitors or structures at WHSA.
Earth Resources (soils)	No change when compared to baseline conditions	Soils would undergo temporary, short-term impacts during demolition and repair activities at the North Ramp and Apron Access. With best management practices and implementation of the SWPPP, impacts from erosion and offsite sedimentation would be negligible.
Water Resources (storm water)	No change when compared to baseline conditions	Increase of 1.15 acres in impervious surfaces with the addition on the apron; however, runoff would be handled through existing storm water outfalls to avoid long-term impacts to water quality. The existing SWPPP would be updated as needed and the base would continue to adhere to its SWPPP provisions.
Biological Resources	No change when compared to baseline conditions	No known federally-listed species or their suitable habitats occur on Holloman AFB; therefore infrastructure projects would not impact listed species. Projects on base would occur in previously disturbed areas and are not anticipated to impact vegetation communities or wildlife. The same airspace as the baseline conditions would be used, with a slight decrease in noise impacts; therefore species are not expected to incur adverse impacts.
Hazardous Materials and Waste	No change when compared to baseline conditions	No substantive changes to the quantities of hazardous materials and petroleum substances used at the installation, therefore, Holloman AFB's status as a large quantity generator pursuant to RCRA would not change. Hazardous material handling and storage would not be affected. Existing ERP sites and waste disposal requirements would not be affected.

AFB	Air Force Base	GHG	greenhouse gas
BASH	Bird/Wildlife Aircraft Strike Hazard	L_{dnmr}	Onset-Rate Adjusted Monthly Day-Night Average Sound Level
dB	decibel	RCRA	Resource Conservation and Recovery Act
DNL	Day-Night Average Sound Level	SWPPP	Storm Water Pollution Prevention Plan
ERP	Environmental Restoration Program	WHSA	White Sands National Monument

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The Proposed Action/Preferred Alternative has the potential to affect certain resources as identified through an initial evaluation, communications with state and federal agencies, correspondence with American Indian Tribal governments, and thorough review of past environmental documentation.

Chapter 3 describes the analytical approach and the resources potentially impacted by the Proposed Action/Preferred Alternative. Justification for why certain resources are not carried on for detailed analysis is discussed. Following the analytical approach, the resource definition, affected environment, and consequences are discussed for each resource category evaluated in detail in this EA.

3.1 Analytical Approach

NEPA requires focused analysis of the areas and resources potentially affected by an action or alternative, and an EA should consider, but is not required to analyze in detail, those areas or resources not potentially affected by the proposal. Therefore, an EA should not be encyclopedic; rather, it should be succinct and to the point. Both description and analysis in an EA should provide sufficient detail and depth to ensure that the agency (i.e., the Air Force) took a hard look at the proposal and the potential impacts it might have on the human and natural environment. NEPA also requires a comparative analysis that allows decision makers and the public to differentiate among the alternatives.

Environmental impact analysis provides a framework for understanding the direct, indirect, and cumulative effects of the Proposed Action and alternatives. Categories of potential environmental impact were developed based on the professional judgment of resource analysts and the magnitude of impacts categorized as follows:

- *None*. There are no impacts to the resource.
- *Negligible Impact.* The environmental impact is barely perceptible or measurable, remains confined to a single location, and does not result in a sustained recovery time for the resource impacted (days to months).
- *Minor Impact.* The environmental impact is readily perceptible and measurable, however, the impact is temporary, and the resource should recover in a relatively short period of time.
- *Major Impact.* The environmental impact is perceptible and measurable, and does not remain localized. Under a major impact, recovery of the resource may not occur or require a longer period of time than a minor impact.

3.1.1 Resource Identification

The Proposed Action/Preferred Alternative includes two components that have the potential to directly affect human health and the environment at Holloman AFB: 1) infrastructure upgrades/improvements, and 2) aircraft operations/maintenance. A total of 13 resource categories were evaluated for their potential to be impacted by the Proposed Action, and the following were identified for more detailed analysis: 1) noise; 2) air quality, including greenhouse gases; 3) aircraft and public safety; 4) land use, including recreation and visual resources; 5) cultural resources; 6) earth resources (soils); 7) water resources (storm water), 8) biological resources, and 9) hazardous and toxic materials and wastes. If a resource was determined to have negligible or no impacts it was not considered further for analysis; justification for not carrying a resource forward is discussed in the following section.

3.1.2 Resources Eliminated from Further Detailed Analysis

NEPA, CEQ, and Air Force procedures for implementing NEPA specify that an EA should focus only on those resources potentially subject to impacts. In addition, the level of analysis applied to any given resource should be commensurate with the level of impact anticipated for that resource. Applying these guidelines, the following resource areas were not analyzed in this EA: airspace management and use, earth resources (topography and geology), water resources (floodplains and quality/quantity), socioeconomics (including economics, environmental justice, provision for persons with disabilities, and protection of children), traffic/transportation, and public services. It is anticipated that impacts would be negligible or nonexistent to these resources.

Airspace Management and Use: Airspace management is defined as the direction, control, and handling of flight operations in the "navigable airspace" that overlies the geopolitical boundaries of the U.S. and its territories. The Federal Aviation Administration (FAA) is responsible for developing plans and policies for using navigable airspace, for designating use of the airspace necessary to ensure aircraft safety, and ensuring its efficient use through regulations or orders (49 USC Section 40103(b); FAA Order JO 7400.2J [with changes 1]). Special Use Airspace identified for military and other governmental activities is charted and published by the National Aeronautical Charting Office in accordance with FAA Order JO 7400.2J and other applicable regulations and orders. Special Use Airspace has defined dimensions where military activities can operate and has boundaries to limit access by non-participating aircraft. Types of this airspace include: Restricted Areas, MOAs, and Warning Areas. Other airspace includes MTRs, National Security Areas, and Air Traffic Control Assigned Airspace (ATCAA). When not required for other needs, an ATCAA can extend the vertical boundary of training airspace (e.g., a MOA) as authorized for military use by the controlling Air Route Traffic Control Center.

Under the Proposed Action/Preferred Alternative, no alterations to airspace structure or management would be needed. The QF-16s would continue operations in Restricted Airspace, MOAs, and ATCAAs now used by the QF-4s at Holloman AFB. There would be no changes to number or type of operations. There would be either no or only negligible changes to departure and arrival routes to accommodate QF-16 flight requirements versus the QF-4, and civil and commercial aviation airspace would be unaffected. Flight safety procedures used for QF-4 FSAT operations would continue with conversion to QF-16 FSATs. Because there would be neither changes in airspace management and structure nor the type and number (i.e., use) of airspace operations, this resource category is not carried forward for further analysis.

Earth Resources (topography and geology): Earth resources are defined as the topography, geology, and soils of a given area. Topography refers to terrain, dominant landforms, and other visible features. The geology of an area includes bedrock materials, mineral deposits, and fossil remains. Neither the topography nor geology would be affected by the Proposed Action/Preferred Alternative. Topography and geology could be affected by demolition and/or upgrade activities. However, the majority of ground disturbance would occur in already developed areas and would not entail ground removal that would change the topography or geology of the sites. It is for these reasons that topography and geology are not carried forward for more detailed analysis; however, effects to soils are evaluated and can be found in Section 3.7.

Water Resources (floodplain and water quality/quantity): EO 11988, *Floodplain Management*, requires federal agencies to consider whether a proposed action will occur in a 100-year floodplain. If so, a FONPA to the action in a 100-year floodplain is required. A floodplain is the flat or nearly flat land adjacent to a stream or river that stretches from the banks of the channel to the base of the enclosing topography and experiences flooding during periods of high discharge. Floodplains typically are described as areas likely to be inundated by a particular flood. For example, a flood that has a 1-percent chance of occurring in any 1 year is considered a 100-year floodplain.

The Clean Water Act of 1972 (Public Law [PL] 95-217), the Safe Drinking Water Act of 1972 (PL 93-523) and Amendments of 1986 (PL 99-339), and the Water Quality Act of 1987 (PL 100-4) are the primary federal laws protecting the nation's waters. In addition, several applicable regulations and permits are in place to protect the quality and quantity of water resources in the U.S. These include: National Pollutant Discharge Elimination System (NPDES) Construction Activity General Permit (40 CFR Sections 122-124); NPDES Industrial Permit and NPDES Municipal Separate Storm Sewer System Permit; U.S. Environmental Protection Agency (USEPA), Subchapter D-Water Programs (40 CFR Sections 100-145); and USEPA, Subchapter N-Effluent Guidelines and Standards (40 CFR Sections 401-471).

Under the Proposed Action/Preferred Alternative, infrastructure upgrades/improvements, including demolition activities, would be the most likely components affecting floodplains and water quality/quantity. Elevated water levels within ephemeral stream channels near Holloman AFB generally occur between June and October. They are characterized by high peak flows with small volumes that are short-lived. Most of the water that flows through these stream channels evaporates, while a small percentage contributes to groundwater recharge (HAFB 2008). According to Federal Emergency Management Agency floodplain maps, only Dillard Draw, located near the southeastern portion of the base, is associated with a 100-year floodplain. No actions as defined by EO 11988 will occur in a100-year floodplain.

The Air Force would follow and complete all applicable federal and state permits prior to any ground-disturbing activities to protect water quality; water quantity would not be impacted during the upgrade phases of the Proposed Action/Preferred Alternative. Once based at Holloman AFB, QF-16 operational and maintenance activities would not affect water quality and quantity. Hydrazine would be stored in a facility designed to contain spills, precluding water contamination. Water use would only be negligibly impacted because there would be neither changes in personnel numbers nor how aircraft are maintained to affect quantity. Therefore, floodplains and water quality/quantity were not carried forward for more detailed analysis. Storm water is addressed in Section 3.8 and wetlands in Section 3.9.

Socioeconomics (Economics, Environmental Justice, Provision for Persons with Disabilities, and Protection of Children): Socioeconomics describes the basic attributes and resources associated with the human environment, particularly population, housing, and economic activity. There are no governing regulations with regard to socioeconomics. Economic activity generally encompasses employment, personal income, and industrial growth. Implementation of the Proposed Action/Preferred Alternative would result in minor, temporary income generated from infrastructure upgrades; however, this amount would not generate any changes to the regional economy.

Environmental Justice: EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires analysis of the potential for a federal action to cause disproportionate health and environmental impacts on minority and low-income populations. Under this proposal, noise generated by aircraft operations would not perceptibly change around the airfield or under the airspace when compared to baseline conditions and would not disproportionally affect low-income or minority populations.

Provision for Persons with Disabilities: According to Deputy Secretary of Defense Memorandum dated October 2008, it is the goal of DoD to make its facilities accessible to persons with disabilities (DoD 2008). To achieve that goal DoD requires that the more stringent of either the *Uniform Federal Accessibility Standards* (49 *Federal Register* 31528 [August 7, 1984]) or the 1991 version of the *Americans with Disabilities Act (ADA) Accessibility Guidelines* be applied to all DoD facilities designed, constructed (including additions), altered, leased, or funded by DoD. Specifically, DoD has adopted the standards from the Architectural Barriers Act of 1968 (ABA), as amended (42 USC Section 4151, *et seq*.); Section 504 of the Rehabilitation Act of 1973, as amended (29 USC Section 794); and the 2004 *ADA and ABA Accessibility Guidelines*. However, exception is made for facilities or portions of facilities

that are designed and constructed for use (e.g., hangars, maintenance, and hydrazine facilities) exclusively for able-bodied military personnel (DoD 2008). Because that is the case in all instances of upgrade improvements under this proposal, no impacts are anticipated to this category.

Protection of Children: EO 13045, *Protection of Children From Environmental Health Risks and Safety Risks*, states that federal agencies (USAF) are responsible for identifying and assessing environmental health risks and safety risks that may disproportionally affect children. Under the Proposed Action/Preferred Alternative, no adverse health risks would be introduced by converting QF-4s to QF-16s, and therefore the Proposed Action does not impact EO 13045. On-base noise impacts would continue as found under baseline conditions (see Section 3.2 for specific noise discussion).

In summary, because no or negligible impacts to the regional economy, low-income populations, minorities, and persons with disabilities, or children would occur, this resource and associated categories are not carried forward for further analysis.

Traffic/Transportation: Traffic and transportation refer to roadway and street systems, the movement of vehicles on roadway networks, and mass transit. Roadway operating conditions and the adequacy of existing roadway systems to accommodate vehicle use are often described in terms of average daily traffic volumes and level of service ratings.

Under the Proposed Action/Preferred Alternative, there would be no changes in personnel numbers to affect long-term daily traffic volumes or level of service ratings at the base. On a temporary basis, construction crews would use existing road networks for site access; however, this would not cause major impacts to traffic flow. No other improvements would be introduced that could affect transportation or traffic flow; therefore, this resource was not carried forward for further analysis.

Public Services: This refers to the system of public works and utilities that provide the underlying framework for a community or installation. There would be impacts to public services if an action degraded the existing infrastructure such that it would not be able to provide the requisite services, or if capacity issues developed for services provided by any locality to the community or installation.

Under the Proposed Action/Preferred Alternative, no additional personnel would be added at Holloman AFB, and therefore, would not degrade existing public services infrastructure or preclude any locality from providing these services. Aircraft operations and maintenance would remain consistent with current levels so would not require any additional services. There would be a temporary increase in solid waste material generated during demolition and upgrade activities; however, materials would be recycled to the maximum extent practicable or disposed of in properly permitted solid waste facilities. In summary, public services would experience either no or negligible impacts; no further analysis of this resource is undertaken.

3.1.3 Baseline and Affected Environment Identification

Baseline conditions provide a benchmark against which the Air Force measures potential impacts. Differences in the conditions between baseline and what would occur under the Proposed Action/Preferred Alternative reflect the magnitude and intensity of impacts relative to the resources analyzed. Under this proposal, baseline airfield operations (FY 14) are those conditions that will be found before the QF-16s would start arriving and operating at the base in FY 16. Baseline airfield operations are those presented in the *Noise Study for the Holloman AFB QF-4 to QF-16 Replacement Environmental Assessment* (Wyle 2014). The most recent, publically-available noise data for Holloman AFB are in the Final EIS for F-35A Training Basing (USAF 2012). Per EIAP policy for noise assessment, detailed in AFH 32-7084, this baseline was revalidated via pilot interviews to revise flight profiles.

Identifying and defining the affected environment (or region of influence) for the Proposed Action/Preferred Alternative provides the foundation for evaluating potential impacts and identifying mitigation strategies when they are needed. The affected environment is identified based on the

anticipated magnitude and intensity of potential impacts and can vary from resource to resource. As presented in Section 2.3, the Proposed Action/Preferred Alternative would replace 35 ATRS QF-4 FSATs with QF-16 FSATs at Holloman AFB and support QF-16 integrated testing and beddown at Holloman AFB. The transition would occur over 2 years (refer to Table 2-1) starting in FY16. In addition, the Proposed Action/Preferred Alternative would include infrastructure upgrades/improvements as described in Table 2-4 and at the locations identified in Figure 2-2.

Under the Proposed Action/Preferred Alternative, the number of operations would remain the same as baseline conditions. For the No Action Alternative, the number of operations would also remain the same. As presented in Chapter 2, this is because the total number of operations is dictated by a fixed-price FSAT maintenance contract. Currently, the Air Force does not anticipate any changes in this contracted number and therefore, operations for the QF-16 would remain unchanged from the QF-4. For the No Action Alternative, QF-4 FSATs would not be replaced by QF-16s and operations would continue as presented under baseline.

The following resources are evaluated in detail:

- Noise
- Air Quality
- Aircraft and Public Safety
- Land Use, Recreation, and Visual Resources
- Cultural Resources
- Earth Resources – Soils
- Water Resources – Storm Water
- Biological Resources
- Hazardous Materials and Waste

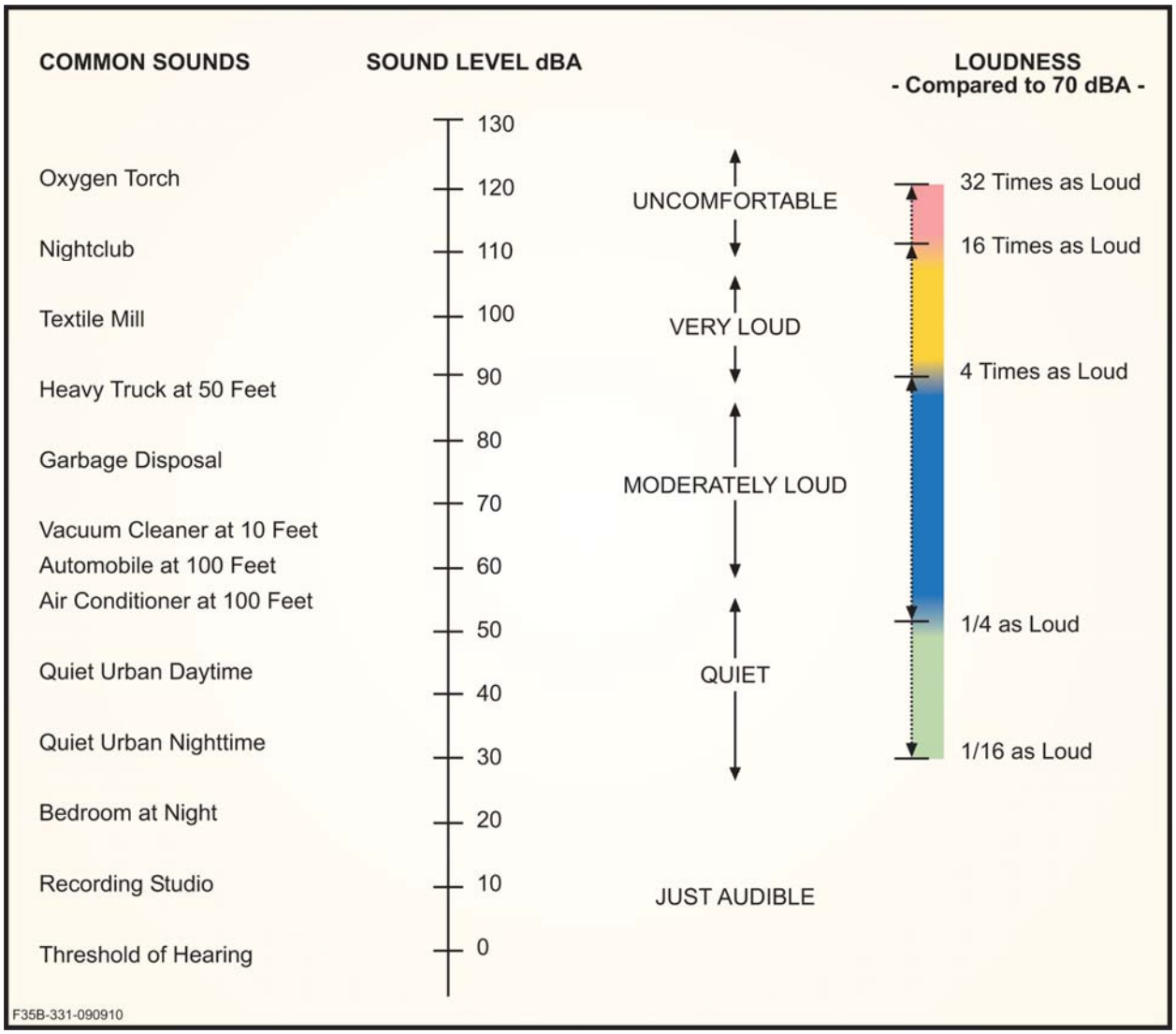
3.2 Noise

The predominant noise sources under the Proposed Action/Preferred Alternative would consist of aircraft operations, both at and around the airfield, as well as in the airspace. Other components such as infrastructure upgrades, aircraft ground support equipment for maintenance purposes, and vehicle traffic would produce noise, but such noise generally represents a transitory and negligible contribution to the average noise environment. Response to noise varies depending on the type and characteristics of the noise, the distance between the noise source and whoever hears it (the receptor), receptor sensitivity, and time of day.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air or water, and are sensed by the human ear. Sound is all around us and noise is defined as unwanted or annoying sound that interferes with or disrupts normal human activities. Although exposure to very high noise levels can cause hearing loss, the principal human response to noise is annoyance. The response of different individuals to similar noise events is diverse and is influenced by the type of noise, perceived importance of the noise, its appropriateness in the setting, time of day, type of activity during which the noise occurs, and sensitivity of the individual.

Noise and sound are expressed in decibels (dB), which are logarithmic units. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions (Figure 3-1). 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. 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 3-1. Typical A-Weighted Sound Levels of Common Sounds



Source: Harris 1979, FICAN 1997

All sounds have a spectral content, meaning their magnitude or level changes with frequency, where frequency is measured in cycles per second or hertz (Hz). To mimic the human ear's non-linear sensitivity and perception of different frequencies of sound, the spectral content is weighted. For example, environmental noise measurements are usually on an "A-weighted" (dBA) 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 was made with this filtering process. For low frequency noise, "C-weighting" (dBC) is typically applied for impulsive sounds such as sonic booms and ordnance detonation.

In accordance with DoD guidelines and standard practice for environmental impact analysis documents, this noise analysis utilizes the following, A-weighted noise descriptors or metrics: Day-Night Average Sound Level (DNL), Sound Exposure Level (SEL), Maximum Sound Level (Lmax), and Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dmnr}).

Noise Metrics

Maximum Sound Level (Lmax) – the highest A-weighted, integrated sound level measured during a single event in which the sound level changes value with time (e.g., an aircraft overflight).

Sound Exposure Level (SEL) – a composite that represents both the magnitude of a sound and its duration. Noise events such as aircraft overflights have two main characteristics: a sound level that changes throughout the event and a period of time during which the event is heard. The SEL metric provides a measure of the net impact of the entire acoustic event, but it does not directly represent the sound level heard at any given time. The SEL is useful for comparing different noise events, e.g., different aircraft types or operations, whose duration or amplitude may be different.

Day-night Average Sound Level (DNL) – a composite metric that accounts for all noise events in a 24-hour period, and takes into consideration the increased human sensitivity to noise at night by applying a 10-dB penalty to nighttime events occurring between 10:00 p.m. and 7:00 a.m.

Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}) – similar to DNL, it is a cumulative daily noise metric devised to account for the "surprise" effect of the sudden onset of aircraft noise events on humans and the sporadic nature of Special Use Airspace (SUA) activity. Whereas aircraft operations at airfields tend to be continuous or patterned, operations in airspace are sporadic and dispersed. L_{dnmr} also accounts for the specific effects of low-altitude and high-speed operations that can occur in airspace such as MOAs or Restricted Areas. Because military jet aircraft can exhibit a rate of increase in sound level (onset rate) of up to 150 dB per second, the L_{dnmr} metric is adjusted to account for the startle effect with addition of up to 11 dB to the normal SEL.

Noise Event – a single event with a noise source being perceived above ambient sound level. Generally, it is characterized by sound level increase up to maximum sound level (L_{max}) followed by decrease back to ambient.

3.2.1 Affected Environment

Noise assessment for this EA was conducted with DoD computer-based tools and programs to produce applicable cumulative noise metrics for each category of aircraft operations, i.e., DNL for airfield operations, L_{dnmr} for subsonic airspace operations, and C-weighted DNL (CDNL or LCdn) for supersonic activity. For airfield operations, supplemental noise metrics of Number of Events Above (NA) and Time Above (TA) were also computed for thresholds of Lmax equal to 35 dB and 65 dB. The information in this section is from *Noise Study for the Holloman AFB QF-4 to QF-16 Replacement Environmental Assessment* (Wyle 2014) which is included in entirety as Appendix D. Previous NEPA analyses were conducted on the renewal of the supersonic flight waivers in the 21 May 2011 CATEX Renewal of Supersonic Waiver for High Altitude (FL 230 and above) and 3 August 2011 CATEX Renewal of Supersonic Waiver for Low Altitude Test and Evaluation Corridor in WSMR.

Under baseline conditions, annual flight operations total nearly 100,000. Of these, the QF-4 aircraft conduct nearly 2,400 annual flight operations, with none during the environmental nighttime period (10 p.m. to 7 a.m.). Figure 3-2 presents baseline contours from 65 to 85 dB DNL in 5 dB increments. The 65 dB DNL noise contour does not extend over public-use portions of WHSA.

Sensitive receptors of noise are either on-base or within the WHSA (Figure 3-2). No off-base residential receptor is located within the vicinity of Holloman AFB. The noise study analyzed 12 locations in greater detail, including five locations on-base and seven locations within WHSA. On-base locations consist of two child development centers, a place of worship, and two schools. WHSA locations consist of the Visitor Center, four locations representing high use areas, and the innermost extents of two trails, identified as Trail East and Trail West in this EA. Trail West is in the southwest corner of WHSA.

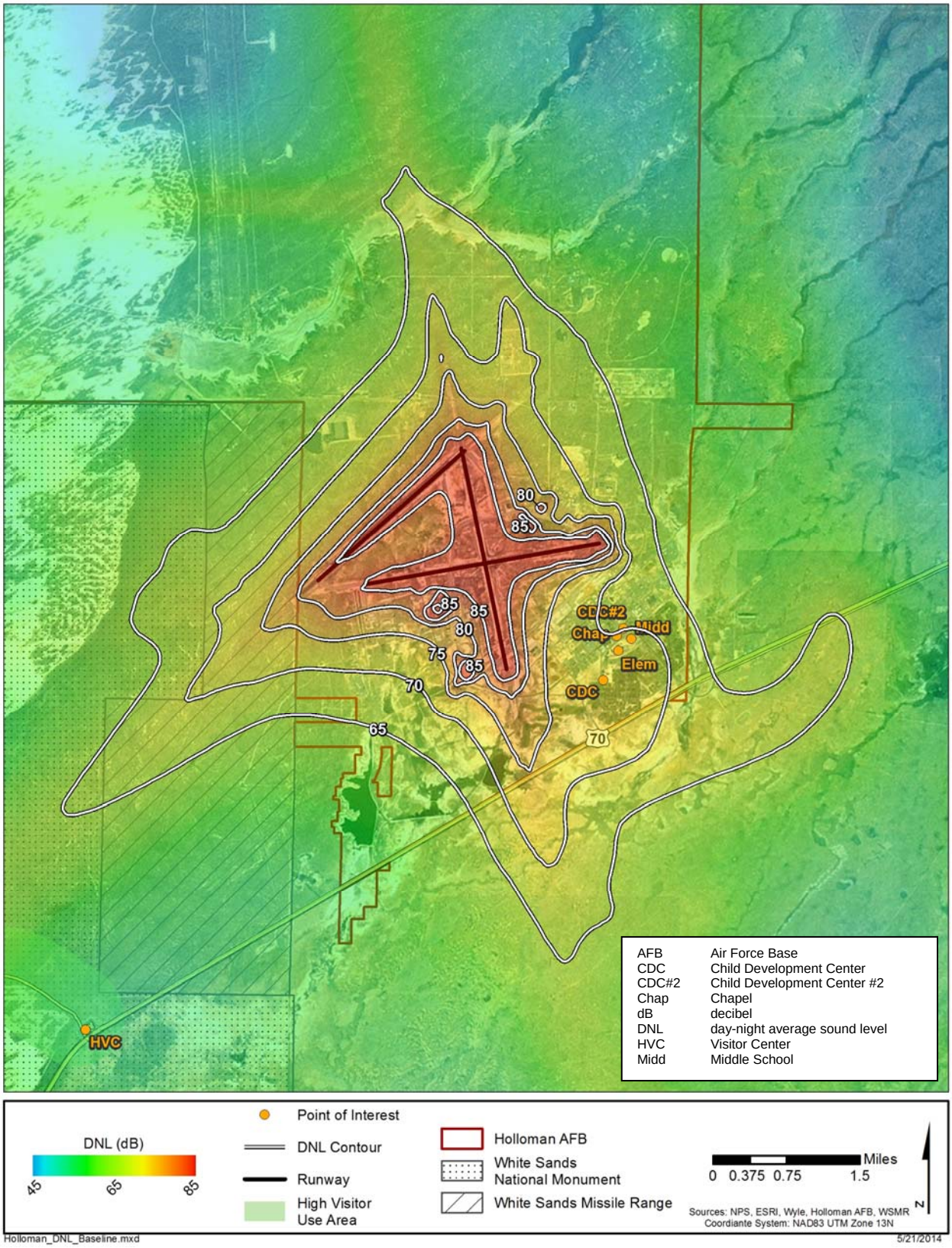


Figure 3-2. Baseline Day-Night Average Sound Level Contours

Table 3-1 lists the DNL at each location for baseline conditions. DNL for on-base locations ranges from 70 to 72 dB. DNL for WHSA locations ranges between 43 and 55 dB. The noise contribution from airfield operations at the Trail West location is negligible.

Table 3-1. Sound Levels at Sensitive Locations under Baseline Conditions

Location	Description	DNL (dB)
Holloman AFB	Child Development Center	72
	Child Development Center #2	70
	Chapel	70
	Elementary School	71
	Middle School	71
WHSA	Visitor Center	54
	High Visitor Use Area 1	55
	High Visitor Use Area 2	< 45
	High Visitor Use Area 3	< 45
	High Visitor Use Area 4	52
	Trail East	< 45
	Trail West	< 45

SOURCE: Wyle 2014
AFB Air Force Base
dB decibel
DNL day-night average sound level
WHSA White Sands National Monument

NA and TA metrics were also computed for WHSA locations and are shown in Table 3-2. NA was computed for 35 dB Lmax and 65 dB Lmax thresholds and TA was computed for the same thresholds. These thresholds were chosen because 35 dB Lmax corresponds approximately to the natural ambient noise level with man-made noise and 65 dB Lmax corresponds to speech interference for normal conversation in close proximity.

Table 3-2. Baseline NA and TA at WHSA

	35 dB Lmax			65 dB Lmax		
Location (Map ID)	NA (events)	TA (minutes)	TA (hours)	NA (events)	TA (minutes)	TA (hours)
Visitor Center (HVC)	217	383	6.4	35	47	0.8
High Visitor Use Area 1 (HUIA1)	199	300	5.0	35	18	0.3
High Visitor Use Area 2 (HUIA2)	196	241	4.0	44	10	0.2
High Visitor Use Area 3 (HUIA3)	193	199	3.3	13	5	0.1
High Visitor Use Area 4 (HUIA4)	198	199	3.3	12	6	0.1
Trail East (Trail East)	193	141	2.4	12	< 0.5	0.0
Trail West (Trail West)	3	4	0.1	< 0.5	< 0.5	0.0

Source: Wyle 2014
dB decibels
Lmax Maximum Sound Level
NA Number of Events Above
TA Time Above

Excluding Trail West, NA at WHSA locations ranges from 193 to 217 events for the 35 dB threshold and from 12 to 44 events for the 65 dB threshold, per average flying day. Trail West has an NA of 3 events and less than 0.5 event, for the 35 dB and 65 dB thresholds, respectively. NA at Holloman AFB locations

ranges from 246 to 251 for the 35 dB threshold and is 190 at all locations for the 65 dB threshold, per average flying day.

Excluding Trail West and Trail East, TA at WHSA locations ranges from 199 to 383 minutes for the 35 dB threshold and from 6 to 47 minutes for the 65 dB threshold, per average flying day. Trail West's TA is 4 minutes and less than half of a minute, for the 35 dB and 65 dB thresholds, respectively. Trail East's TA is 141 minutes and less than half of a minute for the 35 dB and 65 dB thresholds, respectively. TA at Holloman AFB locations ranges from 773 to 803 minutes for the 35 dB threshold and 151 to 165 minutes for the 65 dB threshold, per average flying day.

For comparison, a vehicle (car or semi-truck) pass-by event would cause approximately 72 to 82 dB Lmax at the Visitor Center which is approximately 250 feet from nearest lane of US Hwy 70. Annual average daily traffic for US Hwy 70 is approximately 11,500. Assuming a vehicle pass-by is 5 seconds in duration (above 65 dB Lmax), NA and TA for vehicle noise events at the Visitor Center would result in approximately 11,500 events above 65 dB Lmax for 960 minutes (16 hours), assuming distinct events.

The noise study also analyzed subsonic and supersonic activity. Nearly 11,000 annual sorties were modeled in flight areas associated with Restricted Areas R-5107, R-5103 and nearby MOAs, of which 380 are by the QF-4. Nearly 900 annual sorties were modeled across seven MTRs used by Holloman aircraft, of which 34 are by the QF-4. The term "sortie" is used to describe a single aircraft taking off, conducting an activity, and then returning.

The maximum level for these operations of 50 dB L_{dnmr} occurs in R-5103 primarily due to the 56FW F-16 Close Air Support and Surface Attack Tactics training missions which occur at altitudes as low as 500 feet AGL. The maximum MTR centerline level of 52 dB L_{dnmr} occurs along IR-133 as it ends in Red Rio primarily due to F-16 operations which occur at 300 to 500 feet AGL. The locations at WHSA analyzed in detail are exposed to 43 dB L_{dnmr} for all points except Trail West which is exposed to 45 dB L_{dnmr}. At any given location in the airspace, noise events are heard on an average of about once a week and are typically less than a minute or two.

Most supersonic activity at WSMR occurs at altitudes 10,000 feet mean sea level (MSL) and above (approximately 5,000 feet AGL and above). 4,654 airspace training sorties have the potential to go supersonic for some duration of time. The 56FW F-16s account for 94 percent of this airspace training. The QF-4 accounts for only 10 annual sorties with potential to go supersonic. The boom environment in the center of R-5107 is estimated to be 47.3 dB CDNL and 0.21 booms per day.

More information about the noise environment at WHSA is included in Section 3.5.1.2 of this EA.

3.2.2 Environmental Consequences

3.2.2.1 Proposed Action/Preferred Alternative

The proposed number of flight operations would be the same as under baseline conditions except the QF-4 operations would be replaced by QF-16 operations. The QF-16 operations would total 2,400 annually and none would be during the environmental nighttime period (10 pm to 7 am). Figure 3-3 shows the 65 to 85 dB DNL contours, in 5 dB increments, for the Proposed Action/Preferred Alternative.

Figure 3-4 compares the 65 dB and 75 dB DNL contours for baseline conditions and the Proposed Action/Preferred Alternative. This figure shows the proposed operations would cause a slight reduction in the extent of these contours, most noticeably to the north of the airfield and in the WHSA.

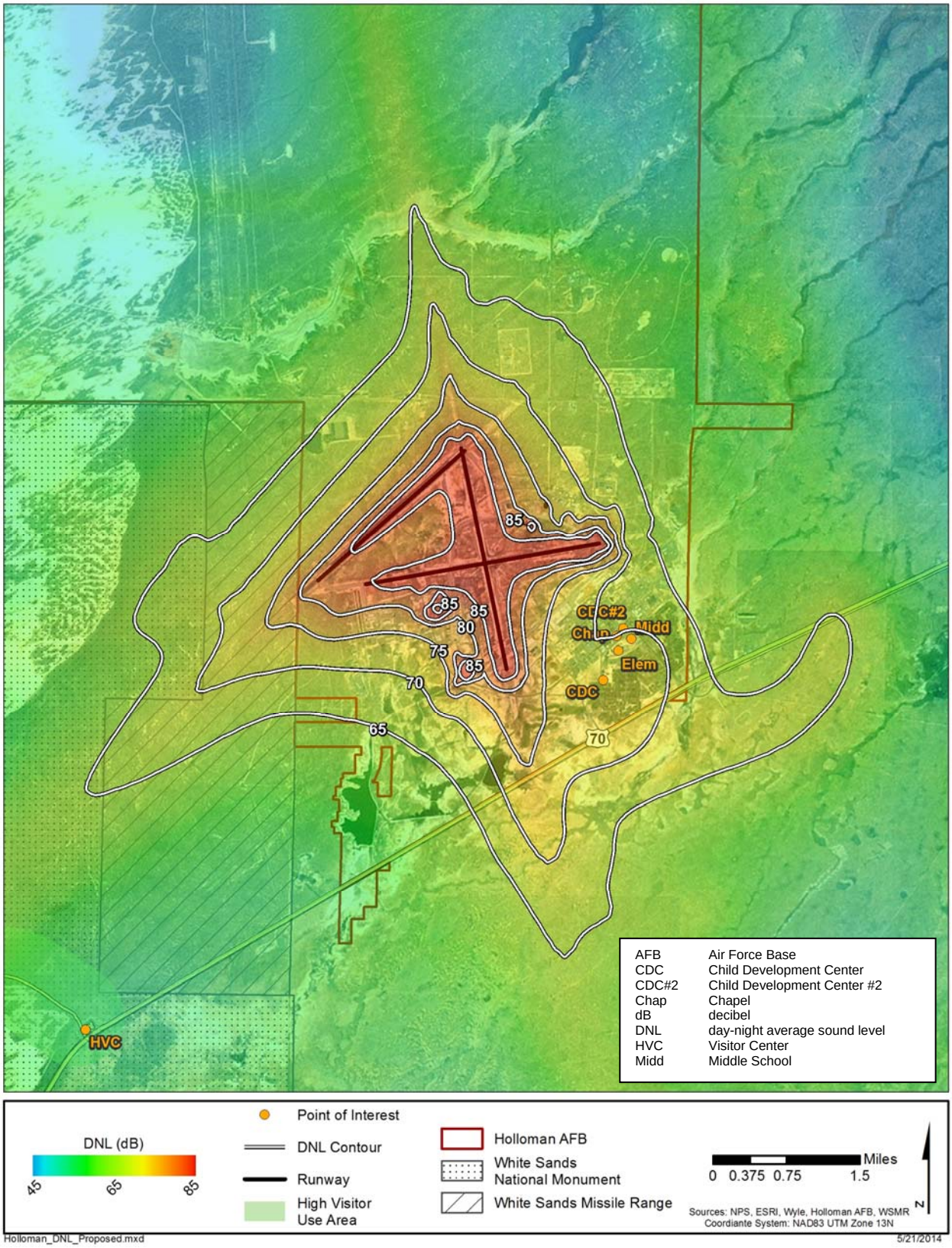


Figure 3-3. Proposed Action/Preferred Alternative Day-Night Average Sound Level Contours

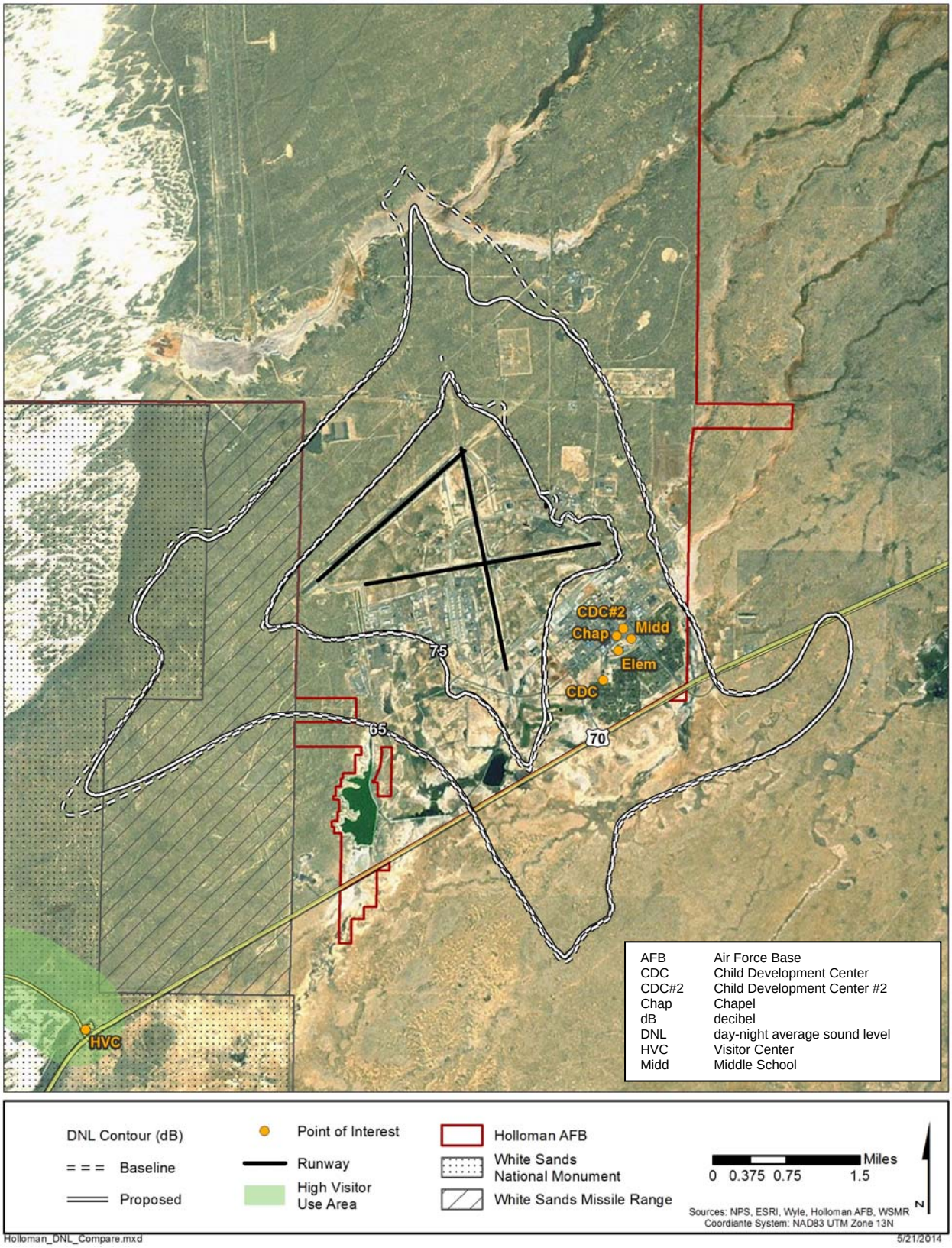


Figure 3-4. Comparison of Noise Contours for the Baseline and the Proposed Action/Preferred Alternative

Table 3-3 presents the DNL for the on-base and WHSA locations under the Proposed Action/Preferred Alternative and the changes from baseline conditions. DNL for on-base locations would range from 70 to 72 dB (identical to baseline). DNL for WHSA locations would range between 43 and 54 dB. Contributions of airfield noise at the Trail West site would be negligible. The sound level at High Use Visitor Area #1 would be 2 dB less than under baseline conditions. High Use Visitor Area #2 would experience a 1 dB reduction in DNL, relative to baseline.

Table 3-3. Sound Levels at Sensitive Locations under the Proposed Action/Preferred Alternative

Location	Description	DNL (dB)	Change from Baseline (dB)
Holloman AFB	Child Development Center	72	0
	Child Development Center #2	70	0
	Chapel	70	0
	Elementary School	71	0
	Middle School	71	0
WHSA	Visitor Center	54	0
	High Visitor Use Area 1	53	-2
	High Visitor Use Area 2	43	-1
	High Visitor Use Area 3	44	0
	High Visitor Use Area 4	52	0
	Trail East	43	0
	Trail West	20	0

AFB Air Force Base
dB decibel
DNL day-night average sound level
WHSA White Sands National Monument

Table 3-4 presents the NA and TA for 35 dB and 65 dB thresholds at WHSA under the Proposed Action/Preferred Alternative and the changes from baseline.

Table 3-4. Proposed Action/Preferred Alternative NA and TA at WHSA

	35dB Lmax				65 dB Lmax			
Location (Map ID)	NA (events)	NA Change from Baseline	TA (minutes)	TA Change from Baseline	NA (events)	NA Change from Baseline	TA (minutes)	TA Change from Baseline
Visitor Center (HVC)	215	-2	379	-4	35	0	47	0
High Visitor Use Area 1 (HUIA1)	198	-1	298	-2	35	0	18	0
High Visitor Use Area 2 (HUIA2)	194	-2	240	-1	44	0	9	-1
High Visitor Use Area 3 (HUIA3)	191	-2	199	0	13	0	5	0
High Visitor Use Area 4 (HUIA4)	196	-2	199	0	12	0	6	0
Trail East (Trail East)	193	0	141	0	12	0	< 0.5	0
Trail West (Trail West)	3	0	4	0	< 0.5	0	< 0.5	0

Source: Wyle 2014
dB decibels
Lmax Maximum Sound Level
NA Number of Events Above
TA Time Above

Excluding Trail West, NA at WHSA would range from 193 to 215 events for the 35 dB threshold and from 12 to 44 events for the 65 dB threshold, per average flying day. Trail West NA would be 3 events and less than 0.5 event for the 35 dB and 65 dB thresholds, respectively. NA at Holloman locations

would range from 245 to 250 for the 35 dB threshold and from 188 to 189 for the 65 dB threshold, per average flying day.

For the 35 dB threshold, NA would decrease by 1-2 events at most locations except Trail East and Trail West which would experience no change. For the 65 dB threshold, NA would decrease for Holloman locations by 1-2 events, but would not change at WHSA locations.

Relative to baseline conditions, TA decreases up to 4 minutes for the analyzed locations. Excluding Trail West, TA at WHSA locations would range from 141 to 379 minutes for the 35 dB threshold. Trail West's TA for the 35 dB threshold would be 4 minutes. Excluding Trail West and Trail East, TA for the 65 dB threshold at WHSA would range from 6 to 47 minutes, per average flying day for the Proposed Action/Preferred Alternative. TA for the 65 dB threshold at Trail West and Trail East would be less than half of a minute. TA at Holloman AFB locations would range from 770 to 799 minutes for the 35 dB threshold and from 151 to 163 minutes for the 65 dB threshold, per average flying day. For subsonic activity, the L_{dnmr} for the Proposed Action/Preferred Alternative would decrease by up to 2 dB at any of the modeled flight areas or under any of the modeled MTRs and at the analyzed locations, relative to baseline conditions. As under baseline conditions, at any given location in the airspace, noise events would be heard on an average of about once a week and would typically be less than a minute or two.

Consistent with baseline conditions, at a rate of one sonic boom every 5 days or less, disturbance for the Proposed Action/Preferred Alternative would remain minimal. The probability of damage to the Visitor Center for baseline conditions and the Proposed Action/Preferred Alternative is approximately one chance in 2 million. The risk to the Visitor Center is thus very small.

Consistent with baseline conditions for low-altitude supersonic activity, the overpressures would be sufficiently high that personnel and non-range equipment should not be exposed. Accordingly, when there are operations that can result in low altitude booms at WHSA, they would be coordinated with the NPS and the monument would be evacuated, per the Interagency Agreement No. F1274100002. The Visitor Center is and would remain well outside of the area exposed to existing or proposed booms from the corridor. More information about the noise environment at WHSA under the Proposed Action/Preferred Alternative is provided in Section 3.5.1.2 of this EA.

In general, QF-16 operations are slightly quieter than the older QF-4. Thus the Proposed Action/Preferred Alternative would cause a slight reduction in the extent of the DNL contours, most noticeably to the north of the airfield and in the WHSA. DNL for analyzed locations would be identical to baseline conditions except the DNL at two locations representing high use areas at WHSA would decrease by up to 2 dB. NA would decrease by 1 to 2 events at all analyzed locations, except Trail West and Trail East which would remain the same. TA would decrease at most analyzed locations, by up to 4 minutes. Impacts to the acoustic environment would not be significant.

Short-term noise impacts from construction activities would occur during the proposed infrastructure upgrade/improvement projects. The noise levels generated by construction equipment vary depending on factors such as the type of equipment, the specific model, the operation being performed, and the condition of the equipment. The impacts would be typical of new construction activities, temporary and intermittent, and would not be significant.

3.2.2.2 No Action Alternative

Under the No Action Alternative, QF-4s would continue operating at Holloman AFB until the inventory is depleted. Noise levels would remain consistent with those presented under baseline conditions.

3.3 Air Quality

National Ambient Air Quality Standards. The Clean Air Act requires the USEPA to establish National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. There are primary and secondary standards under the NAAQS. Primary standards set limits to protect public health, including "sensitive" populations such as children and the elderly. Secondary standards set limits to protect public welfare, including protection from decreased visibility, damage to animals, crops, vegetation, and buildings. Areas that are in violation of the NAAQS are designated non-attainment or in maintenance for attainment of criteria pollutants. Holloman AFB is not located in areas of non-attainment or in maintenance for attainment of any criteria pollutants; therefore, it is considered to be in attainment of the NAAQS.

This EA evaluates five of the six criteria pollutants (Table 3-5). Lead, as well as hazardous and toxic air pollutants, is not included in this analysis because they are primarily generated by stationary industrial activities, not by mobile sources such as aircraft.

Criteria Pollutants

There are six criteria pollutants found under the NAAQS:

- ozone (O_3); ozone precursors include volatile organic compounds (VOCs) and nitrogen oxides (NOx)
- carbon monoxide (CO),
- nitrogen dioxide (NO_2),
- sulfur dioxide (SO_2),
- particulate matter (PM) [which includes (PM_{10}) and ($PM_{2.5}$)]
- lead (Pb)

Established under the Clean Air Act (Section 176(c)(4)), the General Conformity Rule requires federal agencies to ensure that their actions conform to applicable implementation plans for the achievement and maintenance of the NAAQS for criteria pollutants. To achieve conformity, a federal action must not contribute to new violations of standards for ambient air quality, increase the frequency or severity of existing violations, or delay timely attainment of standards in the area of concern (for example, a state or a smaller air quality region).

Federal agencies prepare written Conformity Determinations for federal actions that are in or affect NAAQS nonattainment areas or maintenance areas when the total direct or indirect emissions of nonattainment pollutants (or their precursors in the case of ozone) exceed specified thresholds. Because Otero County is not located in nonattainment or maintenance areas, the general conformity requirements do not apply to the proposed project and a general conformity determination is not required.

Ambient air quality refers to the atmospheric concentration of a specific compound (amount of pollutants in a specified volume of air) that occurs at a particular geographic location. The ambient air quality levels measured at a particular location are determined by the interactions of emissions, meteorology, and chemistry. Emission considerations include the types, amounts, and locations of pollutants emitted into the atmosphere. Meteorological considerations include wind and precipitation patterns affecting the distribution, dilution, and removal of pollutant emissions. Chemical reactions can transform pollutant emissions into other chemical substances. Ambient air quality data are generally reported as a mass per unit volume [e.g., micrograms per cubic meter ($\mu g/m^3$) or milligrams per cubic meter (mg/m^3)] or as a volume fraction [e.g., parts per million (ppm) or parts per billion (ppb) by volume].

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

Table 3-5. National Ambient Air Quality Standards

Pollutant		Averaging Time	National Standards[1,2]	
			Primary[3]	Secondary[4]
O_3		8-hour	0.075 ppm (147 µg/m^3)	Same as primary
CO		8-hour	9 ppm (10 mg/m^3)	—
		1-hour	35 ppm (40 mg/m^3)	—
NO_2		Annual	53 ppb (100 µg/m^3)	Same as primary
		1-hour	100 ppb (188 µg/m^3)	—
SO_2		1-hour	75 ppb (105 µg/m^3)	—
		3-hour	—	0.5 ppm (1,300 µg/m^3)
PM	PM_{10}	24-hour	150 µg/m^3	Same as primary
	$PM_{2.5}$	Annual	12 µg/m^3	15 µg/m^3
		24-hour	35 µg/m^3	Same as primary

Source: USEPA 2012
CO carbon monoxide
NO_2 nitrogen dioxide
O_3 ozone
PM particulate matter
$PM_{2.5}$ particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers
PM_{10} particulate matter with an aerodynamic diameter less than or equal to 10 micrometers
SO_2 sulfur dioxide
Notes:
[1] Standards other than the 24-hour PM_{10}, 24-hour $PM_{2.5}$, and those based on annual averages are not to be exceeded more than once a year.
[2] Concentrations are expressed first in units in which they were promulgated. Equivalent units given in parenthesis. Parts per million (ppm), parts per billion (ppb), micrograms per cubic meter of air [µg/m^3], or milligrams per cubic meter of air [mg/m^3].
[3] Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. Each state must attain the primary standards no later than 3 years after that state's implementation plan is approved by the USEPA.
[4] Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

Secondary pollutants, such as ozone, nitrogen dioxide, and some particulates, are formed through atmospheric chemical reactions that are influenced by meteorology, ultraviolet light, and other atmospheric processes. Particulate matter (PM) [which includes particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (PM_{10}) and less than or equal to 2.5 micrometers ($PM_{2.5}$)], is generated as primary pollutants by various mechanical processes (e.g., abrasion, erosion, mixing, or atomization) or combustion processes. However, PM_{10} and $PM_{2.5}$ can also be formed as secondary pollutants through chemical reactions or by gaseous pollutants condensing into fine aerosols. In general, emissions that are considered "precursors" to secondary pollutants in the atmosphere (such as reactive organic gases, volatile organic compounds (VOCs), and nitrogen oxides, are the pollutants for which emissions are evaluated to control the level of ozone in the ambient air. Sources of emissions evaluated in this EA include those generated during proposed infrastructure upgrades and from aircraft operations/maintenance activities.

The quality of air between ground level and 3,000 feet AGL is of most concern to human health. Below 3,000 feet AGL there is less mixing of the atmosphere, so airflow stagnates and emissions are not as easily dispersed into the upper atmosphere. Pollutants emitted above this mixing height become diluted in

the large volume of air before they are slowly transported to ground level. These emissions have little or no effect on ambient air quality and are excluded from analysis. Per USEPA guidance (USEPA 420-R-92-009, 1992), unless otherwise stipulated within a state's implementation plan, a mixing height of 3,000 feet AGL was assumed.

The methodology for estimating aircraft emissions involves evaluating the type of activity, the number of hours of operation, the type of engine, and the mode of operation for each type of aircraft. Emissions occurring above the mixing height were considered to be above the atmospheric inversion layer and would not impact the local air quality. Mobile source emissions include aircraft operations (take-offs and landings), ground support equipment, and maintenance aircraft operations performed with the engines still mounted on the aircraft (engine run-ups and trim checks). Calculations of emissions from aircraft take-offs and landings, as well as other flight operations at the base, included all based and transient aircraft. Aircraft emissions were calculated based on the following inputs:

- Flight profiles and operations totals for the installation were generated by operations personnel as part of this EA.
- Operation data (power, fuel usage, emission factors) are from Air Emissions Guide for Air Force Mobile Sources (AFCEC 2013).
- Sulfur dioxide emissions for aircraft are calculated based on maximum weight percent sulfur content of jet propellant 8 (JP-8), as identified in MIL-DTL-83133G (April 2010).
- Carbon dioxide, nitrogen dioxide, and methane emissions for aircraft are based on emission factor data from the USEPA Mandatory Greenhouse Gas Reporting Rule.
- Construction vehicle emissions factors were obtained from the USEPA's MOBILE6 model.

Greenhouse Gases (GHGs) trap heat in the atmosphere, similar to the glass walls of a greenhouse. GHG emissions occur from natural processes as well as human activities and accumulation of GHGs in the atmosphere helps regulate the earth's temperature. Scientific evidence suggests a trend of increasing global temperature over the past century may be related to an increase in GHG emissions from human activities. The climate change connected to global warming and its associated ecological changes may produce negative economic and social consequences across the globe. "Climate change" refers to any significant change in measures of climate (such as temperature, precipitation, or wind) that lasts for an extended period (decades or longer). The Intergovernmental Panel on Climate Change, in its Fourth Assessment Report, stated that warming of the Earth's climate system is unequivocal, and that most of the observed increase in globally averaged temperatures since the mid-20th Century is very likely due to the observed increase in concentrations of GHGs from human activities (IPCC 2007).

The most common GHGs emitted from natural processes and human activities include carbon dioxide, methane, and nitrous oxide. Examples of GHGs created and emitted primarily through human activities include fluorinated gases (hydrofluorocarbons and perfluorocarbons) and sulfur hexafluoride. Each GHG is assigned a global warming potential (GWP). The GWP of a gas or aerosol is a function of its atmospheric lifetime and its ability to trap heat in the atmosphere. The GWP rating system is standardized to carbon dioxide, which has a value of one. For example, methane has a GWP of 21, which means that it has a global warming effect 21 times greater than carbon dioxide on an equal-mass basis. Total GHG emissions from a source are often reported as a carbon dioxide equivalent (CO_2e). The CO_2e is calculated by multiplying the emission of each GHG by its GWP and adding the results together to produce a single, combined emission rate representing all GHGs.

On a national scale, federal agencies are addressing GHG emissions by reductions mandated in federal laws and EOs. This includes EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance,* signed in October 2009. In an effort to reduce energy consumption, reduce dependence on petroleum, and increase the use of renewable energy resources in accordance with the goals set by EO

13514 and the Energy Policy Act of 2005, the Air Force has implemented a number of renewable energy projects. The types of projects currently in operation include thermal and photovoltaic solar systems, geothermal power plants, and wind generators. The Air Force continues to promote and install new renewable energy projects.

The potential effects of proposed GHG emissions are by nature global and cumulative. Individual sources of GHG emissions are not significant enough to have an appreciable or measurable effect on climate change. At this time, a threshold of significance has not been established for the emissions of GHGs, but the CEQ has released the *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions*, which suggests that proposed actions that would reasonably emit 25,000 metric tons or more of CO_2e gases should be evaluated by quantitative and qualitative assessments. This is not a threshold of significance but rather a minimum level that would require consideration in NEPA documentation. Nonetheless, the GHG emissions from the Proposed Action/Preferred Alternative were quantified to the extent feasible for information and comparison purposes.

3.3.1 Affected Environment

The affected environment for Holloman AFB-generated emissions includes the base, the area surrounding the base where aircraft operate below 3,000 feet AGL (including the airfield itself), the airspace overlying these areas, and the areas where aircraft train. The base is located in a relatively rural area within Otero County, New Mexico, and falls within the El Paso-Las Cruces-Alamogordo Interstate Air Quality Control Region (AQCR) 153 (40 CFR Part 81.82). This AQCR includes four counties in New Mexico (Dona Ana, Lincoln, Otero, Sierra) and six counties in Texas (Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, Presidio). Air quality in Otero County has been designated as either in "attainment" or "unclassifiable/attainment" with the NAAQS for all criteria pollutants (40 CFR 81.332). Because Otero County is not located in nonattainment or maintenance areas, the general conformity requirements do not apply to the proposed project and a general conformity determination is not required.

Table 3-6 summarizes the regional emissions (stationary and mobile) of criteria pollutants and precursor emissions in Otero County, one of 10 counties in the AQCR. The data indicate that emissions generated by QF-4s do not represent a major regional contribution of emissions. In all instances, except for sulfur dioxide, QF-4 emissions contribute less than 1 percent to regional air quality. QF-4 emissions of sulfur dioxide contribute less than 10 percent to regional air quality. The table also presents GHG contribution at Holloman AFB in the form of CO_2e; however, there are no data available for these emissions at the county level.

Table 3-6. Baseline Emissions Generated by QF-4 Compared to Otero County

Location	Criteria Pollutants (tons per year)						
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2e[1]
Otero County[2]	2,583	14,633	2,473	30	29,794	3,208	-
QF-4 Baseline	4.93	23.37	8.06	1.97	1.84	1.66	3,686
Percent Regional Contribution	0.19	0.16	0.33	6.5	0.006	0.052	-

CO carbon monoxide
CO_2e carbon dioxide equivalent
NOx nitrogen oxides
$PM_{2.5}$ particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers
PM_{10} particulate matter with an aerodynamic diameter less than or equal to 10 micrometers
SO_2 sulfur dioxide
VOC volatile organic compound

[1] $CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 310)$, (40 CFR Part 98, Subpart A, Table A-1) in metric tons per year.
[2] County emissions derived from USEPA website; 2008 data are the most recently recorded by USEPA (2011).

3.3.2 Environmental Consequences

In addition to emissions from air operations, emissions from ground operations and site modifications (such as construction) must also be considered when determining impacts. Impacts would be considered significant if emissions would affect the AQCR attainment status or, in an area of nonattainment or maintenance, preclude the region from meeting its attainment goals. As was mentioned above, Otero County is in attainment for all criteria pollutants.

3.3.2.1 Proposed Action/Preferred Alternative

Under the Proposed Action/Preferred Alternative, air quality impacts would be similar to baseline conditions because there are no differences in the number or type of FSAT operations that would occur. Table 3-7 presents emissions that would be generated by construction and aircraft and ground support maintenance equipment. Appendix E contains the emissions calculations and factors applied. Please note that a conservative approach to calculating emissions was adopted; all construction was assumed to occur within FY15. Projected aircraft emissions were based on 2,400 operations and aircraft operational and maintenance emissions were combined and referred together as operational emissions. As the data indicate, there would be a temporary but minor increase in emissions generated by construction, contributing less than 0.01 percent of regional emissions. Once all QF-4s have been replaced, there would be emissions reductions in four out of the five criteria pollutants and GHGs. There would be a less than 5-ton increase in nitrogen oxides annually. However, even with this increase, nitrogen oxides operational emissions would represent only 0.22 percent of regional contributions. Emissions generated by the Proposed Action/Preferred Alternative, therefore, would not change the AQCR attainment status nor would they contribute more than 10 percent to the regional air emissions.

Table 3-7. Projected FY15 Construction and Operational Emissions at/around Holloman AFB

Location	Criteria Pollutants (tons per year)						
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2e[1]
Construction Emissions FY15							
Construction Emissions	0.10	0.53	1.60	0.02	4.07	0.49	242
Otero County[2]	2,583	14,633	2,473	30	29,794	3,208	-
Percent County Contribution	0.004	0.004	0.065	0.065	0.014	0.015	-
Operational Emissions							
QF-4 Baseline	4.93	23.37	8.06	1.97	1.84	1.66	3,686
Projected QF-16 Emissions	**2.75**	**7.44**	**12.86**	**1.10**	**1.29**	**1.16**	**2059**
Emissions Net Change	-2	-16	5	-0.87	-0.55	-0.5	-1,627
Percent County Contribution Change	-0.08	-0.11	0.19	-2.89	0.00	-0.02	-

CO carbon monoxide
CO_2e carbon dioxide equivalent
FY Fiscal Year
NOx nitrogen oxides
$PM_{2.5}$ particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers
PM_{10} particulate matter with an aerodynamic diameter less than or equal to 10 micrometers
SO_2 sulfur dioxide
VOC volatile organic compound
[1] CO_2 in metric tons per year. Nitrous oxide and methane not calculated.
[2] County emissions derived from USEPA website; 2008 data are the most recently recorded by USEPA (2011).

3.3.2.2 No Action Alternative

Under the No Action Alternative, QF-4 FSAT operations would continue and emissions generated would remain at levels consistent with those presented for the baseline in Table 3-6. Continued operation of the QF-4s would not change the AQCR attainment status or represent a major contribution to the regional air quality.

3.4 Aircraft and Public Safety

The Air Force practices Operational Risk Management as outlined in AFI 90-901, *Operational Risk Management* (2000). This AFI provides for a process to maintain readiness in peacetime and achieve success in combat while safeguarding people and resources. The safety analysis addresses issues related to the health and well-being of both military personnel and civilians living on or in the vicinity of Holloman AFB, and under airspace used by the FSATs. Specifically, this section provides information on hazards associated with aviation safety [aircraft mishaps, emergency and mishap response, Bird/Wildlife Aircraft Strike Hazard (BASH), Accident Potential Zones (APZs)], and construction safety.

Aircraft Mishaps are classified as A, B, or C (Table 3-8). Class A mishaps are the most severe with total property damage of $2 million or more, or a fatality, and/or permanent total disability.

Table 3-8. Aircraft Mishap Definitions

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

SourceDoD Instruction 6055.07 (2011)

Emergency and Mishap Response involves the procedures and equipment needed to react to mishaps on or off the base. Elements of this response include rescue, fire suppression, security, and investigation.

Bird/Wildlife Aircraft Strike Hazards constitute a safety concern because of the potential for damage to aircraft or injury to aircrews or local populations if an aircraft should crash in a populated area. Aircraft can encounter birds at nearly all altitudes up to 30,000 feet MSL. According to the Air Force Safety Center BASH statistics, more than 60 percent of bird/wildlife strikes occur below 500 feet, and 90 percent occur at less than 2,000 feet AGL (AFSC 2012a). Waterfowl present the greatest BASH potential due to their congregational flight patterns and because, when migrating, they can be encountered at altitudes up to 20,000 feet AGL. Raptors also present a substantial hazard due to their size and soaring flight patterns. In general, the threat of bird/wildlife-aircraft strikes increases during March and April and from August through November due to migratory activities. The Air Force BASH program was established to minimize the risk for collisions of birds/wildlife and aircraft and the subsequent loss of life and property. In accordance with AFI 91-202, *U.S. Air Force Mishap Prevention Program*, each flying unit in the Air Force is required to develop a BASH plan to reduce hazardous bird/wildlife activity relative to airport flight operations. The intent of each plan is to reduce BASH issues at airfields by creating an integrated hazard abatement program through awareness, avoidance, monitoring, and actively controlling bird and animal population movements. Some of the procedures outlined in the plan include monitoring the airfield for bird and other wildlife activity, issuing bird hazard warnings, initiating bird/wildlife avoidance procedures when potentially hazardous bird/wildlife activities are reported, and submitting BASH reports for all incidents.

Accident Potential Zones were first established by the Air Force's Air Installation Compatible Use Zone (AICUZ) program, a DoD discretionary program designed to promote compatible land use around military

airfields. The military services maintain an AICUZ program in an effort to protect the operational integrity of their flying mission in accordance with DoD Instruction 4165.57 (2001).

APZs define the areas in the vicinity of an airfield that would have the highest potential to be affected if an aircraft mishap were to occur. AICUZ guidelines identify three types of APZs for airfields based on aircraft mishap patterns: the Clear Zone (CZ), APZ I, and APZ II. The standard CZ 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 CZ, has a lower mishap probability; and APZ II, which typically extends 7,000 feet from the end of APZ I, has the lowest mishap probability of the three zones.

Construction Safety. Human health and safety issues associated with construction are generally found with traffic and the potential for accidents involving pedestrians and vehicles, as well as safety of personnel involving land uses within or adjacent to the construction zones. All construction and demolition activities are required to be performed in accordance with all federal regulations, including applicable U.S. Occupational Safety and Health Administration (OSHA) requirements; therefore, this facet of safety is not carried forward for more detailed analysis.

3.4.1 Affected Environment

The affected environment comprises the airfields, areas encompassed by the APZs, lands under airspace where aircraft operations are conducted and airspace in which flight operations occur. Aircraft operations include arrival, departure, and pattern activities around the airfields.

Aircraft Mishaps. The QF-4 and QF-16 FSATs are flown as both manned aircraft and unmanned targets. Comparison of accident rates is still applicable for the unmanned flights because aircraft mechanical failures comprise some of the mishap statistics. However, as an aerial target, the QF aircraft are sometimes meant to be destroyed as part of a testing and evaluation mission. These mission events are not counted as mishaps. Table 3-9 presents the number of mishaps by year, flight hours, and mishap rate of the aircraft since their introduction into the fleet. Mishap rates are calculated per 100,000 flying hours. The F-4 was retired from operational service in 1996. The lifetime Class A mishap rate for the F-4 is 4.64, and for the F-16 is 3.56 (AFSC 2013).

Table 3-9. Historic Class A Flight Mishaps for F-4 and F-16 Aircraft

Year	F-16			F-4		
	Class A Mishaps	Flight Hours	Mishap Rate	Class A Mishaps	Flight Hours	Mishap Rate
FY 71	-	-	-	23	436,269	5.27
FY 72	-	-	-	30	568,706	5.28
FY 73	-	-	-	25	519,446	4.81
FY 74	-	-	-	21	419,577	5.01
FY 75	1	161	621.12	19	425,582	4.46
FY 76	1	226	442.48	24	407,606	5.89
FY 77	0	856	0.00	23	420,527	5.47
FY 78	0	1,402	0.00	11	396,350	2.78
FY 79	2	6,527	30.64	24	393,891	6.09
FY 80	5	26,803	18.65	14	360,491	3.88
FY 81	5	56,423	8.86	25	353,214	7.08
FY 82	17	107,389	15.83	12	343,186	3.50
FY 83	11	150,728	7.30	14	349,925	4.00
FY 84	10	199,761	5.01	11	349,657	3.15

Year	F-16			F-4		
	Class A Mishaps	Flight Hours	Mishap Rate	Class A Mishaps	Flight Hours	Mishap Rate
FY 85	10	219,647	4.55	11	350,597	3.14
FY 86	11	254,491	4.32	14	324,011	4.32
FY 87	8	233,560	3.43	13	298,062	4.36
FY 88	23	338,039	6.80	12	253,486	4.73
FY 89	14	385,179	3.63	6	220,354	2.72
FY 90	13	408,078	3.19	13	152,886	8.50
FY 91	21	461,451	4.55	4	108,172	3.70
FY 92	18	445,201	4.04	0	47,356	0.00
FY 93	19	433,949	4.15	1	32,182	3.11
FY 94	16	400,474	4.00	1	24,394	4.10
FY 95	10	386,429	2.59	1	22,953	4.36
FY 96	9	374,517	2.14	1	8,956	11.17
FY 97	11	367,038	3.00	0	3,840	0.00
FY 98	14	360,245	3.89	0	4,561	0.00
FY 99	18	352,275	5.11	0	4,306	0.00
FY 00	9	343,085	2.62	0	4,214	0.00
FY 01	13	337,315	3.85	-	-	-
FY 02	7	368,707	1.90	-	-	-
FY 03	11	355,557	3.09	-	-	-
FY 04	2	343,198	0.58	-	-	-
FY 05	5	324,238	1.54	-	-	-
FY 06	9	327,979	2.74	-	-	-
FY 07	11	304,030	3.29	-	-	-
FY 08	3	285,503	1.05	-	-	-
FY 09	3	257,209	1.17	-	-	-
FY 10	3	245,029	1.22	-	-	-
FY 11	5	225,079	2.22	-	-	-
FY 12	4	207,159	1.93	-	-	-
FY 13	7	190,142	3.68	-	-	-
Total	**359**	**10,084,953**	**3.56**	**353**	**7,604,757**	**4.64**

Source: TAFB 2013
FY Fiscal Year

Two QF-4 FSATs have crashed within WHSA. Table 3-10 presents the details of those two crashes.

Table 3-10. QF-4 Crashes within White Sands National Monument

Year	Location	Within 10 miles of Runway End	Environmental Impact
2003	200 yards east of NE-30 Road	No	Between 1,000 and 1,500 gallons of jet fuel released, with a portion burned
2014	150 yards east of Dune Drive Road	Yes	Between 150 and 1,500 gallons of jet fuel released, with a portion burned

Emergency and Mishap Response. Detailed mishap response plans and procedures are maintained by the 49 WG to respond to a wide range of potential incidents. These plans assign agency responsibilities and prescribe functional activities necessary to react to major mishaps, whether on or off base. Response

would normally occur in two phases. The first phase is the initial response that considers such factors as rescue, evacuation, fire suppression, safety, ensuring security of the area, and other actions immediately necessary to prevent loss of life or further property damage. The first response element includes crash rescue, medical, security police, and crash recovery personnel. The second response element, the investigative phase, is a team composed of an array of organizations, whose participation is governed by the circumstances associated with the mishap and the actions required to be performed.

After all required investigations and related actions on the site are complete, the aircraft is removed. The base civil engineer is responsible for site cleanup and either accomplishes this in-house or contracts to an outside entity. Overall, the purpose of response planning is to:

- save lives, property, and material by timely and correct response to mishaps;
- quickly and accurately report mishaps to higher headquarters; and
- investigate the mishap to preclude the reoccurrence of the same or a similar mishap.

In the event of a mishap, the following specific response plans for Holloman AFB are initiated:

- Holloman AFB Comprehensive Emergency Management (CEMP) Plan 10-2: Identifies procedures to be followed in the event of major accidents. It outlines and describes specific actions to be accomplished during an event. It identifies specific functional area checklists required to implement response procedures. It identifies the actions that Holloman AFB's disaster response force personnel will implement when deployed to aircraft accidents, such as formulating an action plan to implement Render Safe procedures. The CEMP is complimented by other plans, including the Medical Contingency Response Plan, Mishap Response Plan, Otero County Emergency Operations Plan, and New Mexico Emergency Operations Plan.
- Holloman AFB 49th Wing Mishap Response Plan (91-204): Establishes the 49th WG's plan to initiate investigative process of a mishap in support of the Air Force's mishap prevention program. The procedures ensure compliance with AFI 91-204, *Safety Investigations and Reports*. A checklist is provided for each tasked agency to ensure that the plan is supported.

The basic procedure after any mishap is the following:

- The Wing Command Post receives notice and passes the information to Security Forces, Fire Department/Hazard Responders, Weapons Safety, and Explosive Ordnance Disposal, as necessary.
- The notified groups secure the scene, remove any explosives and specific hazards such as radioactive parts, and for QF aircraft, remove unexploded flight termination hardware.
- After all groups declare the crash site to be "safe", debris removal is conducted and the site is opened to other disciplines.
- The base Cultural Resources Manager follows the "Procedures: Section 106 Project Review and Consultation", Section 4.5.4.8 for Hazardous Waste/Material Site Assessment under the base Environmental Restoration Program , in the base Integrated Cultural Resources Management Plan (ICRMP), to check with state and agency databases and personnel for sites or surveys on record in the vicinity.
- The base Cultural Resources Manager requests whether the land owner prefers to have their staff or the base staff conduct a damage assessment survey for the presence or absence of cultural resources and the possible effects on those resources. The cultural resource survey and damage assessment is mapped and reported to the land manager and/or the base and/or SHPO as appropriate to the ownership and the findings.
- Base Environmental Restoration personnel are informed of the presence or absence of cultural resources and they assess the site by surface and core sampling for levels of contamination to

establish and plan remediation. If cultural resources are involved, the effects of sampling would be subject to SHPO consultation by either the Air Force or the land managing agency.

- Natural Resources surveys and need for consultation follows a similar path.

Nonhazardous aircraft debris removal is negotiated with the land manager of the crash site. A major consideration is balancing the further impacts of crash clean-up, sampling equipment, and associated personnel versus the owning agency's land condition requirements.

Bird/Wildlife Aircraft Strike Hazards. The Air Force BASH Team maintains a database that documents all reported bird/wildlife-aircraft strikes. Historic information since 1973 indicates that 39 Air Force aircraft have been destroyed and 33 fatalities have occurred from bird/wildlife-aircraft strikes (AFSC 2013).

A minimal BASH exists at Holloman AFB and vicinity due to low populations of resident and migratory bird species and the distribution patterns of those species. Within the Holloman AFB affected environment, a total of 82 strikes were recorded between April 1994 and July 2005, mostly sparrows and other small upland birds, two bats, two ducks and a hawk. Information on species was not collected until 2002, so most strikes were unknowns as to species (HAFB 2011c). Most strikes are not discovered until the plane is in for post-flight maintenance, when evidence of a strike with no resulting damage is discovered on the aircraft.

The base is located within a minor migration corridor in the Central Flyway. Near Lake Holloman the local waters sustain relatively low levels of breeding populations, primarily of small shorebirds, but can seasonally support large populations of migratory shorebirds and waterfowl. The primary hazards to Holloman AFB aircraft are mourning doves and horned larks, and raptors during the March through April and September through October migrations. The doves and larks are routine threats as they forage in the short vegetation in, and perch on walls and fences around, the airfield (HAFB 2011c).

Local flying procedures and flight paths keep aircraft from direct overflights of the Lake Holloman area to minimize BASH potential and other specific actions identified in the BASH plan are implemented as appropriate during periods of increased bird activity. These include raising the pattern altitude, limiting low-level training, and full-stop landings, among others.

Clear and Accident Potential Zones. The Air Force identifies three areas of accident potential to assist in land use planning: CZ, APZ I, and APZ II. These zones are not meant to serve as predictors of accidents; rather, if an aircraft mishap were to occur, a higher probability of occurrence is expected within a CZ or APZ. Zones are delineated based on historical data associated with departure, arrival, and flight tracks on and near airfield runways. Figure 3-5 illustrates these three zones for active and drone runways at Holloman AFB.

In order to assist installations and local governments in land use compatibility near airfields, the AICUZ program recommends no development in the CZ and includes general suggestions for development restrictions on density/intensity of development in APZs I and II. In general, the recommended land use restrictions are:

- Residential: no residential use in APZ I, and maximum of two single detached dwelling units per acre in APZ II;
- Commercial, services, or industrial: buildings or structure occupants limited to a density of 25 people per acre in APZ I and 50 people per acre in APZ II;
- Outside events: limited to assemblies of not more than 25 people per acre in APZ I and maximum assemblies of 50 people per acre in APZ II.

The AICUZ program also notes that it is not realistic to state that one numerical density is safe while another is not; rather, the objective is to maximize the degree of safety that can reasonably be attained within local land use considerations.

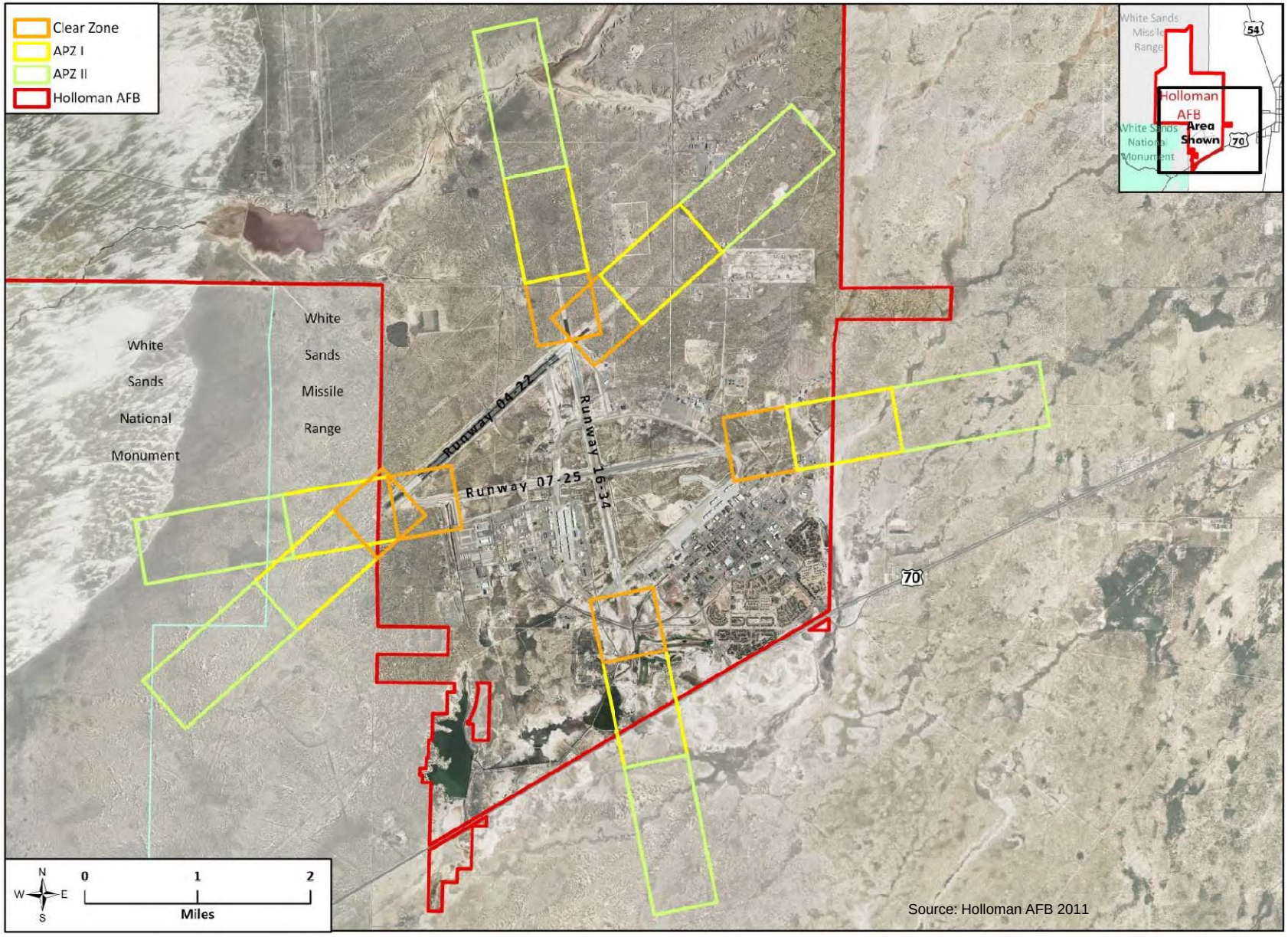


Figure 3-5. Clear Zones and Accident Potential Zones at Holloman AFB

3.4.2 Environmental Consequences

Impacts to aircraft and public safety would be considered significant if the ability to provide for safe operation of aircraft is diminished or safety hazards are introduced to risk military personnel, the public, or property.

3.4.2.1 Proposed Action/Preferred Alternative

The Proposed Action/Preferred Alternative would replace QF-4s with the newer QF-16 FSATs. The number of operations in the Holloman AFB terminal airspace would remain consistent with baseline conditions after the QF-4s are replaced by QF-16s. For F-16 aircraft, the historic mishap rate is 3.56 versus the F-4 rate of 4.64; therefore, a minor decrease in the probability of mishaps would occur with replacement of QF-4s with QF-16s. In addition, all safety regulations and procedures currently in force would continue to be applied to minimize risks to aircrews and the general population. No changes in emergency and accident response would occur if the Proposed Action/Preferred Alternative was implemented. Partial or full evacuation of the WHSA and closure of surrounding highways are existing mitigation measures to safeguard health and safety of park personnel and visitors and are commonly used during missile testing over the monument.

Current BASH procedures would continue to apply to operations within Holloman AFB terminal airspace. Although the possibility of strikes exists, they are not expected to increase because there would be no changes in the overall number of aircraft operations. It is reasonable to expect no significant impacts to bird populations resulting from aircraft strikes. Under the Proposed Action/Preferred Alternative, no increases in the number of BASH incidents are anticipated and no unacceptable hazards to military personnel, the public, or property would result.

Proposed infrastructure improvement projects related to the Proposed Action/Preferred Alternative would be consistent with established CZs and APZs. Therefore, construction activity and subsequent operations within renovated structures would not result in any greater safety risk.

3.4.2.2 No Action Alternative

Under the No Action Alternative, QF-4 FSAT operations would continue at Holloman AFB. The potential for aircraft mishaps and BASH incidents would remain unchanged from baseline conditions.

3.5 Land Use, Recreation, and Visual Resources

Land use encompasses natural land uses and land uses that reflect human modification. Natural land use classifications include wildlife areas, forests, and other open or undeveloped areas. Human land uses include residential, commercial, industrial, utilities, agricultural, recreational, and other developed uses. Management plans, policies, ordinances, and regulations determine the types of uses that are allowable, or protect specially designated or environmentally sensitive uses.

Recreation encompasses those indoor and outdoor recreational activities that take place away from the residence of the participant. Factors that influence recreational experiences include opportunities (i.e., type and number of facilities) and settings (i.e., municipal park versus wilderness area).

Visual resources are defined as the natural and manufactured features that constitute an area's aesthetic qualities. These features form the overall impression that an observer receives of an area, including its landscape character. Landforms, water surfaces, vegetation, and manufactured features are considered distinctive elements of an area's visual character if they are inherent to the function and structure of the landscape. Viewer sensitivity is a measure of the concern for the scenic values of a landscape.

3.5.1 Affected Environment

This section describes existing conditions for land use, recreation, and visual resources at Holloman AFB and in surrounding areas that could potentially be affected by the Proposed Action/Preferred Alternative.

3.5.1.1 Land Use

Land Use – Holloman AFB. The affected environment for land use includes Holloman AFB and areas exposed to aircraft noise. Holloman AFB is located in Otero County in southeast New Mexico and manages 61,179 acres (not including ranges). This is mostly Public Land Withdrawn for Military Purposes (approximately 46,000 acres), but includes 16,500 acres of fee simple acquired land and a variety of small off-base facilities, permits, and easements. There are about 52,000 acres within the base and 7,000 acres in the Boles Wells Water System Annex, which is located 6 to 16 miles southeast of the base, east of U.S. Highway 54.

The 52,000 acres of Holloman AFB are referred to as the North Area and Main Base. The North Area is 42,000 acres of mostly undeveloped open space. The High Speed Test Track facilities and explosives safety zone, a small arms range and safety zone, a munitions storage and safety zone, and an alternative energy development area are also located in the North Area. In addition, both the AF and WSMR have a scatter of small sites across the North Area, used for guidance testing, flight and missile tests, portable instrumentation, mobile communications and training exercise purposes.

The Main Base (cantonment) is a 3-mile by 4-mile area (approximately 7,700 acres) surrounding and extending south of the airfield with three centers of activity, the Main Ramp, the West Area, and the North Ramp. The airfield and its safety zones encompass 3,500 acres. Urban density administrative, commercial, community and residential land uses of the Main and West areas occupy less than 2,000 acres on the south of the airfield. The areas far west and north around the airfield contain very few mission facilities, but several important facilities are in the northeast, on or near the North Ramp.

The North Ramp is home to the 96th Test Group (TG), Army Air and Det 1 of the 82 ATRS that flies the QF aircraft. Land uses include historic hangar 1079 where Army Air maintains UH-72 helicopters, a variety of recent and temporary buildings for TG, Army Air and Det 1 administration and storage, and hangar 1080 where the QF planes are serviced. The large paved ramp where the QF aircraft are parked is between these buildings and the airfield-edge taxiway.

South of the cantonment and southwest of housing, the base golf course, intermittently wet playas, and Lake Holloman occupy 2,000 acres of open terrain in an area of modified natural playas at the end of Dillard Draw. The playa and lake area receive runoff from the cantonment and Dillard Draw, as well as about 150 million gallons of treated waste water per year. Because it supports migrant and native wildlife, the lake is open to the public for recreational activities on a limited basis within established regulations.

Surrounding Land Use. Land surrounding Holloman AFB includes Bureau of Land Management (BLM)-administered lands, WHSA, WSMR, State Trust, and private lands. A combination of BLM-owned, state-owned, and private lands within Otero County are located to the east, southeast, and south of the base. These lands are designated for open, agricultural, and transportation land uses and are used primarily for grazing. Scattered commercial and light industrial development is found along US 70 between Holloman AFB and the City of Alamogordo. On the south side of US 70 (closer to the City of Alamogordo), there is a mix of residential, commercial, and light industrial uses.

The WHSA encompasses approximately 115 square miles of dune fields to the west and southwest of Holloman AFB. The NPS administers WHSA for recreation and preservation of special resources (e.g., gypsum dunes, unique flora and fauna). Except for 3 miles of boundary in common with Holloman, WHSA is completely enclosed within WSMR. The area in the WSMR is essentially unpopulated and

supports a variety of military, test, and development activities at specific locations and in airspace over the range (HAFB 2011).

Figure 3-6 presents land ownership beneath the area of potential effect of aircraft operations at Holloman AFB. The Holloman AFB training airspace overlies parts of eight New Mexico counties (Chaves, Doña Ana, Eddy, Lincoln, Otero, Torrance, Socorro, and Sierra).

Table 3-11 provides acreage of lands at and adjacent to Holloman AFB exposed to 65 dB DNL and greater under baseline conditions.

Table 3-11. Baseline Noise Exposure at and Surrounding Holloman AFB

Location	Geographic Area (Acres) Exposed to Noise Levels (db DNL)					
	65-70	**70-75**	**75-80**	**80-85**	**>85**	**Total**
Holloman AFB	3,515.6	2,856.1	1,403.4	1,206.0	1,220.8	10,201.9
White Sands Missile Range	1,395.8	589.7	114.3	4.0	0.0	2,103.8
White Sands National Monument	686.7	19.6	0.0	0.0	0.0	706.3
Off Base	2,208.3	526.7	0.0	0.0	0.0	2,735.0
Total	**7,806.4**	**3,992.1**	**1,517.7**	**1,210.0**	**1,220.8**	**15,747.0**

AFB Air Force Base
db decibel
DNL day-night average sound level

Table 3-1 in Section 3.2.1 provides a list of noise-sensitive receptors exposed to noise contour bands 65 dB DNL and greater; they are the same Holloman AFB receptors identified in the Training EIS (USAF 2012). The DNL for on-base locations ranges from 70 to 72 dB. This list is not meant to be inclusive of all noise-sensitive receptors, but illustrates noise exposure levels which individuals underlying these noise contour bands may experience. Figure 3-2 in Section 3.2.1 presents the baseline noise contours and the locations of the receptors.

Baseline noise levels at WHSA are described in the next section under Recreation.

3.5.1.2 Recreation

Holloman AFB has several outdoor recreational areas for use by base personnel including a golf course, soccer fields, ball fields, tennis courts, football field, running track, jogging paths, two parks, family camping area, skeet/archery range, and an equestrian facility. Most facilities are compatibly located in areas affected by baseline noise levels of 75 dB DNL or less except for portions of the golf course, which are within the CZ and experience high noise levels (above 85 dB DNL) (USAF 2012).

The WHSA, administered by the NPS, is a popular destination for both in state and out-of-state visitors. The monument is a natural wonder of gypsum sand dunes distributed across 115 square miles within the monument boundaries. Park facilities include residences for NPS employees, a visitor center with educational displays and gift shop, access road, trails, boardwalks, and picnic areas. Favorite activities include sledding and sliding in the dunes, photography, scenic viewing, full moon hikes, and monthly tours to Lake Lucero. Camping, after obtaining a permit, is also allowed. Portions of the monument are governed by a co-use agreement with WSMR that allows WSMR to use the co-use area as a surface danger zone for hazardous activities. Public access is therefore restricted in these areas. The main public areas in the northeast part of the monument are near the boundary with Holloman AFB and experience noise from airfield operations. The Visitor Center and residences are 5 miles from the airfield and the main picnic area in the dunes is 8 miles from the airfield (Figure 3-7). Flight tracks for the primary runways minimize direct overflight of monument facilities to reduce noise effects.

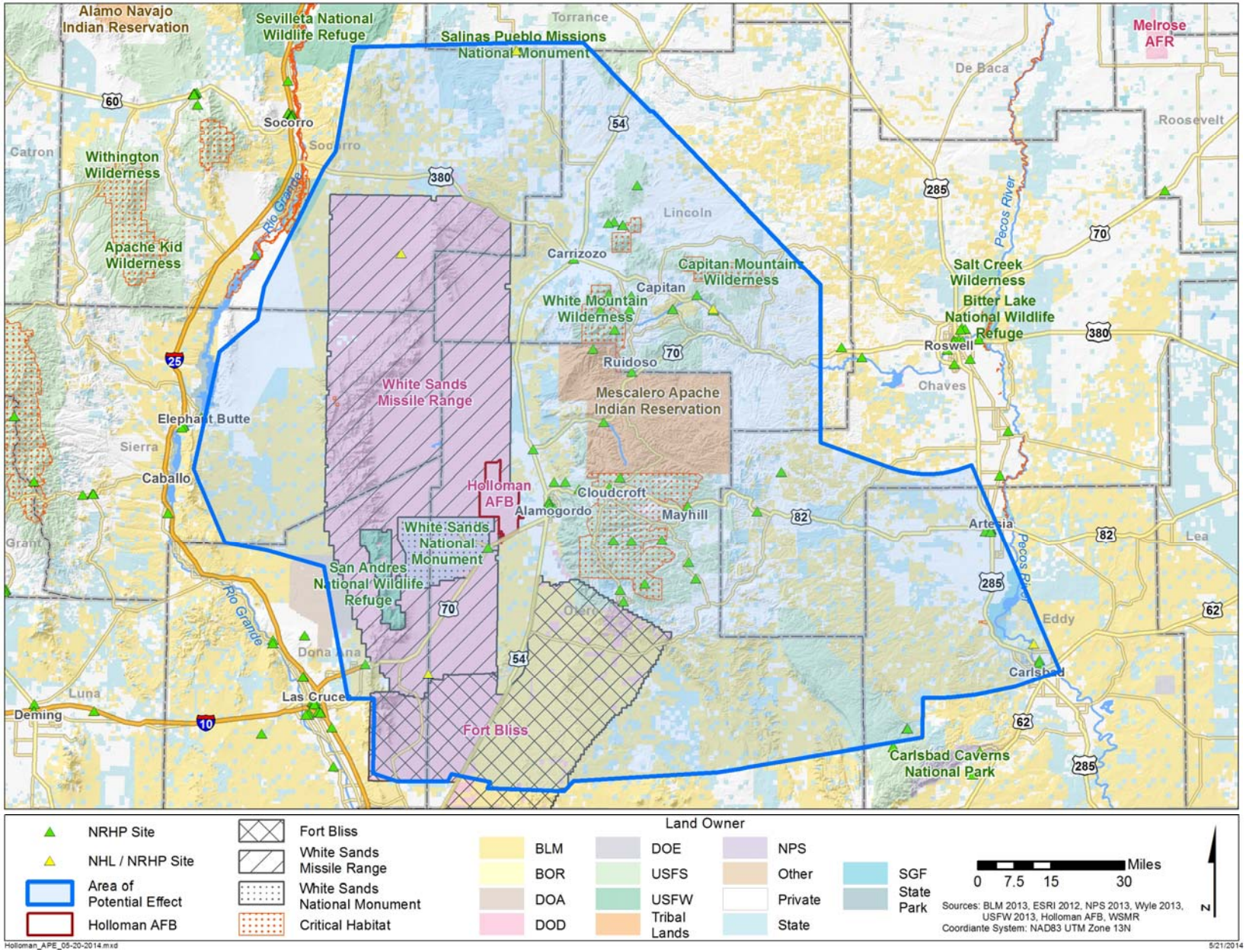


Figure 3-6. Land Ownership under Aircraft Operations at Holloman AFB

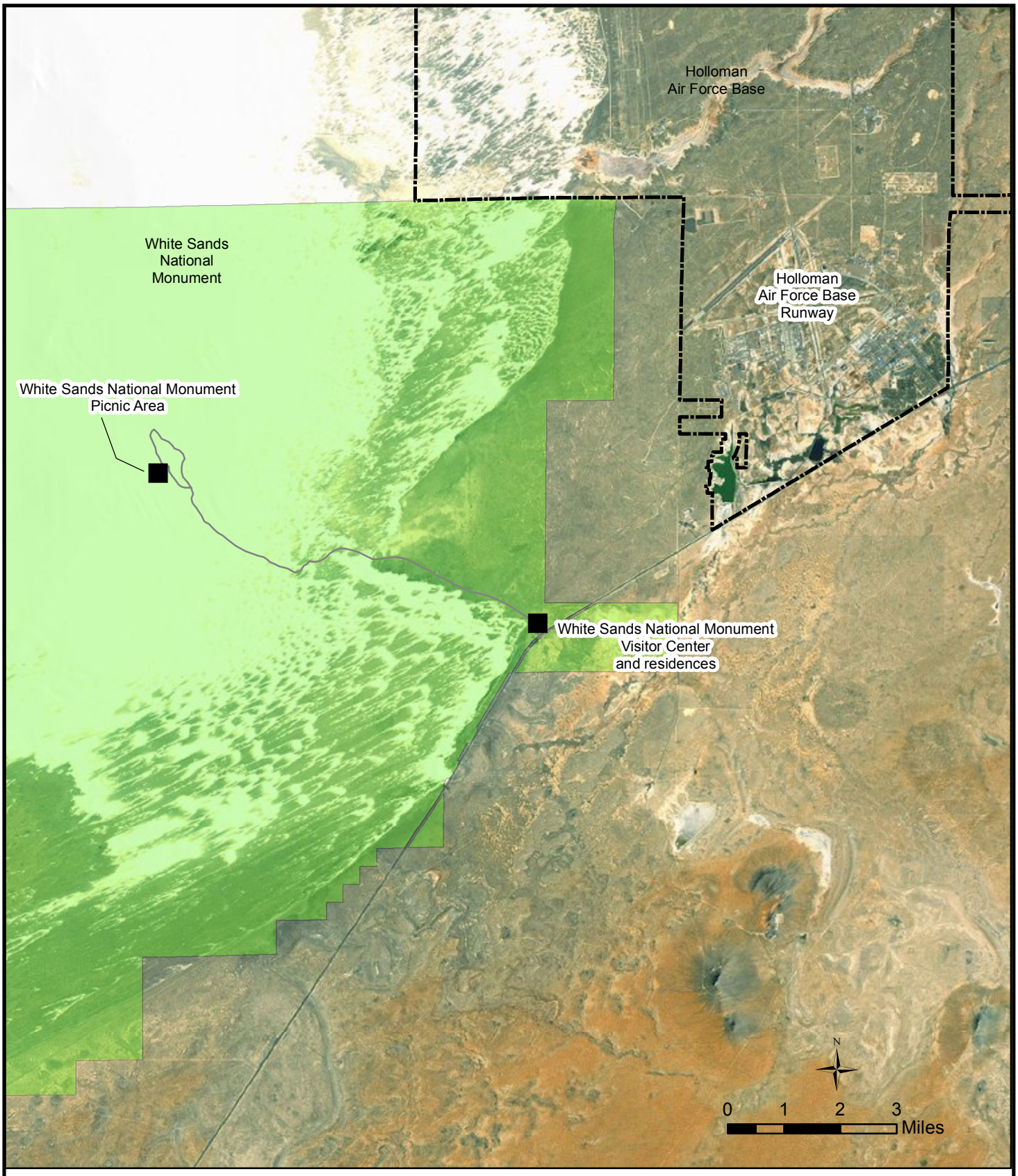


Figure 3-7. White Sands National Monument

Figure 3-8 shows representative flight tracks associated with the Holloman AFB which traverse the WHSA. None of the flight tracks in this figure are supersonic, as aircraft departures, arrival and closed patterns near the airfield are not supersonic. Other overhead break/pitch-out and closed pattern flight tracks populate an eastern portion of the WHSA.

Baseline DNL for WHSA locations ranges between 43 and 55 dB. The noise contribution from airfield operations at the Trail West location is negligible. Section 3.2 of this EA provides more details regarding the noise analysis.

3.5.1.3 Visual Resources

In general, the visual landscape can be characterized as fully developed within the cantonment. Looking away from base, the general landscape (except along US 70 East) is open rural. Lands to the west of Holloman are grasslands verging into the white dune field; to the north, east and south of the cantonment are desert scrub grasslands; there are desert playas to the south, and high mountains in the distance to the east and west.

3.5.2 Environmental Consequences

3.5.2.1 Proposed Action/Preferred Alternative

Land Use. Land use impact analysis focuses on those areas affected by aircraft noise. Land uses that are most sensitive to noise typically include residential and commercial areas, public services, and areas associated with cultural sensitivities and recreational activities.

Under the AICUZ Program, three noise zones are identified for community compatibility purposes. Noise Zone I includes areas exposed to noise levels less than 65 dB using averaged sound levels that occur during the day and night (i.e. DNL). Zone I is generally considered compatible with all types of land uses such as residential areas, schools, and churches. Zone II comprises those areas exposed to noise levels of 65 to 75 dB DNL. Exposure to noise within this area is normally compatible with activities such as commercial/retail/services, manufacturing, agriculture and highways; however, residential areas, schools, and churches are generally considered incompatible and communities are discouraged from introducing such land uses in this zone. Noise Zone III encompasses noise levels greater than 75 dB DNL. Land uses such as residential areas, hospitals, schools, and churches are incompatible and highly discouraged for development in this zone.

Impacts to land use would be significant if the Proposed Action/Preferred Alternative would:

- Be inconsistent or non-compliant with applicable land management plans or policies
- Preclude the viability of an existing land use activity
- Preclude the continued use or occupation of an area
- Be incompatible with adjacent land uses

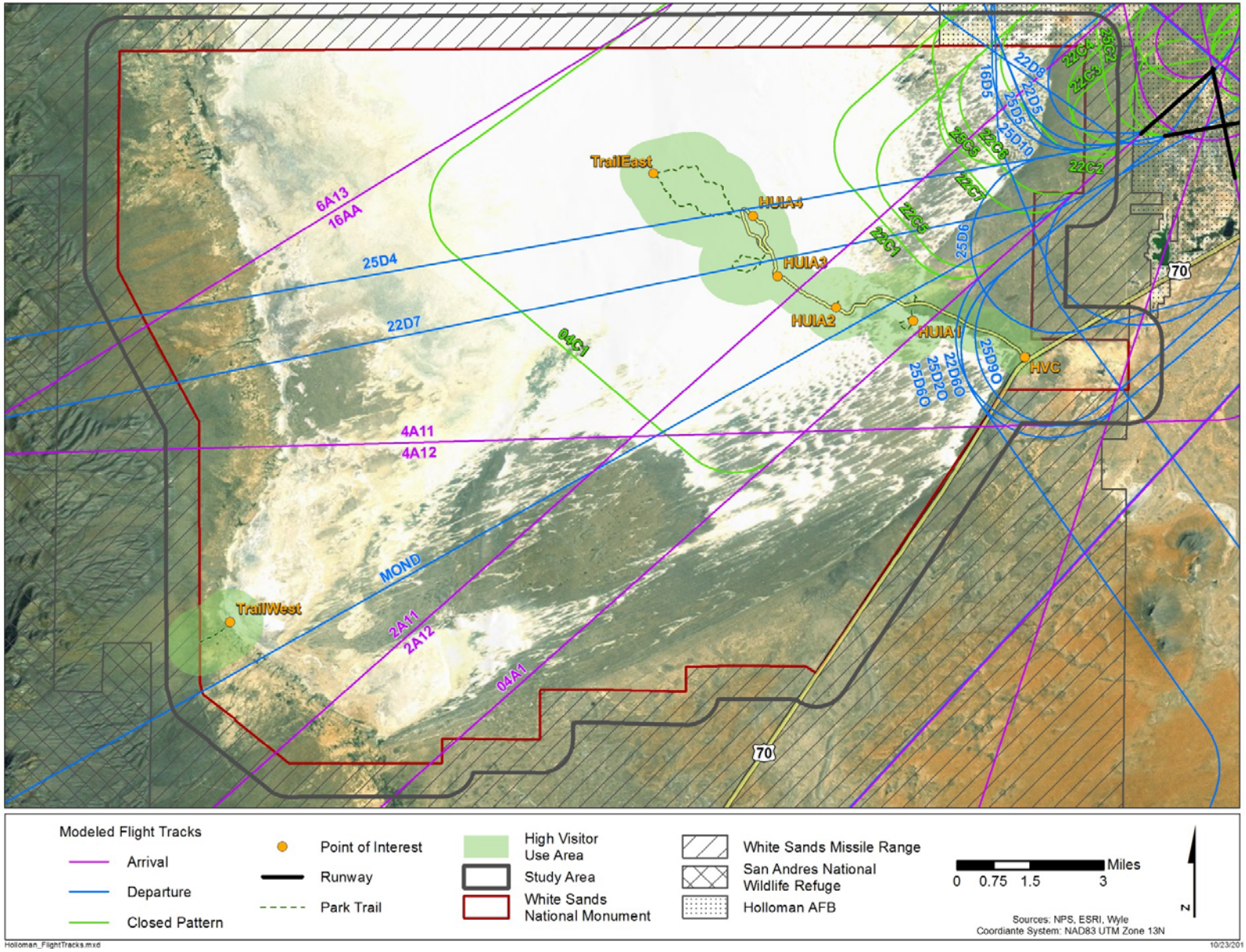


Figure 3-8. Holloman AFB Flight Tracks Traversing WHSA

Areas affected by noise levels 65 dB DNL and greater would decrease with the replacement of QF-4s with QF-16s. As presented in Table 3-12, excluding lands at Holloman AFB, there would be an overall reduction of 305 acres (7 percent) exposed to noise levels 65 to 85 dB DNL. Since off-base land uses would experience reductions in noise exposure, no changes in land uses are anticipated under the Proposed Action/Preferred Alternative. Figure 3-3 in Section 3.2.2.1 illustrates noise contours under the Proposed Action/Preferred Alternative and Figure 3-4 compares select noise contours to baseline conditions. In general, QF-16 operations are slightly quieter than the older QF-4. Thus the Proposed Action/Preferred Alternative would cause a slight reduction in the extent of the DNL contours, most noticeably to the north of the airfield and in the WHSA as shown on Figure 3-4 in Section 3.2.2.1.

Table 3-12. Proposed Action/Preferred Alternative Noise Exposure at and Surrounding Holloman AFB

Location	Geographic Area (Acres) Exposed to Noise Levels (db DNL)						Change from baseline
	65-70	70-75	75-80	80-85	>85	Total	
Holloman AFB	3,211.8	2,687.4	1,343.0	1,201.5	1,163.5	9,607.2	-594.7
White Sands Missile Range	1,355.8	542.2	103.1	2.2	0.0	2,003.3	-100.5
White Sands National Monument	577.5	5.1	0.0	0.0	0.0	582.6	-123.7
Off Base	2,183.7	470.5	0.0	0.0	0.0	2,654.2	-80.8
Total	**7,328.8**	**3,705.2**	**1,446.1**	**1,203.7**	**1,163.5**	**14,847.3**	**-899.7**

AFB Air Force Base
db decibel
DNL day-night average sound level

As shown in Table 3-2 in Section 3.2.2.1, no change in sound levels would occur at noise-sensitive receptors exposed to noise contour bands 65 dB DNL and greater and therefore, no impacts to land use are expected. Noise levels at WHSA are discussed below in the Recreation section.

The five infrastructure upgrade/improvement projects proposed under the Proposed Action/Preferred Alternative are either repair or upgrades to existing infrastructure and facilities and would not impact land use. Prior to demolition or renovation at any site, a construction laydown area and a haul route would be established. The repair/renovation would involve minimal ground disturbance and any areas that may be disturbed would be restored; thus no long-term impacts to land use would occur.

Recreation. Evaluation of recreational resources considers whether the Proposed Action/Preferred Alternative would preclude, displace, or alter the suitability of an area or facility for ongoing or planned recreational uses. Changes in noise, access, visual context, availability of recreation sites, or change in the desired qualities of an area that contribute to recreational opportunities could impact recreational resources.

Table 3-2 in Section 3.2.2.1 presents noise levels at seven locations in WHSA under the Proposed Action/Preferred Alternative and the changes in noise levels from baseline conditions. At two locations the noise levels would decrease slightly by 1 or 2 dB and at all other locations would remain the same as under baseline conditions.

Table 3-4 in Section 3.2.2.1 presents the NA and TA for 35 dB and 65 dB thresholds at WHSA under the Proposed Action/Preferred Alternative and the changes from baseline conditions. Under the Proposed Action/Preferred Alternative, NA would decrease by up to 2 events and TA would decrease by up to 4 minutes.

Noise assessment of Special Use Airspace activity was conducted using the L_{dnmr} metric. L_{dnmr} is a cumulative daily noise metric devised to account for the "surprise" effect of the sudden onset of aircraft noise events on humans and the sporadic nature of Special Use Airspace activity. The study found that

the maximum level for these types of operations would be 50 dB L_{dnmr} which would occur in R-5103 and the maximum MTR centerline level of 51 dB L_{dnmr} would occur along IR-133 as it ends in Red Rio. Six of the seven locations in WHSA that were analyzed in the study would be exposed to 42 dB L_{dnmr} and the Trail West location would be exposed to 44 dB L_{dnmr}. At any given location in the airspace noise events would be heard on an average of about once a week. The noise model does not directly provide the duration of noise events, but they are typically less than a minute or two.

The overall reduction in L_{dnmr} for the Proposed Action/Preferred Alternative compared to baseline is due to the QF-16 being as much as 10 dB lower in SEL than the QF-4 it is replacing. The total noise event time from the modeling analysis is one to two orders of magnitude less than the threshold of five percent time audible. This threshold was determined as a result of surveys conducted at WHSA for visitor reaction to aircraft noise reported in 1999 by Miller in *Mitigating the Effects of Military Aircraft Overflights on Recreational Users of Parks*. Reaction was quantified in two ways: interference and annoyance. A key result from the study is that there was no annoyance when time audible was below five percent. Subsonic noise from airspace operations would therefore continue to have no adverse effect on visitors at WHSA and thus no significant impact (Wyle 2014).

High altitude supersonic activity was assessed using CDNL contours and booms per month plots and determined they were identical for baseline conditions and the Proposed Action/Preferred Alternative (Wyle 2014). The boom environment in the center of R-5107 would remain at a CDNL equal to 47.3 dB and 0.21 booms per day. Consistent with baseline conditions, at a rate of one boom every 5 days or less, disturbance is expected to remain minimal. The cumulative sonic boom exposure would be below 62 dB CDNL (DoD policy threshold) throughout R-5107 and therefore acceptable, not causing significant impact.

In addition to the high altitude supersonic activity, there is a low altitude corridor. The overpressures are sufficiently high that personnel and non-range equipment should not be exposed. Accordingly, when there are operations that can result in low altitude booms at WHSA, they are coordinated with NPS and the monument is evacuated, per the Interagency Agreement No. F1274100002. The Visitor Center is approximately 8 miles due east of the eastern edge of the corridor and 14 miles from the corridor centerline and thus beyond the sonic boom cutoff. Therefore the Visitor Center is well outside of the area exposed to booms from the low level corridor. The total low altitude supersonic operations along the corridor would not change relative to baseline and the replacement of the QF-4 with the QF-16 would create no appreciable difference in noise levels and thus no significant impact. These operations would continue to be coordinated with NPS as is currently done.

The QF-16s would use chaff and flares in the same manner as the QF-4s and therefore no change would occur to visitor safety at WHSA. More information about the use of chaff and flares is provided in Section 2.3.2. No changes in noise, access, visual context, availability of recreation sites, or change in the desired qualities of an area that contribute to recreational opportunities would occur under the Proposed Action/Preferred Alternative; and therefore, no significant impacts to recreation would occur. An additional concern at WHSA is potential damage to the adobe walls of the Visitor Center. This potential is analyzed in the cultural resources analysis in this EA (Section 3.6.2.1).

Visual Resources. The Proposed Action/Preferred Alternative would cause minor, short-term visual impacts resulting from ground disturbance; the presence of workers, vehicles, and equipment; and the generation of dust and vehicle exhaust associated with five infrastructure upgrade/improvement projects. Figure 2-2 identifies the locations of the proposed upgrades. Once the upgrades were complete, the reclamation of disturbed areas would remove these visual impacts. Night skies are an important attribute at WHSA. Nighttime construction at Holloman AFB should be avoided to minimize light pollution at WHSA.

The QF-16s would use existing runways and operate in airspace similar to the way QF-4s currently operate. As with existing QF-4, the QF-16 would have no operations between 10 p.m. and 7 a.m. No

perceptible changes in how QF-16s fly when compared to the QF-4s would occur. The Proposed Action/Preferred Alternative would not cause long-term changes to visual resources from baseline conditions.

3.5.2.2 No Action Alternative

Under the No Action Alternative, the Air Force would not replace QF-4 FSATs with QF-16 FSATs at Holloman AFB. Land use, recreation, and visual resources would remain unchanged from those presented under baseline.

3.6 Cultural Resources

Cultural resources include archaeological resources, historic properties, and traditional cultural properties. Archaeological resources include sites from the prehistoric through the early 20th century period. These resources are protected under the Archaeological Resource Protection Act (16 USC Sections 470aa-470mm, PL 96-95 and amendments).

Historic properties include prehistoric or historic districts, sites, buildings, structures or objects that are included in or are eligible for inclusion in the National Register of Historic Places (NRHP). Section 106 of the NHPA and implementing regulations at 36 CFR Part 800 require federal agencies to consult with SHPOs on the effects of a project on historic properties. Eligible properties receive the same level of protection as properties actually listed on the National Register, until determined ineligible by the Air Force and SHPO.

Traditional cultural properties are historic properties to which an Indian Tribe attaches religious and cultural significance. Section 106 of the NHPA and implementing regulations at 36 CFR Part 800 require federal agencies to allow Indian tribes the opportunity to present their concerns about the adverse effects of a project on traditional cultural properties and to participate in the resolution of those effects.

DoD and Air Force instructions mandate all bases have an ICRMP that will be a decision document for management and protection of cultural resources on the installation. The instructions include a provision that the ICRMP be a component of the base Master Plan and be revised every 5 years. Holloman AFB updated its ICRMP in 2010 (HAFB 2010).

3.6.1 Affected Environment

The area of potential effect (APE) for cultural resources encompasses areas where ground disturbing activities would occur (for proposed infrastructure upgrade/improvement projects) and those areas underlying airspace where noise is generated by aircraft overflights. The APE is three dimensional, and includes subsurface, surface, and airspace lying above the potentially affected surface. The APE for this project encompasses the same training airspace and training ranges, at the same operational levels, analyzed in the Holloman AFB 2011 Recapitalization EA (HAFB 2011a). The APE includes the following airspaces: R5107, R5103, R5109, R7101, R5111, Ancho ATCAA, Beak MOA, and Talon MOA.

Consultation with the New Mexico SHPO, Mescalero THPO, and the Ysleta del Sur Pueblo and Zuni Tribal Council was initiated early in the environmental analysis process (Appendix B). Archeological and historic architectural resources within the APE were identified using the records of the NRHP and National Historic Landmarks, and are described below.

3.6.1.1 Holloman AFB

Approximately 57,600 acres of Holloman AFB have been surveyed for cultural resources. This represents about 96 percent of the base's total area. Most of the surveys were conducted between 1993 and 1997 (HAFB 2010). The acres that were not surveyed are entirely within the disturbed and built environment of

Holloman AFB. Through these surveys, 363 archaeological resources have been identified on the base. Of the 363 recorded sites, 250 are located on the main base.

Of the 250 archaeological resources located on the main area of Holloman AFB, 135 are associated with the activities of indigenous populations and are distributed between four recognized periods spanning almost 12,000 years. An additional 23 cultural resources attributable to the historic period are primarily associated with ranching; 49 cultural resources are related to the military presence in the Tularosa Basin; and 41 cultural resources have both an indigenous and a historic component. Two of the cultural resources are isolated thermal features with no associated artifacts and, without testing, defy categorization (HAFB 2011a). There are 35 archaeological resources on the main area of Holloman AFB that are considered eligible for the NRHP, 142 that are potentially eligible, and 73 that are considered not eligible (HAFB 2010).

Currently there are 1,474 architectural resources inventoried on Holloman AFB (HAFB 2011a). Of these, 60 are recognized as being associated with World War II (pre-1946); 1,392 are related to the Cold War Period (1946 to 1989); and 22 are pre-military Historic Era architectural resources. Of the World War II and Cold War Period resources, 29 are considered eligible for inclusion in the NRHP, 18 are potentially eligible, 50 are considered ineligible, 1,200 housing units were removed from consideration by a Program Comment by the Advisory Council on Historic Preservation (ACHP 2004), and 177 remain unevaluated. Of the eligible Cold War Period resources, 14 are considered to have the potential to form an NRHP "Missile Test Stands Historic District." Pre-military historic era architectural resources were assessed on Holloman AFB. Of the 22 European-American historic activity areas recorded, one is considered eligible for the NRHP, 18 are potentially eligible, and three are ineligible and require no further consideration (HAFB 2010).

Native American groups with historic ties to the area such as the Mescalero Apache have not identified any traditional cultural properties on Holloman AFB (HAFB 2010). The USAF coordinated with tribal governments as part of this EA process (Appendix B).

3.6.1.2 Holloman AFB Training Airspace

The Holloman AFB training airspace that falls within the APE overlies at least part of eight New Mexico counties (Chaves, Doña Ana, Eddy, Lincoln, Otero, Sierra, Socorro, and Torrance). A total of 87 NRHP-listed properties have been identified under airspace associated with Holloman AFB. Archeological sites under the airspace include native burials, village and settlement sites, historic trails, battle sites, and historic mining sites. Historical architectural resources under the MOAs, ATCAAs, and ranges include structures relating to mining, ranching, settlement, the railroad, and the military. The documented, historic trails that crisscross New Mexico span the period from the first Spanish explorers to the twentieth century. Many of these routes followed Native American travel and trading roads that long pre-dated the historic period (USAF 2012).

WHSA is located directly southwest of Holloman AFB (Figure 1-1). The WHSA Historic District, located just over 5 miles southwest of the Holloman airfield, is a complex of ten buildings including residences and the park Visitor Center. Designed by architect Lyle Bennett and built between 1936 and 1940, these buildings are listed on the NRHP. These structures were constructed in a traditional southwest Pueblo style using adobe bricks and a flat, horizontal roof supported by "large, exposed log beams or vigas" (King et al. 1988). A study of the Visitor Center identified "low-flying helicopters and low-flying, high-speed jet aircraft" as well as "road construction or heavy earth-tamping" as potential sources of damage from vibration (King et al. 1988).

In addition to the National Monument Historic District, the National Park Service has identified hearth mounds as a sensitive historic resource/property. Hundreds of hearth mounds exist throughout the parabolic dunes of the White Sands National Monument, as well as in dunes lying outside the boundaries of the National Monument. As documented in a 2012 survey, approximately 250 of these hearth mounds

have been recorded within the monument boundaries, and potentially hundreds more have been predicted to exist by analysis of high resolution aerial imagery, both within and outside the National Monument. The confirmed hearth mounds are from 2 to 40 feet tall and range in age from 1400 to 6000 years old. They contain artifacts and charcoal and plant fibers that can provide scientific information on earlier human and natural history, as well as on the natural progression/ recession of the dunes over time. (Kurota et al. 2012; disclosure of site location data is restricted per Section 304 of the National Historic Preservation Act [16 U.S.C. 470w-3]).

Though there are numerous historic properties within the APE, the properties identified in Table 3-13 were selected as the most representative based upon their location and character. These properties are listed in the NRHP, and there is sufficient publically available information to formulate findings regarding effects. Other properties in the APE that are similarly situated and with similar characteristics would experience similar effects from the Proposed Action/Preferred Alternative, so identification of every property is not necessary.

Table 3-13. Historic Properties Potentially Affected

Property Name	County	Address	Type	National Register Number
White Sands National Monument Historic District (White Sands National Monument Headquarters Area)	Otero	Off US 70/82, near Alamogordo	Historic District	88000751
Salinas Pueblo Missions National Monument (Gran Quivira)	Socorro and Torrance	Gran Quivira portion of Salinas Pueblo Missions, about 7.5 miles NW of Claunch	Structures, Archaeological Sites, Ruins, National Monument; National Historic Landmark	66000494
Wizard's Roost	Lincoln	On Mescalero Reservation near Ruidoso	Archaeological Site	82004841
St. Joseph Apache Mission Church	Otero	626 Mission Trail, Mescalero Reservation	Structure	04001588
V-2 Rocket Launch Site, also known as Launch Complex 33	Doña Ana	White Sands Missile Range, NE of Las Cruces	Structures, Site; National Historic Landmark	85003541
Trinity Site	Soccoro	S of US 380, near Bingham (within White Sands Missile Range)	Site; National Historic Landmark	66000493
Carlsbad Irrigation District (Carlsbad Reclamation Project, Irrigation System of the Pecos)	Eddy	Off Hwy 285 about 5 miles N of Carlsbad	Structures; National Historic Landmark	66000476
Lincoln Historic District	Lincoln	US 380, Lincoln	Historic District; National Historic Landmark	66000477
Fort Stanton Historic District	Lincoln	7 miles SE of Capitan, off US 380, Capitan	Historic District	73001142 99001679
NM School for the Visually Handicapped Administration, Infirmity, Central Receiving, and Auditorium and Recreation Buildings	Otero	1900 N White Sands Blvd, Alamogordo	Structures	88001567
Artesia Residential Historic District	Eddy	Bounded by W Main St, W Missouri Ave, S 2nd St & S 10th St	District	09001267
Hopeful Lode/Parsons Mine	Lincoln	Lincoln National Forest. FR 108, N of Bonito Lake	Historic Archaeological Site	95001014
Sitting Bull Falls Recreation Area Dam and picnic shelters	Eddy	Lincoln National Forest, 45 miles WSW of Carlsbad, off NM 137	Structures, Sites	93001419 93001420 93001418

Property Name	County	Address	Type	National Register Number
Prehistoric domestic multiple dwellings and agricultural fields	Lincoln	Near Lincoln	Archaeological Sites	88001507 88001509 88001510 88001511 88001512 88001513 88001514 88001516 88001515
The following historic properties are representative sites of similarly grouped sites within the Project Area, or Area of Potential Effect (APE)				
La Luz Pottery Factory	Otero	Approx 2 miles E of La Luz	Structures	79001544
US Post Office--Alamogordo (Alamogordo Federal Building)	Otero	1101 New York Ave, Alamogordo	Structure	00000510
Tularosa Original Townsite District	Otero	Junction 54/70, Tularosa	Historic District	79001545
Jackson House	Otero	1700 Ninth St, Alamogordo	Structure	03001511
Las Acequias	Otero	S part of Alamogordo	Structures/ Features	08000697
Mexican Canyon Trestle (Cloudcroft Railroad Trestle)	Otero	Off NM 83, NW of Cloudcroft	Structure	79001543
Fresnal Shelter	Otero	Near High Rolls	Archaeological Site	98000315
Wofford Lookout Complex	Otero	Lincoln National Forest, NE of Cloudcroft	Buildings/ Structures	87002484
Flying H Ranch	Chaves	Off US 70 between Hope and Elk area	Buildings/ Structures	85003633
Ring Midden Sites	Otero	Lincoln National Forest	Archaeological Site	95001479 98000278 95001319
Corona Phase Village Sites	Lincoln	Near White Oaks	Archaeological Sites	90001252 90001251 90001531 90001532 90001533 74001198 90001250
Hearth Mounds	Otero, Doña Ana	White Sands National Monument	Archaeological Sites	not applicable

3.6.2 Environmental Consequences

Properties identified in the APE are evaluated according to the NRHP criteria, in consultation with the SHPO, THPO, and other parties. Typically, if the SHPO or THPO and other parties and the Air Force agree in writing that a property is eligible or not eligible to the NRHP, that judgment is sufficient for Section 106 purposes (36 CFR 800.4[c][2]). Significant impacts to cultural resources would occur only if the Proposed Action/Preferred Alternative would adversely affect historic properties. Effects (i.e., impacts) to historic properties are defined as "alteration to the characteristics of an historic property qualifying it for inclusion in or eligibility for the National Register" (36 CFR 800.16(i)). For the purposes of this analysis, effects are discussed as either adverse or not adverse. "An adverse effect is found when an undertaking may alter, directly, or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feelings, or association" (36 CFR 800.5(a)(1)).

In accordance with DoD Instruction 4710.02 (*DoD Interactions with Federally-Recognized Tribes*), government to government consultation related to this action was initiated in June 2014 with three federally-recognized American Indian Tribes, including the Ysleta del Sur Pueblo, Zuni Tribal Council, and Mescalero Apache Tribe. These tribes were contacted for project-specific consultation during IICEP.

The USAF's findings of effect and request for concurrence were transmitted to the New Mexico SHPO. Since a portion of the APE overlies the Mescalero Reservation, findings and request for concurrence were transmitted to the Mescalero THPO. Preliminary findings indicate there will be either no effect at all or at most, a minimal/minor effect that is not adverse (see Appendix B).

3.6.2.1 Proposed Action/Preferred Alternative

QF-16 training activities would operate in the same airspace and conduct similar missions as the QF-4 FSATs, with the same number of operations. As is currently the case, the majority of QF-16 manned, and all unmanned operations, would occur in the R-5107 airspace, where very few of the archaeological, historic architectural, or traditional resources within the APE exist. Operations would continue to occur during the environmental daytime hours between 7 a.m. and 10 p.m.

Noise levels for subsonic activity related to the Proposed Action/Preferred Alternative would remain the same or decrease compared to baseline conditions in all of the airspaces within the APE outside of Holloman AFB, and all would be below L_{dnmr} 65 dB. A very small portion of the northeast corner of the WHSA falls under the 65-70 dB DNL noise contour (Figure 3-3). The WHSA Historic District (including the Visitor Center), which is listed on the NRHP, is located in an area that would experience noise levels of approximately 54 dB. The WHSA Visitor Center would experience no change in subsonic noise levels from baseline conditions, and the High Use Visitor Areas within the monument would range from no change to a 2 dB reduction compared to baseline conditions. Subsonic noise from operations would continue to have no adverse effect on visitors or structures at WHSA. Further, there would be no adverse effect related to subsonic noise levels resulting from the Proposed Action/Preferred Alternative on other archeological, traditional, or historic architectural resources in the APE.

Supersonic booms would continue to occur within the same areas of the APE at a rate of one boom every 5 days or less frequently, which is the same rate that occurs under baseline conditions. As is currently the case, a large portion of the APE would have no supersonic activity, and there would be no changes to the location and operation of areas with supersonic restrictions.

Preliminary studies indicate that the largest influence on hearth mound stability and degradation is related to exposure to natural forces through dune movement over time. The dynamic nature of the dune landscape is such that any given site may have remained buried from the time of occupation until very

recently, or remained exposed for much of that time, or it may have been buried and re-exposed numerous times.

Thus, age and general location of a given site vis-à-vis modern human activity does not appear to be determinative of condition/integrity of hearth mound sites. Experience with the dune hearths excavated on Holloman AFB indicates they survived decades of test track shock waves (sites located relatively near the track), as well as numerous F-4 and F-15 fighter overflights, before being excavated/removed.

There would be no change in the operations of supersonic activity within WHSA; therefore, there would be no additional impacts to the adobe structures or hearth mounds from the Proposed Action/Preferred Alternative. As noted above, the degradation of the hearth mound sites over time is overwhelmingly due to natural forces including weathering and the dynamics of the dune landscape (Kurota et al. 2012). Techniques exist to maintain and preserve adobe structures, as described in NPS Preservation Brief No. 5: Preservation of Historic Adobe Buildings, which could be used to minimize any impacts from supersonic activities along with any degradation/deterioration of adobe structures due to other causes (NPS 1978).

The total number of low altitude supersonic operations would not change relative to baseline, and the replacement of the QF-4 with the QF-16 would create no appreciable difference in noise levels. Further, when there are operations that could result in low altitude booms at WHSA, they would be coordinated with the NPS and the monument would be evacuated. Historically, this has occurred fewer than 10 times per year. The WHSA Visitor Center is well outside of the area exposed to supersonic booms from low altitude supersonic activity. The probability of damage to the Visitor Center due to implementation of the Proposed Action/Preferred Alternative is approximately one chance in 2 million, similar to baseline conditions; therefore, the risk to the Visitor Center is very small.

The five proposed infrastructure upgrade/improvement projects involve repair or upgrades of existing facilities in a previously built area. One of the built features in the APE is historic hangar 1079, located on Holloman AFB. The Proposed Action/Preferred Alternative would renew but not change the essential appearance of the vicinity, and would not involve any direct effect on hangar 1079. No ground-disturbing activities in previously undisturbed or unevaluated areas are part of the Proposed Action/Preferred Alternative. Therefore, there is no reason to expect that historical, archaeological, or traditional resources would be affected. In the unlikely event archeological deposits are discovered during the implementation of the Proposed Action/Preferred Alternative, work at that point of discovery will stop and the area will be secured until appropriate measures can be taken per the Holloman ICRMP.

The proposed QF-16s use of chaff and flares would occur in the same manner as the QF-4, with no anticipated changes. Flares are consumed approximately 400 feet from the release altitude, and are completely extinguished prior to reaching the ground surface. Holloman AFB restricts flare use during very high or extreme fire danger, minimizing impacts. Considering that chaff is an inert material consisting of fine segments thinner than a human hair that breaks up quickly, it is unlikely that any chaff that reaches the ground surface would have an impact on humans or animals with which it comes in contact. It is reasonably expected that flares and chaff would have no, or negligible if any, effects on historic properties.

As no changes are proposed to existing operations and no subsurface areas underlying existing approved airspace would be affected, no direct effects to off-base subsurface or surface features within the APE are anticipated. Further, adverse effects to cultural resources resulting from any operational noise, including vibration and overpressure effects, are not expected under the Proposed Action/Preferred Alternative.

3.6.2.2 No Action Alternative

Under the No Action Alternative, the Air Force would not replace QF-4 FSATs with QF-16 FSATs and none of the five planned infrastructure upgrade/improvement projects would be implemented. As a result, no adverse effects to cultural resources would occur.

3.7 Earth Resources

As indicated in Section 3.1.2, topography and geology would not be affected and are not evaluated further in the EA. Soil, however, is analyzed due to the potential for infrastructure upgrades/improvements to impact drainage, erosion, and flooding potential at Holloman AFB.

3.7.1 Affected Environment

The affected environment includes areas that would be exposed to ground-disturbing activities on the base. Holloman AFB lies within the Tularosa Basin of southern New Mexico in an area characterized by relatively flat topography and surrounding mountain ranges. Earth-moving activities associated with the development of Holloman AFB have altered much of the soil profiles to the extent that soil horizons do not completely concur with local soil surveys from adjacent off base areas.

Holloman AFB is predominantly underlain by Holloman-Gypsum Land-Yesum Complex soils that are well-drained soils found on nearly level to gently sloping uplands. These soils have relatively low permeability, shrink/swell potential, and available water capacity, and are moderately to highly vulnerable to wind and water erosion. These soils do not provide good road fill material and have limitations for construction of buildings due to lower soil strength and varying depth to bedrock. In addition, due to periodic flooding and poor drainage, soils at Holloman AFB are high in salt and gypsum concentrations (NRCS 1981).

3.7.2 Environmental Consequences

Impacts on soils can result from earth disturbance that expose soil to wind or water erosion. Analysis of impacts on soils examines the potential for such erosion at Holloman AFB and describes typical measures employed to minimize erosion.

3.7.2.1 Proposed Action/Preferred Alternative

The Proposed Action/Preferred Alternative would involve modification of facilities and airfield infrastructure to meet the operational and maintenance requirements for the proposed beddown of the QF-16 FSATs. All of the proposed renovation projects would be to existing facilities. Soils at Holloman AFB would undergo temporary, short-term impacts during demolition and repair activities at the North Ramp and Apron Access. Soils would be temporarily disturbed during the addition to the apron at the North Ramp (1.15 acres).

Removal of existing pavement, grading, and excavations would expose the moderately to highly erosive soil to potential wind and water erosion, which in turn could result in sedimentation of nine prominent east to west drainages located on Holloman AFB that receive intermittent flows during seasonal thunderstorms. Since more than 1 acre would be disturbed by construction, a NPDES storm water permit would be required. Under the permit, the base must develop a construction Storm Water Pollution Prevention Plan (SWPPP) that describes the standard construction practices to be implemented to eliminate or reduce sediment and non-storm water discharges. The SWPPP would also be completed in compliance with the Holloman AFB Master Sediment Control Plan that provides information relative to temporary and permanent sediment controls for construction activities throughout the main base to inhibit discharge of contaminated and non-contaminated sediments. This plan segments the main base into zones based on soils, vegetation, and topography as well as a buffer zone along the banks of arroyos and provides a methodology for calculating predicted soil loss from specific construction sites based on soil type and slope length.

Surface erosion is best controlled by stabilization practices such as seeding, mulching, surface roughing, and buffer strips as well as minimizing the area disturbed and the time of exposure to disturbance. In addition, erosion can be controlled by structural actions such as construction of silt fences and straw bale dams, sediment traps, compost filter berms, and stabilized entrance and exit points to construction sites.

With proper design and implementation of the SWPPP, impacts from erosion and offsite sedimentation would be negligible.

The main limitation of soils at Holloman AFB is extreme solubility resulting in dissolution cavities that are not necessarily visible on the surface and that occasionally cause collapses affecting utilities and facilities. Other limitations are localized areas of expansive soils, low soil strength, periodic sheet wash erosion, and poor drainage. These soil limitations can be resolved through standard engineering and modern construction techniques so that significant impacts would not occur.

3.7.2.2 No Action Alternative

Under the No Action Alternative, the Air Force would not replace the QF-4 FSATs with QF-16 FSATs for aircrew training. Baseline soil conditions described above would remain unchanged.

3.8 Water Resources

Water resources include surface water bodies, storm water, wetlands, floodplains, coastal zones, and groundwater. As indicated in Section 3.1.2, only storm water is evaluated in this section, because it is the only water resource that would be disturbed or otherwise impacted by the Proposed Action/Preferred Alternative. Wetlands are discussed in Section 3.9.

Storm water is precipitation that falls onto surfaces, such as roofs, streets, the ground, etc., and is not absorbed or retained by that surface but flows off, collecting volume and energy. Storm water runoff management addresses measures to reduce flow energy and pollutants in storm water and to control discharge from point and non-point sources. Non-point source pollution is pollution of surface-water and groundwater resources by diffuse sources. Point source pollution is pollution produced by a single, identifiable point source. Management of storm water associated with construction activities, including infrastructure/lineal projects, is covered under NPDES permits.

Federal Leadership in Environmental, Energy, and Economic Performance (EO 13514) requires a 2-percent annual reduction in potable, industrial, landscaping, and agricultural water intensity by FY20. In addition, the EO requires that all new construction comply with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings.* This includes employing design and construction strategies that reduce storm water runoff. Furthermore, Section 438 of the Energy Independence and Security Act of 2007 requires that any development or redevelopment project involving a federal facility with a footprint exceeding 5,000 square feet shall use site planning, design, construction, and maintenance strategies to maintain or restore the predevelopment hydrology of the property with regard to temperature, rate, volume, and duration of flow. Compliance with this requirement can be met through the implementation of low impact development technologies.

3.8.1 Affected Environment

Storm water results from rainfall or snowmelt that runs over the land surface and ultimately empties into a receiving water body. Many areas on Holloman AFB are subject to extensive ponding of rainfall runoff during storm events with most runoff directed to retention basins located in open spaces. Storm water on Holloman AFB is regulated under NPDES Permit Number NM0029971, which considers industrial activities associated with airfield operations to be covered under the industrial permit and recognizes the potential for runoff contamination, authorizes the discharge of storm water associated with specific industrial activities, and requires monitoring activities. USEPA requires development and implementation of a SWPPP for compliance with NPDES storm water permits. The base has 12 specified outfall areas for discharges from industrial activities. Automatic samplers have been placed at all outfalls to monitor industrial discharges to ensure compliance with the NPDES permit.

3.8.2 Environmental Consequences

Criteria for evaluating impacts related to water resources associated with the Proposed Action/Preferred Alternative are adherence to applicable local, state, and federal regulations and permits. Impacts to storm water are measured by the potential to violate laws or regulations adopted to protect or manage water resources. Land development changes the physical, chemical, and biological conditions of water resources. When land is developed, the hydrology (the natural cycle of water) can be altered. Impacts on hydrology can result from land clearing activities, disruption of the soil profile, loss of vegetation, introduction of pollutants, new impervious surfaces, and an increased rate or volume of runoff after major storm events. Without proper management controls, these actions can adversely impact water resources. The degree of impact considers the size of the affected area, the magnitude, and nature of change caused by the action.

Management of storm water under NPDES associated with construction activities, including infrastructure/lineal projects, is covered by New Mexico's Environment Department, Surface Water Quality Bureau (SWQB). Similar to soil resources, management of storm water requires development and implementation of a SWPPP. The permittee (i.e., construction contractor) is required to develop and implement the SWPPP to reduce or minimize any impacts to water resources and to protect waterways from sedimentation due to eroding soil conditions. A notice of intent for construction-related storm water discharge must be submitted to New Mexico's SWQB.

3.8.2.1 Proposed Action/Preferred Alternative

All infrastructure upgrades/improvements would be internal building repairs, additions on already paved areas, or replacement of airfield asphalt surfaces with concrete. All required storm water protection measures and minimization efforts would be employed by the construction contractor(s) to eliminate adverse pollutant runoff, minimize soil erosion, and protect against undue sedimentation of wetlands or surface water bodies to avoid short-term direct and indirect impacts to storm water. There would be an increase in impervious surfaces with the addition on the apron (1.15 acres); however, runoff would be handled through existing storm water outfalls to avoid long-term impacts to water quality. The existing Holloman AFB SWPPP would be updated as needed and the base would continue to adhere to its SWPPP provisions.

3.8.2.2 No Action Alternative

Under the No Action Alternative, the Air Force would not implement any of the proposed infrastructure upgrade/improvement projects; therefore conditions would continue as presented under baseline conditions.

3.9 Biological Resources

3.9.1 On Base Affected Environment

3.9.1.1 Vegetation

Holloman AFB is dominated by xerophytic shrubland and grassland communities having plant assemblages biogeographically related to the Great Basin and Chihuahuan Desert (HAFB 2011c). Within the cantonment areas on Holloman AFB, much of the original vegetation has been disturbed or removed for air traffic facilities and other base-related uses such as residential development (HAFB 2011a). Where vegetation has been replaced, ornamental plants and shade trees have been established (both native and introduced). The installation includes a golf course with introduced grasses and lawns that flank some of the residential buildings. Native vegetation in the cantonment area is composed principally of shrublands dominated by four-wing saltbush (*Atriplex canescens*), sometimes accompanied by alkali sacaton

(*Sporobolus airoides*), a large perennial grass, and grasslands dominated by alkali sacaton (HAFB 2011c).

The undeveloped portions of Holloman AFB are 45 percent upland, 33 percent dune land, 6 percent arroyo/riparian, 4 percent playa, less than 1 percent constructed/enhanced wetland, and 11 percent miscellaneous, which includes developed areas (HAFB 2011c). Uplands are often dominated by native vegetation including creosote bush (*Larrea tridentata*), interspersed with lowlands and swales supporting sacaton (*Sporobolus spp.*) and saltgrass (*Distichlis spicata*). Dune lands support two primary community types: hoary rosemary mint/sandhill muhly (*Poliomintha incana/Muhlenbergia pungens*) and hoary rosemary mint/mesa dropseed (*Poliomintha incana/Sporobolus flexuosus*) (HAFB 2011c). Nine drainages cross Holloman AFB from east to west. These are dominated by semi-riparian honey mesquite shrublands, semi-riparian alkali sacaton grasslands, salt cedar woodlands, and pickleweed shrublands (HAFB 2011c). The latter occurs especially in the more playa-like portions along some of the arroyos where the topography flattens out.

Cryptogrammic crusts, also known as biological soil crusts, are present in less disturbed areas (HAFB 2011c). Biological soil crusts are comprised of a variety of organisms including lichens, liverworts, mosses, algae, and blue green algae (Belnap et al. 2001). The crusts are beneficial since they hold the soil in place by increasing infiltration of rainfall, retention of moisture, and contributing to soil nutrient status.

Of the 32 plant species currently included on the New Mexico State Noxious Weed List, seven have been documented on Holloman AFB and seven additional species from the list are known to exist on adjacent lands and have the potential to spread onto the installation (HAFB 2011c). Other invasive plant species, which are not currently classified as noxious but are being monitored and reviewed by the state and county governments, also occur on Holloman AFB and adjacent lands. In 2006, several species listed by Otero County as invasive species were found on Holloman AFB including African rue (*Peganum harmala*), Malta star thistle (*Centaurea melitensis*), Russian knapweed (*Rhaponticum repens*), Russian-olive (*Elaeagnus angustifolia*), salt cedar (*Tamarix spp.*), Russian thistle (*Salsola iberica*), and Siberian elm (*Ulmus pumila*) (HAFB 2011c). African rue in particular is invasive and local management efforts are aimed at preventing its spread. The vegetation on disturbed soils within Holloman AFB may consist largely of introduced plants such as silverleaf nightshade (*Solanum elaeagnifolium*), Russian thistle, or African rue (HAFB 2011c).

3.9.1.2 Wildlife

Throughout the Holloman AFB vicinity, suitable wildlife habitat has often been reduced and fragmented due to urban, agricultural, and other rural development including roads and fences (HAFB 2011c). The land in the base cantonment area is characterized as "Development/Ground Disturbance" and it covers about half of the area (HAFB 2011c). In less-developed portions of the base and vicinity, pronghorn (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*) are the most widely distributed large, native game animals (Bailey 1995). African oryx or gemsbok (*Oryx gazella*), a large antelope, originally introduced as a game animal to southern New Mexico has become abundant on Holloman AFB, requiring occasional population reduction hunts on the base and the adjacent WSMR.

Grasslands of the Tularosa Basin and its drainages have been altered from their native state by agricultural practices decreasing the habitats available for small mammal communities, most notably the black-tailed prairie dogs (*Cynomys ludovicianus*), which are no longer observed on Holloman AFB (HAFB 2011c). The main base continues to seasonally support numerous small colonies of bats that forage for insects at the playas, wetlands, and riparian habitats and bats are known to use buildings on Holloman AFB as roosting sites (HAFB 2011c). Small mammal surveys conducted on Holloman AFB have recorded 14 species of the rodents. Ubiquitous species common to the area include adaptable predators such as the badger (*Taxidea taxus*) and coyote (*Canis latrans*) as well as the desert cottontail (*Sylvilagus audubonii*) and black-tail jackrabbit (*Lepus californicus*) (HAFB 2011c).

Characteristic reptiles at Holloman AFB include checkered whiptails (*Cnemidophorus tesselatus*), the prairie (or western) rattlesnake (*Crotalus viridis*), and western diamondback rattlesnake (*C. atrox*). Fish species that occur in the golf course ponds include introduced carp (*Cyprinidae*) and mosquito fish (*Gambusia affinis*) (HAFB 2011c).

At least 230 bird species are confirmed visitors to Holloman AFB, with a substantial proportion of waterbirds and songbird species using the wetlands associated with the Lake Holloman Wetlands Complex (HAFB 2011c). Typical birds occurring on Holloman AFB include great-tailed grackles (*Quiscalus mexicanus*), Gambel's quail (*Callipepla gambelii*), the western kingbird (*Tyrannus verticalis*), Cassin's kingbird (*T. vociferans*), and Say's phoebe (*Sayornis saya*) (HAFB 2011c). In addition, Swainson's hawks (*Buteo swainsoni*), red-tailed hawks (*Buteo jamaicensis*), northern harriers (*Circus cyaneus*), and Chihuahuan ravens (*Corvus cryptoleucus*) nest locally (HAFB 2011c).

Holloman AFB is located within a minor migration corridor of the Central Migratory Bird Flyway. Ducks and other waterbirds may be observed in a small pond adjacent to the golf course and nesting along a ditch with emergent wetland vegetation including bulrushes (*Scirpus spp.*) and cattails (*Typha spp.*). The most common species are northern shoveler (*A. clypeata*), ruddy duck (*Oxyura jamaicensis*), and Wilson's phalarope (*Phalaropus tricolor*) (HAFB 2011c). Around Lake Holloman, the complex of constructed wetlands (Lagoon G), drainage channels, and the impoundment in the natural Dillard Draw playa provide the majority of permanent surface water near the base. These wetlands support low populations of breeding species and a substantial number of migratory waterfowl and shorebirds during spring and fall (HAFB 2011c). Aquatic birds are observed during the winter in areas of Holloman AFB with permanent surface water including the American coots (*Fulica americana*), ruddy ducks, and American avocet (*Recurvirostra americana*) (HAFB 2011c).

Waterfowl and shorebirds attracted to the water features on the base contribute to potential bird–aircraft collision danger. Aircraft flying procedures on Holloman AFB includes the avoidance of direct overflight of water and bird gathering areas (HAFB 2011c). Although not an important cause of bird mortality, collisions between birds and airplanes do occur at Holloman AFB. The low collision rate is likely due to low populations of resident species and their distribution patterns as well as Air Force procedures to avoid areas with high risk of bird–aircraft collisions (Section 3.4.1).

3.9.1.3 Wetlands and Aquatic Communities

Although there are no perennial streams on Holloman AFB, there are at least nine prominent drainages flowing east to west that receive intermittent flows during seasonal thunderstorms (HAFB 2011c). These drainages are broad and deeply entrenched where extensive downcutting has occurred by as much as 50 feet below the basin floor. The largest of these is the Lost River drainage system that includes Malone Draw and Ritas Draw. Prior to extensive management of the surface topography and construction of US 70 and US 54 that altered the natural flow regimes, Dillard Draw emptied into the main base, creating a network of alkali flats and ephemeral playas, including what are now the Lake Holloman Wetlands Complex, Stinky Playa, and Lagoon G. Wetlands have been constructed in this area to enhance wildlife habitat and are known as the Lake Holloman Wetlands Complex.

A total of 868 acres of U.S. jurisdictional waters, including about 120 acres of wetlands and 750 acres of non-wetland waters have been identified within Holloman AFB (HAFB 2011c). Some of the wetlands consist of ponds and sections of open ditches that support cattail and bulrush. Along some ditches, the vegetation is dominated by the introduced invasive plant salt cedar, while others are lined with a mix of native and invasive vegetation that includes saltbush, silverleaf nightshade, Russian thistle, globe mallow, buffalo gourd (*Cucurbita foetidissima*), desert willow, creosote bush, and common reed (*Phragmites australis*).

3.9.1.4 Special Status Species

For purposes of this assessment, special status or sensitive biological resources are defined as those plant and animal species listed as threatened or endangered by the USFWS under the ESA and species that are listed for conservation-related reasons by the State of New Mexico. No species listed as threatened, endangered, proposed, or candidate under the ESA is known to occur on Holloman AFB (HAFB 2011c). Threatened and endangered species surveys have been conducted every 3 to 5 years on Holloman AFB and are planned to continue on this schedule. The federally-listed, proposed, and candidate species that are known to occur, or that may occur, on Holloman AFB or under airspace are presented in Table 3-14. Section 3.9.1.6 of this EA provides further discussion concerning species that could occur in the QF-16 airspace.

Table 3-14. Federally-Listed, Proposed, and Candidate Species Known to or that May Occur on Holloman AFB or under Airspace and Ranges

Main Use Airspace (Socorro, Sierra, Doña Ana, Lincoln, Otero Counties)				
Common Name	**Scientific Name**	**Federal Listing**	**State Listing**	**County**
Fish				
Gila trout	*Oncorhynchus gilae*	T	T	Sierra
Rio Grande cutthroat trout	*Oncorhynchus clarki virginalis*	C	S	Lincoln, Otero, Sierra
Rio Grande silvery minnow	*Hybognathus amarus*	E	E	Sierra, Socorro[1]
Invertebrates				
Alamosa springsnail	*Psuedotryonia alamosae*	E	E	Socorro
Chupadera springsnail	*Pyrgulopsis chupaderae*	P	E	Socorro[1]
Socorro isopod	*Thermosphaeroma thermophilum*	E	E	Socorro
Socorro springsnail	*Pyrgulopsis neomexicana*	E	E	Socorro
Amphibians				
Chiricahua leopard frog	*Rana chiricahuensis*	T	-	Sierra[1], Socorro[1]
Reptiles				
Narrow-headed garter snake	*Thamnophis rufipunctatus*	PT	T	Sierra[2]
Birds				
Least Tern (Interior Population)	*Sterna antillarum*	E	E	Socorro, Doña Ana, Otero
Mexican spotted owl	*Strix occidentalis lucida*	T	-	Lincoln[1] , Otero[1], Sierra[1], Socorro[1]
Northern aplomado falcon	*Falco femoralis septentrionalis*	Ex NS	E	Doña Ana, Lincoln, Otero, Sierra, Socorro,
Piping plover	*Charadrius melodus*	T	T	Socorro
Southwestern willow flycatcher	*Empidonax traillii extimus*	E	E	Lincoln, Sierra, Socorro[1]
Sprague's pipit	*Anthus spragueii*	C	-	Doña Ana, Otero, Sierra, Socorro
Yellow-billed cuckoo	*Coccyzus americanus*	C	-	Doña Ana, Sierra, Socorro
Mammals				
Gray Wolf (Mexican Gray Wolf)	*Canis lupus baileyi*	Ex NS	E	Sierra
Penasco (Least) chipmunk	*Tamias minimus atristriatus*	C	E	Lincoln, Otero

Main Use Airspace (Socorro, Sierra, Doña Ana, Lincoln, Otero Counties)				
Common Name	**Scientific Name**	**Federal Listing**	**State Listing**	**County**
New Mexican meadow jumping mouse	*Zapus hudsonius luteus*	PE	E	Socorro[2], Otero[2]
Plants				
Kuenzler's hedgehog cactus	*Echinocereus fendleri var. kuenzleri Escobaria (=Coryphantha)*	E	E	Lincoln, Otero
Pecos sunflower	*Helianthus paradoxus*	T	E	Socorro
Sacramento Mountains thistle	*Cirsium vinaceum*	T	E	Otero
Sacramento prickly poppy	*Argemone pleiacantha spp. pinnatisecta*	E	E	Otero
Sneed pincushion cactus	Coryphantha sneedii var. sneedii	E	E	Doña Ana
Todsen's pennyroyal	*Hedeoma todsenii*	E	E	Otero, Sierra[1]
Wright's marsh thistle	*Cirsium wrightii*	C	E	Socorro, Otero
Occasional Use Airspace (Chaves, De Baca, Eddy, Guadalupe, Lea, Roosevelt, Torrance Counties, New Mexico and Bailey, Cochran, Gains, Terry, Yoakum Counties, Texas)				
Common Name	**Scientific Name**	**Federal Listing**	**State Listing**	**County**
Fish				
Pecos bluntnose shiner	*Notropis simus pecosensis*	T	E	Chaves[1], Eddy[1], De Baca[1]
Pecos gambusia	*Gambusia nobilis*	E	E	Chaves, Eddy
Sharpnose shiner	*Notropis oxyrhynchus*	PE	-	Bailey, Cochran, Terry
Smalleyed shiner	*Notropis buccula*	PE	-	Bailey, Cochran, Terry
Invertebrates				
Koster's springsnail	*Juturnia kosteri*	E	E	Chaves[1]
Noel's amphipod	*Gammarus desperatus*	E	E	Chaves[1]
Pecos assiminea snail	*Assiminea pecos*	E	E	Chaves
Roswell springsnail	*Pyrgulopsis roswellensis*	E	E	Chaves[1]
Texas hornshell (mussel)	*Popenaias popei*	C	E	Eddy
Birds				
Least Tern (Interior Population)	*Sterna antillarum*	E	E	NM - Chaves, De Baca, Eddy TX - Bailey, Cochran, Gaines, Terry, Yoakum
Lesser prairie-chicken	*Tympanuchus pallidicinctus*	T	-	NM - Chaves, De Baca, Eddy, Guadalupe, Lea, Roosevelt, Torrance; TX - Bailey, Cochran, Gaines, Terry, Yoakum
Mexican spotted owl	*Strix occidentalis lucida*	T	-	Eddy, Torrance[1]
Northern aplomado falcon	*Falco femoralis septentrionalis*	Ex NS	E	Chaves, Eddy, Lea
Piping plover	*Charadrius melodus*	T	T	NM - Chaves, Eddy, Guadalupe TX-Bailey, Cochran, Gaines, Terry, Yoakum

Main Use Airspace (Socorro, Sierra, Doña Ana, Lincoln, Otero Counties)				
Common Name	**Scientific Name**	**Federal Listing**	**State Listing**	**County**
Sprague's pipit	*Anthus spragueii*	C	-	Chaves, DeBaca, Eddy, Guadalupe, Lea, Roosevelt
Southwestern willow flycatcher	*Empidonax traillii extimus*	E	E	Eddy, Guadalupe
Whooping Crane	*Grus americana*	Ex NS (NM); E (TX)	E	Ex NS – Roosevelt E – Bailey, Cochran, Terry, Yoakum
Plants				
Gypsum wild buckwheat	*Eriogonum gypsophilum*	T	E	Eddy[1]
Kuenzler's hedgehog cactus	*Echinocereus fendleri var. kuenzleri Escobaria (=Coryphantha)*	E	E	Chaves, Eddy
Lee's pincushion cactus	*Coryphantha sneedii var. leei*	T	E	Eddy
Pecos sunflower	*Helianthus paradoxus*	T	E	Chaves[1], Guadalupe[1]
Sneed pincushion cactus	Coryphantha sneedii var. sneedii	E	E	Eddy
Wright's marsh thistle	*Cirsium wrightii*	C	E	Chaves, Eddy, Guadalupe

E = Endangered Ex NS = experimental non-essential population T = Threatened C = Candidate P = Proposed
PE = Proposed endangered PT = Proposed threatened S = Sensitive
[1] Designated critical habitat in the county [2] Proposed critical habitat in county
Sources: USFWS 2014, BISON-M 2014, TPWD 2014

During previous coordination efforts for Holloman AFB, the NMDGF expressed concern for the White Sands pupfish (*Cyprinodon tularosa*) that the state lists as threatened. This small fish is endemic to only the Tularosa Basin of New Mexico, within which Holloman AFB occurs. The species occurs naturally in two areas on WSMR. It was also introduced to another spring within WSMR and into the Lost River on Holloman AFB in 1970. The pupfish population in Lost River on Holloman AFB is distributed between three stream segments connected by water only at times of heavy rains or heavy runoff from canyons on the western slope of the Sacramento Mountain escarpment (HAFB 2011c). A narrow ribbon of riparian vegetation in the westernmost reaches of the Lost River provides suitable habitat for one surviving population of the White Sands pupfish. Three other populations originally observed in 1987 within this reach were not found during surveys conducted in 1995 (HAFB 2011c). The White Sands pupfish is considered the most sensitive species identified within Holloman AFB (HAFB 2011c).

New Mexico ranks species of concern in the state (that are not federally-listed) as Species of Greatest Conservation Need. In addition to the White Sands pupfish, other Species of Greatest Conservation Need that occur on base lands (including the Boles Well Water System Annex) include the loggerhead shrike (*Lanius ludovicianus*), western burrowing owl, Mexican free-tailed bat (*Tadarida brasiliensis*), pallid bat (*Antrozous pallidus pallidus*), Wilson's phalarope, white-faced ibis (*Plegadus chihi*), and the snowy plover (*Charadrius alexandrius*) (HAFB 2011c). The Texas horned lizard (*Phrynosoma cornutum*) is an USFWS Species of Concern, which is apparently abundant on Holloman AFB (HAFB 2011c).

In addition, the western burrowing owl, also a USFWS Species of Concern, occurs on dry and open shortgrass prairie as well as disturbed areas near recent construction, runways, utility trenches, the High Speed Test Track and the cantonment. The species has been known to be tolerant of high levels of human activity in addition to being present in more remote areas where suitable habitat exists. Surveys have been conducted regularly and, in addition to burrows in natural settings, specially constructed burrows on Holloman AFB have been used by breeding pairs of burrowing owls (HAFB 2011c). The burrowing owl was considered a successful breeder on base by previous surveys but populations have declined, likely as

a result of extreme drought reducing the availability of prey species. Due to the population decline on base, and jeopardized populations elsewhere in the owl's range, burrowing owls continue to be a Species of Greatest Conservation Need in New Mexico.

3.9.2 Training Airspace Affected Environment

3.9.2.1 Vegetation

Vegetation cover types that occur in the region under training airspace vary from desert grasslands to scrublands to forests and subalpine areas. Table 3-15 lists the vegetation/land cover types that occur under the airspace proposed for use by QF-16s, based on F-16 training areas, as well as their acreages and percentages.

Table 3-15. Vegetation/Land Cover Types under Main Use Training Airspace and on Ranges

Vegetation/Land Cover Classification	Acres Under the Airspace	Percentage of the Total Acreage Under Airspace
Semi Desert Grassland	5,416,965	32
Plains Mesa Grassland	2,544,781	15
Chihuahuan Desert Scrub	4,706,290	27
Coniferous and Mixed Woodland	3,543,564	21
Interior Chaparral	64,566	<1
Montane Coniferous Forest	738,640	4
Subalpine Coniferous Forest	110,689	<1
Closed Basin Scrub	9,072	<1
Alpine Tundra	1,104	<1
Open Water	18,186	<1
Total	**17,153,857**	**100**

Source: HAFB 2011a

Vegetation underlying main use training airspace generally follows an elevation gradient that begins with grasslands mixed with shrubs at lower elevations, transitions to shrubland mixed with forest stands at mid-elevations, and becomes denser forest cover at higher elevations. A detailed description of each vegetation classification can be found in the Holloman AFB 2011 Recapitalization EA (HAFB 2011a).

3.9.2.2 Wildlife

This section discusses the wildlife species associated with the primary vegetation types under the training airspace as listed in Table 3-15. In general, wildlife species are associated with the specific habitats defined by the vegetation composition, but some species are generalists and may occur in more than one habitat type. Holloman AFB is set in a region of Chihuahuan Desert Scrub and Closed Basin Riparian Scrub so wildlife species discussed in Section 3.9.1.2 are also common under the airspace that occurs in these vegetation regions. Wildlife species common to the other vegetation types are described in detail in the Holloman AFB 2011 Recapitalization EA (HAFB 2011a).

3.9.2.3 White Species

Located near Holloman AFB, the gypsum dune fields of WHSA have a distinct assemblage of wildlife, many of which exhibit lighter coloration forms and are commonly referred to as "white animals." All species of lizards that inhabit White Sands exhibit blanched forms in the gypsum dunes and dark forms in the surrounding dark substrate habitats, including the common lesser earless lizard (*Holbrookia maculate*), eastern fence lizard (*Sceloporus undulatus*), the Cowles prairie lizard (*Sceloporus undulates*

cowlesi), and the little striped whiptail (*Aspidoscelis inornata*) (Rosenblum 2005). Light colored variations of many other species occur as well, including the Plains (Apache) pocket mouse (*Perognathus flavescens)*, white sand wood rat (*Neotoma micropus leucophaea*), and camel cricket (*Ammobaenetes arenicolus),* as well as other arachnids, mammals, amphibians, and reptiles. In addition to these light colored variations within species, new species have been discovered, including two moth species, *Euxoa lafontainei* and *Protogygia whitesandsensis* (Metzler et al. 2009). Since these gypsum sand dunes are a geologically young formation and acutely distinct from their surrounding environment, they provide a unique opportunity for the study of evolutionary process. The light colored populations of animals are recent adaptations to the white environment, making them striking examples of rapid convergent evolution.

3.9.2.4 Wetland and Aquatic Communities

Wetlands and aquatic habitat represent a very small, but ecologically important fraction of the habitat under the airspace. Wetlands and aquatic habitat on WSMR and McGregor Range include springs and seeps in mountainous areas and wetland marshes and creeks in the Tularosa Basin (WSMR 2009a). Other regional wetland features usually occur as ephemeral ponds, commonly known as playas that form in undrained or poorly drained basins with seasonal rainfall. Typical wetland plants in the region include cattail, bulrush, rushes, and sedges, often interspersed with willows (WSMR 2009a).

Plains cottonwood (*Populus deltoides*), peachleaf willow (*Salix amygdaloides*), and narrowleaf cottonwood (*Populus angustifolia*) are the dominant native trees in the riparian community along the larger stream systems. Riparian scrublands, composed of several willow species, and salt cedar are found along floodplains and streams throughout the region (WSMR 2009a). At higher elevations, riparian communities of streams and canyons are characterized by narrowleaf cottonwood, maple (*Acer* spp.), box elder (*Acer negundo*), alders (*Alnus* spp.), willows, blue elderberry (*Sambucus glauca*), and red osier dogwood (*Cornus sericea*).

3.9.2.5 Special Status Species

Federally-listed species that occur under training airspace at Holloman AFB are listed in Table 3-14 in Section 3.9.1.4. Potential occurrences for federally-listed, proposed, and candidate species were evaluated based on species data available for counties overlapping ranges and underlying airspace proposed for use by this project. Since counties are large and sensitive species usually have extremely specific habitat requirements, the potential for species listed in the county to occur in the project area is low in most cases.

In addition, species that occur under the project airspace have been exposed to past and ongoing military overflights and noise similar to those being proposed for this project. Since the project area is composed of currently used airspace and ranges, many investigations of potential impacts to sensitive species have been conducted. Comprehensive reviews of threatened, endangered, and other special status species and communities that may occur under the airspace associated with Holloman AFB were included in the Integrated Natural Resources Management Plan (INRMP) (HAFB 2011c). Some birds at sensitive life stages (such as during breeding season) could possibly be affected by overflights and noise disturbances from implementation of the Proposed Action/Preferred Alternative. Brief background information on those species and potential impacts from airspace usage are analyzed in the Holloman AFB 2011 Recapitalization EA (HAFB 2011a) and are applicable to the Proposed Action/Preferred Alternative in this EA.

3.9.3 Environmental Consequences

3.9.3.1 Proposed Action/Preferred Alternative

3.9.3.1.1 On Base

Five infrastructure upgrade/improvement projects are identified to adequately support this project's conversion from QF-4s to QF-16s at Holloman AFB (Table 2-4). The proposed projects are either repair or upgrades to existing infrastructure and facilities. It is anticipated that construction would occur within an approximate 6-month timeframe beginning in FY15. Prior to demolition or renovation at any site, a construction laydown area and a haul route would be established. The repair/renovation would involve minimal ground disturbance and any areas that may be disturbed would be restored to prevent any long-term soil erosion. In all cases where infrastructure upgrades/improvements disturb the existing vegetation or other ground surface, the contractor would revegetate or restore the area as directed by the base.

Vegetation and Wildlife — No direct or long-term impacts on vegetation and wildlife are anticipated since all proposed facility upgrade/improvement activities would occur in developed portions of Holloman AFB. Species on Holloman AFB are primarily common or ubiquitous to the area and would therefore, not experience an adverse population impact due to implementation of the project. To comply with the Migratory Bird Treaty Act (MBTA), DoD Bat Protection Memorandum of Understanding, and to ensure no habitation by nesting birds or sensitive bat species, unused buildings would be surveyed for these species before upgrades/improvements.

Wetlands and Aquatic Communities — No wetlands or aquatic habitats would be within the upgrade/improvement zones where they could be directly affected by project implementation. Measures to control erosion, siltation, and fugitive dust would be included as part of the project's standard construction practices to minimize the potential for construction to affect offsite aquatic and wetland habitats and biota indirectly. No adverse impacts on aquatic and wetland habitats are expected from construction associated with the Proposed Action/Preferred Alternative.

Special Status Species — There are no known federally-listed threatened, endangered, proposed, or candidate species or their suitable habitats on Holloman AFB; therefore, no adverse impacts are anticipated from implementation of the Proposed Action/Preferred Alternative. The Lost River pupfish population on Holloman AFB is distributed between three stream segments connected by water only at times of heavy rains or heavy runoff from canyons on the western slope of the Sacramento Mountain escarpment. Proposed modifications to the buildings and pavements would not affect these stream segments. In addition, the *Cooperative Agreement for Protection and Maintenance of White Sands Pupfish between U.S. Army – White Sands Missile Range, U.S. Air Force – Holloman Air Force Base, National Park Service – White Sands National Monument, U.S. Fish and Wildlife Service, and New Mexico Department of Game and Fish* (2006) provides measures to ensure protection of the species. The proposed upgrade/improvement areas on Holloman AFB are located in previously disturbed areas so no significant impacts on other sensitive species observed on base (or that may occur on base) would result (Appendix B).

3.9.3.1.2 Training Airspace

Vegetation and Wildlife — The QF-16 would use the same regional airspace that QF-4s operate in now, at the same number of operations. No modifications or enhancements to airspace are proposed. The same procedures and processes in place for coordinating and scheduling airspace for QF-4 operations would be maintained for the QF-16s. Bird species protected under the MBTA are not expected to be affected, given that there are no changes to existing military air flights proposed. Potential impacts from low-level overflight and noise, sonic booms, munitions use, and defensive countermeasures are discussed below.

Low-level Overflight and Noise — Animals living beneath airspace units would not experience a change in the number of loud overflight noise events per day. It has been shown that the sudden appearance of aircraft and onset of noise from a low-level overflight has the potential to startle wildlife (Manci et al. 1988). Both the visual appearance and noise levels of aircraft diminish rapidly with increasing altitude. Wildlife and domestic animals continually exposed to noise events such as overflights have been shown to habituate to those stimuli that prove to be of no danger (Conomy et al. 1998; Bayless et al. 2004; Krausman et al. 1998, Brown et al. 1999). While overflight events would be loud, most would occur in MOAs and restricted airspace at altitudes where the noise generated would not be expected to startle animals so negative impacts associated with startle responses would be limited. Based on the previous and ongoing exposure of wildlife to training by other aircraft in the airspace and the fact that noise levels in the airspace are not expected to increase as the QF-16s are quieter than the current QF-4s, no adverse impacts on vegetation or wildlife from overflights or noise are anticipated to be associated with the implementation of the Proposed Action/Preferred Alternative.

Sonic Booms — Animals living beneath airspace units would not experience a change in the number of sonic boom events. The sound of a sonic boom can be like thunder, a sharp double clap if the aircraft is directly overhead, or a distant rumble if the aircraft is at a distance. The intensity of the boom (overpressure) at the Earth's surface decreases with an increase in the altitude at which the plane goes supersonic. All supersonic flight would occur at altitudes and within airspace already authorized for such activities. Overall, studies of wildlife and domestic animals have demonstrated that behavioral responses are of short duration and rarely result in injury or negative population impacts (Weisenberger et al. 1996; Krausman et al. 1998) and habituation to more frequent sonic booms may occur (Workman et al. 1992; Ellis et al. 1991). Similar habituation to thunderclaps and rumble associated with seasonally frequent thunderstorms within the region would be expected to minimize response of birds, mammals, and domestic animals to sonic booms. Sonic booms and seasonally frequent thunderclaps currently exist in the project airspace. Most training flights occur above 5,000 feet AGL with distance attenuating the noise to levels generally causing minimal response to sonic booms by livestock and wildlife.

Munitions Use and Defensive Countermeasures — Ground-disturbing operations that accompany QF-16 training and that have the potential to disturb vegetation and wildlife include deployment of chaff and flares as training to counter heat-seeking missiles. The replacement of QF-4s with QF-16s would not change training exercises, so the release of chaff and flares would continue at the same rate as prior years. If a flare were to reach the ground while still burning, it could ignite dry vegetation and start a wildland fire. In fire-prone areas, flare use during periods of very high or extreme fire danger is restricted to minimize the potential for a burning flare to reach the ground. Generally, the duration of a flare burn is a few seconds and the flare burns out within a few hundred feet of its release altitude. By restricting use of flares to airspace over military training areas and to more favorable vegetation conditions, the potential for flares to ignite and/or spread a wildland fire is reduced. Periodic wildland fire is a regular occurrence in desert grassland ecosystems and the vegetation and wildlife species are well adapted to natural fire cycles, having mechanisms to escape and survive fire and to regenerate after fire. Since measures to avoid the potential for wildland fire from flare use are in place, it is unlikely that flare use during QF-16 training would appreciably increase the incidence of rangeland fires and, therefore, impacts on vegetation and wildlife would be less than significant.

Due to the low rate of application and the wide dispersal of training chaff fibers and flare residues during defensive training, wildlife and domestic animals would have little opportunity to be exposed to these residual materials. Although some chemical components of chaff are toxic at high levels, such levels could only be reached through the ingestion of many chaff bundles or billions of chaff fibers, which seems highly unlikely to occur (Marr and Velasco 2005). Although chaff particles can degrade to small pieces, they are still too large for inhalation and the number of degraded or fragmented particles in any one place is insufficient to result in adverse health effects. Chaff is similar in form and softness to a strand

of very fine human hair and is unlikely to cause negative reactions if animals were to be exposed to it inadvertently.

White Species — The potential for adverse impact to the white animals found in the gypsum sand dunes is the same as discussed above for wildlife in general. The Proposed Action/Preferred Alternative would not affect these populations because the proposed infrastructure upgrade/improvement activities are within the base cantonment area and not near the white sands dune fields, and the training missions involving the new QF-16s would be the same as the current mission of the QF-4s they would replace and to which the white animals are adapted. The potential exposure to sonic booms would be unchanged and the noise levels from training overflights would be slightly less since the QF-16 makes slightly less noise than the QF-4. The use of defensive countermeasures would be unchanged, and measures are in place to avoid the potential for wildfires.

Wetlands and Aquatic Communities — The use of defensive countermeasures could occur in airspace over areas that contain wetlands or aquatic communities. Under the Proposed Action/Preferred Alternative, QF-16s would train with defensive chaff and flares in areas where their use is currently approved and in the same manner as QF-4s are currently training. Extensive research has been conducted on the potential for countermeasures to affect the environment and chaff fibers could accumulate on the ground or in water bodies. In water, only under very high or low pH could the aluminum present in chaff become soluble and toxic. These conditions are rare and few organisms would be present in water bodies with such extreme pH levels. Given the small amount of diffuse or aggregate chaff material that could possibly reach water bodies, it is not expected that the water chemistry would be affected. Similarly, the magnesium in flares can be toxic at extremely high levels, a situation that could occur only under repeated and concentrated use in localized areas, which would not occur because of the widely dispersed nature of flare deployment. In addition, there would be a very low probability that an unburned flare or material from a flare would reach an aquatic or wetland environment. The conclusions of research studies indicate that no adverse impacts on wetlands and water bodies have been observed from the use of chaff and flares (Wilson et al. 2002).

Special Status Species — The potential for adverse impacts to endangered, threatened, or special status plants and wildlife from QF-16 training in the airspace is minimal. Since an adverse impact to a single individual of a federally-listed, endangered, or threatened species or its critical habitat is significant under ESA, a more detailed consideration of impacts is required for these species. Table 3-16 summarizes the projected impacts from QF-16 training activities in airspace overlying habitat that may be occupied by avian ESA-listed, proposed, or candidate species compared to existing conditions. These species are more likely to be affected than other taxa as they share the airspace with the training missions. All QF-16 flight activities would occur in existing airspace so no airspace modifications would be required. The Proposed Action/Preferred Alternative does not include any changes to current training activities so factors that affect ground level noise exposure, such as altitude and speed of the aircraft, would not change. Hence, the occurrence of supersonic noise levels would be unchanged, and, since the QF-16 generates slightly less noise than the QF-4, ground level noise exposure would be slightly less.

Table 3-16. Potential Impacts to Federally-listed, Proposed, and Candidate Species Known to or that May Occur under Proposed Project Airspace

Species	Potential Presence under Project Airspace	Potential Adverse Impacts
Least Tern (Interior Population)	Sparse presence near perennial waters with sandbars under airspace and MTRs. Nesting colony within 15 miles of Roswell International Air Center.	Introduction of the QF-16 aircraft would represent a minimal departure from existing conditions to species under the airspace. QF-16 overflight would not be expected to adversely affect the interior least tern or its habitat under the airspace. The potential for 'take' in the form of disturbance (i.e., harassment) from low-flying aircraft is extremely low due to the localized nature and seasonality of the tern populations. The potential for a bird-aircraft strike involving this small low-flying species is so low as to be discountable. Terns nesting at Bitter Lakes NWR, about 15 miles northeast of Roswell International Air Center, or Least Terns who take up residence at Lake Holloman, would be near the flight path of QF-16 aircraft on approach to the airport; however, individuals present would have had a history of exposure to and habituation to aircraft overflight. An individual that responded to overflight would most likely briefly assume an alert posture and then quickly resume normal activities because of the previous and ongoing exposure of this species to training aircraft. No significant adverse impacts on the interior least tern from overflights or noise are anticipated.
Lesser Prairie-Chicken	Present in counties under eastern MOAs.	Similar to impacts as on other birds; introduction of the QF-16 aircraft would represent a minimal departure from existing conditions and slight changes in the noise environment would not be expected to adversely affect the lesser prairie chicken or its habitat under the airspace. This bird is a low-flying species and the potential for a bird-aircraft strike is so low as to be discountable.
Yellow-Billed Cuckoo (Western U.S. Distinct Population Segment)	Breeds in select dense riparian habitats that are very localized and scattered under the airspace and MTRs.	Introduction of the QF-16 aircraft would represent a minimal departure from existing conditions and slight changes in the noise environment would not be expected to adversely affect the yellow-billed cuckoo. Its preferred habitat of thick, riparian canopy cover would be expected to minimize or eliminate any visual appearance of an overflying aircraft. The potential for a bird-aircraft strike is so low as to be discountable.
Mexican Spotted Owl	Limited, specific habitat located in Montane forests and canyons under airspace and MTRs.	The potential for overflight impacts on the owl have been studied in some detail. It has been noted that owl responses to F-16 overflights were often less than responses to naturally occurring events such as thunderstorms. The WSMR Biological Assessment (WSMR 2009b) determined that training, including aircraft overflights, may affect, but is not likely to affect, the owl or its critical habitat adversely. Past studies including Delaney et al. 1997; and Johnson and Reynolds 2002 showed that noise associated with aircraft overflights has minimal impact on the owl. With overflight elevation and seasonal restrictions in place for Holloman AFB, and the change to QF-16 aircraft causing a slight reduction in existing noise, no adverse impacts are expected to Mexican spotted owls under the project airspace. The chance of accidental aircraft strike is so low as to be discountable.

Species	Potential Presence under Project Airspace	Potential Adverse Impacts
Northern Aplomado Falcon	Sparse recovery populations occur under airspace and MTRs.	This species was reintroduced to limited, remote grassland habitats in southern New Mexico, Arizona, and Texas and has ESA Endangered (E)/Non-Essential (N-) status with USFWS. Any occurrences near airfields where low-level flight would be most frequent would be extremely rare and incidental so the potential for a bird-aircraft strike is so low as to be discountable. The Proposed Action would not jeopardize the continued existence of the Northern Aplomado falcon.
Piping plover	Rarely recorded beside limited perennial water habitats under airspace and MTRs.	Similar to impacts on other birds, changing from QF-4 to QF-16 aircraft would represent a minimal departure from existing conditions, with QF-16s having a slightly lower noise level. This would not be expected to adversely affect the piping plover or its habitat that may occur under the airspace. This bird is a small, low-flying species and the potential for a bird-aircraft strike is so low as to be discountable.
Whooping Crane	No confirmed sightings; unconfirmed sighting in Bailey County, TX in 2006. The spring and fall migration route of the Texas winter population is through central Texas and the eastern panhandle.	After an attempt to establish a Rocky Mountain population in the 1970s failed, the ESA status of this species in New Mexico was changed to Experimental, Non-essential Population. In Texas, the ESA status of this species is Endangered for four of the five counties under Holloman AFB training airspace. The airspace over the Texas counties is classified as "occasional use airspace" for which Holloman does not have baseline or projected operations (HAFB 2011a). Considering the minimal use of this airspace, and the extremely rare and unconfirmed presence of this species in these counties, the potential for a bird-aircraft strike is so low as to be discountable. The Proposed Action would not jeopardize the continued existence of the whooping crane.
Southwestern Willow Flycatcher	Breeds in very localized, small, dense riparian habitats under airspace and MTRs.	Similar to impacts on other birds, changing from QF-4 to QF-16 aircraft would represent a minimal departure from existing conditions, with QF-16s having a slightly lower noise level. This would not be expected to adversely affect the flycatcher. Its preferred habitat of thick, riparian canopy cover would be expected to minimize or eliminate any visual appearance of an overflying aircraft. The potential for a bird-aircraft strike is so low as to be discountable.
Sprague's pipit	Prefers grasslands during fall and winter in counties under the airspace.	Introduction of the QF-16 aircraft would represent a minimal departure from existing conditions and slight changes in the noise environment would not be expected to adversely affect the Sprague's pipit. The species only occurs sporadically in southern New Mexico, therefore, the potential for a bird-aircraft strike is so low as to be discountable.

Note: See Table 3-14 for species status in counties over which QF-16 training may occur.

ESA Endangered Species Act
MOA military operations area
MTR Military Training Routes
NWR National Wildlife Refuge
USFWS U.S. Fish and Wildlife Service
WSMR White Sands Missile Range

With the lack of changes to aircraft exposure in the training areas other than the reduced sound generated by the QF-16 versus the QF-4, startle responses from some special status species would be unchanged or slightly lower, and individual animals that are habituated to current conditions would not be affected. Changes in the noise environment from the replacement QF-16 aircraft would range from none to minor decreases (Section 3.2).

Eight known Todsen's pennyroyal populations lie beneath Yonder Impact Area (5107-B at WSMR), portions of which are already used for live-fire air-to-air activities. The use of Yonder Impact Area by the Air Force was assessed previously in a biological assessment which determined that developing new test and training capabilities at the installation would have no adverse effect on Todsen's pennyroyal or critical habitat. Similar overflights and training activities (e.g. use of flares and chaff) as previously analyzed would occur under the Proposed Action/Preferred Alternative; therefore no impacts to the Todsen's pennyroyal are expected. The likelihood of a munition affecting the endangered Todsen's pennyroyal (plant) in the Yonder Range is so low as to be discountable given the distance between the target areas within the range and the locations at which the pennyroyals and their habitat are known to occur. More detailed analyses and USFWS concurrence on no adverse impacts from aircraft training to Todsen's pennyroyal or its critical habitat are included in recent biological assessments (WSMR 2009b). In addition to the Todsen's pennyroyal, five other species have critical habitat designated in counties within which the Proposed Action/Preferred Alternative would occur. Critical habitat for the Mexican spotted owl occurs in Otero County where ground disturbing activities would occur; however, this designation lies east of the base in the Lincoln National Forest. Other critical habitat for the owl lies west of Holloman airspace but does occur under the restricted airspace where the QF aircraft operate. Critical habitat for the Rio Grande silvery minnow (the Rio Grande River), Southwestern willow flycatcher (*Empidonax traillii extimus*; riparian areas along the Rio Grande), and the Chiricahua leopard frog (streams) does not occur under the airspace where the QF aircraft operate. Habitat for the Chupadera springsnail (*Pyrgulopsis chupaderae*) is localized and found only in Willow Spring where no ground disturbance would occur. Therefore, the Air Force anticipates that none of these species or their critical habitat would be affected by the Proposed Action/Preferred Alternative.

It is possible for federally-listed and other sensitive wildlife species to exhibit a temporary response (such as assuming an alert posture) to a low-level overflight or sonic boom. It is very unlikely that such a response would adversely affect the survival or fecundity of the affected individual or population or approach the level of "take" as defined in the ESA. Considering the nature of the proposed uses of the project airspace, no adverse impacts are anticipated for the sensitive mammals, reptiles, amphibians, fish, invertebrates, or plant species listed in Table 3-14 or their associated habitats that may occur in the project area (Appendix B).

3.9.3.2 No Action Alternative

Under the No Action Alternative, QF-4 FSATs would not be replaced with QF-16 FSATs; QF-4s would continue operating as described under baseline conditions and no additional potential impacts to biological resources would occur.

3.10 Hazardous Materials and Wastes

This section assesses the potential for hazardous materials to be introduced or hazardous wastes generated at Holloman AFB during the course of infrastructure upgrade/improvement projects; and for encounters with contaminated media during the course of these activities. This section also presents impacts related to the continuing use of hazardous materials and generation of hazardous wastes during QF-16 FSAT operations and maintenance.

Hazardous materials are chemical substances that pose a substantial hazard to human health or the environment. Hazardous materials include hazardous substances, hazardous chemicals, and toxic chemicals. In general, these materials pose hazards because of their quantity, concentration, or physical, chemical, or infectious characteristics. Resource Conservation and Recovery Act (RCRA) defines a hazardous waste as a solid waste, or combination of solid waste, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may: 1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible,

illness; or 2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

With regard to environmental impacts, hazardous substances are regulated under several federal programs administered by the USEPA, including the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Emergency Planning and Community Right-to-Know Act, Toxic Substances Control Act (TSCA), and RCRA. DoD installations are required to comply with these laws along with other applicable federal, state, and DoD regulations, as well as with relevant EOs.

Hazardous materials are defined in AFI 32-7086, *Hazardous Materials Management*, to include any substance with special characteristics that could harm people, plants, or animals. Waste may be classified as hazardous due to its toxicity, reactivity, ignitability, or corrosivity. In addition, certain types of waste are listed or identified as hazardous in 40 CFR Part 263. The Environmental Restoration Program (ERP) and Installation Restoration Program (IRP) are DoD programs used to identify, characterize, and remediate contamination from past activities at DoD installations.

3.10.1 Affected Environment

Most of the hazardous materials used at Holloman AFB are controlled by the hazardous materials pharmacy established at the base in 1993 (HAFB 2008). This pharmacy tracks products used at Holloman AFB and ensures that they are utilized prior to the expiration of their shelf life. It also operates a Just-In-Time ordering system to reduce the amount of hazardous materials stored onsite. Most hazardous materials used by Holloman AFB are controlled through the Air Force Pollution Prevention Program Plan, which provides centralized management of the procurement, handling, storage, issuance, turn-in, recovery, reuse, or recycling of hazardous materials. Development of this plan includes review and approval by Air Force personnel to ensure that users are aware of exposure and safety risks. Base management plans further serve to ensure compliance with applicable federal, state, and local regulations (USAF 2012). Aircraft flight operations and maintenance, as well as installation maintenance, require the storage and use of many types of hazardous materials such as flammable and combustible liquids. These materials include acids, corrosives, caustics, glycols, compressed gases, aerosols, batteries, hydraulic fluids, solvents, paints, pesticides, herbicides, lubricants, fire retardants, photographic chemicals, alcohols, and sealants.

Holloman AFB is a large-quantity generator (LQG) of hazardous waste, generating more than 2,200 pounds of non-acute hazardous waste per month. Hazardous wastes are generated from a variety of functions including aircraft and vehicle operations and maintenance, medical and dental facilities, cleaning and degreasing operations, and various maintenance and paint operations. These wastes include solvents, paints, paint-related materials, absorbent materials, rags and debris, blast materials, and materials with an expired shelf life. Holloman AFB recycles all lubricating fluids, batteries, and shop rags and hazardous wastes are managed in accordance with the Holloman AFB Hazardous Waste Management Plan (HWMP) (HAFB 2013).

Initial Accumulation Point (IAP) managers are responsible for properly segregating, storing, characterizing, labeling, marking, packaging, and transferring all hazardous wastes for disposal from the IAP to the established 90-day storage area according to federal, state, local, and Air Force regulations. The Hazardous Waste Program Manager is responsible for characterizing and profiling each waste stream. Approximately 35 hazardous waste IAPs are located at Holloman AFB, which are located at or near the point of waste generation (HAFB 2013).

Up to 30,000 pounds of hazardous wastes were disposed of in FY12. Holloman AFB has one less-than-90-day site (Building 149) that allows the base to store hazardous waste for up to 90 days before transfer to the Defense Logistics Agency Disposition Services. The 90-day site is currently operated by a contractor with the base retaining quality control of the site. Hazardous waste that is generated on the base and not stored in an IAP must be characterized, profiled, and moved to the 90-day site the same day it is

rendered as waste. Wastes generated on base are managed under regulations set forth in the Holloman AFB RCRA Part B permit. Holloman AFB also holds a RCRA permit for handling the disposal and treatment of waste munitions (USAF 2012).

Existing storage tanks and capacity for JP-8 are currently operated under a Spill Prevention, Control, and Countermeasures Plan (SPCCP) in place for the base. Hazardous materials and wastes used and generated at Holloman AFB are currently managed under existing management procedures and standard construction practices, which are sufficient to prevent any significant impact on the environment at the base or on the general public (USAF 2012).

Environmental Restoration Program. DoD developed the ERP to identify, investigate, and remediate potentially hazardous material disposal sites that existed on DoD property prior to 1984. A total of 52 active ERP sites and 13 Military Munitions Response Program (MMRP) sites are in the process of restoration at Holloman AFB as of November 1, 2013. Those ERP sites comprise 59 regulated corrective action areas including 25 Solid Waste Management Units (SWMUs) and 34 Areas of Concern (AOCs). Of these, 13 SWMUs and 2 MMRP sites are in the process of being approved for Corrective Action Complete status pending regulatory approval (Lawton 2013). The Holloman AFB Environmental Restoration Program Management Action Plan (HAFB 2005) identifies the status of the sites including SWMUs and AOCs, and presents a comprehensive strategy for implementing actions to protect human health and the environment. This strategy integrates activities under the ERP and the associated environmental compliance programs that support full restoration of the base. Air Combat Command policy requires that any proposed project on or near a Holloman AFB ERP site be coordinated through the Holloman AFB ERP Manager and construction waivers be obtained from Air Combat Command.

Toxic Substances. ACMs are those materials that contain greater than 1 percent asbestos. Friable, finely divided, and powdered wastes containing greater than 1 percent asbestos are subject to regulation. A friable waste is one that can be reduced to a powder or dust under hand pressure when dry. Non-friable ACMs, such as floor tiles, are considered nonhazardous, except during removal and/or renovation, so they are not subject to regulation. An asbestos management plan provides guidance for the identification of ACMs and the management of asbestos wastes. An asbestos facility register is maintained by 49th Civil Engineering Squadron (49 CES). The design of building alteration projects and requests for self-help projects are reviewed to determine if ACMs are present in the proposed work area. ACM wastes are removed by a contractor and disposed of in accordance with federal and state regulations. Proposed infrastructure upgrade/improvement projects at the Hangar 1080 and Building 1073 have the potential to contain ACM.

Lead-based paint (LBP) is defined as surface paint that contains lead in excess of 1 milligram per square centimeter as measured by X-ray fluorescence or 0.5 percent lead by weight. Several structures that are proposed for infrastructure upgrades/improvements have the potential to contain LBP on building surfaces, including Hangar 1080 and Building 1073.

3.10.2 Environmental Consequences

3.10.2.1 Proposed Action/Preferred Alternative

There would be no substantive changes to the quantities of hazardous materials and petroleum substances used at the installation, therefore, the status of Holloman AFB as a LQG pursuant to RCRA would not change. Any additional hazardous waste generation or handling areas that are established due to the conversion of QF-16 FSAT aircraft would be managed in accordance with the installation's HWMP.

The number of sites storing, using, and handling hazardous materials may change slightly with the replacement of QF-4s with QF-16s; however, the authorization process already in place for the acquisition of these materials would ensure that only the specific types and quantities necessary to carry out the mission would be brought to Holloman AFB.

Both manned and unmanned QF-4s and QF-16s use a variety of hazardous materials as part of their standard operations, including fuel, oils, hydraulic fluids, explosives, and batteries. Unmanned QF-16 flights incorporate the use of FTS and Visual Augmentation System (VAS) that are not used for manned QF-16 flights. The FTS uses explosives and energetic materials to remotely terminate an aircraft's flight. The VAS injects traces of oil into the aircraft exhaust, creating a smoke trail to aid visual tracking. Manned and unmanned QF-4 engines also contain a small amount of Thorium, a low-level radioactive element. QF-16 engines do not contain Thorium.

QF-16s use hydrazine (H-70) during manned operations to operate the aircraft's emergency power unit, although during unmanned flights the hydrazine tank is removed. Hydrazine is a colorless liquid with an ammonia-like odor that is highly reactive and easily catches fire. Periodic refueling, defueling, and purging of the QF-16's emergency power unit is required. A hydrazine storage facility, which consists of an enclosed concrete block building with metal roof, internal secondary containment, and security fence, was constructed for another unassociated project and would be used for QF-16 purposes. The F-16 mission uses about one 55-gallon barrel of hydrazine annually; this amount would roughly stay the same under the Proposed Action/Preferred Alternative. Air Force Policy Directive 21-1, *Airspace and Space Maintenance*, covers hydrazine policies and procedures for F-16 installations. Accordingly, each F-16 base is required to develop operating instructions for maintenance and storage of hydrazine, responding to potential hydrazine spill/incident, and supplying specialized training and equipment for personnel dealing with hydrazine. With the transition to QF-16s, Holloman AFB would apply the operating instructions for hydrazine use and maintenance that were developed for F-16s. The SPCCP would be updated to reflect the addition of QF-16s, and ensure that operational, maintenance, security, safety, and medical procedures are enforced, and to ensure personnel are well trained in these procedures.

Table 3-17 compares the hazardous and radioactive materials used by the QF-4, QF-16 manned, and QF-16 unmanned aircraft.

Table 3-17. Hazardous and Radioactive Materials Used by the QF-4 and/or QF-16 Aircraft

Type of hazardous or radioactive material	Use	Used by the QF-4	Used by the QF-16 Manned	Used by the QF-16 Unmanned
JP-4/JP-8	Fuel	■	■	■
Hydrazine H-70	Emergency Power Unit		■	
High Blast Explosive (HBX)-1-Explosive	FTS- Mark 8 Warhead	■		■
Tetryl- Explosive	FTS- Mark 35 fuse booster	■		■
Hexanitrostibene Type I and II-Explosive	FTS- Explosive transfer system detonation cords	■		■
CH-6- Explosive	FTS- Explosive transfer system warhead adapter assembly	■		■
Zirconium/ Potassium Perchlorate; Lead Azide; RDX-Explosive	FTS- Safe arm device	■		■
Nickel Cadmium Battery	FTS- Battery Assembly	■		■
Oil- MIL-L-6081 Grade 1010	VAS	■		■
Thorium	Engine	■		

Sources: Bruscino 2014 and USAF 2009
FTS Flight Termination System
VAS Visual Augmentation System

Environmental Restoration Program. Under the Proposed Action/Preferred Alternative, existing infrastructure would be renovated and/or repaired. This work and the expansion of the aircraft parking apron would not impact any ERP sites or known contaminated areas. Any potential impacts associated

with unknown contamination, however, would be mitigated through existing regulations and procedures as well as worker awareness and safety training.

Toxic Substances. Since Hangar 1080 and Building 1073 were constructed in the 1950s and 1960s, respectively, it is likely that they contain ACMs and/or LBP. Therefore, prior to the beginning of any infrastructure upgrades or improvements related to the Proposed Action/Preferred Alternative, surveys would be conducted to determine the presence of ACMs and LBP. If ACMs or LBP are present, the Holloman AFB installation would employ appropriately trained and licensed contractors to perform the ACM or LBP removal work, in accordance with the base's management plans for ACM and LBP. ACM and LBP would be segregated for disposal and managed in accordance with applicable federal, state, and local regulations, as well as the base's management plans for these materials. Therefore, no significant impacts from toxic substances would occur from the implementation of the Proposed Action/Preferred Alternative.

3.10.2.2 No Action Alternative

Under the No Action Alternative, the replacement of QF-4 FSATs with QF-16 FSATs would not occur and baseline conditions would continue. No impacts to hazardous materials, hazardous waste, ERP/MMRP sites, or toxic substances would occur.

4.0 CUMULATIVE EFFECTS

This section provides: 1) a definition of cumulative effects, 2) a description of past, present, and reasonably foreseeable actions relevant to cumulative effects, 3) an analysis of the incremental interaction the Proposed Action/Preferred Alternative may have with other actions, and 4) an evaluation of cumulative effects potentially resulting from these interactions.

4.1 Definition of Cumulative Effects

CEQ regulations stipulate that the cumulative effects analysis within an EA should consider the potential environmental impacts resulting 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 guidance in *Considering Cumulative Effects* (CEQ 1997) affirms this requirement, stating that the first steps in assessing cumulative effects involve defining the scope of the other actions and their interrelationship with the proposed action. The scope must consider geographic and temporal overlaps among the proposed action and other actions. It must also evaluate the nature of interactions among these actions.

4.2 Scope of Cumulative Effects Analysis

The scope of the cumulative effects analysis involves both the geographic extent of the effects and the timeframe in which the effects could be expected to occur. For this EA the geographic extent, or region of influence, is: 1) the base itself, but specifically the areas proposed for infrastructure upgrades/improvements and 2) areas off base affected by perceptible changes (plus or minus) in the noise environment. The timeframe for cumulative effects begins with initiation of the construction/improvements (FY15) and extends 3 years into the future. This 3-year timeframe was selected because replacement of the QF-4s with QF-16s would be completed during that time.

4.3 Past, Present, and Reasonably Foreseeable Actions

A thorough search for relevant related actions within the region of influence was performed to identify past, present, and reasonably foreseeable actions that could cumulatively interact with the Proposed Action/Preferred Alternative. Actions identified and considered in the cumulative effects analysis are summarized in Table 4-1.

Table 4-1. Past, Present, and Reasonably Foreseeable Actions Included in Cumulative Effects Analysis

Air Force Action	Proponent/ Location	Timeframe	Description	Potential Resource Interaction
National Integration Exercises	U.S. Army / WSMR, Fort Bliss, and McGregor Range	Present	Involves ground use at WSMR and Fort Bliss, NM and McGregor Range, NM	Noise, Air Quality, Biological Resources, Cultural Resources
MILCON projects on Holloman AFB	Air Combat Command / Holloman AFB	Present	Construction of a new parallel taxiway for runway 07/25 near the west ramp. Estimated 10 acres to be disturbed.	Air Quality, Soil Resources, Biological Resources, Water Resources
Development and Implementation of Range Wide Mission and Major Capabilities at WSMR, NM	U.S. Army / WSMR	Present	Augmented existing capabilities for testing and training missions. Approved changes in land use to support off-road operations for heavy brigade combat team sized unit at WSMR in the future and provides for the expansion of the main post area as well as several of the Range Centers. Considered increase in test mission operations including directed energy weapons. Operations overlap with R-5107 airspace.	Air Quality, Airspace Management and Use, Biological Resources, Cultural Resources, Hazardous Materials and Waste, Land Use and Recreation, Noise, Aircraft and Public Safety, Soil Resources, Water Resources
Holloman AFB Photovoltaic Solar Energy Array	Holloman AFB	Future	400 acres on Holloman being analyzed for array.	Infrastructure, Land Use
Runway improvements to Stallion Army Airfield on WSMR	Holloman AFB	Future	Runway replacement and extension to the existing airfield on WSMR to improve the runway for use by fighter jets such as the F-16. Proposal also includes the addition of arresting cables and instrumentation. NEPA analysis has not been conducted for this action, but is required.	Air Quality, Biological Resources, Soil Resources, Hazardous Materials and Waste

Air Force Action	Proponent/ Location	Timeframe	Description	Potential Resource Interaction
QF-16 Integrated Development/ Operational Testing (HAFB 2011b)	Holloman AFB and WSMR	Present	Involves the use of six, QF-16 aircraft for a 5-6 month period conducting up to 30 sorties (0.003% of total annual airfield activity). Integration and flight testing of variants of QF-16 conversions to ensure that all components, subsystems, systems, and software are integrated, reliably operating and capable of supporting weapon system evaluation. The Development Test phase was completed in May 2014, and the Operational Test is expected to be completed in June 2014.	Airspace Management and Use, Noise, Air Quality, Aircraft and Public Safety
WHSA Maintenance	WHSA	Present/Future	Planned maintenance for the upkeep of WHSA which can include paving and reroofing.	Noise, Air Quality, Cultural Resources
Fighter Aircraft Use of Biggs AAF for Joint Forces Training on Fort Bliss, TX and NM	Air Force and Army / Fort Bliss	Future	Air Force fighters (e.g., F-15, F-16, F-18) would use Biggs AAF for joint training on Fort Bliss for up to approximately six events per year. Aircraft would be loaded at Biggs with inert ('concrete') bombs for drops on approved impact areas on Fort Bliss in conjunction with Army ground operations. Guns (.50 cal., 20mm) would be loaded with non-explosive training rounds.	Noise and Public Safety

AAF Army Airfield
AFB Air Force Base
MILCON Military Construction
NEPA National Environmental Policy Act
WHSA White Sands National Monument
WSMR White Sands Missile Range

4.4 Cumulative Impact Analysis

The following analysis considers how the actions in Table 4–1 might affect or be affected by the replacement of QF-4s to QF-16s. The analysis considers whether such a relationship would result in potentially significant impacts not identified when the replacement of the QF-4 is considered alone.

4.4.1 Holloman AFB

Present and reasonably foreseeable future actions at Holloman AFB include new construction which will cause ground disturbance. Most of the recent construction on Holloman AFB is already reflected in the baseline conditions. However, the QF-4 replacement would add to total impervious surface on Holloman AFB, particularly around the airfield, by approximately 1 acre. The proposed infrastructure upgrade/improvement projects to support the Proposed Action/Preferred Alternative could overlap temporally, but not spatially, with current construction projects. Best management practices would minimize impacts from construction noise and impacts to air quality and soil resources. The Proposed Action/Preferred Alternative and future actions all occur in areas that have either been previously disturbed or areas that do not contain much vegetation or important biological habitats; therefore, these actions would not be expected to adversely impact vegetation or wildlife habitats. No federally-listed species occur in the area. The Proposed Action/Preferred Alternative and future actions would create ground disturbance on a small scale, which could increase storm water runoff and erosion potential during heavy precipitation events. Implementation of best management practices and post construction restabilization and revegetation would reduce storm water runoff and erosion potential; therefore, adverse impacts to surface water would be minor.

Hazardous materials use would increase slightly as hydrazine would be required for manned aircraft operations. Use conditions and procedures for these hazardous materials would preclude public exposure to an inadvertent release; therefore, implementation of the Proposed Action/Preferred Alternative and other reasonably foreseeable projects would not be expected to result in adverse cumulative impacts on hazardous materials and waste management. There would be a temporary but minor increase in emissions generated by construction, contributing less than 0.01 percent of regional emissions, which would not cumulatively impact air quality due to the temporal separation of the projects.

4.4.2 Training Airspace

The Proposed Action/Preferred Alternative would not increase usage in the training airspace. Training airspace identified for the QF-16 mission has supported military missions for units at Holloman AFB, WSMR, and Fort Bliss; joint exercises; and transient military users for decades. A minor decrease in the probability of mishaps could be anticipated with replacement of QF-4s with QF-16s. Once all QF-4s have been replaced, there would be emissions reductions in four criteria pollutants and GHGs. Nitrogen oxides emissions would increase under the Proposed Action/Preferred Alternative and combined with other training would cause a slight cumulative impact in the regional airspace, however, they would not change the AQCR attainment status. Sonic booms have decreased from past activities with the removal of the F-22 mission at Holloman AFB and no additional sonic booms are expected from the conversion of QF-4s to QF-16. Therefore, no cumulative impacts to air quality, noise, biological resources, or aircraft and public safety are expected to occur.

The Proposed Action/Preferred Alternative is not expected to have a significant impact on land use, recreational resources, visual resources, or cultural resources. The Proposed Action/Preferred Alternative when combined with other ongoing and proposed projects on Holloman AFB would result in an imperceptible reduction of noise from QF-16 versus QF-4 operations. Cumulative impacts to cultural resources (visual, vibration, etc.) are not expected from ongoing or proposed operations/actions. Therefore, cumulative impacts to cultural resources and land use, recreational, and visual resources are not expected to be significant.

4.5 Cumulative Effects Summary

In terms of cumulative effects, no significant impacts are anticipated because: 1) no past, present, or reasonably foreseeable actions would interact with the Proposed Action/Preferred Alternative to cause any significant impacts; 2) noise levels would imperceptibly be reduced outside of base boundaries; and 3) air emissions would decrease for carbon monoxide, VOCs, sulfur dioxide, PM_{10}, $PM_{2.5}$, and GHG, with only a minor increase in nitrogen oxides.

5.0 OTHER NEPA CONSIDERATIONS

5.1 Unavoidable Adverse Environmental Effects

Implementation of the Proposed Action/Preferred Alternative would not result in the unavoidable adverse loss of any resources at Holloman AFB.

5.2 Relationship between Short-Term Use of the Human Environment, and Maintenance and Enhancement of Long-Term Productivity

NEPA requires analysis of the relationship between a project's short-term impacts on the environment and the effects those impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This means that choosing one option may reduce future flexibility in pursuing other options, or that committing a resource to a certain use may eliminate the possibility for other uses of that resource.

Implementation of the Proposed Action/Preferred Alternative would not result in impacts that would reduce environmental productivity, permanently narrow the range of beneficial uses of the environment, or pose long-term risks to health, safety, or the general welfare of the public.

5.3 Irreversible and Irretrievable Commitment of Resources

Primary irreversible effects result from permanent use of a nonrenewable resource. Irretrievable resource commitments involve the loss in value of an affected nonrenewable resource that cannot be restored or consumption of renewable resources that are not permanently lost. Secondary impacts could result from environmental accidents. Nonrenewable resources are those resources that cannot be replenished by natural means, including oil, natural gas, and iron ore. Renewable natural resources are those resources that can be replenished by natural means, including water, lumber, and soil.

The Proposed Action/Preferred Alternative would not impose irreversible impacts, and only minor irretrievable impacts to renewable or nonrenewable resources would occur. Minor impacts to soil (a renewable resource) would occur as a result of impervious surfaces being introduced. However, other renewable resources would not be affected because there would be no increases or decreases in water use and timber would not be removed. In terms of nonrenewable resources, implementation of the Proposed Action/Preferred Alternative would result in a small *decrease* in impacts to these irretrievable resources. This would occur because QF-16 FSATs have a more efficient engine than the older QF-4 FSATs and would negligibly decrease overall fuel consumption. Therefore, no irretrievable or irreversible impacts are associated with implementing the Proposed Action/Preferred Alternative.

Under the No Action Alternative, fossil fuels would continue to be consumed at the current rate and no reductions in nonrenewable resources would occur. Though not significant, impacts would continue to nonrenewable resources should the No Action Alternative be chosen for implementation.

5.4 Other Considerations

EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, sets goals for federal agencies in areas such as energy efficiency, renewable energy, toxic chemical reduction, recycling, sustainable buildings, electronics stewardship, and water conservation. EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, expands on the requirements set forth in EO 13423 and requires that all new construction comply with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings.* This includes employing design and construction strategies that increase energy efficiency, eliminate solid waste, and reduce storm water runoff. EO 13423 sets as a goal for all federal agencies the improvement of energy efficiency and the

"reduction of greenhouse gas emissions of the agency, through reduction of energy intensity by (i) 3 percent annually through the end of FY15, or (ii) 30 percent by the end of FY15, relative to the baseline to the agency's energy use in FY03."

The Air Force has developed an energy plan to reduce energy demand, increase energy supply, and create a culture change where energy is a consideration in all actions (USAF 2008). Implementation of this vision has resulted in a decrease in facility energy intensity by nearly 18 percent since 2003; reducing ground vehicle fleet fossil fuel consumption by 15 percent since 1999; purchasing over 190,000 Energy Star®-compliant computers since July 2007; and implementing cost efficiencies, such as reducing aircraft weight and optimizing flight routes, where mission appropriate. In addition, by 2016, the Air Force plans to cost-effectively acquire 50 percent of contiguous U.S. aviation fuel via a synthetic fuel blend, utilizing domestic feedstocks and produced in the U.S., with the intent that the synthetic fuel purchases be sourced from suppliers with manufacturing facilities that engage in carbon dioxide capture and effective reuse (USAF 2008).

While the Proposed Action/Preferred Alternative may contribute to the consumption of nonrenewable resources, it is anticipated that consumption would slightly decrease and not have an adverse impact on continued availability, and the energy resource commitment would not increase in terms of region-wide usage. Furthermore, the Air Force's ongoing efforts to comply with the requirements set forth in EO 13423 would assist in minimizing any further irreversible or irretrievable effects to multiple non-renewable and renewable resources.

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