

# Environmental Assessment

## Recapitalization of the 49th WG Combat Capabilities and Capacities

Holloman Air Force Base, New Mexico



July 2011



# Environmental Assessment

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Capabilities and Capacities  
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New Mexico

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## FINDING OF NO SIGNIFICANT IMPACT (FONSI)

**NAME OF THE PROPOSED ACTION:** Recapitalization of the 49th Wing Combat Capabilities and Capacities for Holloman Air Force Base (AFB), New Mexico.

**DESCRIPTION OF PROPOSED ACTION AND NO ACTION ALTERNATIVE:** The Proposed Action would relocate two F-16 training squadrons with 50 Primary Aircraft Inventory (PAI) and six Backup Aircraft Inventory (BAI) aircraft to Holloman AFB in two phases. The F-16 training mission would renovate vacant or underused facilities. New construction for the F-16 mission would disturb about 12 acres in previously developed areas. Construction projects include 19 proposed Operations and Maintenance (O&M) projects and nine Military Construction (MILCON) projects. Personnel changes as Holloman AFB transitions from the F-22 to the F-16 training mission would result in a net increase of 142 personnel and 312 dependents. Annual airfield operations would increase to 101,966 operations from 91,366 operations. The F-16 training mission would use existing training airspace currently used by the F-22 mission, including the restricted airspace and air-to-ground bombing ranges on White Sands Missile Range and McGregor Range of Fort Bliss. The Roswell International Air Center (RIAC) has been proposed as an auxiliary airfield to accommodate about 8,960 annual airfield operations from the F-16 training mission.

Under the No Action Alternative, the F-16 training mission would remain at Luke AFB, and the F-22 mission would depart from Holloman AFB by the fourth quarter of Fiscal Year (FY) 13. No construction or renovation projects would be implemented.

**SUMMARY OF ENVIRONMENTAL CONSEQUENCES:** This Environmental Assessment (EA) provides an analysis of the potential environmental impacts associated with the Proposed Action and the No Action Alternative. Thirteen resource areas near Holloman AFB and ten under the training airspace received a thorough evaluation to identify potential environmental consequences. As indicated in the *Environmental Assessment for the Recapitalization of the 49th FW Combat Capabilities and Capacities for Holloman Air Force Base (AFB), New Mexico* (which is hereby incorporated by reference), neither the Proposed Action nor the No Action Alternative would result in significant environmental impacts on any resource area. The following conclusion provides details of expected impacts if the Proposed Action is implemented.

### Holloman AFB Vicinity Resources

**Airspace Management and Use** – The Holloman airfield would experience an 11 percent increase in air operations, but the air traffic's management system is robust and can accommodate this traffic without any adverse effects.

**Noise** – Noise levels at the airfield and in the surrounding area would decrease. The area exposed to 65 decibel (dB) Day-Night average noise Levels (DNL) and above would decrease by 16,671 acres, and the affected population would decline by 27 persons.

**Safety** – The new aircraft type would not cause any appreciable change in ground or flight safety procedures. Necessary manpower adjustments and facility improvements to support specific

services for the new aircraft would provide adequate capacity to perform routine functions safely.

**Air Quality** – Emissions for construction fall below Prevention of Significant Deterioration (PSD) thresholds for all pollutants. Volatile Organic Compound (VOC) and Nitrogen Oxide (NO<sub>x</sub>) emissions from the F-16 airfield operations would increase from current levels while emissions from Carbon Monoxide (CO), Sulfur Dioxide (SO<sub>2</sub>), and Particulate Matter less than 2.5 microns and less than ten microns (PM<sub>2.5</sub> and PM<sub>10</sub>) would decrease. Therefore, the implementation of the Proposed Action would produce less than significant air quality impacts and would not cause an exceedance of air quality standards.

**Physical Resources** – Disturbance of up to 12 acres could cause some loss of soil. Since more than one acre would be disturbed by construction, a National Pollutant Discharge Elimination System (NPDES) stormwater permit would be required. Construction projects would incorporate appropriate erosion control measures in accordance with the base's Stormwater Pollution Prevention Plan (SWPPP) to minimize soil loss and migration of soil into surface waters.

**Biological Resources** – Construction and operations around the airfield would affect previously altered habitats. The project area does not support any federally listed species, and therefore no impact would result. State-listed burrowing owls may be present in the construction areas. If burrowing owls were found at any site, construction activities would halt and consultation with the New Mexico Department of Game and Fish (NMDGF) would ensue to determine an appropriate course of action. Coordination with United State Fish and Wildlife Service (USFWS) on this action has been completed with the USFWS indicating no comments on the findings in this EA.

**Cultural Resources** – Construction, demolition, and renovation will not affect any structures that are eligible for the National Register of Historic Places (NRHP) so no archaeological impacts are anticipated. Consultation with the State Historic Preservation Office (SHPO) was concluded with SHPO's concurrence on the determination of no significant impacts to cultural resources. Holloman AFB coordinated with tribal governments as part of the environmental process. The Mescalero Apache indicated there were no comments on the proposal after being contacted by a representative of Holloman AFB.

**Land Use and Recreation** – Reduced noise levels around the airfield would provide slightly beneficial effects for land uses and recreation, both on Holloman AFB and in surrounding areas such as White Sands National Monument. During construction, some temporary effects of dust and traffic may be inconvenient for activities on base, but would not affect land use.

**Socioeconomics** – A net increase of 142 positions and 312 dependents would provide a stimulus for the local economy. Local housing market, schools, and community services have adequate capacity to accommodate the 1.5 percent increase in population. Off-base residents would not be exposed to noise levels greater than 75 dB DNL.

**Environmental Justice** – Since there are no significant environmental or health effects caused by this action, no disproportionately high and adverse impacts to minorities or low-income

populations are anticipated. The schools and childcare center located on Holloman AFB would experience a decrease in noise of 1 dB as compared to baseline.

**Infrastructure** – Less than one percent increase in water use and wastewater generation would have negligible impact on the base and on Alamogordo's systems. Energy use may increase by an estimated 6 percent for electrical use and 9 percent for natural gas use with newly constructed facilities. New "green" standards and specifications would achieve lower energy consumption per square foot for new facilities and adequate capacity is available from current providers.

**Transportation** – A 6 percent increase in commuting and on-base traffic would not cause any noticeable change in traffic levels or access. During construction, commercial vehicles would follow project specific safety plans and access routes.

**Hazardous Materials and Waste** – An estimated increase of 60 percent in the consumption of jet fuel is within the capacity of the current fuel storage and distribution system. A new hydrazine facility would provide for the specific needs of this product used by the F-16 aircraft and would consist of an enclosed concrete block building with metal roof, internal secondary containment, and security fence. Some increase in volumes of hazardous waste generation would remain within the permitted levels for Holloman AFB as a large quantity generator.

### **Training Airspace and Ranges**

**Airspace Management and Use** – Minor increases in sortie-operations of five or less per day in Military Operations Areas (MOAs) and Air Traffic Control Area Airspace (ATCAAs) and one per day in Military Training Routes (MTRs) would not adversely affect management of special use airspace. The use of the RIAC as an auxiliary field for up to 8,960 annual operations can be accommodated via prior coordination with local the airport's air traffic controllers to establish protocols flight tracks for the F-16 pattern work.

**Noise** – Subsonic noise levels beneath all training airspace units would remain below 65 dB DNL. The areas beneath Red Rio, Oscura, and Centennial Ranges would increase to 58, 56, and 52 dB DNL<sub>mr</sub>, respectively. DNL<sub>mr</sub> in areas beneath Lava, Mesa, Yonder, and McGregor Range airspaces would not change. Increases in subsonic noise levels would be expected to increase the likelihood of annoyance in affected persons; however, the restricted airspace units overlie land that is owned by DoD so few persons (not associated in some way with a military) would be affected. Subsonic noise levels beneath Beak MOA would remain below 45 dB DNL<sub>mr</sub> and DNL<sub>mr</sub> beneath Talon MOA would not change. Noise levels beneath the MTRs would increase by less than one dB. Supersonic noise levels would increase slightly (less than 2 dB) in Red Rio and Oscura Range airspace, but would decrease beneath the other training airspace units. Munitions noise levels would increase at Red Rio Bombing Range, with levels of 62 CDNL extending to 1.4 nautical miles (nm) from targets; however, the closest non-military land is 3.4 nm away. There would be no appreciable change in munitions noise levels at Oscura or Centennial bombing ranges. Proposed operations at RIAC would increase the area affected by noise levels greater than 65 dB DNL by 1,229 acres, and newly affect an estimated 58 residents.

**Safety** – Flight safety considerations would be similar to current and prior military activities operating from Holloman AFB. The F-16 mission would follow all existing and any particular



protocols or procedures for the aircraft to ensure safety of pilots and persons on the ground.

**Air Quality** – Emissions from aircraft operations would not exceed the 250 tons per year threshold of significance for any pollutant. NO emissions would decrease by 17.5 tons per year in military training airspace including R-5107, 20 miles from the Bosque del Apache Wilderness Class 1 PSD area. Natural dispersion would dilute concentrations of visibility-impairing pollutants in this area.

**Physical Resources** – New construction and improvements on Centennial and Oscura ranges would occur mostly in previously disturbed and regularly cleared areas. Since more than one acre of area would be disturbed, a NPDES stormwater permit would be required. Using standard erosion control measures prescribed in the each range's Stormwater Pollution Prevention Plan (SWPPP), impacts to soils and surface water would be minimal.

**Biological Resources** – Areas underlying proposed training airspace are currently exposed to military aircraft noise and as a result, noise is part of the current environment for wildlife. Noise levels underlying restricted airspace on White Sands Missile Range (WSMR) and on McGregor Range of Fort Bliss would increase slightly, but should not affect wildlife populations. The risk of indirect effects from fire caused by flares would be low due to altitude restrictions for their use and limitation on use when fire hazards are high. Concentrations of chaff and flare debris would not result in conditions that affect biological resources. Eight special status species in the region are not likely to be affected by the modest change in noise conditions and continued deployment of chaff and flares in some airspace.

Construction and improvements on two active bombing ranges (Oscura and Centennial) are proposed in areas already modified by these uses. The USFWS may recommend no ground disturbance near active bird nests during nesting season. Coordination with USFWS on this action has been completed with the USFWS indicating no comments on the findings in this EA.

**Cultural Resources** – Impacts from noise vibration on historic structures or archaeological resources in the region are likely to be less since the F-16 produces less intense sonic booms than the F-22 that currently operates in the region. Holloman AFB has consulted with SHPO and concluded with SHPO's concurrence on the determination of no significant impacts to cultural resources. Holloman AFB coordinated with tribal governments as part of the environmental process. The Mescalero Apache indicated there were no comments on the proposal after being contacted by a representative of Holloman AFB.

**Land Use and Recreation** – Subsonic noise levels would decrease or remain the same except at Red Rio, Oscura, and Centennial Ranges. There are no Special Use Land Managed Areas (SULMAs) intersecting these locations and therefore no subsonic noise impacts. Noise levels would be below 65 dB DNL<sub>mr</sub> in all other areas. Noise levels from munitions and training operations would be similar to current and recent levels and the approved military uses of Centennial Range. Levels of 62 CDNL and above would extend out about 1.4 nm from the target areas, but would not extend outside the McGregor Range boundary. The overall impact on recreation areas from changes in noise levels is expected to be minimal. Increased noise around RIAC may affect some low-density rural residential areas on the north and northeast side of the airfield newly exposed to incompatible noise levels above 65 dB. Projected noise levels are not

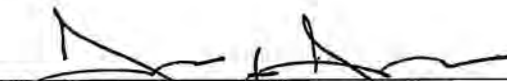


expected to change or displace current land uses but would pose a moderate adverse impact in specific residential locations.

**Socioeconomics** – Noise levels under training airspace would remain below 65 dB DNL<sub>mr</sub>, and would not trigger any socioeconomic indicators for effects on property values. Higher noise levels around RIAC are not expected to change economic decisions and property values significantly, since this area has developed and been influenced by activities at the airfield for many years.

**Environmental Justice** – The minority and low-income populations affected by noise levels greater than 65 dB DNL is comparable to the minority and low-income population in Chaves County, which is defined as the community of comparison. Flight operations from the F-16 at the RIAC would not present a disproportionately high or adverse impact to populations of concern. Therefore, no significant impacts are anticipated.

**CONCLUSION:** Based on the information and analysis presented in this Environmental Assessment, which was conducted in accordance with the requirements of the National Environmental Policy Act of 1969, the Council on Environmental Quality (CEQ) regulations, and implementing regulations set forth in Title 32 of the Code of Federal Regulations (CFR) Part 989 (Environmental Impact Analysis Process) as amended, and review of the public and agency comments submitted during the 30-day public comment period, I conclude that implementation of the Proposed Action would not result in significant impacts on the quality of the human or natural environments. For these reasons, a Finding of No Significant Impact (FONSI) is made, thereby making the preparation of an Environmental Impact Statement unwarranted.

  
\_\_\_\_\_  
David F. DeMartino, Colonel, USAF  
The Civil Engineer

29 Jun 2011  
\_\_\_\_\_  
Date



# 1 Purpose and Need for the Proposed Action

## 1.1 Introduction

The United States Air Force (Air Force) is in the process of shaping its strategic force structure to advance United States interests while maintaining the capability to respond to the full spectrum of threats present in the twenty-first century. The Air Force's primary purpose is to train its personnel and pilots to be the best-prepared combat force in the world in the ever-changing warfare situations. To do this, the Air Force continually upgrades and improves its fleet and equipment. As part of this effort, the Air Force Chief of Staff recently considered and approved several strategic basing options to better utilize its assets and resources across several locations.

Transition to new aircraft types and the upgrade of equipment comes with new requirements, both in terms of basing its fleet and in performing the requisite training to prepare pilots for combat. With shrinking budgets and resources, effective and efficient use of available resources is of primary importance. For this reason, the Air Force seeks to maximize the use of its assets and capitalize on existing fighter missions and support capabilities. This involves consolidation and redistribution of units to support strategic utilization of resources. As part of this effort, Holloman Air Force Base (AFB) is identified as an installation with the requisite infrastructure and access to airspace and air-to-ground ranges to support the training of F-16 fighter pilots.

On July 29, 2010, the Department of the Air Force announced actions to consolidate the F-22 fleet. The Secretary and Chief of Staff of the Air Force determined that the most effective basing for the F-22 would result in the movement of all Holloman AFB F-22s to other locations by the fourth quarter of Fiscal Year (FY) 2013. These actions created excess capacity for airspace, range, and base availability at Holloman AFB and, in the national interest, it is imperative that this airspace and range capacity be utilized to ensure that the Air Force maintains their capability to train for the immediate, short, and long term. The future locations of the F-22s currently located at Holloman AFB will be determined in part by the results of the environmental analysis being conducted by Air Combat Command (ACC).



The Air Force proposes to relocate two training squadrons of Block 42 F-16 "Fighting Falcon" aircraft to Holloman AFB, New Mexico. The two squadrons would arrive by FY13 from the 56th Fighter Wing (56 FW) at Luke AFB as a Formal Training Unit (FTU), part of the Air Education and Training Command (AETC). The F-16 training mission includes air-to-air and air-to-ground training at a higher operations tempo than the current F-22 aircraft mission. Operational requirements and performance characteristics of the F-16 dictate that routine training would occur within 100 nautical miles (nm) of Holloman AFB in existing restricted areas, Military Operations Areas (MOAs), Air Traffic Control Assigned Airspaces (ATCAAs), and on Military Training Routes (MTRs).

This Environmental Assessment (EA) analyzes the potential environmental consequences associated with the Proposed Action and alternatives in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969 (42 USC 4321-4317), the Council on

Environmental Quality (CEQ) regulation of 1978 (40 CFR §§ 1500-1508), and Title 32 of the Code of Federal Regulations (CFR) 989. 32 CFR 989 establishes the Environmental Impact Analysis Process (EIAP), which addresses the Air Force implementation of NEPA and Air Force Instruction (AFI) 32-7161 directs Air Force officials to consider the environmental consequences of any action prior to implementation.



HOLLOMAN AFB BASES F-22, T-38A, QF-4, TORNADO AIRCRAFT, AND VARIOUS REMOTELY PILOTED VEHICLES

## 1.2 Background

Holloman AFB is located near Alamogordo, New Mexico and is managed by ACC. It covers 59,639 acres at an average altitude of 4,093 feet in south central New Mexico

Figure 1-1. Holloman AFB is the home of the 49th Wing (49 WG), training for the German Air Force (GAF), and various Air Force test programs including the world’s longest rail test track. Currently, F-22, T-38A, Tornado aircraft (GAF), and Remotely Piloted Aircraft (RPA) (QF-4, MQ-1, and MQ-9) operate from Holloman AFB.

Training airspace used by aircraft at Holloman AFB includes restricted areas associated with the White Sands Missile Range (WSMR) and the McGregor Range of Fort Bliss, as well as large overland MOAs, ATCAAs, and MTRs. In addition, existing training ranges (Oscura and Red Rio Ranges at WSMR and the Centennial Range at McGregor Range) provide for local air-to-ground training for the F-22 aircraft. The F-16 would use the existing training airspace and training ranges currently used by Holloman AFB-based aircraft, which is described in more detail in Chapter 2 of this EA.

Table 1-1 presents the aircraft characteristics and capabilities of the current and proposed aircraft at Holloman AFB. The F-16 Block 42 is an all weather, day-night, multi-role fighter aircraft with air-to-air and air-to-ground missions. It is powered by a single turbofan jet engine with an afterburner and is capable of flying at twice the speed of sound (Mach 2) and at operational altitudes over 50,000 feet. The F-16 has been in production since the late 1970 in a number of block variants. The Block 42 incorporates significant technological improvements including advanced engines, targeting and weapons systems, navigation systems, and cockpit configurations.

**Table 1-1. Comparison of Aircraft Characteristics and Capabilities**

Aircraft	Stealth	Air-to-Ground	Air-to-Air	Engines	Speed	Flight Ceiling	Defensive Countermeasures
F-16	No	Yes	Yes	1 at 27,000 pound thrust	Mach 2	Above 50,000 feet	Chaff and Flares
F-22	Yes	Yes	Yes	2 at 35,000 pound thrust	Above Mach 1.5 plus supercruise	60,000 feet	Chaff and Flares
T-38A	No	No	No	2 at 2,900 pound thrust	Mach 1.08	45,000 feet	None
QF-4	No	No	No	2 at 17,845 pound thrust	Mach 2.23	60,000 feet	None
Tornado	No	Yes	Yes	2 at 9,850 pound thrust	Mach 1.2	50,000 feet	Chaff



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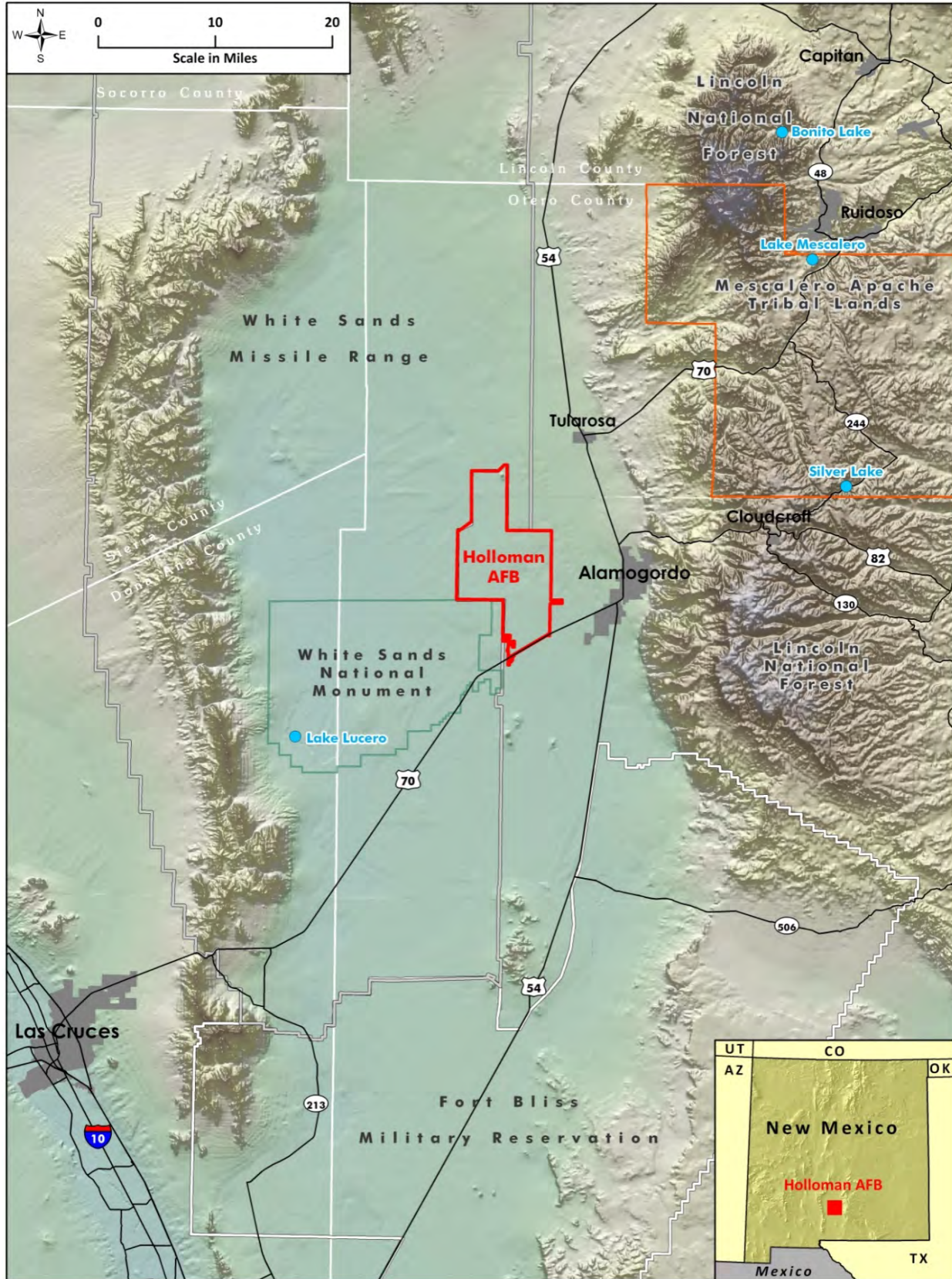


Figure 1-1. Location of Holloman AFB

### **1.3 Purpose of the Proposed Action**

The purpose of the Proposed Action is to utilize the extensive infrastructure in place at Holloman AFB for fighter aircraft following the departure of the F-22 aircraft. Specifically, this Proposed Action would relocate two F-16 training squadrons with 50 Primary Assigned Inventory (PAI) and six Backup Assigned Inventory (BAI) aircraft to Holloman AFB. To acquire the training skills required for F-16 pilot training, the squadrons would fly in existing training and restricted airspace ranges. Additionally, the F-16 training squadrons propose to use Roswell Industrial Air Center (RIAC) as an auxiliary airfield. This action would largely involve the use and renovation of existing facilities with some construction of new facilities and infrastructure to support the F-16 training mission and aircraft. It would also bring personnel, their family members, and students associated with the training units to Holloman AFB.

### **1.4 Need for the Proposed Action**

The Air Force must maximize use of its extensive investment in the Holloman AFB infrastructure, capitalize on existing fighter missions and support capabilities, access airspace and air-to-ground ranges (i.e., WSMR), and support varied training opportunities (i.e., Fort Bliss) and other available infrastructure. The F-16 training mission has a requirement to access these types of assets to successfully fulfill its required training syllabus and Holloman has unused facility capacity available to support the two training squadrons. The Air Force also needs to balance the use of its resources and installations to ensure that key locations such as Holloman AFB maintain high levels of use.

## 2 Description of the Proposed Action and Alternatives

### 2.1 Identification of Alternatives

The Air Force seeks to maximize the infrastructure and assets Holloman AFB provides by relocating an appropriate mission to Holloman AFB. Inefficiencies in the F-22 fleet led to the F-22 consolidation initiative via a Program Change Request (PCR) and a basing action. These actions resulted in the movement of all Holloman AFB F-22s to other locations by the fourth quarter of FY13, creating excess airspace, range, and base capacity at Holloman AFB. In the national interest, it is imperative that this airspace and range capacity be utilized to ensure that the capability to train remains for the immediate, short, and long term.

Missions considered for relocation should emphasize the excess capacity available, i.e. multi-role fighter training and Intelligence, Surveillance, and Reconnaissance (ISR), both of which utilize the air-to-air and air-to-ground ranges at close to capacity. Additionally, synergies can be gained by relocating a multi-role fighter training mission to Holloman AFB as this would provide an opportunity to "train as we fight" by capitalizing on the co-location of ISR and fighter training missions. The only multi-role fighter-training mission currently available is the F-16 and the only regular Air Force units are at Luke AFB.

The relocation of the F-16 mission to Holloman AFB is under consideration at this time since this installation has the requisite infrastructure and assets to support the F-16 training mission. The following criteria were also important parameters for supporting this training mission:

- Adequate training airspace sized for air-to-air maneuvering as well as airspace approved for chaff and flare use and supersonic operations within 100 nm of the primary base.
- Air-to-ground ranges within 60 nm of primary base.
- Airfield runway capable of supporting the two squadrons of F-16 aircraft.
- Suitable ramp space, facilities, and infrastructure to support two fighter squadrons with minimum investment in new physical development.
- Suitable area for core mission facilities along the flight line.
- Live ordnance loading capability.

This EA is not decisional, but provides information about the Proposed Action as part of a strategic basing process to assist the Air Force in planning and selecting suitable locations among its current active bases and assets to support the F-16 training mission.

### 2.2 Proposed Action

The proposed relocation and beddown of the two F-16 squadrons would take place over a period of approximately two years and would occur in two distinct phases. The proposed aircraft transition schedule is presented in Table 2-1. The first flow of aircraft would arrive at the base in FY12 followed by the second group in FY13. New construction and facility renovation would occur prior to the first squadron's arrival. Some interim use of facilities may occur at Holloman AFB (Section 2.2.4 for more details).

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**Table 2–1. F-16 Transition Schedule to Holloman AFB**

Primary Aircraft Inventory (PAI)	Proposed Action					Total End State	No Action Alternative
	Baseline	FY10	FY11	FY12	FY13		
F-16	0	0	0	25	50	0	0
F-22	36	36	21	21	0	0	0
T-38A	11	11	11	11	4	4	4
Other 49 WG (includes German Air Force (GAF))	72	72	72	84	84	84	84
<b>Total Aircraft</b>	119	119	104	141	138	138	88
<b>Net Change</b>	0	0	-15	37	-3	19	-31

**Key:**

49 WG = 49th Wing

FY = Fiscal Year

The two F-16 squadrons would consist of 50 PAI and 6 BAI aircraft. PAI aircraft are assigned to perform the squadron’s training missions and BAI aircraft are used as substitutes for PAI aircraft (for example, when aircraft are undergoing maintenance).

**2.2.1 Flight Activities**

This section describes existing and proposed flight activities on and near the Holloman AFB. F-16 aircraft would use the base runways and fly in the base environs similar to the way the F-22 aircraft do today. This includes takeoffs, landings, and practice approaches; however, the F-16 and the F-22 aircraft have different performance characteristics resulting in different flight profiles. The Air Force anticipates that the two F-16 squadrons would fly approximately 10,704 sorties per year and the aircraft would use afterburner power during takeoffs approximately 40 percent of the time.

A **SORTIE** IS THE FLIGHT OF A SINGLE AIRCRAFT FROM TAKEOFF TO LANDING.

AN **AIRFIELD OPERATION** IS THE SINGLE MOVEMENT OR INDIVIDUAL PORTION OF A FLIGHT IN THE BASE AIRFIELD ENVIRONMENT SUCH AS ONE LANDING, ONE TAKEOFF, OR ONE TRANSIT OF THE AIRFIELD TRAFFIC AREA.

A **SORTIE-OPERATION** IS THE USE OF ONE AIRSPACE UNIT BY ONE AIRCRAFT.

Table 2-2 presents the existing and proposed annual airfield operations by aircraft based at Holloman AFB. There are currently 91,366 annual airfield operations. Proposed operations reflect the addition of two squadrons of F-16 aircraft with a projected decrease of F-22/T-38A operations by FY13. Other military operations are projected to remain the same as current levels. Holloman AFB F-16s would conduct approximately 1 percent of arrival operations after 10:00 PM and all other operations would typically be conducted prior to 10:00 PM.

The F-16 training squadrons need an alternate airstrip equipped with arresting gear to use in the event of an emergency landing. Arresting gear is a mechanical system typically consisting of a cable laid across the aircraft landing area that is designed to catch the aircraft’s tail hook in the case of an emergency landing. Biggs Army Airfield (AAF) on Fort Bliss (70 miles south of Holloman AFB) and RIAC (100 miles to the northeast of Holloman AFB) would serve as locations for emergency landings. Only Biggs AAF would require the installation of arresting cables. Kirtland AFB has the requisite arresting cables, but is located 130 miles from Holloman AFB and would be used rarely and only as a backup to the other locations. The F-16 squadrons propose to use RIAC as an auxiliary field to support a portion of the required pattern work for pilot training. RIAC currently supports 24,715 military and 24,004 civilian airfield operations annually. The F-16 mission would add approximately 8,960 additional military airfield operations annually.



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**Table 2–2. Baseline and Proposed Annual Airfield Operations**

Aircraft	Arrivals		Departures		Closed Patterns <sup>1</sup>		Total		All
	Day	Night	Day	Night	Day	Night	Day	Night	
<b>Baseline Operations</b>									
F-22	8,316	324	8,640	0	16,632	0	33,588	324	<b>33,912</b>
Other Military <sup>2</sup>	10,991	256	10,991	256	34,279	683	56,260	1,194	<b>57,454</b>
<b>Total</b>	<b>19,307</b>	<b>580</b>	<b>19,631</b>	<b>256</b>	<b>50,911</b>	<b>683</b>	<b>89,848</b>	<b>1,518</b>	<b>91,366</b>
Aircraft	Arrivals		Departures		Closed Patterns		Total		All
	Day	Night	Day	Night	Day	Night	Day	Night	
<b>Proposed Operations</b>									
F-22	0	0	0	0	0	0	0	0	<b>0</b>
Other Military <sup>2</sup>	10,825	256	10,825	256	33,616	683	55,263	1,194	<b>56,457</b>
F-16	10,623	81	10,704	0	24,101	0	45,429	81	<b>45,509</b>
<b>Total</b>	<b>21,448</b>	<b>337</b>	<b>21,529</b>	<b>256</b>	<b>57,717</b>	<b>683</b>	<b>100,692</b>	<b>1,275</b>	<b>101,966</b>

**Notes:**

- <sup>1</sup> Each multiple pattern (closed pattern) at the airport consists of two operations (a touchdown immediately followed by a takeoff) in addition to the initial takeoff and final landing of each sortie at the airfield.
- <sup>2</sup> Other military includes the German Air Force (GAF), T-38A, the Remotely Piloted Aircraft (RPA), and other tenant units stationed at Holloman AFB.

**Key:**

Day Sortie = 7:00 AM to 10:00 PM Local Time

Night Sortie = 10:00 PM to 7:00 AM Local Time

## 2.2.2 Base Facilities

The departure of the F-22 aircraft from Holloman AFB permits the reuse of many of the base facilities and provides space for the F-16 aircraft on the West Ramp area (Figure 2–1). A list of proposed construction activities is provided in Table 2–3, which includes nine proposed Military Construction (MILCON) projects and 19 Operations and Maintenance (O&M) projects, resulting in 269,350 Square Feet (SF) of new heated space. Building 825 is proposed for demolition.

The F-16 squadrons are a training mission rather than an operational mission so additional facilities for classrooms and aircraft simulators, dormitories, and dining areas for pilots-in-training are required. For O&M of the aircraft, projects include major retrofitting and renovation of aviation back shops and a new facility for storage and handling of Liquid Oxygen (LOX). The new facilities would provide for the specific needs to maintain the F-16 engine, electronics, and maintenance procedures. The combined total footprint of disturbed ground for proposed MILCON construction projects and major renovations is about twelve acres, including about six acres for new housing units (and interior roads) contiguous to existing housing areas. Most construction would occur in late 2011 and 2012 and some projects would continue through 2013. Infrastructure upgrades, such as connecting new facilities to water and power systems, would also count as affected area on the base. These projects would all be located in developed areas on the installation.

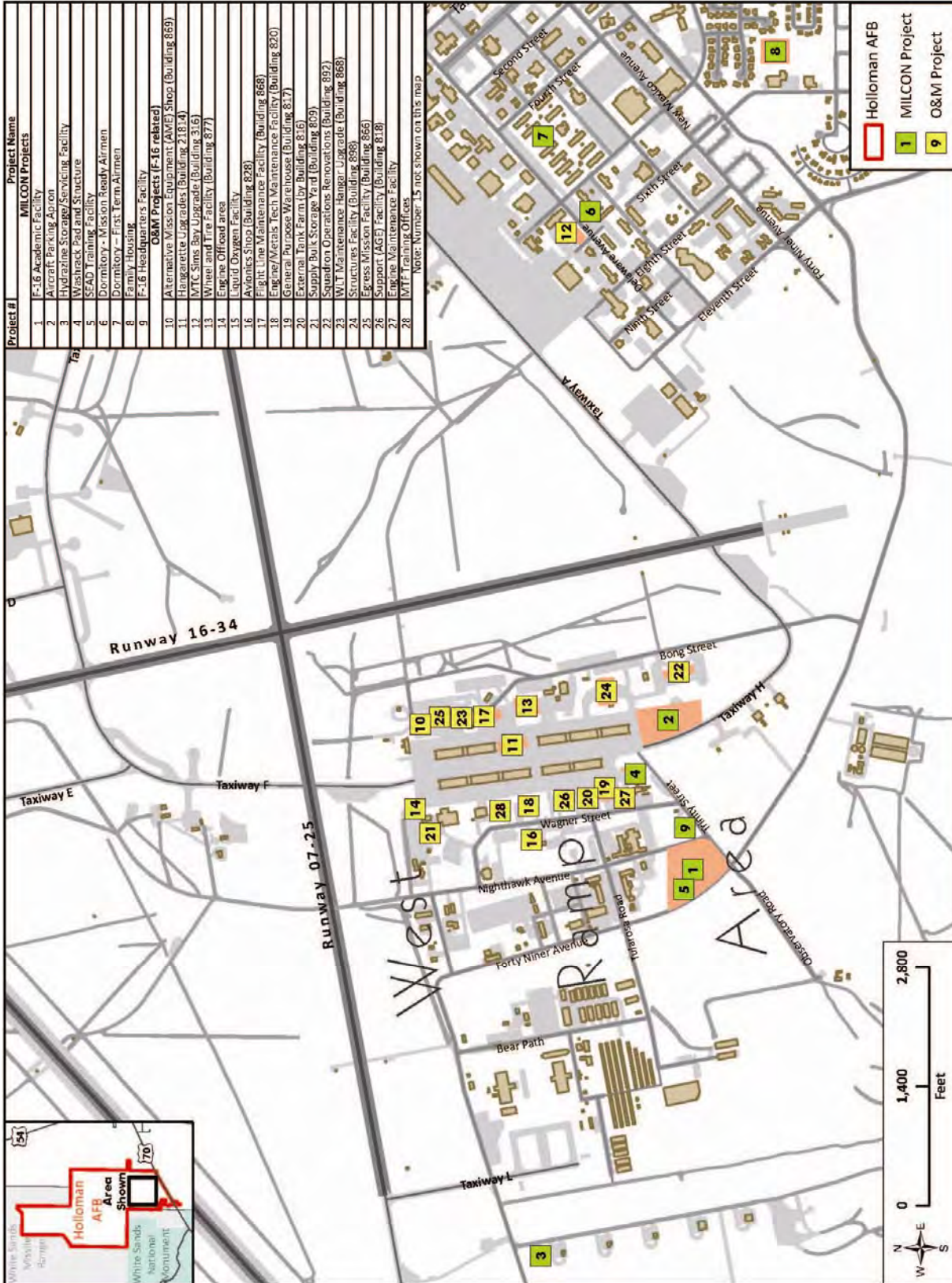


Figure 2-1. Proposed Facility Modifications at Holloman AFB

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**Table 2–3. Proposed Action Facility Requirements**

Project # <sup>1</sup>	Project Name	Fiscal Year	Project Size	Project Details
<b>Military Construction (MILCON) Projects</b>				
1	F-16 Academic Facility	2011	1,391 SM/ 15,000 SF	Single story, classrooms and administrative
2	Aircraft Parking Apron	2011	4,214 SM/ 46,000 SF	Concrete apron sized to park ten F-16 aircraft
3	Hydrazine Storage/Service Facility	2011	97 SM/ 1,050 SF	Enclosed facility, tanks with secondary containment. Enclosed concrete block building with metal roof, internal secondary containment, and security fence.
4	Washrack Pad and Structure	2012	2,730 SM/ 29,400 SF	Pad, covered area, storage area
5	Suppression of Enemy Air Defenses (SEAD) Training Facility	2013	831 SM/ 9,000 SF	Single story, classrooms and administrative
6	Dormitory - Mission Ready Airmen	2013	1,200 SM/ 12,900 SF	Single story, 24-room dormitory near Building 457; renovate Building 584
7	Dormitory – First Term Airmen	2013	76,000 SF	New dormitory near Building 339
8	Family Housing	2013	40 homes (approx. 80,000 SF)	On-base family housing contiguous with existing family housing includes roads, pavements, and landscaped areas
9	F-16 Headquarters Facility	2014	23,365 SF	Construct new facility to house headquarters functions
<b>Operations and Maintenance (O&amp;M) Projects (F-16 Related)</b>				
10	Armament and Alternative Mission Equipment (AME) Facility (Building 869)	2012		Renovate Building 869 to provide space for armament suspension equipment repair and AME storage
11	Hangar Upgrade (Building 21814)	2011	1 each	Upgrade hangar
12	Mission Training Center (MTC) Sims Bay Upgrade (Building 316)	2011	38,613 SF	Upgrade four bays
13	Wheel and Tire Facility (Building 877)	2011	600 SF	Addition
14	Engine Offload Area	2011	600 SF	New pad and demolish Building 825
15 <sup>2</sup>	Liquid Oxygen Facility	2011	1,000 SF	Relocated from current location
16	Avionics Shop and Pod (Air Combat Maneuvering Instrumentation [ACMI]) (Building 828)	2011	1,692 SF	Building 824 renovation
17	Flight Line Maintenance Facility (Building 868)	2011	17,843 SF	Repairs
18	Engine/Metals Tech Maintenance Facility (Building 820)	2011	3,000 SF	Addition
19	General Purpose Warehouse (Building 817)	2011	10,820 SF	Reuse for storage
20	External Tank Farm (by Building 816)	2011	52,200 SF	Vertical tank storage
21	Supply Bulk Storage Yard (Building 809)	2011	9,000 SF	Demolish interior for storage
22	Squadron Operations Renovations (Building 892)	2012	27,000 SF	Phased upgrades
23	Weapons Load Training (WLT) Maintenance Hangar Upgrade (Building 868)	2012	500 SF	Upgrade existing building
24	Structures Facility (Building 898)	2012	3,000 SF	Use existing shops
25	Egress Mission Facility (Building 866)	2013	5,520 SF	Repairs
26	Support Aerospace Ground Equipment (AGE) Facility (Building 818)	2013	3,000 SF	Repairs
27	Engine Maintenance Facility	2013	29,099 SF	Renovate Building 800
28	Military Training Facility (MTF) Training Offices	2011	2,673 SF	Addition to Building 823

**Notes:**

- <sup>1</sup> Project numbers used to identify locations on Figure 2–1 by number.
- <sup>2</sup> Project not shown on Figure 2–1.

Key: SF = Square Feet

SM = Square Meter

In addition to major construction and renovations projects, optional and interim support projects (Table 2-4) could be scheduled should funds become available.

**Table 2-4. Optional and Interim Facility Support Projects**

Optional and Interim Projects
Temporary Facility for F-16 Academics
Engine Maintenance (Building 816) Upgrade for Interim Use
Interim Use of Dormitories (Building 584)

### **2.2.2.1 Standard Construction Activities**

Prior to facility renovation, Holloman AFB would contract to have any Asbestos-Containing Materials (ACMs) properly disposed of in accordance with federal and state regulations and site preparation would include establishment of a buffer zone around the involved facilities. The proposed renovation would include dismantling and removal of 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.

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. The 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 on exposed soil during ground disturbance activities, proper soil stockpiling methods, and prompt replacement of ground cover or pavement are standard construction procedures that could be used to minimize the amount of dust generated.

With the start of construction, each building site would be graded and sediment and erosion controls appropriate to the site would be installed. These standard construction practices include the installation of a silt fence, inlet protection for the storm drain, temporary sediment traps, and diversion dikes within project limits prior to commencement of any onsite work. All development activities would be performed in accordance with current security and force protection requirements.

Prior to construction at any site, a construction laydown area and a haul route would be established. Appropriate erosion and siltation controls would be implemented and maintained in effective operating condition prior to, and throughout all construction activities. Similarly, fugitive dust would be controlled by the use of standard construction practices. In all cases where construction disturbs the existing vegetation or other ground surface, the contractor would revegetate or restore the area as directed by the base.

### **2.2.3 Personnel Changes**

Table 2-5 details current and end-state proposed manpower authorizations at Holloman AFB required to operate and maintain all aircraft and to provide necessary support services at the installation. Table 2-5 also shows the expected transitional period between the proposed F-16 beddown and the concurrent F-22 drawdown. Manpower authorizations associated with the RPA program, the GAF, and other tenants are included in the Other 49 WG section. While the

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RPA program in particular continues to buildup concurrently with the proposed F-16 beddown, the RPA personnel increase has been evaluated in previous NEPA documentation and is considered as part of the baseline. Personnel authorizations for the F-16 mission would be directly related to the arrival of aircraft. For Holloman AFB, the F-16 personnel positions would be filled from the equivalent positions associated with existing manpower authorizations of departing aircraft to the extent practicable.

**Table 2–5. Manpower Requirements under Baseline and Proposed Action at Holloman AFB**

Authorized Manpower	Baseline	Proposed Action					No Action Alternative
		FY10	FY11	FY12	FY13	Total End State	
F-16 Operations and Maintenance	0	0	0	432	988	988	0
F-16 Students	0	0	0	10	80	80	0
<b>F-16 Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>442</b>	<b>1,068</b>	<b>1,068</b>	<b>0</b>
F-22	926	926	463	463	0	0	0
<b>Other 49th Wing (49 WG) (Includes German Air Force)</b>	<b>5,664</b>	<b>5,664</b>	<b>5,664</b>	<b>5,664</b>	<b>5,664</b>	<b>5,664</b>	<b>5,664</b>
<b>Total Manpower</b>	<b>6,590</b>	<b>6,590</b>	<b>6,127</b>	<b>6,569</b>	<b>6,732</b>	<b>6,732</b>	<b>5,664</b>
<b>Net Change</b>	<b>0</b>	<b>0</b>	<b>-463</b>	<b>+442</b>	<b>+163</b>	<b>+142</b>	<b>-926</b>

The change in manpower requirements at Holloman AFB when viewed in combination with concurrent mission changes would result in a net increase of 142 personnel under the Proposed Action at the end state. The Air Force has assumed the military personnel would be accompanied by 2.2 dependents. Due to the temporary nature of the F-16 training, it is not expected that F-16 students would be accompanied by dependents. Therefore, the net increase in dependents would be 312 for a total change in population at Holloman AFB of 454.

### 2.2.4 Training Missions

The F-16 is a highly versatile aircraft capable of carrying out both air-to-air and air-to-ground missions. A list of typical training activities performed by F-16 pilots is provided in Table 2–6. These training activities would be conducted only in authorized airspace and ranges for the particular training mission. The QF-4s and T-38As stationed at Holloman AFB would be expected to provide dissimilar air combat training. Air Force operated ranges would provide air-to-ground capabilities for routine F-16 training within 100 nm of Holloman AFB and munitions employment training could be simulated in the training airspace. Training for these missions would be carried out in existing MOAs, ATCAAs, MTRs, restricted airspace, and on existing bombing ranges.

**Table 2–6. Projected F-16 Training Activities**

Activity	Description <sup>1,2</sup>	Altitude (feet)	Time in Airspace
Basic Surface Attack	Air-to-ground simulated delivery of munitions or delivery of inert ordnance such as training ordnance on a military training range.	Surface to 22,000 MSL	0.5 to 1.0 hour
Tactical Weapons Delivery	More-challenging multiple-attack headings and profiles where pilot is exposed to varying visual cues, shadow patterns, and the overall configuration and appearance of the target. Supersonic speeds that can include target acquisition are added to the challenge of weapon release accuracy.	Surface to 40,000 MSL	0.5 to 1.0 hour
Surface Attack Tactics	Practiced in a block of airspace (Military Operations Area [MOA] or restricted area) that provides room for supersonic speeds. Defensive countermeasures may be deployed. Precise timing during the ingress to the target, target acquisition, egress from the target area, and reforming into a tactical formation is practiced. Training ordnance is only used on approved ranges.	Surface to 40,000 MSL	0.5 to 1.0 hour

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Activity	Description <sup>1,2</sup>	Altitude (feet)	Time in Airspace
Basic Fighter Maneuvers	Training designed to apply aircraft (1 versus 1) handling skills to gain proficiency in recognizing and solving range, closure, aspect, angle, and turning room problems in relation to another aircraft to attain a position from which weapons may be launched or to defeat weapons employed by an adversary.	5,000 AGL to 30,000 MSL	0.5 to 1.0 hour
Air Combat Maneuvers	Training designed to achieve proficiency in formation (2 versus 1 or 2 versus 1+1), maneuvering, and the coordinated application of basic fighter maneuvers to achieve a simulated kill or effectively defend against one or more aircraft from a pre-planned starting position while using defensive countermeasures such as chaff and/or flares. Air combat maneuvers may be accomplished from a visual formation or short-range to beyond visual range.	5,000 AGL to 40,000 MSL	0.5 to 1.0 hour
Close Air Support (CAS)	Focuses on missions that provide direct support to ground forces that are in close proximity to enemy forces. A Forward Air Controller [FAC] uses radio contact to direct CAS. Training includes coordination with the FAC, precise location of friendly troops, and simulated delivery of ordnance on enemy positions.	500 AGL to 40,000 MSL	0.5 to 1.0 hour
Advanced Tactical Pods	During the day, the advanced targeting pods assist in navigation and weapons delivery at various altitudes. During the night, advanced targeting pods are used and training is performed at specified altitudes for navigation and weapons delivery training.	500 AGL to 40,000 MSL	0.5 to 1.0 hour
Aircraft Handling Characteristics	Training for proficiency in the use and exploitation of the aircraft's flight capabilities (consistent with operational and safety constraints) including, but not limited to, high/maximum angle of attack maneuvering, energy management, minimum time turns, maximum/optimum acceleration and deceleration techniques, and confidence maneuvers.	5,000 AGL to 60,000 MSL	0.5 to 1.0 hour
Basic Fighter Maneuvers	Training designed to apply aircraft (1 versus 1) handling skills; to gain proficiency in recognizing and solving range, closure, aspect, angle, and turning room problems in relation to another aircraft; and to attain a position from which weapons may be launched or to defeat weapons employed by an adversary.	5,000 AGL to 30,000 MSL	0.5 to 1.0 hour
Air Combat Maneuvers	Training designed to achieve proficiency in formation (2 versus 1 or 2 versus 1+1) maneuvering and the coordinated application of basic fighter maneuvers to achieve a simulated kill or effectively defend against one or more aircraft from a pre-planned starting position while using defensive countermeasures such as chaff and/or flares. Air combat maneuvers may be accomplished from a visual formation or short-range to beyond visual range.	5,000 AGL to 40,000 MSL	0.5 to 1.0 hour
Tactical Intercepts	Training (1 versus 1 up to 4 versus multiple adversaries) designed to achieve proficiency in formation tactics, radar employment, identification, weapons employment, defensive response, electronic countermeasures, and electronic counter countermeasures.	500 AGL to 40,000 MSL	0.5 to 1.0 hour
Night Operations	Aircraft intercepts (1 versus 1 up to 4 versus multiple adversaries) flown one-half hour after sunset including tactical intercepts, weapons employment, both offensive and defensive maneuvering, chaff/flare, and electronic countermeasures.	2,000 AGL to 40,000 MSL	0.75 to 1.5 hour
(Dissimilar) Air Combat Tactics	Multi-aircraft and multi-adversary (2 versus multiple to larger force exercises) conducting offensive and defensive operations, combat air patrol, defense of airspace sector from composite force attack, interception, simulation, and destruction of bomber aircraft, destruction/avoidance of adversary ground and air threats with simulated munitions and defensive countermeasures, strike-force rendezvous, and protection.	500 AGL to 60,000 MSL	0.5 to 1.0 hour
Suppression of Enemy Air Defenses (SEAD)	Highly specialized mission requiring specific ordnance and avionics that can include supersonic speeds and defensive countermeasures. The objective of this mission is to neutralize or destroy ground-based anti-aircraft systems.	Surface to 60,000 MSL	0.5 to 1.0 hour
Destruction of Enemy Air Defenses (DEAD)	A specialized mission that combines tactics, ordnance, and avionics to support the specific objective of destroying ground-based weapons that could threaten friendly forces.	500 AGL to 40,000 MSL	0.5 to 1.0 hour
Combat Search and Rescue (CSAR)	A specialized mission using aircraft, rescue teams, and specialized equipment to search for and rescue personnel in distress. Training is conducted at low airspeeds at 1,000 feet AGL or lower.	500 AGL to 40,000 MSL	0.5 to 1.0 hour

**Notes:**

<sup>1</sup> Ordnance (inert and live) can only be released on an air-to-ground range.

<sup>2</sup> All mission-training activities are conducted in Special Use Airspace (SUA) and on Military Training Routes (MTRs). Only simulated deliveries are conducted in this airspace.

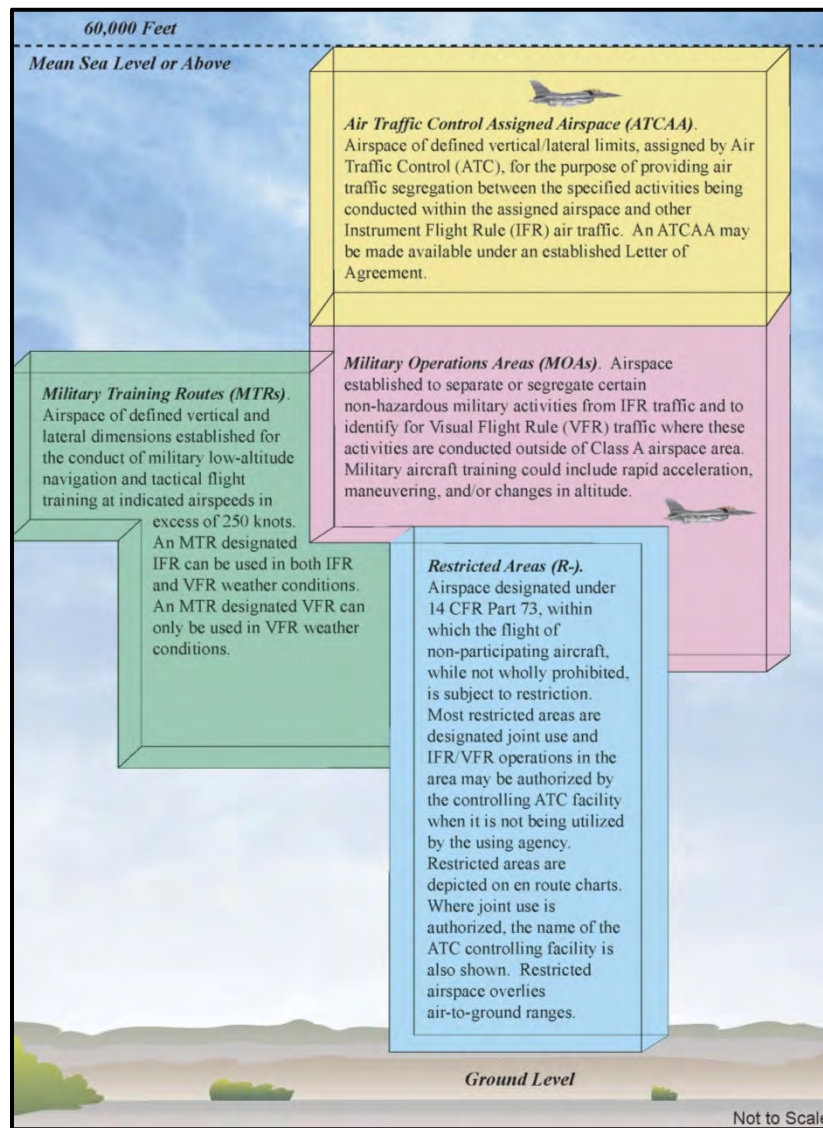
**Key:**

AGL = Above Ground Level

MSL = Mean Sea Level



Figure 2-2 illustrates the four types of airspace used by Holloman AFB aircraft. MOAs are established by the Federal Aviation Administration (FAA) to separate military training aircraft from nonparticipating aircraft (those not using the MOA for training). When a MOA is active, the FAA routes other air traffic around it. Nonparticipating military and civil aircraft flying under Visual Flight Rules (VFR) may transit an active MOA by employing see-and-avoid procedures. When flying under Instrument Flight Rules (IFR), nonparticipating aircraft must obtain clearance from air traffic control to enter an active MOA.



**Figure 2-2. Types of Training Airspace**

An ATCAA is airspace (often overlying a MOA) extending from 18,000 feet above Mean Sea Level (MSL) to the altitude assigned by the FAA. Assigned on an as-needed basis and established by a Letter of Agreement between a military unit and the local FAA Air Route Traffic Control Center (ARTCC), each ATCAA provides additional airspace for training. ATCAAs are released to military users by the FAA only for the time they are to be used, allowing maximum access to the airspace by nonparticipating aviation.

MTRs are flight corridors used to practice high-speed, low-altitude training and generally occur below 10,000 feet MSL. MTRs are described by a centerline, with defined horizontal limits on either side of the centerline and vertical limits expressed as minimum and maximum altitudes along the flight track.

Restricted areas are airspace used to separate nonparticipating air traffic from hazardous military activities. These areas are typically established over military airfields and training ranges and flight through a restricted area without approval from the using or controlling agency is not permitted. Activities within these areas must be confined due to their nature or must have limitations imposed upon aircraft operations that are not a part of those activities or both. Restricted areas denote the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles.

The F-16 incorporates several specialized capabilities that allow it to carry out Suppression of Enemy Air Defenses (SEAD)/Destruction of Enemy Air Defenses (DEAD) missions. Training for this type of mission and other less-specialized air-to-ground missions would be carried out primarily in three air-to-ground ranges: the Red Rio and Oscura Ranges on WSMR and the Centennial Range portion of McGregor Range.

The altitudes used within the available airspace volume are determined based on the type of training mission being carried out. Table 2-7 lists percentages of time spent by F-16 aircraft in several altitude bands within military training airspace.

**Table 2-7. Comparable F-16 and F-22 Altitude Use**

Altitude (feet)	Percent of Flight Hours	
	F-22 (Current)	F-16 (Projected)
Above 30,000 Mean Sea Level (MSL)	8	2
18,000-30,000 MSL	45	30
10,000 Above Ground Level (AGL) -18,000 MSL	30	30
5,000-10,000 AGL	12	15
2,000-5,000 AGL	4	10
500-2,000 AGL	1	13

Typically, a certain percentage of aircraft training operations must be conducted after dark (i.e., about one hour after sunset) so that pilots can maintain proficiency in nighttime flying. Aircrews operating from Holloman AFB can normally fulfill the annual night flying requirements during winter months without flying during the late night period (10:00 PM to 7:00 AM); however, accomplishing night training during the summer necessitates flying during the late night period. Overall, approximately 1 percent of total training sortie operations would occur (at least partially) after 10:00 PM.

### **2.2.5 Airspace and Use**

The F-16 would use existing regional airspace (Figure 2-3) and no modifications or enhancements are proposed. MOAs, ATCAAs, and MTRs projected for use by F-16 squadrons are managed by Holloman AFB. 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.



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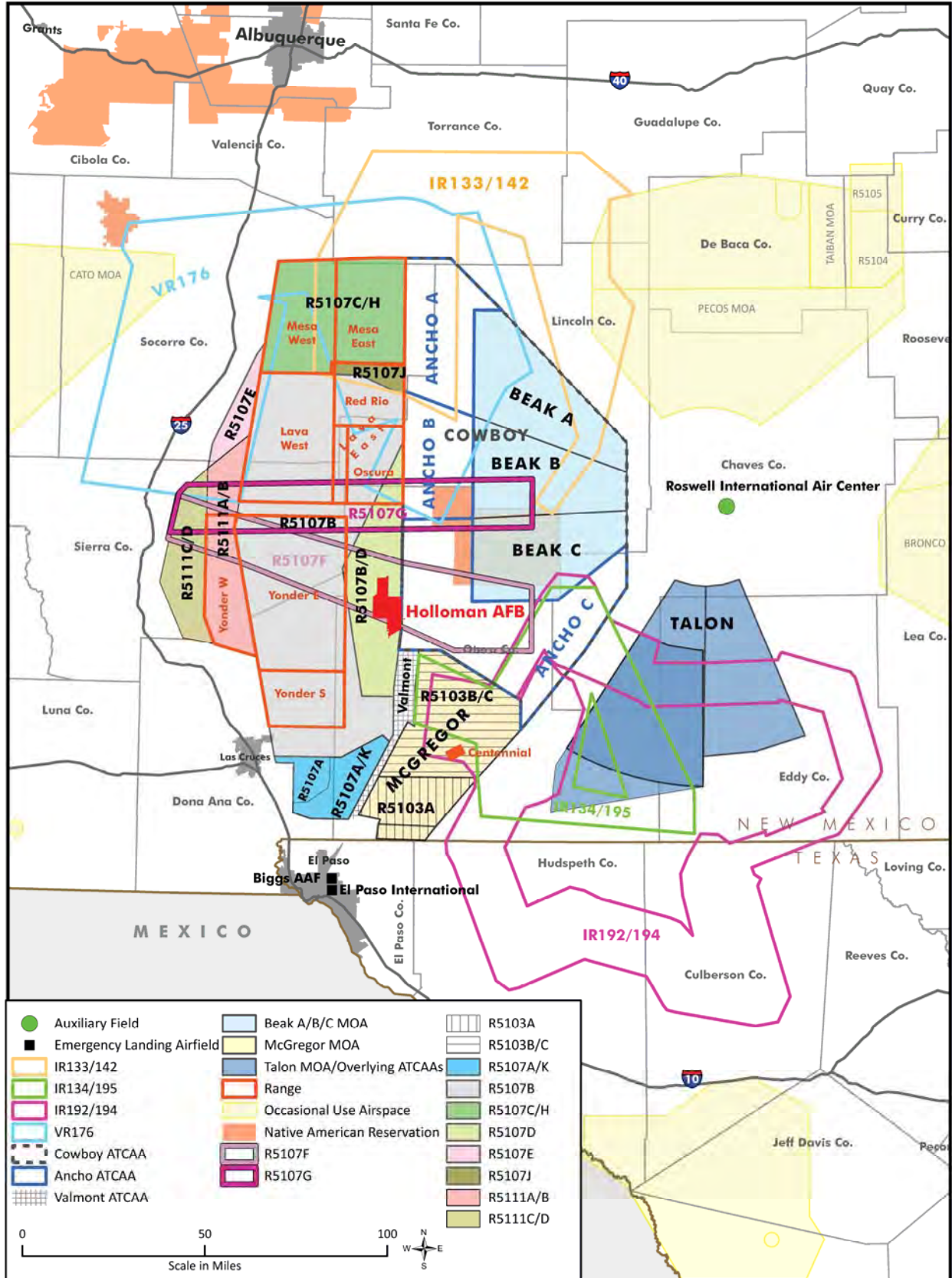


Figure 2-3. Regional Military Training Airspace Used by Holloman AFB

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The proposed F-16 aircraft would routinely fly training flights in one or more of the Holloman AFB airspace units. Activities in the training airspace are termed sortie-operations, which is defined as the use of one airspace unit by one aircraft. Each time a single aircraft flies in a different airspace unit, one sortie-operation is counted for that unit. Thus, a single aircraft can generate several sortie-operations in the course of a mission. Table 2-8 presents the current and projected sortie-operations in MOAs, ATCAAs, MTRs, and restricted airspace used by Holloman AFB-based aircraft

**Table 2-8. Baseline and Projected Annual Sortie-Operations in Training Airspace**

Airspace Unit	Supersonic Yes/No	Floor (feet)	Ceiling (feet)	Baseline Use			Projected Use		
				F-22	Other Military	Total	F-16 <sup>3</sup>	Other Military	Total
Beak A/B/C MOAs with overlying ATCAAs	No	12,500 AGL	FL 600	1,473	3,513	<b>4,986</b>	2,217	3,513	<b>5,730</b>
Talon MOA East/West	No	12,500 MSL	FL 180	23	1,527	<b>1,550</b>	969	1,527	<b>2,496</b>
R-5107 Red Rio	Yes (above 10,000 feet MSL)	Surface	Unlimited	0	1,327	<b>1,327</b>	1,194	1,327	<b>2,521</b>
R-5107 Oscura WSMR	Yes (above 10,000 feet MSL)	Surface	Unlimited	0	1,592	<b>1,592</b>	712	1,592	<b>2,304</b>
R-5107 Lava East/West	Yes (above 10,000 feet MSL)	Surface	Unlimited	2,230	5,320	<b>7,550</b>	743	5,320	<b>6,063</b>
R-5107 Mesa East/West	Yes (above 10,000 feet MSL)	Surface	Unlimited	2,211	5,275	<b>7,486</b>	885	5,275	<b>6,160</b>
R-5107 Yonder and Yonder South	Yes (above 10,000 feet MSL)	Surface	Unlimited	2,047	4,882	<b>6,929</b>	2,265	4,882	<b>7,147</b>
R-5103 Centennial Range	No	Surface	Unlimited	46	867	<b>913</b>	1,207	867	<b>2,074</b>
R-5103 McGregor A/B/C	A = No B & C = Yes (above 10,000 feet MSL)	Surface	Unlimited	0	880	<b>880</b>	427	880	<b>1,307</b>
IR 133/142	No	100 feet AGL	12,000 feet MSL	0	523	<b>140</b>	86	523	<b>868</b>
IR 134/195	No	100 feet AGL	12,500 feet MSL	0	140 <sup>1</sup>	<b>140</b>	86	140 <sup>1</sup>	<b>226</b>
IR 192/194	No	500 feet AGL	50,000 feet MSL	0	373 <sup>1</sup>	<b>373</b>	86	373 <sup>1</sup>	<b>459</b>
VR 176 (Short) <sup>1,2</sup>	No	100 feet AGL	1,500 feet AGL	0	98	<b>98</b>	86 <sup>2</sup>	98	<b>184</b>

**Notes**

<sup>1</sup> Primarily used by German Air Force Tornado aircraft.

<sup>2</sup> VR-176 Short uses route segments J through N as defined in Flight Information Publication AP-1B.

<sup>3</sup> F-16 operations would not fly lower than 500 feet AGL as per the applicable training syllabus; therefore, they are not projected to use R-5111 A/C, B/D, or Talon MOA Low.

**Key:**

AGL = Above Ground Level

ATCAA = Air Traffic Control Assigned Airspace

FL = Flight Level (the altitude above MSL that is based upon the use of a directed barometric altimeter setting and is expressed in hundreds of feet. Therefore, FL 600 is equal to approximately 60,000 feet MSL)

IR = Instrument Route

MOA = Military Operations Area

MSL = Mean Sea Level

VR = Visual Route

WSMR = White Sands Missile Range

F-16 aircraft are capable of reaching supersonic speeds up to Mach 2.0, which are employed primarily during air-to-air combat to support training and uses the full capabilities of the aircraft. All supersonic flight would occur at altitudes and within airspace already authorized for such activities. Table 2-9 describes the percent of flight hours spent in supersonic operations by the proposed F-16 aircraft and the current F-22 aircraft. Supersonic operations are permitted in R-5107 above 10,000 feet MSL (or about 5,500 feet Above Ground Level [AGL] considering local elevation). About 40 percent of supersonic activity would take place between 5,500 feet AGL and 10,000 feet AGL (14,500 feet MSL). Approximately 60 percent of supersonic flight would be conducted above 10,000 feet AGL.

**Table 2-9. Supersonic Flight under Current and Projected Conditions**

Altitude (feet)	Percent of Flight Hours	
	F-22 (Current)	F-16 (Projected)
>30,000 Mean Sea Level (MSL)	30	10
10,000 Above Ground Level (AGL)-30,000 MSL	50	50
5,500 -10,000 AGL	20	40

### 2.2.6 Air-to-Ground Training

The F-16 has an air-to-ground mission that includes the ordnance training presented in Table 2-10, which would primarily use the Red Rio and Oscura Bombing Ranges on WSMR and the Centennial Range portion of McGregor Range. All ordnance delivery training would adhere to the requirements and restrictions of the ranges. F-16 munitions use would occur on approved ranges at flight profiles designed to keep munitions within the range's safety footprint.

**Table 2-10. Current and Projected Annual Air-to-Ground Munitions**

Types	F-22 (Current)	F-16 (Projected)	Net Use
BDU-33 (25 pound)	0	3,456	3,456
Inert GBU-12, GBU-38 (500 pound inert)	200	576	376
MK-82 (500 pound live)	0	630	630
GBU-32 (1,000 pound)	100	0	-100
MK-84 (2,000 pound)	0	10	10
20 millimeter	0	204,800	204,800

The F-16 training syllabus includes live drops and the use of a Class A manned range. Red Rio Range is an approved range for live drops and no change in range status or configuration is planned. Improvements proposed for the Oscura and Centennial Ranges would upgrade these to Class A manned ranges as described below.

**Oscura Range** - This was previously a Class A range and has the requisite infrastructure to become a Class A range again. The primary aircraft using this range are the Tornado, H-60 helicopters, and MQ-9 RPAs. Munitions currently expended at this range include BDU-33, 20-millimeter (mm), and 7.62 mm ammunition. The layout of current and proposed improvements for the Oscura Range is shown in Figure 2-4, which includes:

- Install a strafe pit with two targets and an Improved Remote Strafe Scoring System (IRSSS) capability in the same location as the original strafe pit. Clear 500 feet by 1,000 feet area for pit and two dirt target berms and trench for installing scoring cable along

existing gravel road from pit to range compound building.

- Install an 8-inch-thick concrete pad, 100 feet by 100 feet with an 8-foot chain link fence (about 2,000 linear feet) around a 2.5-acre range compound area, with 20-foot wide gate.
- Relocate munitions holding area to outside the Weapons Danger Zone (WDZ) on a new area southwest of firebreak within an existing cleared (graded) area used as a target holding area.
- Interior renovations of existing structures in range compound area.
- Disc new run-in lines to existing target areas.
- Total disturbed area is about 12 acres for clearing and grading in previously disturbed areas.

**Centennial Range** - This range is currently used primarily by Tornado aircraft, MQ-9 RPA, and H-60 helicopters with lesser use by F-22s and F-16s. Munitions currently expended at the range include BDU-33, BDU-50, GBU (12, 15, 24, 31, 32, 38) 7.62 mm, 27 mm, 30 mm, .50 caliber, 20-mm, and 2.75-inch rockets. The locations for improvements proposed at Centennial Range are illustrated in Figure 2-5 including the following:

- A three-story Range Control Officer (RCO) tower with a footprint of 25 feet by 25 feet and a height of 30 feet. The facility would have power supplied by generator with auxiliary solar-powered system, 1,000-gallon propane tank, 10,000-gallon water storage tank, septic system, and an enclosed 30 foot by 30 foot covered carport for one fire truck outside the target area and required safety footprint.
- RCO tower and adjacent carport would be sited on graded area 50 feet by 100 feet along the existing fire break on the west side of Centennial Range. Trenching and installation of cable for remote scoring system between existing tower and new RCO tower within existing firebreak.
- Installation of a new IRSSS strafe pit with two targets; clear area for pit with dimensions of 500 feet by 1,000 feet with two dirt target berms and four instrument protective dirt berms; trench for scoring cable from pit to existing corner tower.
- Upgrade of 6.5 miles of existing firebreak road to become an improved gravel road with an improved base course, culverts, and engineered stormwater runoff areas (assumed width of 20 feet).
- Estimation of total of up to 20 acres disturbed in previously disturbed areas and about eight acres newly disturbed for strafe pit within existing bombing range boundary.

### **2.2.7 Air-to-Air Training**

The F-16 is a multi-role weapon fighter aircraft that uses air-to-air missiles and has a 20-mm gun for close-in air-to-air engagements. Most of the air-to-air training missions described in Table 2-6 would occur at higher altitudes and speeds and would not involve the release of weapons. Training for the use of these weapons is predominantly simulated, using all the performance, radar, and targeting systems that are available on the F-16 to support air combat maneuvering engagements. There is no training requirement to conduct live-fire air-to-air training.



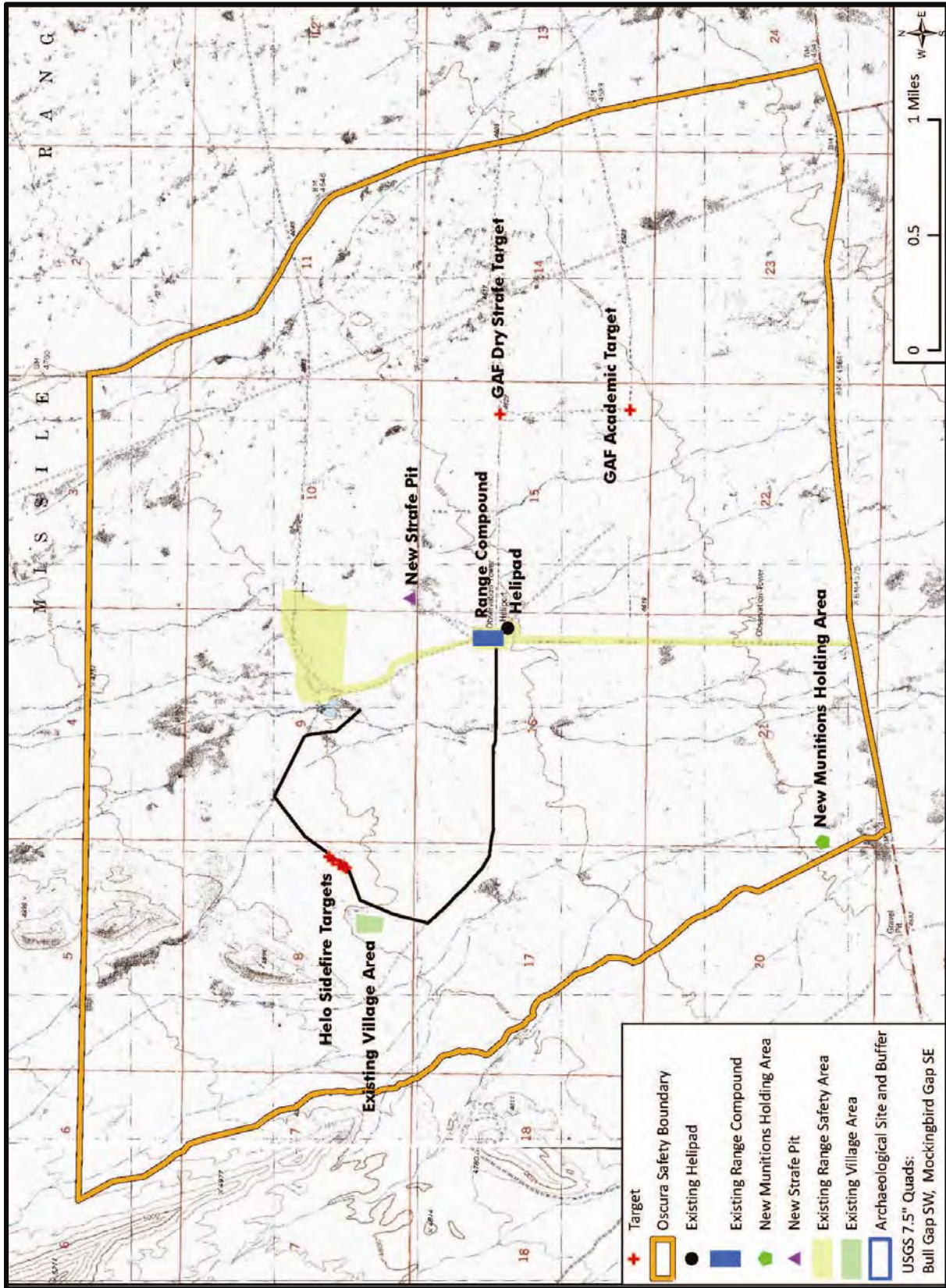


Figure 2-4. Location of Proposed Improvements at Oscura Range



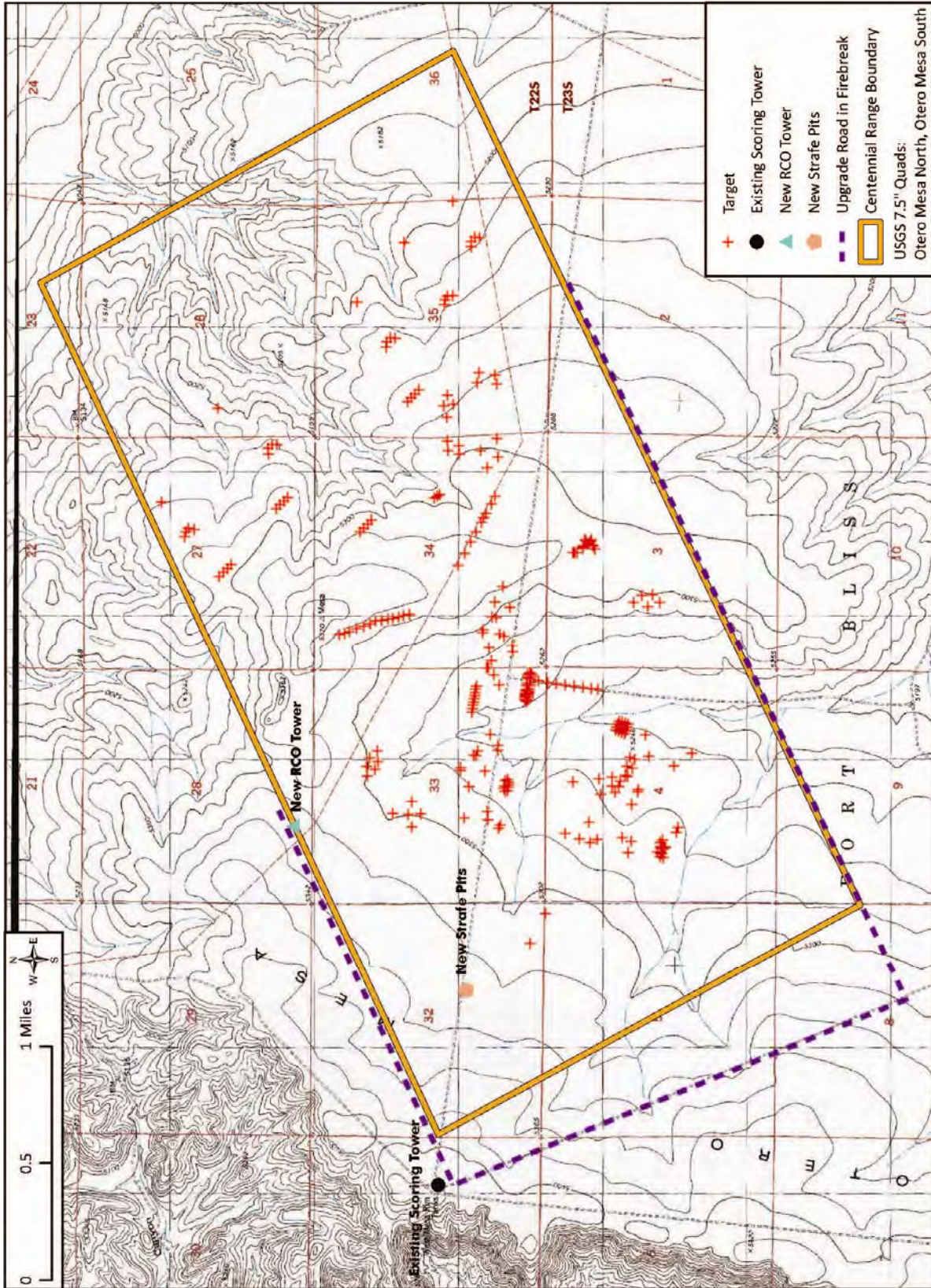


Figure 2-5. Location of Proposed Improvements at Centennial Range

### **2.2.8 Use of Defensive Countermeasures**

Chaff and flares are the principal defensive countermeasures dispensed by military aircraft to avoid detection or attack by the enemy's air defense systems and keep aircraft from being successfully targeted by weapons 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 nm of radar facilities for El Paso or Albuquerque air traffic control.

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 three to four 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 F-16 mission. Flares may be dropped from a minimum altitude of 2,000 feet 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.

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.

Under the Proposed Action, the F-16s would train with defensive chaff and flares in airspace units where use of such materials is currently permitted. Table 2-11 provides current chaff and flare use by F-22 aircraft and the amount proposed for use by the F-16. The Proposed Action includes F-16 use of 7,680 bundles of RR-188 type chaff and the same number of M-206 or MJU-7A/B flares per year. The number of defensive chaff bundles and flares used per year would be substantially less than the number used by F-22 aircraft under baseline conditions. Minimum flare release altitudes by the F-16 mission would be in accordance with current restrictions at the training ranges.

**Table 2-11. Current and Projected Annual Chaff and Flare Use**

Countermeasure	F-22	F-16	Net use
Chaff (bundles)	20,900	7,680	-13,220
Flares	11,200	7,680	-3,520



## 2.3 No Action Alternative

Section 1502.14(d) of NEPA requires analysis of a No Action Alternative. Under the No Action Alternative, the Proposed Action would not occur and no F-16 FTU would be established at Holloman AFB. The F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels.

## 2.4 Alternatives Considered but Not Carried Forward

The Air Force considered several alternative missions that could be relocated to Holloman AFB to meet the purpose and need described in Chapter 1. These alternatives were not carried forward for further analysis for reasons described in the following paragraphs.

Air National Guard (ANG) units were not considered a reasonable alternative as they are state agencies and ANG missions are allocated by the state. Any relocation of an ANG mission to another state would require ANG personnel assigned to the relocated mission to travel across state lines to participate in required training.

MQ-1/9 missions would not be reasonable alternative because they would not utilize the Holloman AFB airspace at close to capacity or in the same manner as the multi-role fighter would during air-to-air and air-to-ground training scenarios.

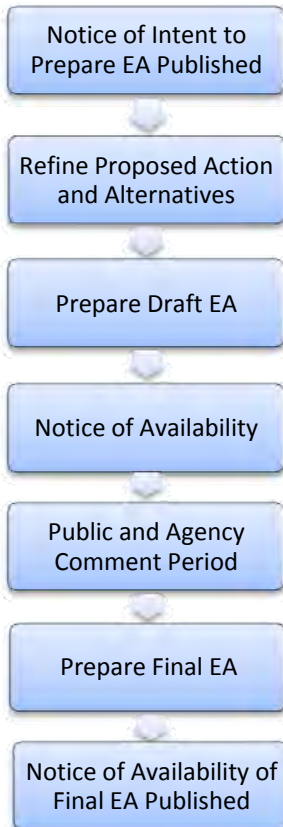
Light Attack Armed Reconnaissance Aircraft (LAAR) missions being considered through the basing process would not be available at the time required and would leave the range and airspace at Holloman AFB unused for several years. This timing also prevented consideration of the F-35A as an alternative in the short term. Long-term, Holloman AFB would be a viable location for F-35As, but the F-35As do not meet Holloman AFB's needs, as the F-35A mission would not be available until FY14, which would leave Holloman AFB ranges and airspace unused for two years.

## 2.5 Environmental Impact Analysis Process

The EIAP ensures that environmental information is available to the public, agencies, and decision-makers before making decisions and before implementing actions. The process involves several steps, including public and agency review of information pertinent to the Proposed Action and any alternatives and provides a full and fair discussion of potential consequences to the natural and human environment.

Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) letters were sent and responses received through 28 February 2011. At the time the IICEP letters were sent, the project was referred to as "Relocating an F-16 Formal Training Unit (FTU) to Holloman AFB, New Mexico". The project has subsequently been renamed to *Recapitalization of the*

### The EA Process





*49th WG Combat Capabilities and Capacities for Holloman AFB* to reflect the purpose of the Proposed Action better.

### **2.5.1 Scope of Resource Analysis**

The Proposed Action has the potential to affect certain resources as identified through communications with state and federal agencies and Native American governments and through review of past environmental documentation. To comply with NEPA and other environmental requirements, the decision-making process for the Proposed Action includes development of this EA to evaluate the potential environmental impacts associated with the Proposed Action. Specific resources with the potential for environmental consequences include airspace management, noise, safety, air quality, physical resources, biological resources, cultural resources, land use and recreation, socioeconomics, environmental justice, infrastructure, transportation, and hazardous materials and waste.

### **2.5.2 Public and Agency Input**

The EA process includes public and agency review of information pertinent to the Proposed Action and provides a full and fair discussion of potential consequences to the natural and human environment. The IICEP process was initiated with the distribution of letters and memoranda to federal, state, local, and tribal entities that have an interest in this federal action within the affected region soliciting public and agency input on the proposal. Sample correspondence, distribution lists, and responses from agencies are included in Appendix A. Responding agencies did not identify any particular issues of concern. The United States Fish and Wildlife Service (USFWS) referred to species lists available on an internet website as a point of consideration ([http://www.fws.gov/southwest/es/NewMexico/SBC\\_intro.cfm](http://www.fws.gov/southwest/es/NewMexico/SBC_intro.cfm)).

On June 14, 2011, the Draft EA was released for a 30-day public comment period. Copies of the Draft EA were distributed to IICEP recipients including Native American tribes and regulatory agencies. Hard copies of the Draft EA were also made available in the Alamogordo and Roswell Public Libraries for public access. An electronic copy of the Draft EA was posted on the Holloman AFB website at [www.holloman.af.mil](http://www.holloman.af.mil). A Notice of Availability was published in the Alamogordo Daily News, Roswell Daily Record, and Las Cruces Sun-News on June 14, 2011 notifying the public of the availability of the Draft EA on the website and in the libraries and initiating the public comment period.

Table 2-12 summarizes public comments received during the 30-day public and agency comment period and provides a response and reference to the document section where the comment response can be found. The Air Force received one comment letter from the public and four letters from agencies. These letters are provided in Appendix A.

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**Table 2–12. Summary of Public Comments Received**

Resource	Summarized Comment	EA Section and Response to Comment
General	Concern the Draft EA had limited distribution and was not available by public or local government agencies for 30 days.	Section 2.5.2 and Appendix A. The Draft EA was distributed to the recipients of the IICEP list, which included federal, state, and local governmental agencies. The Draft EA was available for 30-days at the Alamogordo and Roswell public libraries as well as on the Holloman AFB website.
	The EA does not review F-22 noise complaints or claims for damages.	Under other actions being implemented by the Air Force, F-22 aircraft will be consolidated at other locations and no longer be stationed at Holloman AFB.
Proposed Action	Concern there is not enough specificity in the training activities described in Table 2-6 in terms of airspace to be used, number of aircraft, and types of dissimilar aircraft to be used.	Table 2-6 shows the typical training missions conducted by the F-16 aircraft. These training missions would be conducted only in the authorized airspace and ranges. Ordnance would only be used on ranges in restricted airspace. Chaff and flares would only be used in authorized airspace. Specifics on the number of aircraft and the type of dissimilar aircraft is contingent on the availability of aircraft at Holloman AFB at the time; however, the QF-4s and T-38As currently stationed at Holloman AFB would be expected to fulfill this role as they currently do for the F-22. This discussion has been added to Section 2.2.4 of the Final EA.
	Concern there is not enough specificity on where and how much chaff and flares would be used.	In the Draft EA, Table 2-11, Section 2.2.8 listed the amount of chaff and flares proposed for use by the F-16 training mission. Section 2.2.8 and Section 4.3.2 also described where and under what conditions chaff and flares would be used.
Airspace Management and Use	Concern that the proposal will include enhancements to the existing airspace and would allow airspace to be used as a training range.	Section 2.2.5 describes how the F-16 would use the existing airspace. Section 4.1.2.1 describes how the existing airspace structure is adequate to meet the F-16 training requirements without the need to expand or establish new airspace.
Noise	Concern that noise levels and compatibility for residential areas were not given the same level of analysis as the residential areas on Holloman AFB.	The Draft EA analysis presented in Section 3.2 determined that noise levels greater than 65 db DNL would not extend into the greater part of the city of Alamogordo. Section C.3.1 in Appendix C explains that 65 dB DNL is the cumulative noise level most commonly used for noise planning purposes and impacts to surrounding communities.
	The EA states that noise levels greater than 75 decibels would not extend off base but with sonic booms and focused booms noise levels off base would be greater than 75 decibels.	Different noise metrics are used to estimate noise levels surrounding an airfield and noise levels related to sonic booms and focused booms. These noise metrics are defined in Section C.2 in Appendix C. Section 4.2 discusses that noise from sonic booms would decrease under the Proposed Action with the exception of a less than 2-dB increase in noise levels from supersonic operations in Red Rio and Oscura Ranges on WSMR.
	Sonic booms, specifically focused booms, have documented impacts on human health and quality of life. Humans and animals do not habituate to sonic booms.	Potential noise impacts on auditory and non-auditory health as well as annoyance (i.e. quality of life) are discussed in Appendix C (Section C.3). In most locations, implementation of the Proposed Action is expected to result in reductions in supersonic noise levels relative to baseline conditions.
	Table 3-11 shows 0 at 80 dB DNL but does not explain where the information came from.	Table 3-11 includes a source citation for the information. The noise levels were calculated using the NOISEMAP model used for the noise analysis in Section 3.2 and described in detail in Section C.4 of Appendix C. The noise contours evaluated by the NOISEMAP model were then applied to GIS data supplied by the Alamogordo Department of Planning and Zoning and the New Mexico office of the Bureau of Land Management.

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Resource	Summarized Comment	EA Section and Response to Comment
Safety	Concern for the impacts of an F-16 Class A mishap while flying over populated areas, particularly since the F-16 uses hydrazine.	Section 4.3.2.1 acknowledged and described the potential for fire and environmental contamination of an F-16 Class A mishap, specifically in regards to an F-16 crash. This section also describes the potential contamination and dispersion of hydrazine in this situation.
	Concern that flares will be used by the military during extreme fire danger and severe drought.	Section 2.2.8 of the Draft EA indicated that Holloman AFB restricts flare use during very high or extreme fire danger.
Air Quality	Concern that air quality has decreased and air pollutants have increased as activity at Holloman AFB has increased.	Sections 3.4 and 4.4 of the Draft EA analyzed the potential air quality impacts from the F-16 training mission. This analysis concluded that while air emissions would increase, the emissions would not exceed the standards set by the National Ambient Air Quality Standards established by the U.S. Environmental Protection Agency or the New Mexico Ambient Air Quality Standards established by the New Mexico Environmental Improvement Board.
	Concern for the impacts on air quality from increased ground disturbance from F-16 bombing and gunnery operations.	Text has been added to Section 4.4.2.1 of the Final EA. Bombing and gunnery operations would produce fugitive dust emissions upon impact. As these operations would occur in designated target areas, some ordnance impactions would occur on previously disturbed lands minimizing the potential for fugitive dust emissions. In addition, these operations would occur intermittently and the increase in emissions would not be expected to contribute to an exceedance of an ambient air quality standard. Since these operations would occur intermittently, emissions from the increase in proposed ordnance usage would not be expected to contribute to an exceedance of an ambient air quality standard.
Physical Resources	Concern that pollutants from chaff would contaminate private property. Residual material from chaff has been found on private property.	All chaff consists of fine segments (thinner than a human hair) of aluminum-coated silica cut to lengths of ½ to two or more inches to reflect radar signals from threats to aircraft. Chaff rapidly breaks up to become indistinguishable from native soils. Chaff use would not be able to be discerned in the environment and would not produce a significant effect on water or soils under the airspace. These materials are inert and are not expected to be concentrated in any way that could impact soil or water resources.
Environmental Justice	Minority and low-income individuals are being negatively impacted by dangerous noise levels and exposure to pollutants.	Section 3.10.2 and Section B.10 discussed the methodology used in evaluating impacts to children, minority, and low-income populations. Based on guidance from the FAA and DoD in determining compatibility of residential use with aircraft noise, noise levels greater than 65 dB DNL were evaluated for potential disproportionate impacts in accordance with the Air Force's Guide to Environmental Justice Analysis.
	Children in the local communities are being impacted by dangerous noise levels, pollutants, and under danger zones should an aircraft crash. The Draft EA has too much focus on the impacts to Holloman AFB children.	Section 3.10.2 and Section B.10 of the Draft EA discussed the methodology used in evaluating impacts to children, minority, and low-income populations. Based on guidance from the FAA and DoD in determining compatibility of residential use with aircraft noise, noise levels greater than 65 dB DNL were evaluated for potential disproportionate impacts. Section 3.2 and 4.2 analyzed noise levels at Holloman AFB and under the training airspace. The only schools and childcare centers affected by these high noise levels are located on Holloman AFB. Section 3.4 and 4.4 analyzed the level of air emissions and pollutants introduced by the proposed action. This evaluation determined that the projected increases in air emissions would be less than significant.
Hazardous Waste and Materials	More information needs to be provided on what the chemical hydrazine is and how the waste is handled.	Section 4.3.2.1 in the Draft EA provided information on the use and composition of hydrazine. No hazardous wastes are generated with the maintenance of the equipment containing hydrazine.

## 2.6 Regulatory Compliance

This EA has been prepared to satisfy the requirements of NEPA (Public Law [P.L.] 91-190, 42 USC 4321 *et seq.*) as amended in 1975 by P.L. 94-52 and P.L. 94-83. In addition to complying with NEPA (Section 2.5), Table 2-13 presents additional reviews and permits required if the F-16 mission is selected for Holloman AFB.

**Table 2-13. Reviews and Permits Required for Implementing the Recapitalization of the 49th Wing (WG) Combat Capabilities and Capacities to Holloman AFB**

Review/Permit	Responsible Agency(ies)	Action Requiring Analysis, Permit Review, and/or Permit
<b>Federal</b>		
National Environmental Policy Act of 1969 (42 USC 4321 <i>et seq.</i> )	Council on Environmental Quality (CEQ)	Full compliance would be achieved upon issuance of a signed Finding of No Significant Impact (FONSI) (if appropriate)
32 CFR 989, Air Force Environmental Impact Analysis Process	Air Force	Full compliance would be achieved upon issuance of a signed FONSI (if appropriate)
Section 7 of the Federal Endangered Species Act (ESA)	United States Fish and Wildlife Service (USFWS)/Air Force	Construction and operational changes associated with recapitalization of the 49 WG
<b>State</b>		
Construction Permit	Air Force/New Mexico Air Quality Bureau (AQB)	If net change in emissions for existing paint booth facilities exceed jet engine testing or new construction equipment such as boilers and emergency diesel engines permitted levels, modify permit
Prevention of Significant Deterioration (PSD) Permit	Air Force/AQB	If net change in emissions from the hush house facility exceeds permitted levels, modify permit
National Pollution Discharge Elimination System Permit (NPDES)	Air Force/New Mexico Environment Department (NMED)	Land alteration of more than one acre
National Historic Preservation Act (NHPA) Section 106	Consultation with State Historic Preservation Office (SHPO) and Notification to Advisory Council on Historic Preservation	Potential overflight consequences for off base historic properties, construction effects on historic Air Force facilities on base, and effects on cultural resources on the ranges

## 2.7 Environmental Comparison of Alternatives

Table 2-14 presents the summary of environmental consequences for Holloman AFB due to the proposed recapitalization of the 49 WG combat capabilities and capacities.

**Table 2-14. Summary of Consequences by Resource at Holloman AFB**

Resource, EA Section	Proposed Action	No Action Alternative
Airspace Management and Use Section 3.1	The Holloman airfield would experience an 11 percent increase in air operations, but the air traffic's management system is robust and can accommodate this traffic without any adverse effects.	Existing procedures for airspace management and coordination would remain in place. Existing airspace would handle fewer operations.
Noise Section 3.2	Noise levels at the airfield and in the surrounding area would decrease. The area exposed to 65-decibel (dB) Day-Night average noise Levels (DNL) and above would decrease by 16,671 acres, and the affected population would decline by 27 persons.	Decrease in noise surrounding the airfield from fewer operations.

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Resource, EA Section	Proposed Action	No Action Alternative
Safety Section 3.3	The new aircraft type would not cause any appreciable change in ground or flight safety procedures. Necessary manpower adjustments and facility improvements to support specific services for the new aircraft would provide adequate capacity to perform routine functions safely.	All existing safety procedures would remain in place and no construction would occur.
Air Quality Section 3.4	Emissions for construction fall below Prevention of Significant Deterioration (PSD) thresholds for all pollutants. Volatile Organic Compound (VOC) and Nitrogen Oxide (NO <sub>x</sub> ) emissions from the F-16 airfield operations would increase from current levels while emissions from Carbon Monoxide (CO), Sulfur Dioxide (SO <sub>2</sub> ), and Particulate Matter less than 2.5 microns and less than ten microns (PM <sub>2.5</sub> and PM <sub>10</sub> ) would decrease. Therefore, the implementation of the Proposed Action would produce less than significant air quality impacts and would not cause an exceedance of air quality standards.	There would be no construction emissions since there would be no renovation or new construction. There would be lower emissions from reduced aircraft operations and commuting personnel.
Physical Resources Section 3.5	Disturbance of up to 12 acres could cause some loss of soil. Since more than one acre would be disturbed by construction, a National Pollutant Discharge Elimination System (NPDES) stormwater permit would be required. Construction projects would incorporate appropriate erosion control measures in accordance with the base's Stormwater Pollution Prevention Plan (SWPPP) to minimize soil loss and migration of soil into surface waters.	There would be no ground disturbing activities so there would be no change to geology and soils. There would be a decrease in the use of water resources.
Biological Resources Section 3.6	Construction and operations around the airfield would affect previously altered habitats. The project area does not support any federally listed species, and therefore no impact would result. State-listed burrowing owls may be present in the construction areas. If burrowing owls were found at any site, construction activities would halt and consultation with the New Mexico Department of Game and Fish (NMDGF) would ensue to determine an appropriate course of action. Coordination with United State Fish and Wildlife Service (USFWS) on this action has been completed with the USFWS indicating no comments on the findings in this EA.	Effects to biological resources on the base would continue from a reduced level of activity. There would be a lower risk of Bird Air Strike Hazard (BASH).
Cultural Resources Section 3.7	Construction, demolition, and renovation will not adversely affect any structures that are eligible for the National Register of Historic Places (NRHP); no archaeological impacts are anticipated. Consultation with the State Historic Preservation Office (SHPO) was concluded with SHPO's concurrence on the determination of no significant impacts to cultural resources. Holloman AFB coordinated with tribal governments as part of the environmental process. The Mescalero Apache indicated there were no comments on the proposal after being contacted by a representative of Holloman AFB.	There would be no change from existing conditions except for the reduced noise at White Sands National Monument.
Land Use and Recreation Section 3.8	Reduced noise levels around the airfield would provide slightly beneficial effects for land uses and recreation, both on Holloman AFB and in surrounding areas such as White Sands National Monument. During construction, some temporary effects of dust and traffic may be inconvenient for activities on base, but would not affect land use.	There would be no construction or personnel changes so there would be lower noise levels on base and environs including White Sands National Monument.

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Resource, EA Section	Proposed Action	No Action Alternative
Socioeconomics Section 3.9	A net increase of 142 positions and 312 dependents would provide a stimulus for the local economy. Local housing market, schools, and community services have adequate capacity to accommodate the 1.5 percent increase in population. Off-base residents would not be exposed to noise levels greater than 75 dB DNL.	Reduction of 926 personnel and up to 2,037 dependents associated with F-22 mission could also result in reduction of 157 induced jobs in Otero County and a potential loss of \$145.7 million in economic output. Availability of additional housing units would alleviate some pressure in the housing market and schools would have additional capacity.
Environmental Justice Section 3.10	Since there are no significant environmental or health effects caused by this action, no disproportionately high and adverse impacts to minorities or low-income populations are anticipated. The schools and childcare center located on Holloman AFB would experience a decrease in noise of 1 dB as compared to baseline.	There would be no adverse impacts to minority or low-income populations. Populations of concern, schools, and childcare centers continue to be exposed to noise levels at or less than noise levels under the baseline conditions.
Infrastructure Section 3.11	An increase of 454 Air Force personnel and dependents would generate a Less than one percent increase in water use and wastewater generation would have negligible impact on the base and on Alamogordo's systems. Energy use may increase by an estimated 6 percent for electrical use and 9 percent for natural gas use with newly constructed facilities. New "green" standards and specifications would achieve lower energy consumption per square foot for new facilities and adequate capacity is available from current providers.	Reductions in domestic water use, wastewater generation, generation of domestic solid waste, and energy use with fewer personnel on the base.
Transportation Section 3.12	A 6 percent increase in commuting and on-base traffic would not cause any noticeable change in traffic levels or access. During construction, commercial vehicles would follow project specific safety plans and access routes.	Reduction in personnel by FY13 would result in less traffic on base, through access gates, and on local highways.
Hazardous Materials and Waste Section 3.13	An estimated increase of 60 percent in the consumption of jet fuel is within the capacity of the current fuel storage and distribution system. A new hydrazine facility would provide for the specific needs of this product used by the F-16 aircraft and would consist of an enclosed concrete block building with metal roof, internal secondary containment, and security fence. Some increase in volumes of hazardous waste generation would remain within the permitted levels for Holloman AFB as a large quantity generator.	With fewer aircraft to maintain and operate, hazardous wastes would be generated at lower levels than current.



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Table 2-15 presents the summary of environmental consequences at the airfield and under the airspace used for training after implementation of the Proposed Action.

**Table 2-15. Summary of Consequences by Resource under Training Airspace**

Resource EA Section	Proposed Action	No Action Alternative
Airspace Management and Use Section 4.1	Minor increases in sortie-operations of five or less per day in Military Operations Areas (MOAs) and Air Traffic Control Area Airspace (ATCAAs) and one per day in Military Training Routes (MTRs) would not adversely affect management of special use airspace. The use of the Roswell International Air Center (RIAC) as an auxiliary field for up to 8,960 annual operations can be accommodated via prior coordination with local the airport's air traffic controllers to establish protocols flight tracks for the F-16 pattern work.	No change in procedures for air traffic management in regional military airspace but there would be fewer operations.
Noise Section 4.2	Subsonic noise levels beneath all training airspace units would remain below 65 dB DNL. The areas beneath Red Rio, Oscura, and Centennial Ranges would increase to 58, 56, and 52 dB DNL <sub>mr</sub> , respectively. DNL <sub>mr</sub> in areas beneath Lava, Mesa, Yonder, and McGregor Range airspaces would not change. Increases in subsonic noise levels would be expected to increase the likelihood of annoyance in affected persons; however, the restricted airspace units overlie land that is owned by DoD so few persons (not associated in some way with a military) would be affected. Subsonic noise levels beneath Beak MOA would remain below 45 dB DNL <sub>mr</sub> and DNL <sub>mr</sub> beneath Talon MOA would not change. Noise levels beneath the MTRs would increase by less than one dB. Supersonic noise levels would increase slightly (less than 2 dB) in Red Rio and Oscura Range airspace, but would decrease beneath the other training airspace units. Munitions noise levels would increase at Red Rio Bombing Range, with levels of 62 CDNL extending to 1.4 nautical miles (nm) from targets; however, the closest non-military land is 3.4 nm away. There would be no appreciable change in munitions noise levels at Oscura or Centennial bombing ranges. Proposed operations at RIAC would increase the area affected by noise levels greater than 65 dB DNL by 1,229 acres, and newly affect an estimated 58 residents.	There would be slight decreases in subsonic noise levels in military airspace, reduced supersonic noise, and somewhat lower impulsive noise levels at bombing ranges.
Safety Section 4.3	Flight safety considerations would be similar to current and prior military activities operating from Holloman AFB. The F-16 mission would follow all existing and any particular protocols or procedures for the aircraft to ensure safety of pilots and persons on the ground.	There would be lower risk for flight mishaps with fewer aircraft and less chaff and flares would be used.
Air Quality Section 4.4	Emissions from aircraft operations would not exceed the 250 Tons Per Year (TPY) threshold of significance for any pollutant. NO emissions would decrease by 17.5 TPY in military training airspace including R-5107, 20 miles from the Bosque del Apache Wilderness Class 1 PSD area. Natural dispersion would dilute concentrations of visibility-impairing pollutants in this area.	Lower emissions levels with fewer air operations in regional airspace; slight but minimal positive impact on air quality
Physical Resources Section 4.5	New construction and improvements on Centennial and Oscura ranges would occur mostly in previously disturbed and regularly cleared areas. Since more than one acre of area would be disturbed, a NPDES stormwater permit would be required. Using standard erosion control measures prescribed in the each range's Stormwater Pollution Prevention Plan (SWPPP), impacts to soils and surface water would be minimal.	No soil erosion would occur, as construction projects would not be implemented. Reduced levels of aircraft operations and defensive countermeasure use would reduce potential effects to soil and water resources.

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Resource EA Section	Proposed Action	No Action Alternative
Biological Resources Section 4.6	<p>Areas underlying proposed training airspace are currently exposed to military aircraft noise and as a result, noise is part of the current environment for wildlife. Noise levels underlying restricted airspace on White Sands Missile Range (WSMR) and on McGregor Range of Fort Bliss would increase slightly, but should not affect wildlife populations. The risk of indirect effects from fire caused by flares would be low due to altitude restrictions for their use and limitation on use when fire hazards are high. Concentrations of chaff and flare debris would not result in conditions that affect biological resources. Eight special status species in the region are not likely to be affected by the modest change in noise conditions and continued deployment of chaff and flares in some airspace.</p> <p>Construction and improvements on two active bombing ranges (Oscura and Centennial) are proposed in areas already modified by these uses. The USFWS may recommend no ground disturbance near active bird nests during nesting season. Coordination with USFWS on this action has been completed with the USFWS indicating no comments on the findings in this EA.</p>	Fewer air operations and reduced noise levels in regional military airspace would have minor beneficial impact on wildlife and migratory birds.
Cultural Resources Section 4.7	Impacts from noise vibration on historic structures or archaeological resources in the region are likely to be less since the F-16 produces less intense sonic booms than the F-22 that currently operates in the region. Holloman AFB consultation with SHPO has concluded with SHPO's concurrence on the determination of no significant impacts to cultural resources. Holloman AFB coordinated with tribal governments as part of the environmental process. The Mescalero Apache indicated there were no comments on the proposal after being contacted by a representative of Holloman AFB.	There would be little change from existing conditions. There would be fewer sonic booms and decreased impulsive noise reduces potential impact on archaeological resources and historic structures.
Land Use, Section 4.8	Subsonic noise levels would decrease or remain the same except at Red Rio, Oscura, and Centennial Ranges. There are no Special Use Land Managed Areas (SULMAs) intersecting these locations and therefore no subsonic noise impacts. Noise levels would be below 65 dB DNL <sub>mr</sub> in all other areas. Noise levels from munitions and training operations would be similar to current and recent levels and the approved military uses of Centennial Range. Levels of 62 CDNL and above would extend out about 1.4 nm from the target areas, but would not extend outside the McGregor Range boundary. The overall impact on recreation areas from changes in noise levels is expected to be minimal. Increased noise around RIAC may affect some low-density rural residential areas on the north and northeast side of the airfield newly exposed to incompatible noise levels above 65 dB. Projected noise levels are not expected to change or displace current land uses but would pose a moderate adverse impact in specific residential locations.	There would be a slight benefit to land use, especially in areas of natural quiet, from fewer operations in military airspace. There would be no change in land use.
Socioeconomics Section 4.9	Noise levels under training airspace would remain below 65 dB DNL <sub>mr</sub> , and would not trigger any socioeconomic indicators for effects on property values. Higher noise levels around RIAC are not expected to change economic decisions and property values significantly, since this area has developed and been influenced by activities at the airfield for many years.	There would be no change from existing conditions.
Environmental Justice Section 4.10	The minority and low-income populations affected by noise levels greater than 65 dB DNL is comparable to the minority and low-income population in Chaves County, which is defined as the community of comparison. Flight operations from the F-16 at the RIAC would not present a disproportionately high or adverse impact to populations of concern. Therefore, no significant impacts are anticipated.	There would be no change from existing conditions.

## 3 Holloman AFB Affected Environment and Consequences

The definition of resource, its methodology for evaluation, and key terms and definitions are discussed in detail in Appendix B.

### 3.1 Airspace Management and Use

#### 3.1.1 Affected Environment

The airspace environment established for Holloman AFB and the surrounding region supports a diverse variety of aircraft types and mission activities. The Class D airspace immediately surrounding the airfield extends from the airfield surface up to and including 6,600 feet MSL within a radius of 4.8 statute miles of the airfield. This Class D airspace excludes a two square mile radius for the Alamogordo-White Sands Regional Airport, which is located approximately five nm east of the base. The airfield elevation is 4,093 feet MSL and the Holloman AFB Air Traffic Control (ATC) tower is responsible for managing aircraft operations within the airfield environment encompassed by the Class D airspace. Airfield operations are served by runway 7/25 (12,917 feet), runway 16/34 (12,132 feet), and runway 04/22 (10,576 feet).

Instrument approach procedures established for runways 16, 22, and 34 provide a means of navigating to the runway without using visual references to the ground by using aircraft instruments and ground-based electronic communications systems or devices. The intersecting runway configuration at Holloman AFB provides the capability for aircraft to operate simultaneously on different runways as permitted by air traffic conditions and control separation standards. The published airfield hours of operation are 6:00 AM to midnight, Monday through Thursday; 6:00 AM to 9:00 PM on Friday; 8:00 AM to 4:00 PM on Saturday; and closed on Sunday and holidays unless otherwise coordinated.

The number of airfield operations at Holloman AFB varies from year to year as the differing types of aircraft operating at this base and the various test, training, and exercise missions change. Table 2-2 indicates the baseline for comparison with the proposed F-16 operations. This baseline includes the current based F-22 aircraft as well as the RPA mission recently assigned to Holloman AFB for a total baseline of 91,366 annual airfield operations.

The FAA's Albuquerque ARTCC has overall responsibility for the airspace within this region and delegates the larger Class C airspace, surrounding the base to the Holloman AFB Radar Approach Control (RAPCON) facility. RAPCON is responsible for providing ATC radar services to all air traffic operating within this airspace including aircraft arrivals and departures at both Holloman AFB and the Alamogordo-White Sands Regional Airport.

#### 3.1.2 Environmental Consequences

##### 3.1.2.1 Proposed Action

It is anticipated that two F-16 squadrons would conduct nearly 11,000 sorties per year from Holloman AFB based on training requirements for the aircrew flight. These sorties would generate over 45,500 airfield operations (takeoffs/landings/low approaches/touch and go's), as shown in Table 2-2. This table compares the current baseline operations (91,366) with those projected through FY13 with both the proposed F-16 squadron basing and the departure of the F-22 mission by the fourth quarter of FY13. These actions would result in nearly an 11 percent

increase over baseline levels. Such an increase could be effectively managed and accommodated within the existing Class C and D airspace structures and ATC system capabilities without imposing any negative consequences on military or civil air traffic operations. In addition, it is not anticipated that this proposal would require any significant changes to the air traffic patterns/flows, instrument procedures, or ATC services.

### **3.1.2.2 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons would depart by the fourth quarter of FY13. Other military tenants and users would continue to operate at current levels. There would be a reduction in operations at the airfield, but management and coordination of the existing airspace units and ATC capabilities would continue to support the mission.

## **3.2 Noise**

Noise (unwanted sound), has the potential to impact several environmental resource areas. This section describes noise impacts on human annoyance and health and its physical impacts on structures in the Holloman AFB Region of Influence (ROI). Noise impacts on biological, land use, socioeconomic, and cultural resources are described briefly in this section and discussed in more detail in separate sections dealing with those environmental resources. A discussion of the methods used to analyze noise throughout this EA can be found in Appendices B and C.

### **3.2.1 Affected Environment**

Holloman AFB supports the operations of several aircraft types including F-22, T-38, QF-4, MQ-1, MQ-9, Tornado, and various transient aircraft. The baseline Day-Night Average Sound Level (DNL) noise contours shown in Figure 3-1 reflect DNL noise levels at Holloman AFB with all squadrons currently based on the installation at full strength. At this time, neither the F-22 nor the RPA squadrons have received their full complements of aircraft. Noise levels were calculated using the computer NOISEMAP program version 7.3.

Noise levels at several representative noise sensitive locations on Holloman AFB under baseline conditions are presented in Table 3-1. DNL at these locations is between 73 and 74 dB under baseline conditions. The areas near the representative locations would experience similar aircraft noise levels and noise impacts. The Equivalent Sound Level during a typical School Day ( $L_{eq}[SD]$ ) at the elementary school is 73 dB and  $L_{eq}(SD)$  at the middle school is 74 dB. During a hypothetical busy hour during the school day with twice as many operations as the average daytime hour,  $L_{eq}(SD)$ -1hr at the elementary and middle schools would be 76 and 77 dB, respectively.



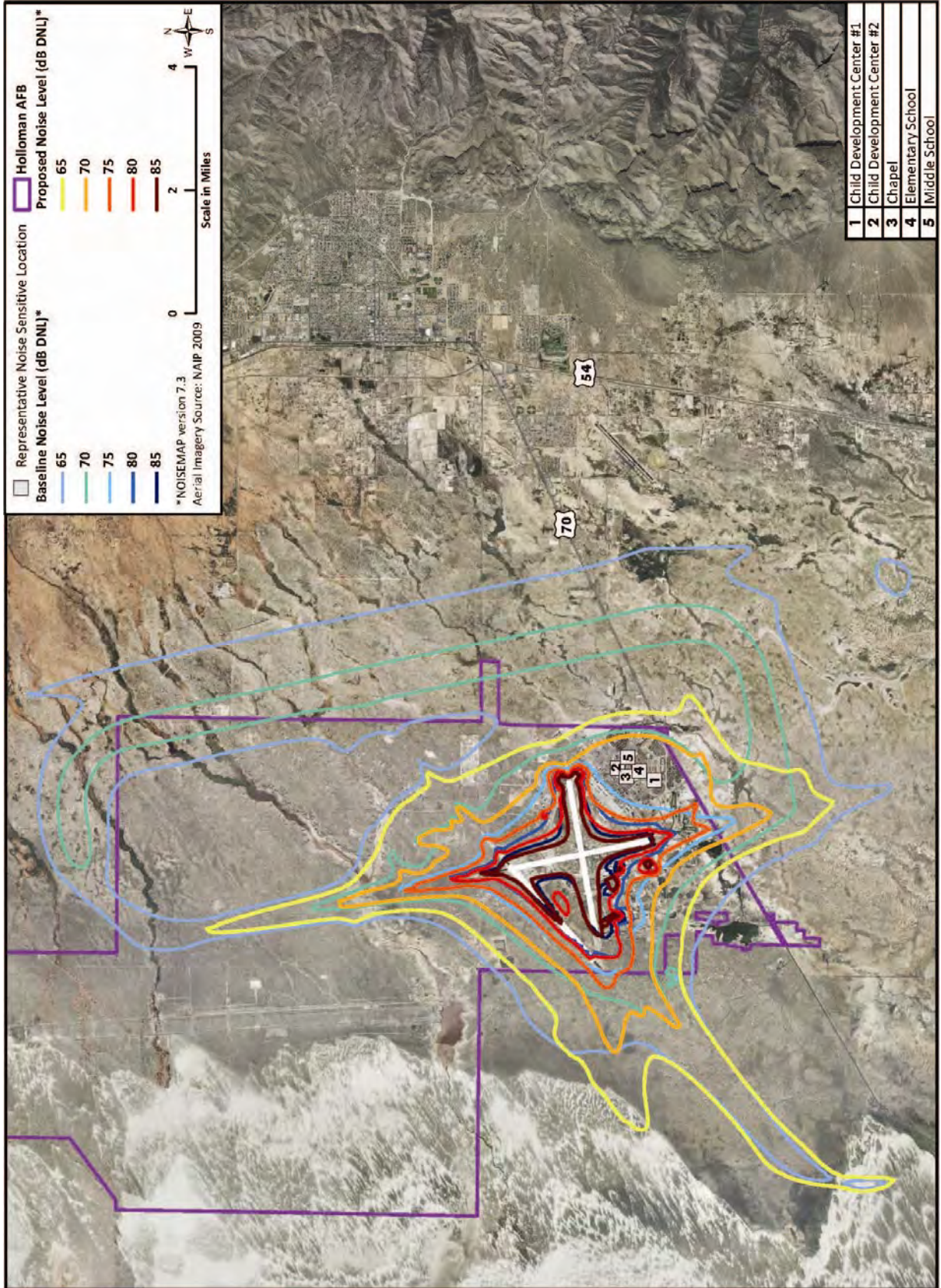


Figure 3–1. Baseline and Proposed Action Noise Contours at Holloman AFB

**Table 3–1. Noise Levels at Selected Noise-Sensitive Locations under Baseline Conditions and the Proposed Action**

ID#	General Description	Day-Night Average Sound Level (DNL)	Equivalent Sound Level during a typical School Day (Leq-SD)	Equivalent Sound Level over a single hour during the School Day (Leq-1hr[SD])
<b>Baseline</b>				
1	Child Development Center #1	73	74	77
2	Child Development Center #2	74	75	78
3	Chapel	73	75	78
4	Elementary School	73	75	78
5	Middle School	74	75	78
<b>Proposed</b>				
1	Child Development Center #1	72	73	76
2	Child Development Center #2	73	74	77
3	Chapel	72	73	76
4	Elementary School	72	73	76
5	Middle School	73	74	77

**Note:** Locations presented in this table are provided to help understand the noise environment. This list is not meant to be inclusive of all noise-sensitive receptors in the affected environment.

### 3.2.2 Environmental Consequences

#### 3.2.2.1 Proposed Action

Under the Proposed Action, two squadrons of F-16 aircraft would relocate to Holloman AFB. Table 3–2 lists noise levels (Sound Exposure Levels [SEL]) associated with individual F-16, F-22, and other aircraft types based at Holloman AFB at a single location on the ground for purposes of comparison. The locations of aircraft ground tracks, altitudes, airspeeds, and engine power settings used in this analysis are representative of current F-22 or proposed F-16 operations based on pilot input. Single-overflight noise levels were generated using NOISEMAP version 7.3 and the same aircraft operations data used to generate time-averaged noise levels (noise contours) are presented later in this section. It should be noted that actual overflight noise levels vary from flight to flight due to variations in aircraft location, configuration, weather conditions, and other factors. Holloman AFB Middle School was selected as the location for the analysis since it is near several frequently used F-22 and proposed F-16 flight paths. For departure operations, the F-16 aircraft generates the highest noise levels when accelerating down the runway so Table 3–2 lists aircraft altitude as zero for departure operations. Noise levels (SEL) at Holloman AFB Middle School generated by afterburner F-16 departures would be approximately the same as the noise level generated by F-22 afterburner departures and would be 1 dB less than a typical Tornado afterburner departure. The noise level generated by F-16 departures in the military power setting would be 8 dB less than noise levels generated by F-22 military power departure. At the middle school, typical F-16 arrivals would generate a SEL 2 dB lower than generated by a typical F-22 arrival and 6 dB lower than a typical Tornado arrival. While maneuvering in the traffic pattern as part of a typical closed pattern operation, the F-16 would generate (at the middle school) an SEL 3 dB greater than a typical Tornado closed pattern operation. Since F-22 closed pattern flight tracks do not come near the middle school, no comparison was made between noise levels for F-22 and F-16 closed pattern operations.



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**Table 3–2. Representative Aircraft Noise Levels Comparison**

Aircraft	Operation Type	Engine Power	Airspeed (knots)	Altitude (feet AGL)	Slant Distance (feet)	SEL (decibel)
F-22 (Military)	Departure	100% ETR	0	0	5,410	96
F-22 (A/B)		150% ETR - A/B	0	0	5,410	93
F-16 (Military)		95% NC	0	0	5,410	88
F-16 (A/B)		92% NC – A/B	0	0	5,410	93
F-4C		100% RPM – A/B	0	0	5,410	97
T-38A		100% RPM – A/B	0	0	5,410	87
Tornado		100% RPM – A/B	0	0	5,410	94
F-22	Arrival	26.5% ETR	150	50	6,941	74
F-16		80% NC	150	50	6,941	72
Tornado		91% RPM	170	50	6,941	78
F-16	Closed Pattern	80% NC	210	1,500	1,590	94
F-4C		85% RPM	200	1,999	2,056	97
T-38A		88% RPM	250	2,000	2,056	78
Tornado		86% RPM	200	2,000	2,056	97

**Key:**

A/B = Afterburner  
ETR = Engine Thrust Request

NC = Core Engine Speed  
RPM = Revolutions Per Minute

Noise impacts under the Proposed Action are shown overlain on baseline noise contours in Figure 3–1. The off installation area affected by noise levels greater than or equal to 65 dB DNL would decrease by approximately 16,671 acres relative to baseline conditions and the number of off installation residents affected by greater than or equal to 65 dB DNL would decrease by 27. These decreases would occur with the implementation of the Proposed Action and the concurrent, but separate departure of the F-22 mission. Off base populations were estimated by proportioning the area of the census blocks affected by noise contours. While noise levels would decrease in most areas, increases in DNL would occur in isolated areas. These areas are located in the White Sands National Monument area and in the area southeast of the Holloman AFB runway. Any persons experiencing an increase in noise level would be more likely to become annoyed by the noise.

DNL would decrease by 1 dB relative to baseline conditions at all five of the noise sensitive locations listed in Table 3–1. This reduction in noise level would be expected to result in minor beneficial impacts in the form of slightly reduced annoyance in affected persons. Leq(SD) and Leq(SD)-1hr at the elementary and middle schools located on Holloman AFB would decrease by 1 to 2 dB from baseline conditions, but would remain above 65 dB. Assuming that a typical school structure provides 25 dB Noise Level Reduction (NLR) with windows closed, schools experiencing an outdoor  $L_{eq-SD}$  exceeding 65 dB may not meet the 2009 American National Standards Institute (ANSI) standard (40 dB) for at least a portion of one hour during a typical school day. Actual outdoor-to-indoor NLR varies from school to school and between locations within individual schools. Although the two schools would still not meet ANSI standards for classroom noise levels, the noise levels at the two schools would decrease slightly, thereby reducing the level of classroom noise impacts relative to baseline conditions.

The risk of Potential Hearing Loss (PHL) was assessed using the methodology described in Appendix B and in detail in Appendix C. No on or off-base residents would be exposed to noise at greater than or equal to 80 dB DNL under the Proposed Action. Therefore, the risk of hearing loss would be minimal and PHL risk among workers on Holloman AFB would be

managed according to Department of Defense (DoD) guidelines. F-16 noise levels are not expected to exceed 130 dB at any off installation location so damage to structures is not expected to result from noise associated with subsonic F-16 aircraft operations.

Construction associated with the Proposed Action would generate noise in the immediate vicinity of the construction activity. Construction workers would wear hearing protection as required and in accordance with applicable regulations. Persons living and working in the near the sites of the construction projects could be annoyed by the noise, which is qualitatively different from the aircraft noise that dominates the noise environment at Holloman AFB. Construction noise would be limited to normal working hours (7:00 AM to 5:00 PM) and would be temporary, ending when the projects are completed. Overall, impacts associated with construction noise would be minimal and insignificant in nature.

Animal species differ greatly in their response to noise. Each species has adapted, physically and behaviorally, to fill its ecological role in nature and its hearing ability usually reflects that role. Animals rely on their hearing to avoid predators, obtain food, and communicate with and attract other members of their species. Aircraft noise may mask or interfere with these functions. Secondary impacts may include non-auditory impacts similar to those exhibited by humans: stress, hypertension, and other nervous disorders. Tertiary impacts may include interference with mating and resultant population declines. Specific information concerning noise impacts on species can be found in Sections 3.6 and 4.6, Biological Resources.

### **3.2.2.2 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. The construction, demolition, and renovation projects required to support the two squadrons of F-16 aircraft would not be conducted and therefore, noise associated with that construction would not occur. Reductions in aircraft operations at Holloman AFB would result in reduced noise levels near the installation. The current Holloman AFB Air Installation Compatible Use Zones (AICUZ) would continue to be used to provide guidance for the installation and local communities regarding compatible land development.

## **3.3 Safety**

### **3.3.1 Affected Environment**

#### **3.3.1.1 Ground Safety**

Ground safety includes many categories such as ground and industrial operations, operational and occupational safety hazards, motor vehicle use, off-duty military and maritime activities, and fire (AFI 91-204). Ground mishaps can occur on the ground or in the water; on or off an installation; and may involve Air Force personnel, contractors, and property losses. They can occur in a work environment (including administrative, supply, custodial, and maintenance for Air Force functions) from the use of equipment or materials. Day-to-day construction operations must be performed in accordance with all applicable Air Force safety regulations; published Air Force Technical Orders; and Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) requirements. Construction and demolition activities on

the base must have an appropriate safety plan for the job site to explain how tasks would be accomplished while assuring job safety throughout the life of the project. Construction and demolition workers are also required to follow applicable Occupational Safety and Health Organization (OSHA) requirements as governed by the terms of the contract, which may incorporate Air Force regulations and technical orders, AFOSH standards, and OSHA standards. Additionally, Holloman AFB fire and emergency services meet all established Air Force staffing and equipment standards.

**Anti-Terrorism/Force Protection (AT/FP)** – A security program designed to protect Air Force active duty personnel, civilian employees, family members, facilities, and equipment in all locations and situations. The program is accomplished through the planned and integrated application of anti-terrorism measures, physical and operations security, and personal protective services. It is supported by intelligence, counterintelligence, and other security programs. In response to terrorist attacks, several regulations have been promulgated to ensure that force protection standards are incorporated into the planning, programming, and budgeting for the design and construction of MILCON facilities. Unified Facilities Criteria (UFC) 04-010-01, *DoD Minimum Antiterrorism Standards for Buildings* (published in 2003 and updated in 2007) establishes minimum standoff distances that must be maintained between several categories of structures and areas that are relatively accessible to terrorists. The intent of this siting and design guidance is to improve security, minimize fatalities, and limit damage to facilities in the event of a terrorist attack. Many military installations, such as Holloman AFB, were developed before AT/FP considerations became a critical concern. Thus, under current conditions, many installations are not able to comply with all present AT/FP standards. As new construction occurs, it would incorporate these standards and, as facilities are modified, AT/FP standards would be incorporated into the modified facilities as practicable.

**Explosive Safety** – Holloman AFB controls, maintains, and stores all ordnance and munitions required for mission performance in accordance with Air Force and Defense Department Explosive Safety Board (DDESB) safety procedures. All munitions maintenance is carried out by trained and qualified personnel using Air Force-approved technical data for the specific type of ordnance. Ample storage facilities exist and all facilities are fully certified for the ordnance they store. In the past, some storage magazines near the Munitions Storage Area (MSA) fence-line were limited to storing less than their designed net explosive weights due to Q-D arc concerns. These restrictions have not impacted operations at Holloman AFB since sufficient storage is available in other magazines within the MSA.

The Air Force imposes procedures for arming and de-arming munitions and ordnance and all such activities occur on defined arm/de-arm pads. An arm/de-arm pad is located at the end of each runway and at a distance specified as safe, away from incompatible land uses. Air Force and DDESB safety procedures require safeguards on weapons systems and ordnance that ensure against inadvertent releases. Both live and inert munitions are stored and handled at Holloman AFB with inert training ordnance accounting for the vast majority of training materials. Trained and qualified personnel using Air Force-approved technical data carry out all munitions maintenance and aircraft loading and storage facilities are approved for the specific ordnance involved.

### 3.3.1.2 Airfield Safety

**Accident Potential Zone (APZ)** - Accident potential relies on identifying where most accidents have occurred in the past at military airfields (Air Force 1972). This approach does not produce accident probability statistics since the question of probability involves too many variables for an accurate prediction model to be developed. The analysis of the history of military aircraft accidents focuses on determining where (within the airfield environments) an accident would likely occur and then estimating the size of the impact area that is likely to result from any single accident. As per DoD Instruction 4165.57, *Air Installations Compatible Use Zones*, Holloman AFB has established three zones to ensure compatible land use and safety in and around the airfield environment; Clear Zone (CZ) (shown in Figure 3-2), APZ I, and APZ II. To this end, an expanded CZ and two APZs have been designated at each end of military runways. The CZs at Holloman AFB are rectangular areas 3,000 feet wide by 3,000 feet long occurring at each end of the three runways. These are the areas have the highest statistical potential for aircraft accidents so DoD generally acquires this land through purchase or easement to prevent development. All land within the CZ is contained within the boundary of Holloman AFB (Holloman AFB 2004a).

APZ I consists of an area 3,000 feet wide by 5,000 feet long adjacent to each CZ. The potential for aircraft accidents is statistically less critical within APZ I than within the CZ, but it is still substantial. APZ I for runway 25 is partially contained within the boundary of White Sands National Monument and a portion of APZ I for runway 7 and runway 16 are contained within Alamogordo city limits (Holloman AFB 2004a).

APZ II consists of an area 3,000 feet wide by 7,000 feet long adjacent to each APZ I. APZ II possesses a lower statistical potential for aircraft accidents than CZ or APZ I, but a risk of aircraft accident is still present. All of the APZ IIs for runway 7 and runway 16 are found within Alamogordo city limits. All of the APZ IIs for runway 25 and a small portion of runway 22 are within the boundary of White Sands National Monument (Holloman AFB 2004a).

**Ground Obstructions** - All structures on the ground have the potential to create hazards to flight. The FAA provides detailed instructions for the marking of obstructions (i.e., paint schemes and lighting) to warn pilots of their presence. Any temporary or permanent structure, including all appurtenances, that exceeds an overall height of 200 feet (61 meters) AGL or exceeds any obstruction standard contained in 14 CFR Part 77 should normally be marked and/or lighted. The FAA may also recommend marking and/or lighting a structure that does not exceed 200 feet AGL or 14 CFR Part 77 standards due to its particular location (FAA 2007). The obstruction standards in 14 CFR Part 77 are primarily focused on structures near airports and the approach and departure corridors from airports.



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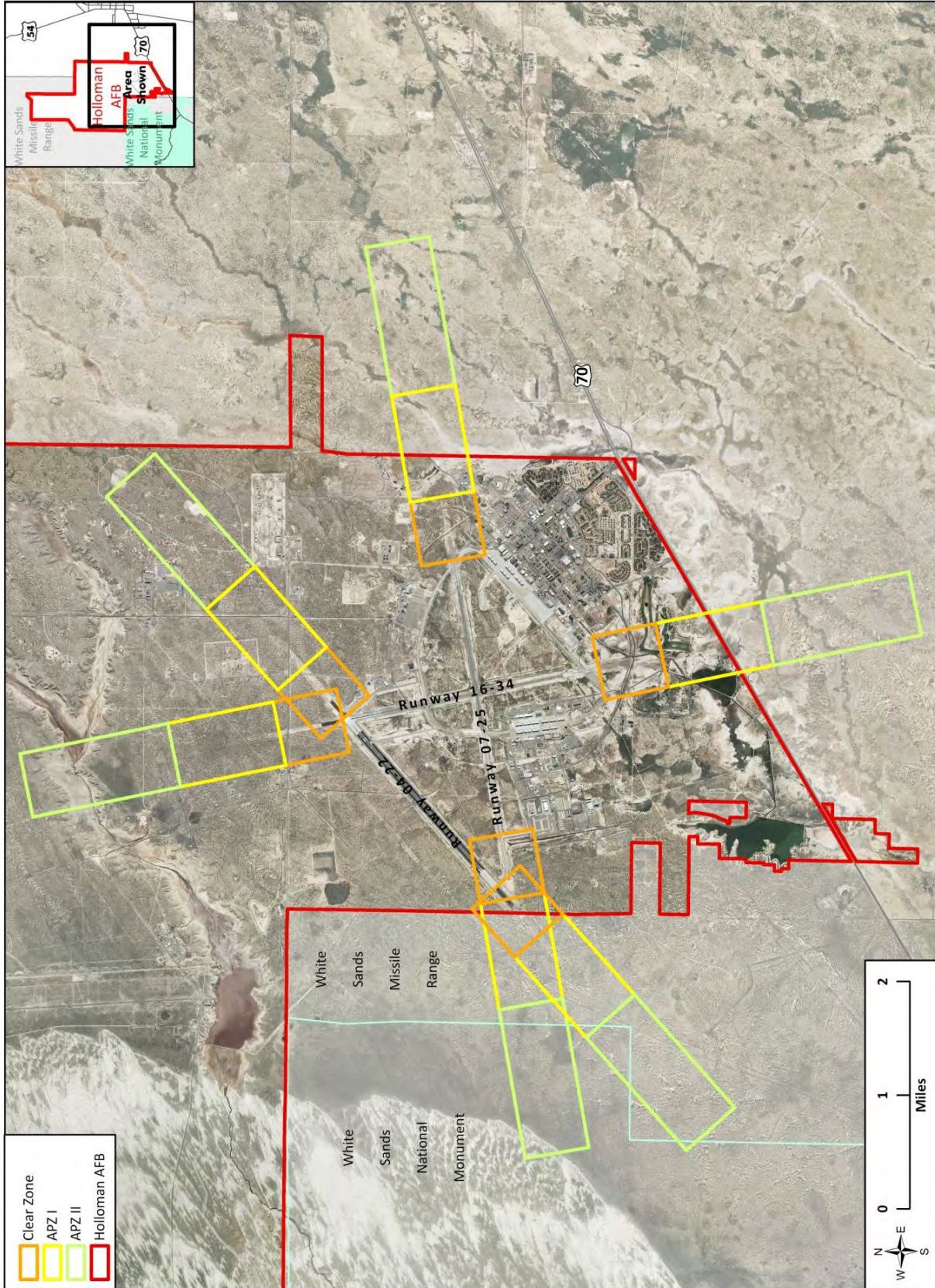


Figure 3-2. Runway Protection Zones at Holloman AFB

### 3.3.1.3 Airfield Flight Safety

The primary public concern regarding flight safety is the potential for aircraft accidents, which may occur due to weather-related accidents, mechanical failure, pilot error, mid-air collisions, collisions with manmade structures or terrain, or bird-aircraft collisions. Flight risks apply to all aircraft and are not limited to the military. The Air Force defines four major categories of aircraft mishaps: Classes A, B, C, and E, which includes High Accident Potential (HAP) (see Appendix B). This EA focuses on Class A mishaps due to their potentially catastrophic results. Based on historical data on mishaps at all installations and under all conditions of flight, the military services calculate mishap rates per 100,000 flying hours for each type of aircraft in the inventory. Mishap rates do not consider combat losses due to enemy action. In addition, data presented are only statistically predictive. The actual causes of mishaps are due to many factors, not simply the amount of flying time of the aircraft. Table 3-3 reflects the cumulative annual Class A mishap rates for the F-22, F-15, F/RF-4, F-117, T-38, F-16, and QF-4 for the periods for which accident records have been established (AFSC 2010a). These aircraft, with the exception of the F-16, have been or are currently based at Holloman AFB.

**Table 3-3. Class A Accident History**

Aircraft	Reporting Period	Accident Rate per 100,000 hours	Lifetime Hours Flown
F-22	Fiscal Year (FY) 02-FY10	6.35	94,519
F-15	CY72-FY09	2.42	5,783,436
F/RF-4 (Retired)	FY71-FY00	4.64	7,604,757
F-117 (Retired)	FY91-FY08	3.21	218,191
T-38	CY60-FY09	1.48	13,635,221
F-16	CY75-FY09	3.68	9,217,670
QF-4	FY99-FY10	12.64	39,551

Source: AFSC 2010a

Historically, when a new military aircraft first enters inventory, its flight safety accident rate is higher. The F-22 is a relatively new aircraft in contrast to the F-16. As such, the F-22 has not yet achieved a similar level of flight hours as the F-16. The F-22 began flying eight years ago, in FY02. It had accumulated 94,519 flight hours by the end of FY10. By contrast, the F-16 began flying over 35 years ago (in Calendar Year [CY] 75) and accumulated 9,217,670 hours by the end of FY09. Based on the expected flight hours for the F-22, it is expected that the F-22 will eventually have an accident rate of two to three per 100,000 flight hours, which is similar to the F-16 and is based on an established trend regarding military aircraft. Accident rates of the F-16 and the F-22 cannot be compared without considering historic accident trends and based on those trends, the accident rate for F-16 and F-22 aircraft should be similar.

Bird-aircraft strikes constitute a safety concern for the Air Force since they can result in damage to aircraft or injury to aircrews or local human populations if an aircraft crashes. Birds are not the only wildlife problem for aircraft. Deer, coyotes, and other animals wandering onto runways can create serious problems for departing and landing aircraft. Since birds constitute the most numerous reported aircraft strikes and management techniques for both bird and wildlife strikes are similar, this analysis will focus on the potential for bird strikes. Aircraft may encounter birds at altitudes up to 30,000 feet MSL or higher; however, most birds fly close to the ground. More than 97 percent of reported bird strikes occur below 3,000 feet AGL. Approximately 30 percent of bird strikes happen in the airport environment and almost 55 percent occur during low-altitude flight training (AFSC 2010b). A minimal bird-aircraft strike



hazard exists at Holloman AFB and its vicinity due to low populations of resident and migratory species and their distribution patterns.

Migratory waterfowl (e.g., ducks, geese, and sandhill cranes) are the birds most hazardous to low-flying aircraft due to their size and propensity for migrating in large flocks at a variety of elevations and times of day. Waterfowl vary considerably in size, from one to two pounds for ducks, five to eight pounds for geese, and up to 12 pounds for most cranes. There are two normal migratory seasons, fall and spring and waterfowl are usually only a hazard during migratory seasons. These birds typically migrate at night and generally fly between 1,000 to 2,500 feet AGL. Holloman AFB is located within a minor migration corridor in the Central Flyway and their most common species of migratory birds are the Mallard, Northern Pintail, Blue-Winged Teal, Northern Shoveler, and Wilson's Phalarope. Lake Holloman and the Holloman AFB Wetlands Complex are close to the migratory flyway and contribute to potential bird strikes. The floodplains in this wetlands complex receive discharges of treated effluent from the Holloman AFB wastewater treatment plant and provide some of the only permanent water in the vicinity, which attracts many waterfowl and shorebirds. The local waters sustain low-breeding populations, but support substantial migratory populations of waterfowl and shorebirds. Local flying procedures avoid direct overflight of these areas.

### **3.3.2 Environmental Consequences**

#### **3.3.2.1 Ground Safety**

No aspects of the Proposed Action for Holloman AFB are expected to create new or unique ground safety issues. O&M procedures conducted by base personnel would not change from current conditions. All activities would continue to be conducted in accordance with applicable regulations, technical orders, and AFOSH standards. Holloman AFB controls, maintains, and stores all ordnance and munitions required for mission performance in accordance with Air Force and DDESB safety procedures. All munitions maintenance is carried out by trained and qualified personnel using Air Force approved technical data for the specific type of ordnance. The Air Force imposes procedures for arming and de-arming munitions and ordnance. All such activities occur on defined arm/de-arm pads. An arm/de-arm pad is located at specified distances away from incompatible land uses for safety standards compliance. The Air Force and DDESB procedures require safeguards on weapons systems and ordnance that ensure against inadvertent releases. All renovation and construction activities would comply with all applicable OSHA regulations to protect workers.

**Anti-Terrorism/Force Protection (AT/FP)** — Buildings would be constructed in compliance with AT/FP requirements and located outside any identified Q-D arcs for explosive safety. The Air Force does not anticipate any significant impacts to safety due to construction, demolition, or renovation if all applicable AFOSH and OSHA requirements are implemented.

**Explosives Safety** — The proposed project areas do not fall within an established Q-D arc and proposed construction, renovation, and infrastructure improvement projects related to the Proposed Action would be consistent with established Q-D arcs. Construction activity and subsequent operations would not result in any greater safety risk. Munitions used by the F-16 would be similar to that associated with current aircraft based at Holloman AFB. Ordnance is handled and stored in accordance with Air Force and DDESB explosive safety directives and all

munitions handling is carried out by trained and qualified personnel. Therefore, munitions handling would not result in any greater safety risk and there would be no significant impact related to explosives safety.

### **3.3.2.2 Airfield Safety**

**Accident Potential Zones (APZs)** - Proposed construction, renovation, and infrastructure improvement projects related to the Proposed Action would be consistent with established APZs. Construction activity and subsequent operations within new or renovated structures would adhere to recommended siting to maintain safe conditions on the ground at and near the airfield so no significant impact related to APZs.

**Ground Obstructions** - None of the projects to support the Proposed would result in any ground obstructions at the airfield as defined in 14 CFR Part 77.

### **3.3.2.3 Airfield Flight Safety**

**Aircraft Mishaps** - The F-16 aircraft at Holloman AFB would operate similar to the current operational environment. Since the F-16 is a new airframe at Holloman AFB and would require response actions specific to the aircraft, the emergency and mishap response plans would be updated to address mishaps involving the F-16 and its' associated equipment. With this update, the Holloman AFB airfield safety conditions would be similar to existing conditions. Accident rates for the F-22 and the F-16 are projected to be similar based upon historic trends so no significant increase in aircraft mishaps is anticipated from implementation of the Proposed Action at Holloman AFB. Capability for fire response is located on base and in the impacted communities. The base fire department is party to mutual aid support agreements with the nearby communities, which would continue to occur as they have under current conditions.

**Wildlife Strike Hazard** - Holloman AFB has an ongoing Bird Aircraft Strike Hazard (BASH) program. Since future aircraft flight operations will remain similar to those that are currently experienced at Holloman AFB, the overall potential for bird-aircraft or wildlife strikes is not anticipated to be significantly greater than at current levels. F-16 aircrews operating in Holloman AFB airspace would be required to continue to follow the applicable procedures outlined in the Holloman AFB BASH Plan. In addition, Holloman AFB personnel developed aggressive procedures designed to minimize the occurrence of BASH strikes and has documented detailed procedures to monitor and react to heightened risk of bird-strikes (Holloman AFB 2006). When BASH risks increase, limits are placed on low altitude flight and some types of training (e.g., multiple approaches, closed pattern work) in the airport and airspace environments. Special briefings are provided to pilots whenever the potential exists for greater BASH within the airspace. F-16 pilots would be subject to these procedures so no significant impact would occur related to BASH issues.

### **3.3.2.4 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. The construction, demolition, and renovation projects required to support the two squadrons of F-16 aircraft would not be conducted. This and other ground safety issues including airfield,

construction, explosives, and AT/FP would not occur. With a reduction in airfield operations, there would be less opportunity for impacts to flight safety.

## **3.4 Air Quality**

### **3.4.1 Affected Environment**

Air quality at a given location can be described by the concentrations of various air pollutants in the atmosphere. The significance of a pollutant concentration is determined by comparing its concentration to an appropriate national and/or state ambient air quality standard. These standards represent the allowable atmospheric concentrations at which public health and welfare are protected including a reasonable margin of safety to protect the more sensitive individuals in the population. The U.S. Environmental Protection Agency (EPA) establishes the National Ambient Air Quality Standards (NAAQS) to regulate the following criteria pollutants: Ozone (O<sub>3</sub>), Carbon Monoxide (CO), Nitrogen Dioxide (NO<sub>2</sub>), Sulfur Dioxide (SO<sub>2</sub>), Particulate Matter less than 10 microns in diameter (PM<sub>10</sub>), Particulate Matter less than 2.5 microns in diameter (PM<sub>2.5</sub>), and lead (Pb). Units of concentration for these standards are generally expressed in parts per million (ppm) or micrograms per cubic meter (µg/m<sup>3</sup>). State standards, established by the New Mexico Environmental Improvement Board and enforced by the New Mexico Air Quality Bureau (AQB) are termed the New Mexico Ambient Air Quality Standards (NMAAQs). The NMAAQs (see Appendix B) are at least as restrictive as the NAAQS and include standards for Total Suspended Particulate (TSP) matter for which there are no national standards.

#### **3.4.1.1 Region of Influence (ROI)**

Air emissions produced from construction and operation of the Proposed Action would mainly affect air quality within Otero County. Operation of proposed aircraft would affect air quality within training areas associated with Holloman AFB and aircraft flight routes between these locations. Identifying the ROI for air quality requires knowledge of the pollutant type, source emission rate, the proximity of project emission sources to other emission sources, and local and regional meteorology. For inert pollutants (such as CO and particulates in the form of dust), the ROI is generally limited to a few miles downwind from a source. The ROI for reactive pollutants such as O<sub>3</sub> may extend much farther downwind than for inert pollutants. O<sub>3</sub> is formed in the atmosphere by photochemical reactions of previously emitted pollutants called precursors. O<sub>3</sub> precursors are mainly Nitrogen Oxides (NO<sub>x</sub>) and photochemically reactive Volatile Organic Compounds (VOCs). In the presence of solar radiation, the maximum effect of precursor emissions on ozone levels usually occurs several hours after they are emitted and many miles from their source.

**Applicable State Regulations and Standards** — In New Mexico, the AQB is responsible for enforcing air pollution regulations. The federal Clean Air Act (CAA) establishes air quality planning processes and requires areas in nonattainment of a NAAQS to develop a State Implementation Plan (SIP) that details how the state will attain the standard within mandated timeframes. The requirements and compliance dates for attainment are based on the severity of the nonattainment classification of the area. The following summarizes the air quality rules and regulations that apply to the project actions.

CAA and its subsequent amendments establish air quality regulations and the NAAQS delegates the enforcement of these standards to the states. The AQB enforces the national and state ambient air quality standards by developing rules to regulate and permit stationary sources of air emissions. The New Mexico air quality regulations are found in the New Mexico Administrative Code (NMAC), Title 20 (Environmental Protection), Chapter 2 (Air Quality) (20.2 NMAC). Holloman AFB currently holds two air permits: (1) a construction permit for the spray paint booth facilities and (2) a Prevention of Significant Deterioration (PSD) permit for the aircraft engine hush house facilities.

Groups of states, such as in the Western Climate Initiative (with New Mexico as a founding member), have formed collectives (based regionally) to jointly address Greenhouse Gas (GHG) pollutants. As part of State of New Mexico Executive Order (EO) 2005-033 (New Mexico 2005), the New Mexico Environment Department (NMED) has completed a statewide inventory of existing and future GHG emissions and is working with state agencies to implement GHG reduction strategies. The NMED is also developing the Proposed Greenhouse and Trade Program (20.2.350 NMAC), Proposed Tailoring Rule Amendments to 20.2.70 NMAC (Operating Permits), and 20.2.74 NMAC (Permits-Prevention of Significant Deterioration).

### 3.4.1.2 Existing Air Quality

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

### 3.4.1.3 Regional Air Emissions

Holloman AFB is located in Otero County and Table 3-4 summarizes the 2002 annual emissions estimated for this region (EPA 2010c, 2010d). The majority of emissions within the region occur from on-road and nonroad mobile sources (VOCs, CO, and NO<sub>x</sub>), solvent/surface coating usages (VOCs), and fugitive dust (PM<sub>10</sub>/PM<sub>2.5</sub>).

**Table 3-4. Annual Emissions for Otero County, New Mexico for Calendar Year 2002**

Location	Air Pollutant Emissions (tons/year)					
	Volatile Organic Compounds VOC	Carbon Monoxide CO	Nitrogen Oxide NO <sub>x</sub>	Sulfur Oxide SO <sub>x</sub>	Particulate Matter less than 10 microns in diameter PM <sub>10</sub>	Particulate Matter less than 2.5 microns in diameter PM <sub>2.5</sub>
Stationary Sources	3,357	10,704	213	130	29,889	3,870
Mobile Sources	1,651	16,833	2,530	138	102	88
<b>Total</b>	<b>5,008</b>	<b>27,537</b>	<b>2,743</b>	<b>268</b>	<b>29,991</b>	<b>3,958</b>

Source: EPA 2010c and 2010d.

### 3.4.1.4 Holloman AFB Emissions

Table 3-5 presents an estimation of annual emissions associated with existing F-22 operations at Holloman AFB in 2010. Sources associated with these operations include (1) F-22 aircraft operations and engine maintenance/testing, (2) onsite Personal and Government Owned Vehicles (POVs and GOVs), (3) offsite POV commuters, (4) Aerospace Ground Equipment (AGE), (5) nonroad mobile equipment, and (6) stationary and other sources.

**Table 3–5. Annual Emissions from Current F-22 Operations at Holloman AFB**

Location	Air Pollutant Emissions (tons/year)					
	Volatile Organic Compounds VOC	Carbon Monoxide CO	Nitrogen Oxide NO <sub>x</sub>	Sulfur Oxide SO <sub>x</sub>	Particulate Matter less than 10 microns in diameter PM <sub>10</sub>	Particulate Matter less than 2.5 microns in diameter PM <sub>2.5</sub>
F-22 Aircraft Operations	42.51	312.51	105.74	13.01	26.01	26.01
Aerospace Ground Equipment (AGE)	0.33	0.89	5.89	0.27	0.31	0.29
On Base Personal Owned Vehicles/Government Owned Vehicles (POVs/GOVs)	4.83	39.64	46.67	0.02	4.49	4.49
POV Commutes	18.26	141.64	12.61	0.77	0.38	0.34
Stationary Sources	19.47	4.18	4.09	0.31	2.37	2.37
<b>Total Existing Emissions</b>	<b>85.40</b>	<b>498.86</b>	<b>175.00</b>	<b>14.38</b>	<b>33.56</b>	<b>33.50</b>

Emissions from POVs, GOVs, and stationary sources associated with F-22 operations were estimated by multiplying annual operational emissions at Holloman AFB in CY03 (ACC 2004) by the ratio of the 2010 F-22 population and the total Holloman AFB population of 2003.

### 3.4.1.5 Regional Climate

Meteorological data collected at Alamogordo are used to describe the climate of the Holloman AFB project area (WRCC 2007a, 2007b, 2010). Otero County is known for high temperatures in the summer months and cool conditions during the winter. The average high and low temperatures in the summer at Holloman AFB range from about 94 degrees °F to 64 °F and in the winter months from 57 °F to 30 °F (WRCC 2010). The average annual precipitation for Holloman AFB is 10.97 inches where more precipitation falls in the summer months when the peak monthly average of 2.04 inches August. Spring receives the least amount of precipitation during the year with the lowest monthly average of 0.36 inches in April. Holloman AFB has an average annual snowfall of 4.1 inches, with a peak monthly average of 1.5 inches in January (WRCC 2010). Holloman AFB is a breezy location with a monthly average wind speed for each month of the year of at least eight miles per hour (mph) and the annual average wind speed of 9.6 mph. Spring is generally the windiest season with the peak average monthly winds of 11.8 mph in April. The wind prevails from the southerly direction for most of the year except in December, when winds prevail from the north (WRCC 2007a, 2007b).

### 3.4.2 Environmental Consequences

Air quality impacts from implementation of the Proposed Action were reviewed under both federal and state standards and regulations for air pollution. The project region is in attainment of all NAAQS so the analysis used the PSD threshold for new major sources of 250 Tons Per Year (TPY) of a pollutant as an indicator of the significance or non-significance of projected air quality impacts.

#### 3.4.2.1 Proposed Action

**Construction** — Implementation of the Proposed Action would require construction and/or renovation of airfield facilities to accommodate the training mission and would include training facilities, hangars, taxiways, and maintenance and fueling facilities. Air quality impacts due to proposed construction activities would occur from combustive emissions of fossil fuel-powered equipment and fugitive dust emissions (PM<sub>10</sub>/PM<sub>2.5</sub>) due to the operation of equipment on

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exposed soil. Equipment and truck activity data were used to estimate combustive and fugitive dust emissions from the proposed construction projects which would begin in 2011 and finish by the end of 2014 (Holloman AFB 2010).

Factors needed to derive construction source emission rates were obtained from the *Compilation of Air Pollution Emission Factors, AP-42, Volume I* (EPA 1995), EPA's NONROAD Model for non-road construction equipment (EPA 2009b), and the MOBILE6.2 Model for on-road vehicles (EPA 2003). The analysis reduced fugitive dust emissions generated from the use of construction equipment on exposed soil by 50 percent from uncontrolled levels to simulate implementation of standard construction practices for fugitive dust control.

Table 3-6 presents estimates of emissions from construction activities occurring under the Proposed Action, which shows that during each year of construction, proposed emissions would fall well below PSD thresholds used to indicate significance or non-significance. Construction emissions from the Proposed Action would produce less than significant impacts to regional air quality. The main sources of PM<sub>10</sub>/PM<sub>2.5</sub> emissions would occur as fugitive dust from the operation of equipment on unpaved surfaces so proposed construction activities would implement standard construction practices to control fugitive dust.

**Table 3-6. Emissions from Construction Activities for the Proposed Action**

Year/Construction Activity	Air Pollutant Emissions (Tons)					
	VOC	CO	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
<b>2011</b>						
Aircraft Parking Apron	0.00	0.01	0.02	0.00	0.11	0.01
Engine Offload Area	0.00	0.00	0.00	0.00	0.00	0.00
F-16 Academic Facility	0.02	0.12	0.18	0.00	0.05	0.02
Hangar/ette Upgrades (Building 21814)	0.05	0.28	0.45	0.01	0.25	0.06
MTC Sims Bay Upgrade (Building 316)	0.04	0.23	0.35	0.01	0.19	0.05
Wheel and Tire Facility (Building 877)	0.00	0.00	0.01	0.00	0.00	0.00
Liquid Oxygen Facility	0.00	0.01	0.01	0.00	0.00	0.00
Avionics Shop (Building 828)	0.00	0.01	0.02	0.00	0.00	0.00
Flight Line Maintenance Facility (Building 868)	0.02	0.10	0.16	0.00	0.05	0.02
Engine/Metals Tech Maintenance Facility (Building 820)	0.00	0.02	0.03	0.00	0.00	0.00
General Purpose Warehouse (Building 817)	0.01	0.06	0.10	0.00	0.02	0.01
External Tank Farm (By Building 816)	0.00	0.02	0.04	0.00	0.03	0.01
Hydrazine Storage/Service Facility	0.01	0.05	0.07	0.00	0.01	0.01
Supply Bulk Storage Yard (Building 809)	0.05	0.31	0.43	0.01	0.05	0.05
<b>2011 Total</b>	<b>0.20</b>	<b>1.22</b>	<b>1.87</b>	<b>0.03</b>	<b>0.76</b>	<b>0.24</b>
<b>2012</b>						
Washrack Pad and Structure	0.03	0.15	0.24	0.01	0.12	0.03
Alternative Mission Equipment (AME) Shop (Building 869)	0.02	0.09	0.14	0.00	0.05	0.02
Squadron Operations/AMU Renovations (Building 892)	0.03	0.14	0.22	0.01	0.10	0.03
WLT Maintenance Hangar Upgrade (Building 868)	0.03	0.13	0.21	0.01	0.02	0.02
Structures Facility (Building 898)	0.00	0.02	0.02	0.00	0.00	0.00
<b>2012 Total</b>	<b>0.11</b>	<b>0.53</b>	<b>0.83</b>	<b>0.03</b>	<b>0.29</b>	<b>0.10</b>



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Year/Construction Activity	Air Pollutant Emissions (Tons)					
	VOC	CO	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
<b>2013</b>						
Suppression of Enemy Air Defenses (SEAD) Training Facility	0.01	0.04	0.07	0.00	0.02	0.01
Dormitory — Mission Ready Airmen	0.01	0.06	0.10	0.00	0.03	0.01
Dormitory — First Term Airmen	0.09	0.48	0.78	0.02	0.88	0.16
Family Housing	0.10	0.50	0.83	0.02	0.97	0.17
Egress Mission Facility (Building 866)	0.01	0.03	0.06	0.00	0.01	0.01
Support (AGE) Facility (Building 818)	0.00	0.02	0.03	0.00	0.00	0.00
<b>2013 Total</b>	<b>0.22</b>	<b>1.13</b>	<b>1.87</b>	<b>0.04</b>	<b>1.91</b>	<b>0.36</b>
<b>2014</b>						
F-16 Headquarters Facility	0.00	0.01	0.01	0.00	0.00	0.00
<b>2014 Total</b>	<b>0.00</b>	<b>0.01</b>	<b>0.01</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Total Emissions — Tons</b>	<b>0.53</b>	<b>2.88</b>	<b>4.57</b>	<b>0.10</b>	<b>2.96</b>	<b>0.70</b>

**Key:**

AGE = Aerospace Ground Equipment  
 AMU = Aircraft Maintenance Unit  
 CO = Carbon Monoxide  
 MTC = Mission Training Center  
 NO<sub>x</sub> = Nitrogen Oxide

PM<sub>2.5</sub> = Particulate Matter less than 2.5 microns in diameter  
 PM<sub>10</sub> = Particulate Matter less than 10 microns in diameter  
 SO<sub>x</sub> = Sulfur Oxide  
 VOC = Volatile Organic Compounds  
 WLT = Weapons Load Training

**Operations** — The operational impact analysis for air quality for the Proposed Action is based upon the net change in emissions between F-22 operations under baseline and the proposed F-16 operations. The F-22 scenario starting point or base case period for comparison to F-16 operations is year 2010. Therefore, the net change in annual operational emissions associated with the Proposed Action at the Holloman AFB is equal to emissions from the F-16 action for a given year, minus emissions from F-22 operations in the base case period. Sources associated with the Proposed Action at Holloman AFB would include operations and engine maintenance/testing of F-16 aircraft, on-site POVs and GOVs, off-site POV commuters, AGE, and stationary and other sources.

Calculations for proposed F-16 aircraft emissions at Holloman AFB used operational data presented in Section 2.0 of this EA. Emissions from proposed POV, GOV, and stationary sources were estimated by multiplying emissions from 2010 base case operations by the ratio of the proposed F-16 and 2010 Holloman AFB populations.

Table 3-7, Table 3-8, and Table 3-9 summarize the annual operational emissions that would occur from the implementation of the Proposed Action. A reduction of the F-22 mission activities in CY11 would result in a net decrease in emissions of all pollutants compared to base case conditions. The addition of the proposed F-16 mission would result in net decreases of (1) CO, PM<sub>10</sub>, and PM<sub>2.5</sub> emissions in year 2012 and (2) CO, SO<sub>2</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub> emissions in year 2013 compared to base case conditions. The Proposed Action would increase emissions of (1) VOC, NO<sub>x</sub>, and SO<sub>2</sub> in year 2012 and (2) VOC and NO<sub>x</sub> in year 2013 compared to base case conditions. These emission increases would remain well below the PSD thresholds used to indicate significance or non-significance. The implementation of the Proposed Action would produce less than significant air quality impacts. The main contributors to the proposed emission increases would include F-16 aircraft operations, F-16 engine runups, and employee vehicles that would commute to and from Holloman AFB.

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**Table 3–7. Net Change in Annual Operational Emissions under the Proposed Action  
Year 2011**

Activity	Air Pollutant Emissions (Tons)						
	VOC	CO	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>
F-22 Operations	24.80	182.29	61.68	7.59	15.17	15.17	23,653
Aerospace Ground Equipment (AGE) — F-22	0.19	0.52	3.43	0.16	0.18	0.17	131
Personally Owned Vehicles (POVs)/Government Owned Vehicles (GOVs) — On-Site	3.64	26.88	33.00	0.01	5.00	5.00	671
POV Commutes	13.74	99.82	8.85	0.50	0.30	0.28	34,315
Stationary Sources	9.74	2.09	2.05	0.16	1.19	1.19	61
<b>Total Proposed Emissions — 2011</b>	<b>52.11</b>	<b>311.60</b>	<b>109.01</b>	<b>8.42</b>	<b>21.84</b>	<b>21.81</b>	<b>58,831</b>
<b>Year 2010 Emissions</b>	<b>(85.40)</b>	<b>(498.84)</b>	<b>(174.99)</b>	<b>(14.39)</b>	<b>(33.56)</b>	<b>(33.50)</b>	<b>(79,939)</b>
<b>Proposed minus Year 2010 Emissions</b>	<b>(33.29)</b>	<b>(187.24)</b>	<b>(65.98)</b>	<b>(5.97)</b>	<b>(11.72)</b>	<b>(11.69)</b>	<b>(21,108)</b>

**Note:** F-22 operational emissions at Holloman AFB are equal to the proposed year of 2011 minus year 2010.

**Key:**

CO = Carbon Monoxide	PM <sub>10</sub> = Particulate Matter less than 10 microns in diameter
CO <sub>2e</sub> = Carbon Dioxide Equivalent	SO <sub>x</sub> = Sulfur Oxide
NO <sub>x</sub> = Nitrogen Oxide	VOC = Volatile Organic Compounds
PM <sub>2.5</sub> = Particulate Matter less than 2.5 microns in diameter	

**Table 3–8. Net Change in Annual Operational Emissions under the Proposed Action  
Year 2012**

Activity	Air Pollutant Emissions (Tons)						
	VOC	CO	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>
F-22 Aircraft Operations	24.80	182.29	61.68	7.59	15.17	15.17	23,653
Aerospace Ground Equipment (AGE) F-22	0.19	0.52	3.43	0.16	0.18	0.17	131
F-16 Aircraft Operations	31.80	110.50	50.66	4.90	3.04	3.04	16,079
F-16 Engine Run-ups	2.56	1.45	15.67	0.74	0.85	0.85	2,440
AGE — F-16	0.23	0.61	4.09	0.19	0.22	0.20	156
Personally Owned Vehicles (POVs)/Government Owned Vehicles (GOVs) – On-Site	3.41	28.49	30.64	0.02	5.56	5.56	746
POV Commutes	14.71	103.14	9.21	0.55	0.34	0.31	38,180
Stationary Sources	19.03	4.08	4.00	0.31	2.32	2.32	119
<b>Total Proposed Emissions — 2012</b>	<b>96.73</b>	<b>431.08</b>	<b>179.38</b>	<b>14.46</b>	<b>27.68</b>	<b>27.62</b>	<b>81,504</b>
<b>Year 2010 Emissions</b>	<b>(85.40)</b>	<b>(498.84)</b>	<b>(174.99)</b>	<b>(14.39)</b>	<b>(33.56)</b>	<b>(33.50)</b>	<b>(79,939)</b>
<b>Proposed minus Year 2010 Emissions</b>	<b>11.33</b>	<b>(67.76)</b>	<b>4.39</b>	<b>0.07</b>	<b>(5.88)</b>	<b>(5.88)</b>	<b>1,565</b>

**Note:** F-22 operational emissions at Holloman AFB are equal to the proposed year of 2012 minus year 2010.

**Key:**

CO = Carbon Monoxide	PM <sub>10</sub> = Particulate Matter less than 10 microns in diameter
CO <sub>2e</sub> = Carbon Dioxide Equivalent	SO <sub>x</sub> = Sulfur Oxide
NO <sub>x</sub> = Nitrogen Oxide	VOC = Volatile Organic Compounds
PM <sub>2.5</sub> = Particulate Matter less than 2.5 microns in diameter	

**Table 3–9. Net Change in Annual Operational Emissions under the Proposed Action  
Year 2013**

Activity	Air Pollutant Emissions (Tons)						
	VOC	CO	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>
F-16 Aircraft Operations	63.61	221.01	101.33	9.80	6.08	6.08	32,158
F-16 Engine Run-ups	5.12	2.90	31.34	1.49	1.70	1.70	4,880
Aerospace Ground Equipment (AGE) F-16	0.46	1.23	8.17	0.37	0.44	0.40	313
Personally Owned Vehicles (POVs)/ Government Owned Vehicles (GOVs) — On-Site	2.88	28.23	25.57	0.02	5.60	5.60	752
POV Commutes	14.58	96.01	8.58	0.56	0.34	0.31	38,539
Stationary Sources	19.85	4.26	4.17	0.32	2.42	2.42	124
<b>Total Proposed Emissions — 2011</b>	<b>106.50</b>	<b>353.64</b>	<b>179.16</b>	<b>12.56</b>	<b>16.58</b>	<b>16.51</b>	<b>76,766</b>
<b>Year 2010 Emissions</b>	<b>(85.40)</b>	<b>(498.84)</b>	<b>(174.99)</b>	<b>(14.39)</b>	<b>(33.56)</b>	<b>(33.50)</b>	<b>(79,939)</b>
<b>Proposed minus Year 2010 Emissions</b>	<b>21.10</b>	<b>(145.20)</b>	<b>4.17</b>	<b>(1.83)</b>	<b>(16.98)</b>	<b>(16.99)</b>	<b>(3,173)</b>

**Note:** F-22 operational emissions at Holloman AFB are equal to the proposed year of 2013 minus year 2010.

**Key:**

- |  |  |
|--|--|
| CO = Carbon Monoxide   | PM <sub>10</sub> = Particulate Matter less than 10 microns in diameter |
| CO <sub>2e</sub> = Carbon Dioxide Equivalent                             | SO <sub>x</sub> = Sulfur Oxide   |
| NO <sub>x</sub> = Nitrogen Oxide   | VOC = Volatile Organic Compounds                                       |
| PM <sub>2.5</sub> = Particulate Matter less than 2.5 microns in diameter |  |

### 3.4.2.2 No Action Alternative

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. The emissions from construction, demolition, and renovation projects required to support the two squadrons of F-16 aircraft would not occur. In addition, there would be a reduction in air emissions from current levels resulting from reductions in aircraft operations and base personnel commuting to and from the installation.

## 3.5 Physical Resources

### 3.5.1 Affected Environment

#### 3.5.1.1 Soils

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 are typically formed in sediment of eolian (i.e., wind-blown deposits) and alluvial origin. The surface layer is typically very fine sandy loam with weak, medium coarse and granular structure approximately three inches thick. Substratum extends to a depth of 60 inches or more and is a fine, friable sandy loam, generally moist, with gypsum found in lower portions (13 to 60 inches). These soils have relatively low permeability, shrink/swell potential, and available water capacity, and are moderately to highly vulnerable to wind and water erosion. Disturbing the vegetative cover on these soils dramatically increases wind erosion and blowing dust.

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).

Very small areas in the southwest and eastern portions of Holloman AFB are underlain by Mead silty clay loam that is located on zero to 1 percent slopes. These soils consist of deep, poorly drained soils found predominantly on alluvial floodplains and formed in fine textured alluvial deposits with some eolian material. The surface layer is approximately five inches thick, silty clay loam, with prominent gypsum crystals. The soils contain a high salt content due to frequent flooding and become extremely sticky when wet. Substratum extends to a depth of 60 inches or more, with prominent gypsum crystals to a depth of 48 inches. These soils typically have low permeability and available water capacity and have moderately high shrink-swell potential. These soils do not provide good road fill material and have limitations for building construction due to lower soil strength, potential to flood, and a higher shrink/swell potential (NRCS 1981).

### **3.5.1.2 Water**

**Surface Water** — Holloman AFB is located within the Tularosa Basin, which is a closed basin bound on the east and west by the Sacramento and San Andres mountains, respectively, and which is fed by ephemeral drainages. There are at least nine prominent east-to-west drainages on Holloman AFB, which receive intermittent flows during seasonal thunderstorms (Holloman AFB 2008b) and are broad and deeply entrenched where extensive downcutting has occurred by as much as 50 feet below the basin floor. The largest of these drainages is the Lost River drainage system that includes Malone and Ritas draws. Prior to extensive management of the surface topography and construction of US 70 and US 54 that altered the natural flow, Dillard Draw emptied into the main base creating a network of alkali flats and ephemeral playas, including what are now the Lake Holloman AFB Wetlands Complex, Stinky Playa, and Lagoon G. Wetlands have been constructed in this area to enhance wildlife habitat.

A total of 868 acres of U.S. jurisdictional waters (including about 120 acres of wetlands and 750 acres of non-wetland waters) has been identified within Holloman AFB (Holloman AFB 2010). While there are no perennial streams on Holloman AFB, there are U.S. waters that receive stormwater discharges from the base including the Lake Holloman AFB Wetlands Complex, Dillard Draw, Ritas Draw, and Lost River as well as three unnamed wetlands (Holloman AFB 2005). Ritas Draw flows into the Lost River that dissipates into the sand dunes of White Sands National Monument. Flows that reach Dillard Draw and the Lake Holloman AFB Wetlands Complex either infiltrate the soil or evaporate. Stormwater, typically generated in the arid climate of New Mexico during the months of June through October, is conveyed through drainage channels, underground piping (storm sewer), and, in a few areas, by sheet flow.

Holloman AFB relies on surface water and groundwater for potable water. Surface water from Bonito Lake and natural springs located in Fresnal and La Luz canyons is transported through pipelines to reservoirs at the City of Alamogordo La Luz Water Treatment Plant that transports treated water to the Boles Wells Field Pumping Station and then to Holloman AFB via pipeline.

None of the arroyos on Holloman AFB was assessed for water quality standards by New

Mexico state agencies (NMED 2008) as none of them has a perennial surface flow. Two arroyos within the Tularosa Basin (Dog Canyon and Three Rivers) are listed on the New Mexico Clean Water Act (CWA) 303(d) list of impaired waters. Dog Canyon and Three Rivers arroyos are relatively distant (16 and 11 miles, respectively) from Holloman AFB (NMED 2008).

**Floodplains** — Elevated water levels within ephemeral stream channels near Holloman AFB generally occur June through October and are characterized by high peak flows and short-lived times with small volumes. Most of the water that flows through these stream channels evaporates while a small percentage contributes to groundwater recharge (FAA 2007). According to the Federal Emergency Management Agency (FEMA) floodplain maps, Dillard Draw, located near the southeast portion of the base, is associated with a 100-year floodplain.

**Groundwater** — Holloman AFB is underlain by the Bolson Aquifer, which is increasingly saline with distance from the mountainous areas toward the basin's interior. It is variably saline with depth below the surface and classified as non-potable. Groundwater underlying Holloman AFB contains naturally high total dissolved solids with salts ranging from 10,000 to 45,000 ppm, which far exceeds the generally acceptable threshold of 800 ppm.

The only source of potable water is located in perched aquifers below the mouths of mountain canyons, as well as near mountain margins of the major aquifer (Holloman AFB 2006). Holloman AFB withdraws groundwater from 15 wells with an average depth of 450 to 550 feet that are located in five well fields (Boles, Escondido, San Andreas, Frenchy, and Douglas). Some of the installation wells have been installed to depths of 1,000 feet. Groundwater extracted from the well fields is transported via pipeline to two ground level storage tanks with a total capacity of 0.9 Million Gallons (MG) (Holloman AFB 2006).

### **3.5.2 Environmental Consequences**

#### **3.5.2.1 Proposed Action**

**Soils and Surface Water** — In total, the renovation, construction, and infrastructure improvements for the Proposed Action would affect about five acres of previously disturbed ground around the airfield and about seven acres for family housing. Affected acres represent the area covered by the construction footprints of the proposed facilities and associated paving, plus the surrounding lands where construction-related clearing and grading would occur. Infrastructure upgrades, such as connecting new facilities to water and power systems would also count as affected area on the base. 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 one acre would be disturbed by construction, a National Pollutant Discharge Elimination System (NPDES) stormwater permit would be required. Under the permit, the base must develop a construction Stormwater Pollution Prevention Plan (SWPPP) that describes the standard construction practices to be implemented to eliminate or reduce sediment and non-stormwater 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 with respect to construction would be localized areas of expansive soils, relatively low soil strength, periodic flooding, and poor drainage. These soil limitations can be resolved through standard engineering and modern construction techniques so that significant impacts would not occur.

**Floodplains** — Elevated water levels within ephemeral stream channels near Holloman AFB generally occur between June and October. They are characterized by high peak flows and short-lived times with small volumes. Most of the water that flows through these stream channels evaporates while a small percentage contributes to groundwater recharge (FAA 2007). The Dillard Draw drainage is located along the east boundary of the base, turns west near the south boundary, and ends at the playa lake in the southwest corner of the base. The Dillard Draw (100-year floodplain) is located a short distance onto the southeast corner of the base. The F-16 aircraft construction and operation areas are not located within the existing designated 100-year floodplain. Construction will not impact the designated 100-year floodplain so no flood-related impacts would occur.

**Groundwater** — Holloman AFB would not significantly increase withdrawal of groundwater to support the F-16 mission so groundwater impacts would not occur.

### **3.5.2.2 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. No new construction or local groundwater withdrawals would occur and there would be an overall decrease in the use of water resources resulting from a reduction in base personnel. There would be no adverse impacts with respect to soils, surface water, floodplains, or groundwater under the No Action Alternative.

## **3.6 Biological Resources**

### **3.6.1 Affected Environment**

#### **3.6.1.1 Terrestrial Communities**

**Vegetation** — Holloman AFB is located in the Chihuahuan Desert Province (Bailey 1995). 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. Where vegetation has been replaced, ornamental plants (both native and introduced) and shade trees such as desert willow (*Chilopsis linearis*), ocotillo (*Fouquieria splendens*), yuccas (*Yucca spp.*), pines (*Pinus spp.*), and mulberry (*Morus sp.*) have been established. 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.

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 (Holloman AFB 2010c). 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*) (Holloman AFB 2010c). 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. The latter occurs especially in the more playa-like portions along some of the arroyos where the topography flattens out.

Cryptogammic crusts, also known as biological soil crusts, are present in less disturbed areas. Biological soil crusts are comprised of a variety of organisms including lichens, liverworts, mosses, algae, and blue green algae. 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 (Holloman AFB 2010c). 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*) (Holloman AFB 2010c). 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.

**Wildlife** — Throughout Holloman AFB, suitable wildlife habitat has often been reduced and fragmented due to urban, agricultural, and other rural development including roads and fences (Holloman AFB 2010c). The land in the base cantonment area is characterized as “Development/Ground Disturbance” and it covers about half of the area in the INRMP (Holloman AFB 2010c). 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. Population reduction hunts occur on Holloman AFB and on the adjacent WSMR periodically, as needed. Within WSMR, hunting has contributed to the reduction of the oryx population from an estimated 5,000 animals in 2000 to an estimated 3,000 to 3,500 animals immediately prior to the 2006 hunt (WSMR 2009a).

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 (Holloman AFB 2010c). The main base continues to 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 (Holloman AFB 2010c). The bats are seasonal inhabitants that migrate south during the winter months. Although individual bats return to Holloman AFB every year, the same roosting site may not be chosen each year and small mammal surveys conducted on Holloman AFB recorded 14 species of the rodents are present. 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*).

Characteristic reptiles at Holloman AFB include checkered whiptails (*Cnemidophorus tesselatus*), bull snakes (*Pituophis melanoleucus*), 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*).

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 AFB Wetlands Complex (Holloman AFB 2010c). Typical birds occurring on Holloman AFB include great-tailed grackles (*Quiscalus mexicanus*), which occur near buildings and trees and the Gambel's quail (*Callipepla gambelii*), which frequents the golf course. Some common terrestrial birds include the western kingbird (*Tyrannus verticalis*), Cassin's kingbird (*T. vociferans*), and Say's phoebe (*Sayornis saya*). In addition, Swainson's hawks (*Buteo swainsoni*), red-tailed hawks (*Buteo jamaicensis*), northern harriers (*Circus cyaneus*), and Chihuahuan ravens (*Corvus cryptoleucus*) nest locally.

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 mallard (*Anas platyrhynchos*), northern pintail (*Anas acuta*), teals (*Anas* spp.), northern shoveler (*A. clypeata*), and Wilson's phalarope (*Phalaropus tricolor*). 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. Aquatic birds are observed during the winter in areas of Holloman AFB with permanent surface water including the American coots (*Fulica americana*), ruddy ducks (*Oxyura jamaicensis*), and American avocet (*Recurvirostra americana*).

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. 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.

### **3.6.1.2 Wetlands and Aquatic Communities**

On Holloman AFB, there are at least nine prominent drainages flowing east to west that receive intermittent flows during seasonal thunderstorms (Holloman AFB 2010c). 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 AFB 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 AFB 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 (Holloman AFB 2010c). Some of the wetlands consist of ponds and sections of open ditches that support cattail and bulrush (*Scirpus* spp.). 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*). Although there are no perennial streams on Holloman AFB, there are waters of the U.S. that receive stormwater discharges from the base including the Lake Holloman AFB Wetlands Complex, Dillard Draw, Ritas Draw, Lost River, and three unnamed wetlands.

### **3.6.1.3 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 Endangered Species Act (ESA) and species that are listed for conservation-related reasons by the State of New Mexico. No plant or animal species federally listed as threatened, endangered, proposed, or candidate are known to occur on Holloman AFB (Holloman AFB 2010c). Threatened and endangered species surveys have been conducted every three to five years on Holloman AFB and are planned to continue on this schedule. The 2008 INRMP provides management planning and conservation benefits to species present to avoid decline in populations that may lead toward listing under ESA. Section 4.6.1.4.1 of this EA provides information concerning species that could occur in the project area and surrounding counties.

During recent coordination, the New Mexico Department of Game and Fish (NMDGF) expressed concern for the White Sands pupfish (*Cyprinodon tularosa*) that the state lists as threatened and is a USFWS species of special concern. 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 White Sands pupfish is considered the most sensitive species identified within Holloman AFB (Holloman AFB 2010c). Habitat for the species is protected under a Cooperative Agreement for Protection and Maintenance of White Sands Pupfish, between the Army (WSMR), Air Force (Holloman AFB), National Park Service (White Sands National Monument), USFWS, and NMDGF as signed in 1994, revised in 1998, and renewed in 2006 (Army 2006). In accordance with the agreement, conservation actions for the pupfish were developed and essential habitat, limited use areas, and areas of concern were designated on Holloman AFB.

This pupfish inhabits clear, shallow, strongly alkaline pools and streams with fine mud/silt and sand bottoms (Holloman AFB 2010c). Within its limited habitat, populations are often dense, but numbers can exhibit wide fluctuations due to natural environmental disturbance such as flood or drought (WSMR 2002). The White Sands pupfish is omnivorous, feeding mainly on aquatic insects and larvae, algae, and organic detritus. Nonnative fish species can pose a threat to White Sands pupfish populations and occupied spring ponds with low salinity are susceptible to invasion by predatory non-native fishes (WSMR 1998). Water levels and salinity of the ponds and lakes often fluctuate seasonally, creating an environment inhospitable to nonnative fish, but one in which White Sands pupfish can survive (WSMR 1998).

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 (Holloman AFB 2010c). 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 (Holloman AFB 2010c). This decline may be linked to encroachment by the surrounding dune field; however, USFWS and the Air Force determined that under AFI 32-7064, the Holloman AFB INRMP provided adequate special management or protection for the White Sands pupfish to avoid the need to list the species under the ESA (AFI 32-7064).

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 {BWWSA}) 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*) (Holloman AFB 2010c). Bats are known to use buildings as roosting sites and the Texas horned lizard (*Phrynosoma cornutum*) is an USFWS Species of Concern, which is apparently abundant on Holloman AFB (Holloman AFB 2010c).

In addition, the western burrowing owl, also a USFWS Species of Concern, occurs on dry and open shortgrass prairie including disturbed areas such as barren grounds around the southern portions of Holloman AFB, near runways, near the high speed test track, and scattered across portions on the cantonment area (Holloman AFB 2010c). The species has been known to be tolerant of high human activity but it can also be present in more remote areas where suitable habitat exists (Holloman AFB 2010c). The burrowing owl was considered a successful

breeder on base in 1997, but populations have declined since so they are considered a high conservation priority due to jeopardized populations elsewhere in its range from the precipitous decline observed on base. Surveys have been conducted regularly and artificially constructed burrows on Holloman AFB have been used by breeding burrowing owls (Holloman AFB 2010c).

### **3.6.2 Environmental Consequences**

#### **3.6.2.1 Proposed Action**

##### **3.6.2.1.1 Construction**

**Vegetation and Wildlife** – All proposed construction and renovation activities would occur in developed portions of Holloman AFB and no direct or long-term impacts on vegetation and wildlife are anticipated. The Proposed Action would involve use and renovation of existing facilities with some construction of new facilities and infrastructure to support the F-16 mission, which would be concentrated in the cantonment area. Under the Proposed Action, approximately five acres of land around the airfield and an additional seven acres for family housing would be disturbed to construct for the beddown of the two F-16 training squadrons and associated personnel. Affected acres represent the area covered by the construction footprints of the proposed facilities and associated paving, plus the surrounding lands where construction-related clearing and grading would occur. Infrastructure upgrades, such as connecting new facilities to water and power systems, were taken into account as part of the affected area on the base. Construction would occur within previously disturbed portions of the base near other development. For all land disturbance calculations, additional area is added outside of the project footprints to account for temporary land disturbance likely to occur for equipment access, laydown areas, and haul routes. Areas slated for new facilities are primarily considered, “previously disturbed/developed” so the affected acres do not represent quality wildlife habitat that would attract or support unique species. 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 (MOU), and to assure no habitation by nesting birds or sensitive bat species abandoned buildings would be surveyed for these species before their demolition or renovation.

During construction activities, the amount of noise and dust generated is expected to increase during working hours causing temporary impacts on the local environment that may indirectly affect local flora and fauna. Typical precautions would be taken to minimize these impacts and fugitive dust would be controlled by the use of standard construction practices. In all cases where construction disturbs the existing vegetation or other ground surface, the contractor would revegetate or restore the area as directed by the base to minimize the potential for continued erosion and dust generation and decrease the duration of temporary vegetation loss. Measures to control erosion and siltation would be included as part of the project to minimize offsite impacts. Areas proposed for construction on Holloman AFB have already been disturbed so no significant adverse, long-term impacts on vegetation or wildlife are expected.

**Wetlands and Aquatic Communities** — No wetlands or aquatic habitats would be within the construction 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.

**Special Status Species** — There are no known federally listed as 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. The proposed construction 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. If burrowing owls or other state species of concern are detected where construction would occur, appropriate consultation with NMDGF would be initiated and measures would be implemented to avoid potential adverse impacts to the species.

### **3.6.2.1.2 Operations**

**Vegetation and Wildlife** — Wildlife species that occur on and near Holloman AFB exist in a military airfield environment that includes regular takeoffs, landings, and low-level overflights by military jet aircraft as well as other human activities. The noise levels associated with the F-16 vary considerably according to the actual flight profile, distance from receptor, altitude, and local conditions. Wildlife species in and near Holloman AFB have been exposed to high performance military aircraft noise for several decades and the F-16 aircraft-generated overflight noise levels would be slightly lower than the noise levels generated by the existing F-22s. Reductions in the time-averaged noise levels near Holloman AFB would occur under the Proposed Action; therefore, no adverse impacts on native vegetation, wildlife, or quality of wildlife habitat are expected.

**Wetlands and Aquatic Communities** — No adverse impacts on aquatic and wetland habitats are expected from the F-16 training operations. Defensive countermeasure use would occur outside the base environment as discussed in Section 4.6. For the wetlands that occur on base, no adverse impacts are expected from the change in aircraft type or training that would accompany the Proposed Action.

**Special Status Species** — No significant impacts are expected on special status plants or wildlife that may occur on base due to the qualitatively similar nature of F-16 operations to the existing airfield environment and local species' habituation to these operations. The Air Force received verbal communication on July 29, 2011 from Mr. Wally Murphy, of USFWS. Mr. Murphy stated that he had reviewed the 49 WG Combat and Capabilities and Capacities EA, which assesses the move of the F-16 to Holloman. He stated that their agency has no concerns regarding the proposed F-16 actions at Holloman AFB addressed in the EA.

### **3.6.2.2 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. Biological resources on the base including vegetation, wildlife, wetlands, aquatic communities, and special status species would continue to be affected by a reduced level of military training and other human activities.



## 3.7 Cultural Resources

For purposes of the National Historic Preservation Act (NHPA) Section 106 compliance definition of Area of Potential Effect (APE) (36 CFR 800.4[a][1]), the APE for direct impacts is considered to equate to the main base area (cantonment) of Holloman AFB, which is composed of approximately 8,000 acres within the southern portion of the base. Potential construction impacts would involve a much smaller area. The APE for indirect impacts equates to the land area beneath the 65 dB contours at Holloman AFB (Figure 3-1) including the auxiliary airfield at RIAC, the emergency divert airfield at Biggs AAF, and the MOAs, MTRs, and other airspace depicted in Figure 2-3. The definition of resource and methodology for analysis is described in Appendix B. Detailed discussions of the APE including RIAC, the airspace, and Biggs AAF are included in Section 4.7. The history of Holloman AFB is presented in the installation's Integrated Cultural Resources Management Plan (ICRMP) (Holloman AFB 2010a) and other documents cited there.

### 3.7.1 Affected Environment

**Archaeological Resources** – 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 survey resulted from projects conducted between 1993 and 1997 (Holloman AFB 2010a). 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 and on base-administered lands. Of the 363-recorded sites, 250 are located on the main base with the remainder located on the BWWSA.

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 that are primarily associated with ranching, 49 cultural resources 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 (Holloman AFB 2010b). There are 35 archaeological resources on the main area of Holloman AFB that are eligible for the National Register of Historic Places (NRHP), 142 that are potentially eligible, and 73 that are considered not eligible (Holloman AFB 2010a).

**Historic Architectural Resources** – Currently there are 1,474 architectural resources inventoried on Holloman AFB (Holloman AFB 2010b). 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, and 1,377 remain unevaluated (Holloman AFB 2010a). 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 (Holloman AFB 2010a). Of the 22 European-American settlements recorded, one is eligible for the NRHP, 18 are potentially eligible, and three are ineligible and require no further consideration (Holloman AFB 2010a).

In the area surrounding Holloman AFB, the most notable historic era cultural resource is the White Sands National Monument Visitor Center. This complex of seven buildings was constructed between 1936 and 1940 and is now officially listed as the White Sands National Monument Historic District. The main visitor's center is an adobe structure that could potentially be damaged by noise and vibrations. This structure is 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).

A search of the New Mexico Cultural Resources Information System (NMCRIS) database revealed that there are no NRHP listed properties on the land within the projected 65 dB DNL noise contour (NMCRIS 2010). Holloman AFB, in consultation with the New Mexico State Historic Preservation Office (SHPO) and in compliance with Section 106 of the National Historic Preservation Act (NHPA) obtained concurrence from SHPO on a finding of no historic properties affected by implementation of the Proposed Action.

Construction, demolition, and renovation will not adversely affect any structures that are eligible for the National Register of Historic Places (NRHP). No archaeological impacts are anticipated.

**Traditional Resources** – Native American groups with historic ties to the area such as the Mescalero Apache have not identified any traditional cultural properties on Holloman AFB (Holloman AFB 2010a). Holloman AFB coordinated with tribal governments as part of the environmental process. The Mescalero Apache indicated there were no comments on the proposal after being contacted by a representative of Holloman AFB.

### **3.7.2 Environmental Consequences**

For all projects included in the Proposed Action, compliance with Section 106 of the NHPA (including SHPO consultation) would be concluded prior to project completion. This includes comparison of Cold War-era photographs of Building 877 to modern photographs to aid in determining Building 877's NRHP eligibility. Several projects include ground-disturbing activities, where there is a possibility of encountering previously unrecorded and unknown archaeological resources. If suspected artifacts of any type (wood, stone, bone, metal, etc.) or other unidentifiable materials are uncovered during ground disturbing projects, the soil disturbance activities in that area must cease until environmental staff can determine if the materials warrant further actions under the Native American Graves Protection and Repatriation Act, the Archeological Resources Protection Act, NHPA, or the Holloman AFB ICRMP (Holloman AFB 2010a).

#### **3.7.2.1 Proposed Action**

The Proposed Action involves 28 construction projects, 20 of which would affect existing buildings or facilities. Most of the projects are located south of runway 07/25 and northwest of the family housing area. One project would locate a hydrazine storage area near the missile assembly buildings on the south end of runway 07/25. Table 3-10 lists buildings that could be affected by the project and includes a description of the proposed work, the date the building

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was constructed, and the NRHP eligibility of the building (not all projects would affect existing buildings or facilities). Project 6 involves two buildings (457 and 584) and Building 868 is part of two projects (Projects 17 and 23).

**Table 3–10. Proposed Action – Projects**

Building Number	Building Date	Current Use	Project Number	Project Activity/Use under Proposed Action	National Register of Historic Places (NRHP) Eligibility
457	1989	Airmen's Dormitory	6	Within viewshed of construction of dormitory – mission ready airmen	Not Eligible
584	1970	Visiting Airmen's Quarters	6	Alternate action for project 6, renovate Building 584 (option project could include interim use)	Not Eligible
339	1956	Non-Commissioned Officer (NCO) Education Center	7	Within viewshed of construction of family housing	Not Eligible
869	1965	Armament and Alternative Mission Equipment (AME) Facility (Building 869)	10	Renovate Building 869 to provide space for armament suspension, equipment repair, and AME storage	Not Eligible
21814	1992	Hangar	11	Upgrade hangar	Not Eligible
316	1977	Mission Training Center (MTC) Sims Bay Upgrade (Building 316)	12	Upgrade four bays	Not Eligible
877	1956	Wheel and Tire Facility	13	Addition	Undetermined
825	1954	Air Freight Terminal	14	Demolish	Not Eligible*
828	1966	Avionics Shop	16	Renovate	Not Eligible
868	1986	Flight line Maintenance Facility	17	Repairs	Not Eligible
820	1954	Engine/Metals Tech Maintenance Facility	18	Addition	Not Eligible*
817	1955	General Purpose Warehouse	19	Reuse for storage	Not Eligible
816	1955	Aircraft Maintenance	20	Within viewshed of the external tank farm (optional project could include an upgrade for interim use)	Not Eligible
809	1956	Supply Bulk Storage Yard	21	Demolish interior for storage	Not Eligible
892	1992	Squadron Operations/Aircraft Maintenance Unit (AMU) Renovations	22	Phased upgrades	Not Eligible
868	1986	Weapons Load Training (WLT) Maintenance Hangar Upgrade	23	Upgrade existing building	Not Eligible
898	1969	Structures Facility	24	Use existing shops	Not Eligible
866	1977	Egress Mission Facility	25	Repairs	Not Eligible
818	2010	Support (Aerospace Ground Equipment [AGE]) Facility	26	Repairs	Not Eligible
800	1957	Aircraft Maintenance Shop	27	Renovate	Not Eligible
823	1952	Avionics Shop	28	Addition	Not Eligible

**Note:** \*Eligibility based on recommendations from the Cold War Historic Properties Survey for Air Combat Command (Holloman AFB 2009b) and the Integrated Cultural Resource Management Plan (ICRMP) (Holloman AFB 2010a). SHPO concurrence July 28, 2011.

Of the 20 existing structures involved in the Proposed Action, 17 date from the Cold War era. None was found to be eligible for the NRHP based on the special consideration criteria applied to Cold War facilities that are less than 50 years old (criterion consideration G). Sixteen of the buildings dating from the Cold War era are not eligible and Building 877 is of undetermined eligibility (Holloman AFB 2010a). Three additional buildings were constructed too recently to be considered for eligibility (Buildings 21814, 892, and 818). On July 29, 2011, SHPO concurred that implementation of the Proposed Action at Holloman AFB will have no adverse effect on

historic properties. Annual airfield operations would increase about 11 percent over baseline conditions and night operations would decrease substantially over current conditions. Overall, noise at Holloman AFB would decrease (Section 3.2.2).

**Archaeological Resources** – Impacts to archaeological resources are not expected under the Proposed Action. The six projects of the Proposed Action that do not involve existing structures include either new construction or relocation. Archaeological surveys have examined about 96 percent of the base including the areas for these six projects, which documented 177 archaeological resources as eligible or potentially eligible for inclusion in the NRHP, none are within the ROI of any of the Proposed Action projects. It is possible that project related ground disturbing activities could encounter previously unknown and unevaluated cultural resources, even underneath existing development. If previously unrecorded or unevaluated cultural resources were encountered during construction, Holloman AFB would manage these resources in accordance with the ICRMP, all federal and state laws, and all Air Force regulations. Indirect impacts on archaeological resources at Holloman AFB due to personnel changes are not anticipated as the on-base population is expected to increase by only a small percentage (Table 2-5).

**Historic Architectural Resources** – There would be no impact on eligible or potentially eligible architectural resources from the noise associated with airfield operations. Continued noise from overflights should have no adverse impact on archaeological sites or historic structures located on Holloman AFB.

Indirect noise impacts to historic architectural resources outside the boundaries of Holloman AFB (on land within the projected 65 dB noise contour) are not anticipated since there are no known NRHP-listed properties within this APE and noise levels may decrease slightly. Holloman AFB, in consultation with the New Mexico SHPO and in compliance with Section 106 of the NHPA obtained concurrence from SHPO on a finding of no historic properties affected by implementation of the Proposed Action outside the boundaries of Holloman AFB. Projected noise contours near the White Sands National Monument Visitor Center would be similar to existing conditions, with overflights producing noise at levels less than 65 dB. Current conditions regarding vibrations from the adjacent highway indicate the building could experience indiscernible short-term change from increased traffic related to construction activities on the base. Following completion of construction, conditions should revert to the baseline since there will be little change in the number of personnel working, living, and flying at Holloman AFB.

**Traditional Resources** – Impacts to traditional resources are unlikely under the Proposed Action as no Native American traditional cultural properties or other traditional resources have yet been identified at the installation. If previously unrecorded or unevaluated traditional cultural resources were encountered during construction, the base would manage them in accordance with the ICRMP, all federal and state laws, and all Air Force regulations.

### **3.7.2.2 No Action Alternative**

Under the No Action Alternative, the F-16 FTU would not be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13. Other military tenants and users would continue to operate at current levels. Construction

associated with the Proposed Action would not occur so impacts to cultural resources are not expected under the No Action Alternative. In all cases, resources would continue to be managed in compliance with federal law, Air Force regulations, and the ICRMP (Holloman AFB 2010a).

## **3.8 Land Use and Recreation**

### **3.8.1 Affected Environment**

#### **3.8.1.1 Land Use**

**On-Base Land Use** — Holloman AFB is located in Otero County in southeastern New Mexico, about six miles west of the City of Alamogordo. One narrow extension of the city reaches along US 70 to three miles east of the base. Holloman AFB is bounded on the northwest by the U.S. Army-administered WSMR, which extends roughly 100 miles to the north and south, and 40 miles to the east and west. White Sands National Monument is located southwest of the base. The eastern boundary of Holloman AFB is bounded by New Mexico State Trust Lands, private lands, Bureau of Land Management (BLM) administered public lands, and WSMR (AFI 91-204).

Holloman AFB is composed of two parcels of land totaling 59,639 acres. Within its contiguous boundaries (main base), there are approximately 52,000 acres including a land parcel transfer from BLM in the southwestern portion of the base. The remaining 7,000 acres is the BWWSA, which is located east of US 54 (AFM 91-201). Figure 3-3 shows existing land use near the proposed MILCON and O&M projects and facilities for the F-16, which would be the focus of the on-base land use analysis. Land use in these areas is designated as administrative, aircraft O&M, airfield, community (commercial), housing (accompanied), housing (unaccompanied), industrial, open space, recreation, and school.

The base is mostly undeveloped, open space used for a variety of mission related activities. Some open space serves as a buffer required for safety clearances, security areas, utility easements, and environmentally sensitive areas (Air Force 2009). Holloman AFB has three main developed areas, main base, west ramp, and north areas. The heaviest concentration of facilities is in the south end of the base and flanks the southern side of the airfield. The three developed areas make up the main cantonment within the southern portion of the installation where land use includes a mix of housing, outdoor recreation, community commercial, community services, administration, and medical (AFM 91-201). North of the cantonment area is a scatter of industrial and aircraft O&M land uses (Holloman AFB 2008b). The north and west areas contain a mixture of industrial, airfield, aviation related, administrative, and community uses. Portions of the west area constitute a separate cantonment area. Industrial and administrative land uses lie between the north and west areas. The north area (i.e., area north of runway 07/25) is composed of open space or aircraft O&M land uses (Holloman AFB 2008b).

The public access area for the Lake Holloman Wetlands Complex is composed of approximately 1,800 acres in the southernmost portion of the base, directly south of the cantonment area. This area serves as the water containment for treated sewage effluent from the wastewater treatment plant. The area is designated as public use and is open to the public for recreational activities on a limited basis and within established regulations.

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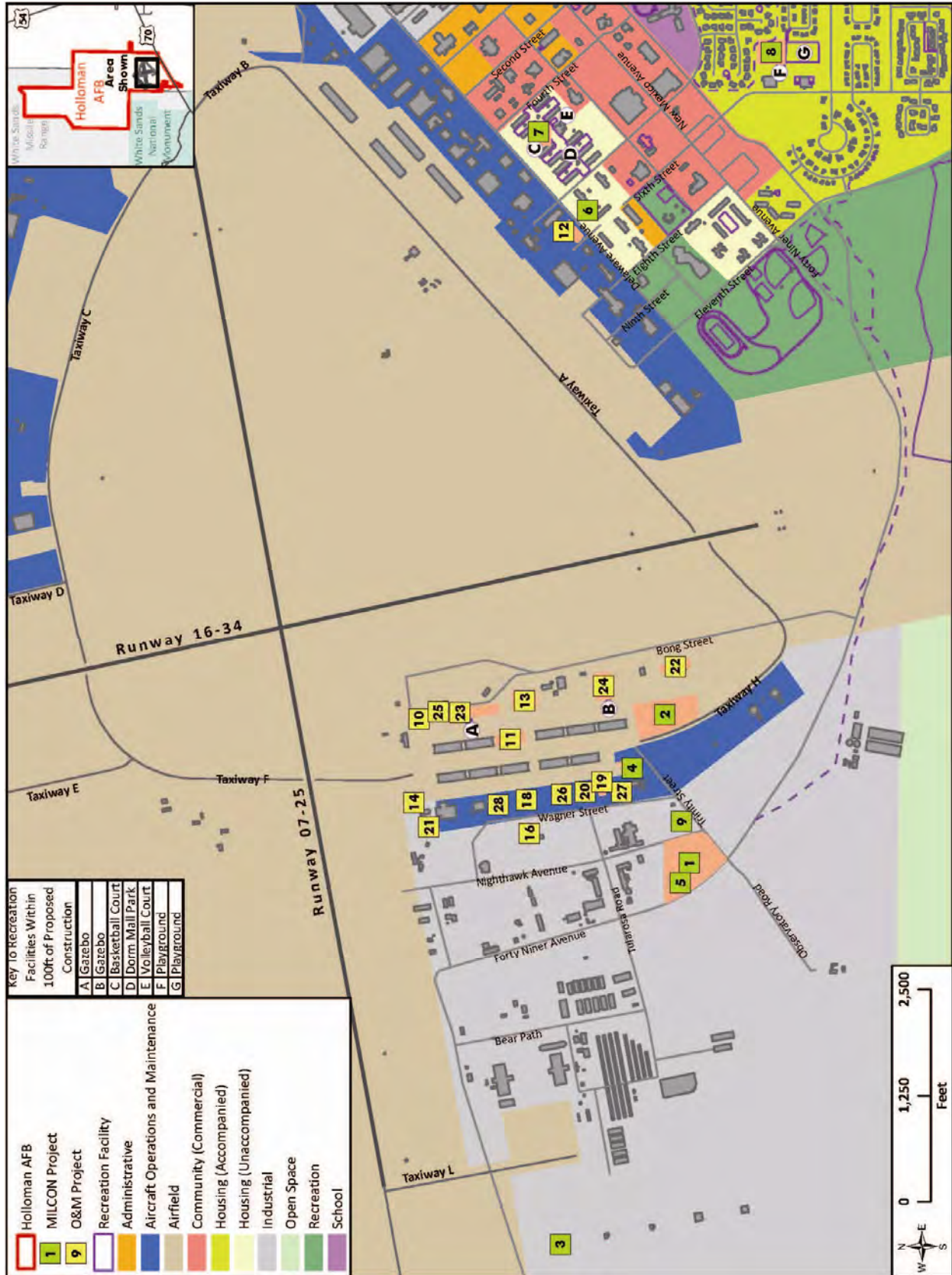


Figure 3-3. Existing Land Use in Project Area at Holloman AFB



The base also has jurisdiction over approximately 7,000 acres of the BWWSA on the Boles, Douglas, and San Andres Well Fields and shares interest in the Bonito Lake Water System with the City of Alamogordo. The primary purpose of the BWWSA and the Bonito Lake Water System is to provide continuous sources of potable water for the base (Holloman AFB 2008b).

Holloman AFB also has use, through a MOU, of five areas located on WSMR for military training purposes. These areas are geographically separated units and include the Red Rio Bombing Range, Oscura Bombing Range, National Radar Test Facility (composed of the Radar Target Scatter {RATSCAT} site and the Radar Target Scatter Advanced Measurement Site[RAMS]), and the Air Force Special Weapons Complex (Holloman AFB 2008a). These areas are discussed in more detail in Section 4.8.

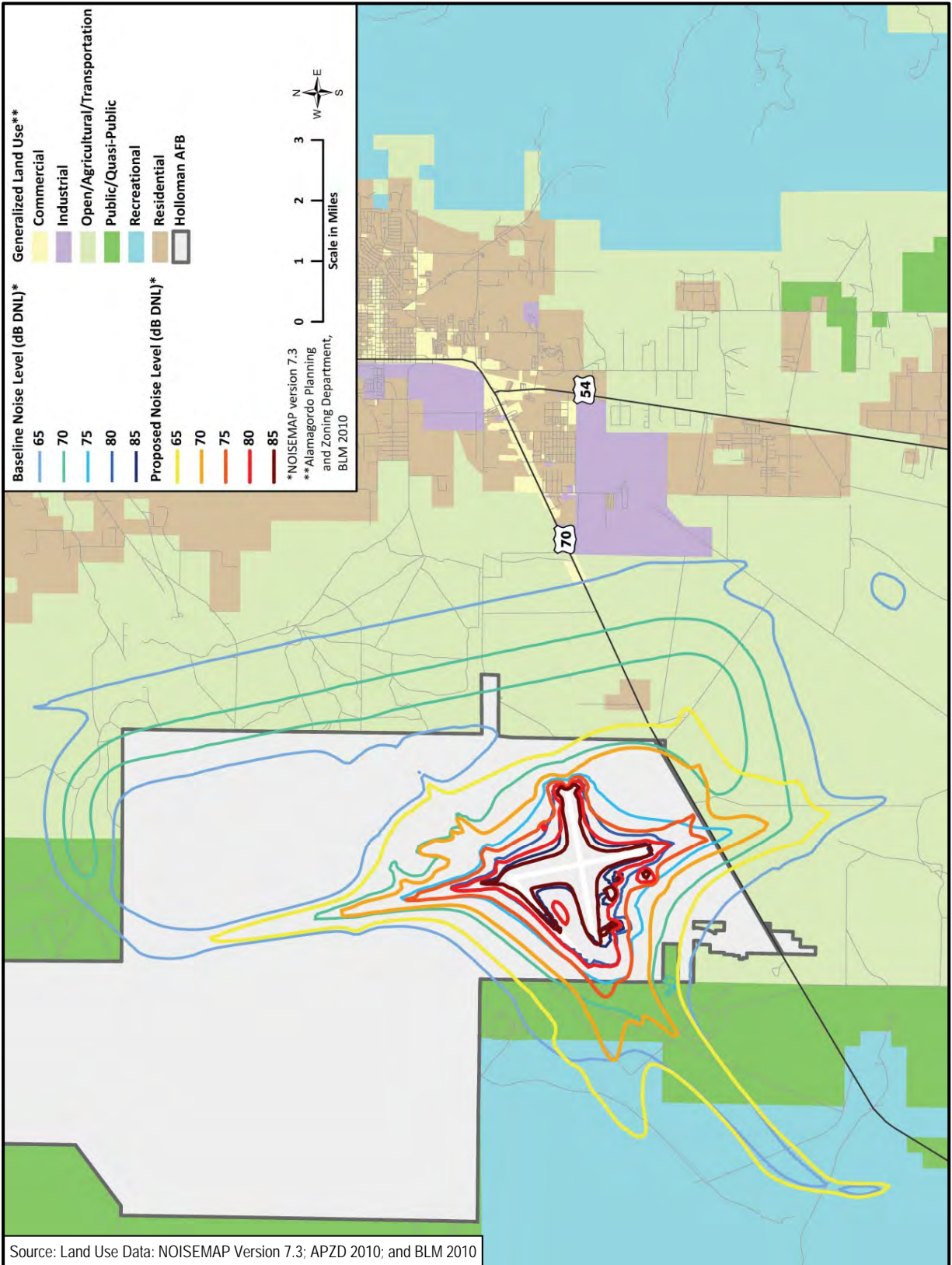
**Surrounding Land Use** – Much of the land south and northeast of Holloman AFB is administered by BLM and is primarily leased for agriculture/open land use (i.e. grazing). The White Sands National Monument (designated for recreational land use) encompasses an area of approximately 145,000 acres to the southwest of Holloman AFB. The National Park Service administers White Sands National Monument, which borders Holloman AFB on the west, north, and east. The monument is used for recreation and preservation of special resources (e.g., flora and fauna, geologic, visual). WSMR surrounds the White Sands National Monument and a small portion borders Holloman AFB near the south end of the test track. The area in the WSMR is essentially undeveloped and supports a variety of military, test, and development activities at specific locations and in airspace over the range (Holloman AFB 2006).

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.

Land uses in the existing 65 dB DNL or greater noise contours for Holloman AFB consist mostly of open, public/quasi-public, recreational, residential, and commercial areas (Table 3–11 and Figure 3–4). Since detailed land use data is not available from local planning department sources, the identification and categorization of existing land uses under the 65 DNL (and greater) noise contour is based on land use data from a local parcel ownership database.

**Table 3–11. Baseline Off-Base Land Uses within the  
65 dB DNL and Greater Noise Contours**

Contour Interval (dB DNL)	Land Use (Acres)						
	Commercial	Industrial	Open	Public/Quasi-Public	Recreational	Residential	Total
65–69	9	0	13,090	2,533	864	205	16,701
70–74	0	0	5,409	664	0	0	6,073
75–79	0	0	37	2	0	0	39
80–84	0	0	0	0	0	0	0
≥ 85	0	0	0	0	0	0	0
<b>Total</b>	<b>9</b>	<b>0</b>	<b>18,536</b>	<b>3,199</b>	<b>864</b>	<b>205</b>	<b>22,813</b>



**Figure 3–4. Off-Base Land Uses within the Holloman AFB Baseline and Proposed Action 65 dB DNL and Greater Noise Contours**

### **3.8.1.2 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) (Holloman AFB 2008b).

The nearby White Sands National Monument, administered by the National Park Service, is a popular destination for both in state and out-of-state visitors. The monument is a natural wonder of gypsum sand dunes spread over 275 square miles. Park facilities include 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 close to Holloman AFB and experience noise from airfield operations. Over the years, flight tracks for the primary runways have been modified to minimize direct overflight of monument facilities to reduce noise.

## **3.8.2 Environmental Consequences**

### **3.8.2.1 Land Use**

The beddown of the F-16 training mission requires construction and modification of facilities located in the West Ramp Area, to the west of the West Ramp area, and to the southeast of Taxiway A. No additional construction is proposed in any location outside the installation. The land uses on Holloman AFB are characteristic of a military installation. New facilities would be designed and sited to be consistent with the general plan, airfield safety guidelines, and related planning programs to ensure that proposed development would be compatible with surrounding land uses. Construction and modification of airfield-related and industrial facilities for the F-16 would take place in the West Ramp Area. New dormitories and family housing would be developed in areas designated for unaccompanied and accompanied housing. Proposed uses would be compatible with existing land uses on the base. Land use impacts to surrounding communities during construction are expected to be minimal since proposed development would be contained within existing military designations. In addition, traffic, noise, dust, and other impacts from construction equipment and vehicles would be reduced through construction plans and practices agreed to by contractors.

Figure 3-4 displays projected noise contours for the Proposed Action compared to baseline, overlaid on existing land use. As summarized in Table 3-12, the Proposed Action would decrease the area surrounding Holloman AFB within the 65 dB DNL or greater noise contour by more than 16,000 acres compared to baseline conditions. The number of off-base residents affected by noise levels greater than 65 dB DNL would decrease by 27 persons.

**Table 3–12. Off-Base Land Uses within the Proposed Action  
65 DNL and Greater Noise Contours**

Contour Interval (dB DNL)	Generalized Land Use (Off-Base)													
	Commercial		Industrial		Open		Public/Quasi-Public		Recreational		Residential		Total Area Affected	
	Acres	Change	Acres	Change	Acres	Change	Acres	Change	Acres	Change	Acres	Change	Acres	Change
65–69	0	(9)	0	0	1,723	(11,367)	1,517	(1,016)	1,729	865	0	(205)	4,968	(11,733)
70–74	0	0	0	0	457	(4,952)	626	(38)	46	46	0	0	1,128	(4,945)
>75	0	0	0	0	0	(37)	46	44	0	0	0	0	46	7
<b>Total &gt; 65</b>	<b>0</b>	<b>(9)</b>	<b>0</b>	<b>0</b>	<b>2,180</b>	<b>(16,356)</b>	<b>2,189</b>	<b>(1,010)</b>	<b>1,775</b>	<b>911</b>	<b>0</b>	<b>(205)</b>	<b>6,142</b>	<b>16,671</b>

**Key:** Change = Change from baseline.

**Source:** Land Use Data: APZD 2010; and BLM 2010 in conjunction with aerial photography.

The amount of land characterized as residential affected by greater than 65 dB DNL would decrease by approximately 200 acres under the Proposed Action. The largest decrease in acreage would be open land use (approximately 16,000 fewer acres affected), followed by public/quasi public (approximately 1,000 fewer acres affected). Recreation land use affected by greater than 65 dB DNL would increase by approximately 900 acres, the only increase identified within the overall net decrease. Under the Proposed Action, there would be no appreciable change to noise exposure at representative locations in White Sands National Monument as only a small portion of the dunes and playas are exposed to levels above 65 dB DNL.

### 3.8.2.2 Recreation

The following construction/renovation projects in the Proposed Action are located less than 100 feet away from existing on-base recreational facilities (Figure 3–3).

- Project 16 (Flight Line Maintenance Facility) – Miscellaneous recreation facility, two gazebos identified as A and B, dorm mall park, basketball court, volleyball court, two playgrounds identified as A and B
- Project 22 (Maintenance Hangar Upgrade) – Gazebo A
- Project 23 (Structure Facility) – Gazebo B
- Project 7 (First Term Airmen Dorm) – Gazebos A and B, dorm mall park, basketball court, volleyball court, playgrounds A and B

Typical concerns of noise, blowing dust, traffic during construction, and other impacts from construction vehicles could temporarily affect recreational amenities located near construction zones. These concerns would be reduced through construction plans and practices agreed to by contractors. Construction on the base would take place several miles from popular sites on White Sands National Monument.

The projected total base manpower change following the arrival of the F-16 aircraft would be 454 persons (142 personnel and 312 dependents), representing a 7 percent increase over current levels. Holloman AFB provides indoor and outdoor recreational facilities for personnel and family members and there would be adequate facilities on base to meet the basic needs of this small population increase. Some personnel and family members may live in Alamogordo and use local facilities where the recreational facilities would have the capacity to serve the added

people since many facilities in Alamogordo are currently functioning below capacity.

Table 3-13 shows that some trails on White Sands National Monument currently experience noise levels between 65 and 70 dB DNL while the main visitor center and picnic area experience levels below 65 dB DNL. Under the Proposed Action, there would be no appreciable change to noise exposure at these representative locations. Only a small portion of the dunes and playas are exposed to levels above 65 dB DNL. The F-16 would use the same flight tracks as the other aircraft that are currently using the airfield. These tracks have been modified over time to reduce noise exposure to the most visited parts of the monument. Under the Proposed Action, changes in noise at these locations would be lower by an almost imperceptible amount.

**Table 3-13. Noise Impacts on Recreational Amenities Surrounding Holloman AFB with Implementation of Proposed Action**

Facility	Baseline Noise Level	Proposed Action
White Sands National Monument Visitor Center	<65	<65
White Sands National Monument Camp/Picnic area	<65	<65
White Sands National Monument Big Dune Trail/Playa Trail	65-70	65-70

### 3.8.2.3 No Action Alternative

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. Land use and recreation conditions would remain the same and the reduced levels of airfield operations would lower noise levels on the base and at the White Sands National Monument.

## 3.9 Socioeconomics

### 3.9.1 Affected Environment

The ROI for socioeconomics for Holloman AFB, New Mexico is defined as Otero County, New Mexico and the City of Alamogordo. Potential socioeconomic consequences from the F-16 training activities would be concentrated within the county and more particularly within the city. The definition of resources and methodology for analysis is described in Appendix B.

#### 3.9.1.1 Population

In 2010, Otero County was ranked as the ninth most populated county in New Mexico with a total of 63,797 persons, accounting for approximately 3.1 percent of the total population of New Mexico (Table 3-14) (USCB 2010a). There are three incorporated municipalities in the ROI, Alamogordo, Tularosa, and Cloudcroft and twelve unincorporated communities, Bent, High Rolls/Mountain Park, Holloman AFB, La Luz, Mayhill, Mescalero, Orogrande, Pinon, Sacramento, Sunspot, Timberon, and Weed (Otero County 2005).

**Table 3-14. Population Growth from 2000 to 2010**

Location	Census 2000	Census 2010	Average Annual Percent Change 2000-2010
Otero County	62,299	63,797	0.2%
Alamogordo	35,582	30,403	(1.6)%
New Mexico	1,819,041	2,059,179	1.2%

Source: USCB 2000a, 2000b, and 2010a.

In 2010, Alamogordo accounted for nearly half of the county's population (47.7 percent), followed by Tularosa (4.5 percent), and Cloudcroft (1.1 percent). Alamogordo is the county seat and the nearest city to Holloman AFB so potential socioeconomic impacts would likely be focused within Alamogordo.

As of 2009, there were approximately 4,241 active duty and 1,613 civilians assigned to Holloman AFB (Holloman AFB 2009a). In 2009 and 2010, additional personnel transferred to Holloman AFB as the F-22 and the new RPA mission beddowns progressed. Therefore, Holloman AFB's estimated baseline population in this EA includes the full complement of F-22 and RPA personnel, which totals 6,590 personnel.

### **3.9.1.2 Housing**

As of 2010, there were an estimated 30,992 housing units in Otero County of which an estimated 24,464 (nearly 80 percent of the total supply of housing) were occupied (USCB 2010a). In the City of Alamogordo, nearly 91 percent of the 14,052 housing units were occupied in 2010. The State of New Mexico and the city Alamogordo have been greatly impacted by the national downturn in housing sales and prices in the last several years. In September 2007, the median price of a housing unit in Otero County was \$159,900 as compared to the median price in the State of New Mexico of \$189,700 (RANM 2009). In September 2009, the median price decreased to \$143,500 in Otero County, a decrease in the median price of 10.3 percent from 2007 as compared to a decrease of 5.1 percent for the State of New Mexico during the same two-year period (RANM 2009).

### **3.9.1.3 Schools**

There are three school districts serving Otero County, Alamogordo Public School District, Tularosa Municipal School District (MSD), and Cloudcroft MSD. During the 2009-2010 school year, there were 7,506 students in the county. The Alamogordo Public School District services the largest population in the county and therefore had the largest number of students (6,124). Tularosa MSD had 946 students and Cloudcroft MSD had 436 students (Table 3-15) (NMPED 2010). The Holloman AFB Elementary School and Holloman AFB Middle School are the two Alamogordo Public Schools located on Holloman AFB (Holloman AFB 2010b).

**Table 3-15. Number of Students for the 2009-2010 School Year**

Location	Kindergarten-Grade 3	Grades 4-8	Grades 9-12	Total
Alamogordo Public School District	2,013	2,235	1,875	6,124
Tularosa Municipal School District (MSD)	280	354	312	946
Cloudcroft MSD	116	159	161	436
Otero County	2,409	2,748	2,348	7,506

**Source:** NMPED 2010.

Capacity varies for individual schools so the average class sizes on a district level are evaluated as an estimate. For the 2008-2009 school year, the student-to-teacher ratio for Alamogordo Public School District was 14.29, Cloudcroft MSD was 9.08, and Tularosa MSD was 11.22. These student-to-teacher ratios are lower than the maximum class loads dictated by NMAC Title 6, Chapter 29, Part 1 that restricts kindergarten class sizes to 20 students, grades 1 through 3 to 22 students, grades 4 through 6 to 24 students, and grades 7 through 12 to 27 students (NMAC 2009). The average New Mexico maximum class size across all grades is 23 students per class.



### 3.9.1.4 Total Employment

Total employment in Otero County in 2008 was 28,216 jobs. Between 2006 and 2008, employment grew at an average annual rate of less than 0.5 percent. Government and government enterprises industry has a total employment of 10,257, followed by retail trade with 3,137 persons, and health care and social assistance with 2,650 persons (BEA 2008).

Holloman AFB serves as a major economic force in Otero County, particularly in the City of Alamogordo. As of 2009, there were approximately 4,241 active duty military personnel and 1,613 civilian personnel assigned to Holloman AFB (Holloman AFB 2009a). An additional 4,441 indirect jobs were created from base-related activities (Holloman AFB 2009a).

### 3.9.1.5 Public Services

Public services are provided to residents through various government agencies including those in Otero County and the City of Alamogordo. Changes in population would affect the demand for these services, as well as the ability to fund them. Tax revenues collected by the State of New Mexico in FY08 totaled over \$6.0 billion including a combination of property taxes, sales taxes, and income taxes (NMDTR 2009). In 2010, Otero County estimated tax revenues to be \$26.3 million (Otero County 2010). In 2009, the City of Alamogordo collected over \$14.78 million in tax revenues (Alamogordo 2010).

Table 3–16 shows the number of Otero County law enforcement personnel as of the fall of 2004. The Department of Public Safety for the City of Alamogordo was established in 1967 to provide police and fire protection services for the community. Officers of the Department of Public Safety serve dual roles as police officers and firefighters. There are 70 officers with these dual roles and 12 officers that serve exclusively as fire equipment operators. There are seven fire stations throughout the City of Alamogordo (Alamogordo 2007).

**Table 3–16. Total Otero County Law Enforcement Personnel for 2004**

Department	Number of Personnel
United States Border Patrol (Agents)	53
New Mexico State Police (Police and Troopers)	20
Otero County Sheriff Department (Sheriff and Deputies)	26
Alamogordo Department of Public Safety *	82
Tularosa Police Department*	8
Cloudcroft Police Department*	3
Alamogordo Animal Control	5
<b>Total</b>	<b>197</b>

**Note:** \*Full-time police officers.

**Source:** Otero County 2005; ADPS 2010.

In addition, fire and emergency medical services are provided to residents of Otero County through the Otero County Fire Fighters Association (OCFFA), which includes 21 volunteer Fire and Emergency Medical Service (EMS) departments, as well as federal, state, municipal, and tribal entities (Cloudcroft 2010).

The City of Alamogordo is the largest city in Otero County and serves as the regional center for medical care. The Gerald Champion Regional Medical Center (GCRMC) located in Alamogordo is the only hospital in the county. It has 640 employees and 165 licensed medical

professionals with varying specializations including primary care, pediatrics, surgery, pharmacy, and nursing (GCRMC 2009; OCEDC 2010). This hospital is a shared facility with Holloman AFB in which military physicians have full admission services for their patients and the patients' dependents. There are also 15 dentists in Otero County (OCEDC 2010).

### **3.9.2 Environmental Consequences**

#### **3.9.2.1 Proposed Action**

Construction expenditures from the Air Force as facilities are renovated or constructed to support the basing of the F-16 training mission would contribute additional employment and income to Otero County. Depending on the intensity of the construction activities in any given year, the level of construction activity may result in an in-migration from surrounding communities and counties such as Doña Ana County or El Paso County as construction workers may choose to move to Otero County to capture the new jobs. Construction expenditures and the jobs created are temporary and would result in two to three years of stimulation of the local construction industry and result in a temporary beneficial impact.

Personnel changes and subsequent socioeconomic impacts are dependent on the net change in personnel from the Proposed Action. The number of personnel assigned to Holloman AFB would increase by an estimated 142 personnel. The Air Force assumes 2.2 dependents per personnel member, resulting in an increase of 312 dependents including spouses and children. This change in personnel at Holloman AFB would increase the total population in the City of Alamogordo by approximately 1.5 percent representing a negligible change in population. It is anticipated that the City of Alamogordo and Otero County would have the resources to accommodate the population change and continue to provide public services such as law enforcement, fire fighting, and medical services with no significant impacts.

Implementation of the Proposed Action would increase employment in Otero County by adding an estimated 142 jobs to Holloman AFB. These jobs would be filled by the incoming personnel and would have the potential to induce job growth as goods and services are needed to support the new personnel. Using the Impact Analysis for Planning (IMPLAN) economic impact model, the addition of 142 direct jobs would potentially create up to 24 induced jobs (MIG 2008). In 2009, Otero County had an unemployment rate of 6.4 percent with 1,688 unemployed persons (BLS 2010). The degree of induced employment growth is such that positions could be filled by unemployed persons currently in the county or by spouses of the incoming personnel. The addition of the direct and induced employment would potentially create up to \$22.3 million in additional economic output in Otero County.

Incoming personnel would increase the demand for housing units. Assuming one housing unit per personnel member would be dependent on community housing as opposed to on-base housing, the demand for community housing could increase by as much as 142 housing units. The number of vacant housing units in the City of Alamogordo in 2010 numbered approximately 1,289. The number of housing units demanded by the change in personnel may be less than 142 housing units if F-16 trainees are housed on base. It is anticipated that the housing market has the capacity to accommodate the change in personnel from implementation of the Proposed Action, but the housing market in Alamogordo is tight and finding suitable housing may be difficult for incoming personnel and/or others looking for a home.

It is expected that the incoming F-16 personnel would be accompanied by spouses and school-aged children. Out of the estimated 312 dependents, approximately 138 are estimated to be school-aged children between the ages of 4 and 18. The average maximum class size for New Mexico schools is 23 students per class as dictated by NMAC Title 6, Chapter 29, Part 1. The average class sizes in the Otero County school districts are substantially lower than the maximum class sizes dictated by the State of New Mexico. Therefore, it is anticipated that the school districts near Holloman AFB would have the capacity to accommodate the increase in students without impact to school resources.

The number of residents affected by noise levels greater than 65 dB DNL due to F-16 airfield operations is expected to decrease as compared to baseline conditions (Table 3-17). The FAA and DoD have identified residential use as incompatible with noise levels above 65 dB DNL unless special measures are taken to reduce interior noise levels for affected residences. Residential use is identified as incompatible regardless of noise attenuation at noise levels greater than 75 dB DNL. Off-base noise levels under the Proposed Action would not exceed 75 dB DNL and therefore, would not be a significant impact to residents, property values, or socioeconomic conditions.

**Table 3-17. Residents Affected by Noise Levels Greater than 65 dB DNL**

Noise Levels (dB DNL)	Baseline	Proposed Action
Total > 65	70	43
65-69	36	20
70-74	34	23
≥ 75	-	-

### **3.9.2.2 No Action Alternative**

Under the No Action Alternative, the F-16 FTU would not be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. Compared to baseline levels that include the F-22 mission at Holloman AFB, the continuing drawdown of the F-22 mission would result in a decrease of 926 personnel and up to 2,037 dependents assigned to Holloman AFB. Using the IMPLAN economic impact model, the drawdown of 926 direct jobs would potentially result in the loss of an additional 157 induced jobs (MIG 2008). The total change in economic output in Otero County due to the drawdown would be an estimated \$145.7 million. In addition, housing units would become available (alleviating some pressure in the housing market) and schools would have additional capacity.

## **3.10 Environmental Justice and Protection of Children**

### **3.10.1 Affected Environment**

The ROI for environmental justice and protection of children is defined as the region in which there is the potential for adverse impacts from construction or flight operations and includes the area potentially impacted by high noise levels. In accordance with the Guide for Environmental Justice Analysis with the Environmental Impact Analysis Process, the ROI is compared with the community of comparisons defined as Otero County. The definition of resources and methodology for analysis is described in Appendix B.

The analysis of environmental justice for the base and vicinity considers changes in airfield noise levels created by the F-16 training activities. The existing area affected by noise levels from Holloman AFB is depicted in Figure 3-1. Using 2010 Census data, the number of persons affected by off-base noise from Holloman AFB was estimated. Baseline noise levels affect an estimated 70 persons with noise levels greater than 65 dB DNL (Table 3-17). Of these persons affected, approximately 30.0 percent are minority and 12.9 percent are low-income.

As the community of comparison required for environmental justice analysis, Otero County is shown in Table 3-18, which identifies total population and percentage populations of concern in Otero County, the State of New Mexico, and the United States.

**Table 3-18. Total Population and Populations of Concern for 2010**

Location	Total Population	Percentage Minority	Percentage Low-Income	Percentage Youth
Otero County	63,797	47.2%	18.9%	25.0%
New Mexico	2,059,179	59.5%	18.1%	25.2%
United States	308,745,538	36.3%	13.5%	24.0%

**Note:** Data for Low-income is derived from the 2005-2009 American Community Survey

**Source:** USCB 2010a and 2010b.

Minority persons represent 47.2 percent of the population in Otero County and 59.5 percent of the state population. Persons categorized as Hispanic or Latino were the predominant minority group with 34.5 percent of the total population in Otero County and 46.3 percent in the state. The percentage of persons and families in Otero County with incomes below the poverty level was higher than state levels, averaging 18.9 percent in the county compared to 18.1 percent in New Mexico. The youth population comprising children under the age of 18 years constitutes 25.0 percent of the Otero County population compared to 25.2 percent for New Mexico. Two schools are located on Holloman AFB and both schools are affected by noise levels between 70 and 74 dB DNL under baseline conditions. There are also two childcare centers located on Holloman AFB, which are affected by 70 dB DNL noise level.

### **3.10.2 Environmental Consequences**

The FAA and DoD have identified residential use as incompatible with noise levels above 65 dB DNL unless special measures are taken to reduce interior noise levels for affected residences. Schools and childcare centers are considered compatible with noise levels up to 75 dB DNL with additional noise attenuation. For noise levels above 75 dB DNL, educational services are not compatible regardless of noise attenuation.

#### **3.10.2.1 Proposed Action**

No disproportionately high and adverse human health or environmental impacts have been identified on minority or low-income populations due to construction on Holloman AFB. Construction would occur within the Holloman AFB cantonment area and would not impact off-base populations. Under the Proposed Action, an estimated 43 off-base residents would be affected by noise levels greater than 65 dB DNL. Of these affected residents, 17 (39.5 percent) would be minority and five (10.9 percent) would be low-income. As described under Section 3.10.1, in Otero County (defined as the community of comparison) the minority population comprises 47.2 percent of the total population and the low-income population comprises 18.9 percent. Therefore, flight operations from the F-16 training mission would not present a

disproportionately high or adverse environmental impact on minority or low-income populations since the share of affected populations of concern is substantially lower than the populations of concern in Otero County. Overall, reduction in noise level would result in minor beneficial impacts in the form of slightly reduced annoyance to any affected persons and schools near the Holloman AFB airfield.

Under the Proposed Action, the only schools and childcare centers affected by noise levels greater than 65 dB DNL are the two on-base schools and the two on-base childcare centers. The DNL at the schools and childcare centers under the Proposed Action would decrease by 1 dB relative to baseline conditions (Figure 3-1) so implementation of the Proposed Action would impact children at these locations slightly less than under baseline conditions. As noise levels at the facilities would be below 75 dB under the Proposed Action, addition of attenuating features (such as double-pane windows) could render the structures compatible with noise requirements if such attenuation features have not been previously incorporated. Additional detail concerning noise and the potential for interference with learning in terms of ANSI's *Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools* is provided in Section 3.2, Noise (ANSI 2009).

### **3.10.2.2 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. Under the No Action Alternative, there would be no adverse impacts to minority or low-income populations. These populations of concern (including the on-base schools and childcare centers) would continue to be exposed to noise levels less than described in Section 3.10.1.

## **3.11 Infrastructure**

### **3.11.1 Affected Environment**

#### **3.11.1.1 Potable Water System**

Holloman AFB relies on both surface and ground water for potable water. The surface water sources are shared with the City of Alamogordo. The base owns the various wells located 12 to 15 miles east of Holloman AFB near the foothills of the Sacramento Mountains. Surface water from Bonito Lake and natural springs located in Fresno and La Luz Canyons is transported through pipelines to reservoirs at the City of Alamogordo's La Luz water treatment plant. The La Luz water treatment facility transports treated water to the Boles Field Pumping Station and then to the base via pipeline. There are two main storage tanks at the water treatment plant, one with a capacity of 1.0 MG and the other with a capacity of 1.5 MG. Other storage tanks include Eagle Tower with a capacity of 0.3 MG, Challenger Tank with a capacity of 0.4 MG, and North Area Tower with a capacity of 0.25 MG. These five potable water storage tanks have a total capacity of 3.45 MG and serve to maintain water pressure on the base.

Groundwater is drawn from 15 wells with an average depth of 450 to 550 feet from five well fields including the Boles, Escondido, San Andreas, Frenchy, and Douglas. Some of these wells have been installed to depths of 1,000 feet below ground and the groundwater extracted from the well fields is transported via pipeline to two ground level storage tanks with a total capacity

of 0.9 MG (Holloman AFB 2006). These water storage tanks are constantly being filled to prevent water deficits from occurring on base. The average usage for FY09 was 1.2 Million Gallons per Day (MGD) (451.7 MG/year).

### **3.11.1.2 Sanitary Sewer System**

Holloman AFB has an existing gravity sewer system that handles the bases' wastewater flow and the Holloman AFB Wastewater Treatment Plant (WWTP) has a maximum design capacity of 4.5 MGD (average 1.0 MGD). Wastewater discharge is regulated under NPDES permit number NM0029971. The facility discharges to the receiving waters named Lagoon G, unnamed jurisdictional wetlands, and Lake Holloman in Segment No. 20.6.4.99 within the Rio Tularosa Closed Basin. Alamogordo has one WWTP that treats an estimated 3 MGD of wastewater with a peak flow of approximately 6 MGD (Alamogordo 2010a).

### **3.11.1.3 Stormwater Drainage System**

Many areas on Holloman AFB are subject to extensive ponding of rainfall runoff during storm events with most runoff directed to inadequately sized retention basins located in open spaces. Stormwater on Holloman AFB is regulated under NPDES Multi-Sector General Permit (MSGP) number MSGP-2000, 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 stormwater associated with specific industrial activities, and requires monitoring activities. EPA requires development and implementation of a SWPPP for compliance with NPDES stormwater permits. The SWPPP is an engineering and management strategy prepared for Holloman AFB to improve the quality of the stormwater runoff and receiving waters. The SWPPP is amended (to the maximum extent practical) when there is a change in facility design, construction, operation, or maintenance that materially affects the potential for stormwater contamination at the facility.

### **3.11.1.4 Solid Waste Management**

Holloman AFB does not operate an onsite solid waste facility (landfill) so it uses a State of New Mexico contractor for non-hazardous solid waste disposal. Dumpsters are located throughout the base for collection of office wastes and inert industrial solid waste. All solid waste is collected and transported off site for disposal. Construction solid wastes are transported to the Mesa Verde landfill and the remaining solid waste is transported to the Lincoln Otero County landfill. Solid waste disposal for CY09 at Holloman AFB was 2,700 tons.

### **3.11.1.5 Electrical System**

Electrical service is supplied to Holloman AFB by the El Paso Electric Company. Holloman AFB consumed 80,720,241-kiloWatt hours (kWh) in FY10.

### **3.11.1.6 Natural Gas System**

Natural gas service is provided to Holloman AFB by the New Mexico Gas Company. Holloman's FY10 natural gas consumption was measured at 300,301 thousand cubic feet.



### 3.11.2 Environmental Consequences

#### 3.11.2.1 Proposed Action

**Portable Water System** – The Proposed Action would result in a net increase of about 454 people. Municipal water consumption for the Alamogordo area was about 4.43 MGD in 2005 (Alamogordo 2010). With an average per capita household water use estimation of about 70 gallons per day (AWWA 2010), it is anticipated that additional consumers on base would generate an increase of less than 1 percent over current demand in the Alamogordo service area.

**Sanitary Sewer System** – EPA estimates that the average person generates approximately 70 gallons per day of wastewater between showering, toilet use, and general water use (EPA 2005). There is an anticipated increase of about 454 people associated with the Proposed Action and an estimated increase in production of domestic wastewater of less than 0.32 MGD. This represents less than 1 percent increase for the municipal system and the Holloman AFB wastewater treatment plant. Both systems would experience minimal impact from this increase. Thus, no significant adverse impact is anticipated on either system.

**Stormwater Drainage System** – A high percentage of the active administrative and industrial areas of the installation are paved or roofed and exhibit high runoff coefficients. Drainage of the built upon area is by overland flow to storm drain inlets and inadequately sized catch basins that are collected by a network of underground pipes. Holloman AFB has an existing (2009) SWPPP that currently complies with the EPA's NPDES MSGP permit requirements. The Holloman AFB SWPPP would be amended to reflect changes in facility design, construction, operation, or maintenance associated with the F-16 improvements that would result in a small increase in impervious surface in existing developed areas. Any amendments are implemented to the maximum extent practical after any such changes.

**Solid Waste Management** – Off-base contractors completing any demolition and construction projects at Holloman AFB installation would be responsible for disposing of waste generated from these activities in accordance with federal, state, and local regulations for the collection and disposal of municipal solid waste. Much of this material can be recycled, reused, or otherwise diverted from landfills. All non-recyclable construction and demolition waste would be collected in a dumpster until removal. Construction and demolition waste contaminated with hazardous waste (ACM, Lead Based Paint [LBP], or other undesirable components) would be managed in accordance with AFI 32-7042, *Waste Management*. Thus, only minor impacts are anticipated to the solid waste management system at Holloman AFB due to the proposed demolition and construction. Solid waste generated by the additional personnel associated with the Proposed Action would be transported off site as well.

**Electrical System** – The demand for energy (primarily electricity) could increase during activities associated with the Proposed Action. The Air Force estimates an annual electrical demand for new mission facilities of about 19 kWh per square foot annually so new facilities for the F-16 mission would use just over 5 million kWh per year or about a 6 percent increase in demand. Data from the United States Energy Information Administration (USEIA) was used to identify that consumers averaged about 7,580 kWh annually per person (USEIA 2010). This would equate to an expected increase of about 3.4 million kWh annually for the new base personnel and dependents. Some of this usage may overlap so that the total projected increase

would likely be less than 8.4 million kWh annually. The Air Force expects increases in electrical use associated with new facilities to be less than current standard consumption given new requirements to reduce energy levels in federal facilities. This is achieved through using Leader in Energy and Environmental Design (LEED) strategies and “green” specifications in new construction. The electrical energy supply grid at Holloman AFB would be adequate to support the Proposed Action and would therefore not be affected by its increased demand.

**Natural Gas System** – As additional heated working and administrative spaces are developed and operations increase under for the Proposed Action, the Air Force estimates natural gas consumption could increase by about 9.6 Million Cubic Feet (MMCF) annually. The natural gas energy supply grid at Holloman AFB would be adequate to support the increased demand. According to the USEIA, for residential consumption estimates, approximately 556,905 residential consumers in New Mexico utilized about 32,375 MMCF of natural gas in 2009 (USEIA 2010). This equates to an average of about 0.06 MMCF per person per year. Assuming all 454 additional persons utilize natural gas, the greatest potential increase in consumption would be 27 MMCF annually (9 percent of current base use). This estimate overlaps the estimate based on new heated space and would occur partially in off-base housing in Alamogordo. There is adequate supply from local purveyors and capacity in the Holloman AFB distribution system for these new demands.

### **3.11.2.2 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. A reduction in the use of utilities and power and waste generation at Holloman AFB would occur due to the reduction in aircraft operations and base personnel. There would be no adverse impacts to these resources under the No Action Alternative.

## **3.12 Transportation**

### **3.12.1 Affected Environment**

#### **3.12.1.1 Regional Access**

Regional access to Alamogordo and Holloman AFB is provided by US 54 and US 70. US 54 is a four-lane highway that runs north to south. It connects Alamogordo to El Paso, Texas to the south and Tularosa, New Mexico to the north and then continues as a two-lane road heading northeast toward Kansas. US 70 is a four-lane divided highway that runs generally northeast to southwest and provides access from Alamogordo to Las Cruces, New Mexico to the south and Ruidoso, New Mexico to the north. A recent highway improvement project upgraded the seven mile portion of US 70 between Alamogordo and Holloman AFB from four to six divided lanes. US 82, a less frequently traveled highway, runs east to west from Alamogordo through small communities in the Sacramento Mountains to the east, and provides access to Artesia and the Texas border. The closest interstate highway is Interstate 10 (I-10) at Las Cruces, approximately 50 miles southwest of the base. The nearest commercial airport to Holloman AFB (approximately five miles east) is Alamogordo/White Sands Regional Airport (formerly Alamogordo Regional Airport), which is a general aviation airport with one 7,000-foot asphalt runway and one 3,500-foot dirt runway.

### 3.12.1.2 Gate Access

Holloman AFB has three active access gates. The main gate is accessed via US 70 approximately six miles west of the US 70/54 intersection in Alamogordo. The main gate includes an overpass to allow direct access to US 70 eastbound from the base and is operated continuously. It is the only gate allowing 24-hour access to the base. A traffic study in 1994 determined that the ramp from westbound US 70 to First Street operates above capacity and is subject to congested conditions during the morning rush. The west access gate is located approximately one mile west of the main gate at the intersection of US 70 and West Gate Avenue and is utilized for all commercial traffic and for base personnel working in western areas of the base. The La Luz gate is located at the northeast corner of the base and serves as an access point for base personnel who live in areas north of Alamogordo. It is generally open during daytime work hours, but only for six hours per day. The La Luz gate is accessible from US 54/70, just north of the Alamogordo city limit, via La Luz Gate Road. A new commercial and hazardous cargo gate three miles west of the current west gate is planned to provide access to the West Ramp Area. This route would greatly enhance safety and security by providing much longer queuing space, greater stand-off for security forces, direct access to the suspect vehicle holding area, and routes all heavy and hazardous cargo away from the residential, recreational, and mission sensitive work areas along the current route.

### 3.12.1.3 On Base Circulation

The road network on Holloman AFB is organized into arterials (moderate or high-capacity road that is just below highway capacity), collector (low or moderate capacity), and local streets (low capacity). Primary on-base arterials include First Street (a four-lane, undivided road with a continuous turning lane) and West Gate Avenue since they both lead directly to and from the main cantonment gates. Other arterials include Delaware Avenue, New Mexico Avenue, and Forty-Niner Avenue. Primary collector streets are Mesquite Road, Eleventh Street, Fifth Street, Arnold Avenue, Arizona Avenue, and Santa Fe Drive, which are all two lane roads. Kelly Road is classified as a collector street. It provides access to and around the far west side of the airfield. The only traffic signal on base is located at the intersection of New Mexico Avenue and First Street (Holloman AFB 2010b).

## 3.12.2 Environmental Consequences

### 3.12.2.1 Proposed Action

**Construction-Related Impacts** – Construction of the projects in the Proposed Action would require both delivery of materials and removal of construction-related debris from construction and renovation sites, but construction traffic would make up only a small portion of the total existing traffic volume in the area and at the base. Increased traffic during construction could contribute to degradation of the internal road surfaces and congestion at the gates and in the processing of access passes. The use of the commercial access gate at Holloman AFB would reduce the potential for congestion at the main gate off US 70. The potential for short-term increases in traffic are not likely to affect commute times substantially. No long-term impacts to on- or off-base transportation systems would result.

**Operations** – The net increase of 454 personnel and dependents for the F-16 FTU mission would increase the base daytime population by a maximum of 6 percent with a possible

proportional increase in daily commuting. The three gates that provide access to Holloman AFB were upgraded recently and have multiple lanes and adequate cueing area available to handle traffic during morning and evening rush hours. Even if every additional driving-aged person made one round trip to and from the base each day, the increase in vehicles passing through these gates would not have discernable impact on traffic flow. Therefore, implementation of the Proposed Action would be accommodated without increased congestion of the local transportation system.

### **3.12.2.2 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. Transportation and circulation on Holloman AFB would experience an improvement resulting from the reduction in base personnel.

## **3.13 Hazardous Materials and Waste**

### **3.13.1 Affected Environment**

#### **3.13.1.1 Hazardous Materials and Waste**

Most of the hazardous materials used at Holloman AFB are controlled by the hazardous materials pharmacy established at the base in 1993 (Holloman AFB 2008c). 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.

Aircraft flight O&M, 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 hazardous waste Generator (LQG), 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 O&M, 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 Program (HWMP).

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 39 hazardous waste IAPs are located at Holloman AFB. Approximately 36,646 pounds of hazardous wastes were disposed of in FY09.

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 are 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 Resource Conservation and Recovery Act (RCRA) Part B permit. Holloman AFB also holds a RCRA permit for handling the disposal and treatment of waste munitions.

Existing storage tanks and capacity for JP-8 would be used for the Holloman AFB sites that are currently operated under a Spill Prevention, Control, and Countermeasures Plan (SPCCP) in place for the base. In FY09, JP-8 consumption averaged 48,578 gallons per day. 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.

### **3.13.1.2 Environmental Restoration Program**

DoD developed the Environmental Restoration Program (ERP) to identify, investigate, and remediate potentially hazardous material disposal sites that existed on DoD property prior to 1984. Seventy-one ERP sites, eight Area of Concern (AOCs), and 106 Solid Waste Management Units (SWMUs) have been identified at Holloman AFB. Of the 71 sites, 36 are closed with no further response action planned, nine are categorized as site closed with remedial action-operations, 15 are closed with long-term monitoring or require no further action, three are in the preliminary assessment/site investigation stage, and one is in the remedial design stage.

The *Holloman AFB Environmental Restoration Program Management Action Plan* (Holloman AFB 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. ACC 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 ACC.

### **3.13.1.3 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.

LBP is defined as surface paint that contains lead in excess of 1 milligram per square centimeter as measured by X-ray fluorescence spectrum analyzer or 0.5 percent lead by weight. Several structures have the potential to have LBP on building surfaces. Demolition and renovation of facilities with LBP require special procedures and disposal. In 1993, OSHA (under 29 CFR, Part 1926) restricted the permissible exposure limit for general industrial workers to 50 micrograms per cubic centimeter of air. This restriction includes workers in the construction field.

### **3.13.2 Environmental Consequences**

#### **3.13.2.1 Proposed Action**

**Hazardous Materials and Wastes** — The movement of F-16 aircraft to Holloman AFB would increase the quantities of hazardous materials and petroleum substances used at the base. The additional 50 F-16 aircraft could increase the daily consumption of JP-8 fuel by 60% to an estimated 79,000 gallons per day. This increase in fuel consumption is supportable by the current infrastructure at the installation and planned construction projects unrelated to the F-16 will further increase the fuel storage capability at Holloman AFB. Any changes to the storage and transportation of fuel would be addressed in changes to the bases SPCCP.

In addition to the increased fuel consumption there would be short-term increases in the quantity of hazardous materials and petroleum substances stored on base to support construction activities since various fuels (e.g., diesel, gasoline) would be required to run earth moving equipment and power tools and to provide electricity and lighting as conditions warrant. The number of sites storing, using, and handling hazardous materials may change slightly with the addition of the F-16 aircraft; however, the current authorization process 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.

The F-16 aircraft requires the use of hydrazine (H-70) to operate the aircraft's emergency power unit and periodic refueling, defueling, and purging of this unit is required. The F-16 mission would use about one 55-gallon barrel of hydrazine annually. The movement of F-16 aircraft to Holloman AFB would require construction of storage/servicing facility for hydrazine to handle the particular needs of this aircraft. The new hydrazine facility would consist of an enclosed concrete block building with metal roof, internal secondary containment, and security fence.

The quantity of hazardous waste generated at Holloman AFB would increase with the movement of F-16 aircraft to the base; however, this would not change the status of Holloman AFB as a large quantity generator pursuant to the RCRA. The hydrazine storage/servicing facility and any additional hazardous waste generation or handling areas (e.g., IAPs) that are established due to the movement of F-16 aircraft to the Holloman AFB installation would be managed in accordance with the installation's HWMP.

**Environmental Restoration Program (ERP)** — There would be construction and demolition



projects associated with the movement of F-16 aircraft to Holloman AFB. New buildings, concrete aprons, and fuel storage facilities would be constructed to accommodate mission specific activities including training, housing, and equipment operation and maintenance. In some cases, existing structures would be renovated and/or expanded or new structures would be constructed. The proposed footprints for most of the demolition and construction projects are not finalized at this time. Based on the preliminary (approximate) locations for construction and demolition projects associated with the movement of F-16 aircraft to Holloman AFB, construction and demolition would take place at or near ERP sites SS-56 and SS-60. The action would require coordination through the Holloman AFB ERP Manager and construction waivers from ACC. As other projects are designed and sited, coordination with the 49 CES would occur to determine if there is any further potential for disturbance of past ERP sites. There is the possibility that undocumented contaminated soils from historical fuel spills may be present beneath portions of the base. Any potential impacts associated with unknown contamination would be mitigated through worker awareness and safety training.

**Toxic Substances** — Prior to any demolition for the Proposed Action, surveys would be conducted to determine the presence of ACM. If ACMs were present, the base would employ appropriately trained and New Mexico-licensed contractors to perform the ACM removal work and notify the contractors of the presence of ACM so that appropriate precautions could be taken to protect the health and safety of workers. ACM would be segregated for disposal and managed in accordance with applicable federal, state, and local regulations.

Prior to any demolition or renovation associated with the F-16 aircraft movement to Holloman AFB, surveys would be conducted to determine the presence of LBP. If LBP were present, the Holloman AFB installation would employ appropriately trained and licensed contractors to perform any work involving the LBP and notify the contractor of the presence of LBP so that appropriate precautions could be taken to protect the health and safety of the workers.

### **3.13.2.2 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. A reduction in the generation of waste at Holloman AFB would take place due to the reduction in aircraft operations and base personnel. There would be no adverse impacts to these resources under the No Action Alternative.

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## 4 Training Airspace and Ranges Affected Environment and Consequences

Chapter 4 provides a description of the affected environment and environmental consequences for proposed training activities in regional military training airspace, training ranges, and the auxiliary and emergency airfield. The descriptions and analysis focus on the resources and locations with the greatest sensitivity or potential for impact. Proposed use of MTRs by the F-16 FTU is minimal and within the variations of recent annual use; therefore, underlying areas are only considered where warranted in the following analysis. Proposed training activities using military airspace and use and improvements at bombing ranges are not anticipated to impact infrastructure, transportation, hazardous materials, or waste management. Therefore, these resources are not carried forward for in-depth analysis under the airspace.

### 4.1 Airspace Management and Use

#### 4.1.1 Affected Environment

##### 4.1.1.1 Special Use Airspace (SUA)

The SUA currently used by Holloman AFB aircraft for flight training activities includes the MOAs, ATCAAs, and restricted areas as shown in Figure 2-3 and described in Table 4-1. These areas are scheduled by the managing agencies and are used individually or in combination (as needed) during the times supplied in Table 4-1 to provide the lateral and vertical airspace necessary to support the different training activities shown in Table 2-6. Sortie-operations data are not always maintained for ATCAAs, therefore (unless indicated in Table 2-8), ATCAA use is assumed the same as the associated underlying MOAs since most aircraft maneuvers extend into both MOA/ATCAA altitudes.

**Table 4-1. Published Use and Managing Agency for Airspace to Support Projected F-16 Use**

Airspace	Airspace Published Use Time (Local)*	Managed By
Beak A/B/C Military Operations Areas (MOAs) with overlying Air Traffic Control Assigned Airspace (ATCAA)	6:00 AM to 6:00 PM	49th Wing (49 WG)
Talon High East/West MOA with overlying ATCAAs	Sunrise–Sunset	49 WG
R-5107 B Red Rio	Continuous	WSMR
R-5107 B Oscura – White Sands Missile Range (WSMR)	Continuous	WSMR
R-5107 B/D Lava East/West	Continuous	WSMR
R-5107 C and H Mesa East/West	Continuous (R-5107H by NOTAM 12 hours in advance)	WSMR
R-5107 B Yonder	Continuous	WSMR
R-5103 Centennial Range	7:00 AM to 8:00 PM	Fort Bliss
R-5103 A/B/C McGregor	7:00 AM to 8:00 PM	Fort Bliss
Instrument Route (IR)-133/142	7:00 AM to 11:00 PM	49 WG
IR 134/195	7:00 AM to 11:00 PM	49 WG
IR 192/194	7:00 AM to 11:00 PM	49 WG
Visual Route (VR) 176 (short)	7:00 AM to 11:00 PM	49 WG

**Note:** \*Monday – Friday, other times by Notice to Airmen (NOTAM)

Several restricted areas are established in this region providing extensive range capabilities for various test and training activities. The airspace controlled by WSMR includes the specific R-5107 subdivisions (Figure 2-3) that are projected for F-16 air-to-air and air-to-ground training missions. Fort Bliss is the controlling agency for R-5103 A/B/C (McGregor Range). The 49 WG operates Oscura and Red Rio Ranges located within the WSMR restricted areas (R-5107) and the Centennial Range within R-5103, several miles inside military installation boundaries. These ranges and restricted areas are used by both the Air Force and the Army.

The FAA's Albuquerque ARTCC is the responsible controlling agency for all MOAs, ATCAAs, and restricted areas in this region with the exception of R-5107B, which is controlled continuously by WSMR. Scheduled use of these areas is coordinated between the 49 WG, Fort Bliss, and WSMR to meet the respective test and training requirements of each organization. Entry clearance, internal control, and exit clearance for WSMR and Fort Bliss restricted areas is provided by Cherokee Control when this airspace is scheduled and activated for training activities. Cherokee Control is managed by a Military Radar Unit and manned by Air Force air traffic controllers that monitor the restricted areas for the Commanding General, WSMR and identifies the operational requirement of Cherokee. This positive control over aircraft operations within this airspace and ATC coordination between the Holloman AFB RAPCON and Albuquerque ARTCC ensures separation from other non-participating military and civil air traffic is maintained in this region.

Victor airways (below Flight Level [FL] 180) and most jet routes (at FL 180 and above) used by commercial/civilian air operations transiting this region are located adjacent to and sufficiently clear of the SUA boundaries to maintain required separation between the air traffic operating along these routes and SUA activities. Two jet routes transiting portions of R-5107 are normally unavailable for use through this restricted airspace on weekdays (Monday through Friday) when military operations are in progress. Most aircraft operations within the MOA, ATCAAs, and restricted areas occur during the operating hours for the Holloman AFB airfield.

#### **4.1.1.2 Military Training Routes (MTRs)**

The MTRs used by Holloman AFB aircraft to conduct low-level training are shown in Figure 2-3. It is anticipated that F-16 low-level training would be conducted on IR-133/142, IR 134/195, IR 192/194, and VR-176 (short) (Table 2-8). The IR routes are a reverse course of each other with virtually the same segment widths and altitudes and are currently used primarily by the Holloman AFB Tornados. VR-176 (short) is used from entry point J (north of Las Cruces, New Mexico) in a clockwise direction.

#### **4.1.1.3 Auxiliary and Emergency Landing Fields**

RIAC (100 miles northeast) would be used occasionally by Holloman AFB aircraft for practice patterns, landings, and training activities instrument approaches. Biggs AAF (70 miles south) on Fort Bliss would be used infrequently as an emergency landing field (Figure 2-3). RIAC is a public airport that supports both civil and military aviation activities. Biggs AAF is a military airfield with an operating control tower and extensive runway capabilities that can support all aircraft types. Both airfields have the airspace and airfield environment and instrument procedure capabilities to support most military flight training activities.

## **4.1.2 Environmental Consequences**

### **4.1.2.1 Proposed Action**

Table 2-8 reflects the estimated number of sortie-operations that would be conducted by the F-16 mission at Holloman AFB within each of the MOAs, ATCAAs, and restricted areas. Based on approximately 240 flying days per year, projected use of each airspace unit would increase an average of five or less sortie-operations per flying day above current daily levels. The increased use of each unit would not adversely affect the overall management and use of this airspace and their associated range training areas. Procedures and processes currently in place for coordinating and scheduling this airspace would help ensure all individual test, training, and other operational requirements are met to the maximum extent necessary including those required to complete F-16 syllabus training. Likewise, those ATC systems and practices currently used to maintain separation between military and civil air traffic operations would also ensure the safe and effective management of any increased operations within this airspace.

Supersonic operations are authorized and conducted in the SUA as indicated in Table 2-8 and Table 2-9. A waiver is required by AFI 13-201, *Airspace Management* for supersonic flight below 30,000 feet MSL for the aircraft types conducting these operations. The waiver includes an environmental assessment and airspace analysis of the affected area, which is submitted by the responsible base through Major Command channels for approval. The current supersonic waivers for the Holloman AFB airspace include the F-16s. Low-level flight training by F-16s on IR 133/142, IR 134/195, IR 192/194, and VR-176 (short) would increase the average daily use of these routes by less than one sortie-operation, based on 240 annual flying days. The consequences of such a minor increase on airspace use and management would be negligible.

Overall, any increased use of the SUA and MTRs under the Proposed Action would have no adverse impacts on the use and management of the training airspace within this region. The existing airspace structure would meet the F-16 training requirements without the need to expand this structure or establish new airspace to accommodate those mission activities. Therefore, the airspace environment is in place to support Air Force and Army test and training operations in this area and would be sufficient to accommodate F-16 operations.

It is anticipated that RIAC would be the only auxiliary airfield used for conducting a portion of the pilot training requirements while Biggs AAF would only be used, as necessary, for emergencies. Approximately 24,715 military and 24,004 civilian operations are conducted annually at RIAC. The additional 8,960 operations projected for F-16 training at RIAC would increase operations at this airfield by about 18 percent. Such increase could be accommodated with prior coordination and scheduling with RIAC personnel to avoid any higher density or problematic airfield traffic periods.

### **4.1.2.2 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. With fewer overall operations in the regional military airspace, the use and management of SUAs, MTRs, and auxiliary airfields would be unaffected under the No Action Alternative.

## 4.2 Noise

### 4.2.1 Affected Environment

**Training Airspace** – Training flights are typically widely dispersed and random within MOAs, ATCAAs, and restricted areas. Flight operations are constrained only by the boundaries of the airspace and any restrictions on training in the form of designated avoidance areas. The Air Force has developed the MOA-Range NOISEMAP (MR\_NMAP) program to calculate subsonic aircraft noise in these areas (Lucas and Calamia 1996). MR\_NMAP can also calculate noise levels beneath MTRs where flight paths are restricted to a designated corridor. Subsonic aircraft noise levels associated with operations in the primary use airspace were calculated using the program MR\_NMAP and are shown in Table 4-2. Noise was not computed for occasional use airspace (Figure 2-3) due to its minimal projected use for the F-16 mission. The number of operations conducted in these occasional use airspace units is so low that their influence on the cumulative (from other current users) noise is negligible. Areas beneath the primary use airspace units experience less than 65 dB Day-Night Average Noise Level (subsonic noise) ( $DNL_{mr}$ ) under baseline conditions (Table 4-2).

**Table 4-2. Noise Environment for Holloman AFB Primary Use Airspace under Baseline and the Proposed Action**

Airspace Name	Baseline		Proposed	
	$DNL_{mr}$	CDNL	$DNL_{mr}$	CDNL
Beak Military Operations Area (MOA)	<45	N/A	<45	N/A
Talon MOA	54	N/A	54	N/A
R-5107 (Red Rio)	46	47	58	48
R-5107 (Oscura)	47	<45	56	47
R-5107 (Lava East/West)	61	59	61	52
R-5107 (Mesa Low/High)	63	59	63	52
R-5107 (Yonder)	62	59	62	53
R-5103 (Centennial)	<45	48	52	47
R-5103 (McGregor)	55	46	55	45
Instrument Route (IR)-133/142	55	N/A	55	N/A
IR-134/195	49	N/A	49	N/A
IR-192/194	53	N/A	53	N/A
Visual Route (VR)-176 (short)	<45	N/A	<45	N/A

**Note:** Noise levels beneath MOAs listed also include noise generated by aircraft operating in overlying Air Traffic Control Assigned Airspaces (ATCAAs).

**Key:**

CDNL = C-Weighted Day-Night Average Sound Level (supersonic noise)

N/A = Not Applicable

$DNL_{mr}$  = Day-Night Average Sound Level (subsonic noise)

Military aircraft are not the only source of sound under the airspace. Aircraft noise must be compared with background or “ambient” noise, as well as be evaluated on an absolute basis. Ambient noise levels in a quiet residential setting are approximately 45 dB DNL (EPA 1974). Most of the airspace ROI consists of rural areas in which noise levels would be below 45 dB. In those areas where military aircraft noise levels would be less than 45 dB  $DNL_{mr}$ , military aircraft noise could be noticed but would not add appreciably to overall noise levels. Noise levels in such airspace units are simply listed in Table 4-2 as “<45”. Sonic boom noise levels were calculated using the BOOMAP program. Under baseline conditions, sonic boom noise levels do

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not exceed 62 C-weighted CDNL under any primary use airspace unit. Supersonic flight is not authorized in Beak or Talon MOAs or on MTRs.

Military ranges (Oscura, Red Rio, and Centennial Bombing Ranges) are used for munitions employment training. They utilize a variety of munitions including 25 pound, 500 pound, 1,000 pound, 2,000-pound bombs, and 20-mm rounds. Oscura and Red Rio Bombing Ranges are located on WSMR, while the Centennial Bombing range is located on the McGregor Range of Fort Bliss. The location of the three ranges, which are distant from any civilian development, generally minimizes noise impacts associated with ongoing munitions training.

**Roswell International Air Center (RIAC)** – RIAC supports extensive non-participating aircraft operations and transient military users. Noise contours reflecting an average busy flying day at RIAC under baseline conditions is shown in Figure 4-1 where, under baseline conditions, four persons and 2,479 acres are affected by DNL greater than or equal to 65 dB (Table 4-3).

**Table 4-3. Population and Acreage under Noise Contours near RIAC**

Contour Interval (dB DNL)	Population Affected		Total Area Affected	
	Number	Change	Acres	Change
<b>Baseline</b>				
Total ≥ 65	4	N/A	2,479	N/A
65-69	4	N/A	1,124	N/A
70-74	0	N/A	649	N/A
75-79	0	N/A	417	N/A
80-84	0	N/A	203	N/A
≥85	0	N/A	86	N/A
<b>Proposed Action</b>				
Total ≥ 65	62	58	3,708	1,229
65-69	60	56	1,821	697
70-74	2	2	905	256
75-79	0	0	492	75
80-84	0	0	351	148
≥85	0	0	139	53

**Key:** N/A = Not Applicable



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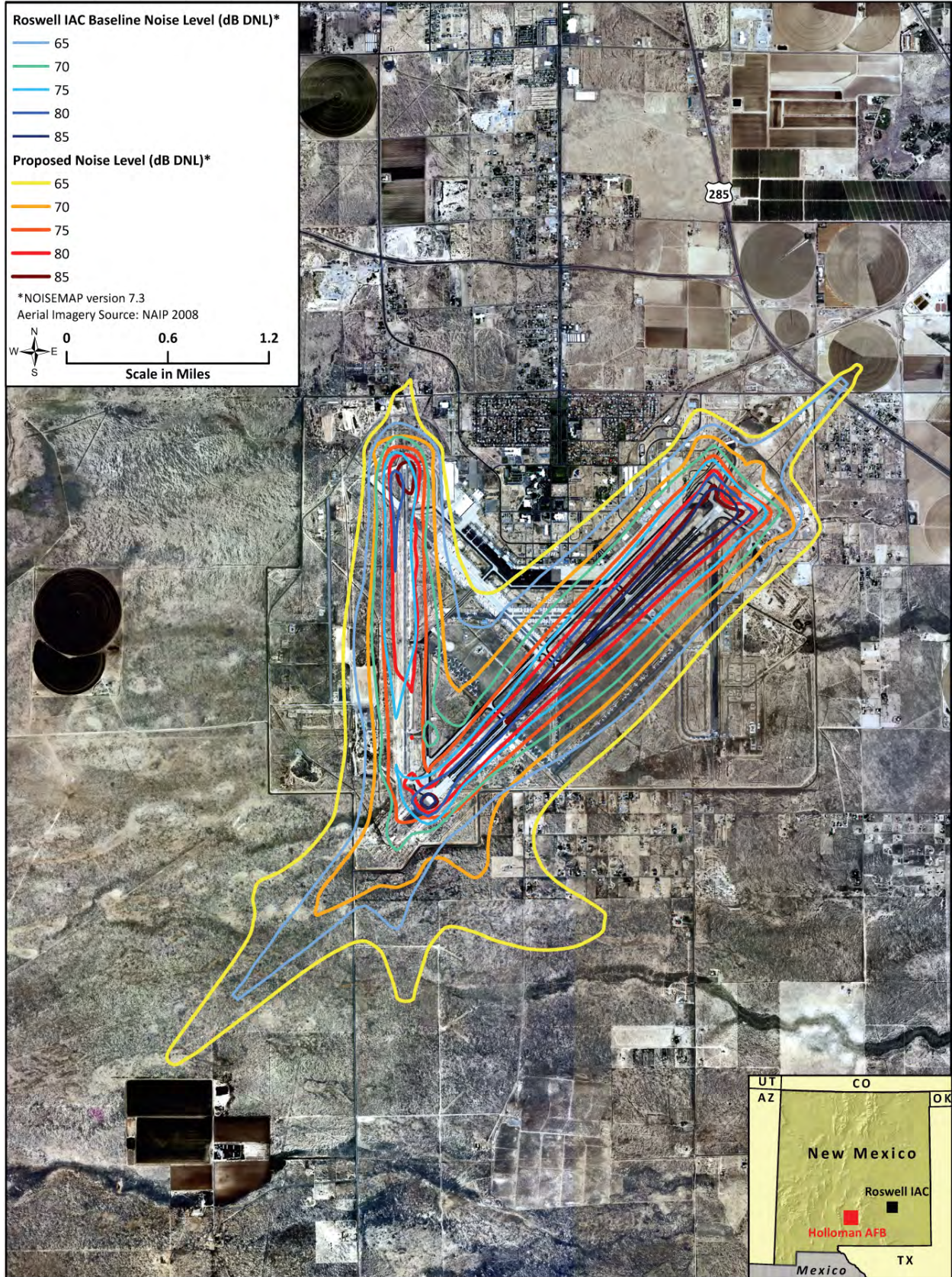


Figure 4-1. Baseline and Proposed Action Noise Contours at RIAC



## 4.2.2 Environmental Consequences

### 4.2.2.1 Proposed Action

**Training Airspace** – Under the Proposed Action, subsonic noise levels beneath all training airspace units would remain below 65 dB DNL. The areas beneath Red Rio, Oscura, and Centennial Ranges would increase to 58, 56, and 52 dB DNL<sub>mr</sub>, respectively. DNL<sub>mr</sub> in areas beneath Lava, Mesa, Yonder, and McGregor Range airspaces would not change. Increases in subsonic noise levels would be expected to increase the likelihood of annoyance in affected persons; however, the restricted airspace units overlie land that is owned by DoD so few persons (not associated in some way with a military) would be affected. Subsonic noise levels beneath Beak MOA would remain below 45 dB DNL<sub>mr</sub> and DNL<sub>mr</sub> beneath Talon MOA would not change. Noise levels beneath the MTRs would increase by less than one dB under the Proposed Action. The proposed 86 additional F-16 sortie-operations per year on each route (about one per every three weekdays) would not add substantially to existing total operations counts for the routes.

The F-16 would conduct supersonic training in airspace units and at altitudes at which supersonic training is currently permitted. CDNL in Red Rio and Oscura Ranges would increase slightly (less than 2 dB) relative to baseline conditions to 48 and 47 dB resulting from F-16 supersonic operations. In all other training airspace units, CDNL would decrease. Overall, implementation of the Proposed Action would be expected to result in impacts that would be either adverse but insignificant in nature or beneficial (in the case of noise level reductions).

Under the Proposed Action, the number of munitions used annually at Oscura, Red Rio, and Centennial Bombing Ranges would increase (Table 2-10). As Red Rio is the only range at which high-explosive munitions use is currently permitted, all proposed high explosive munitions usage would occur at Red Rio Range. Munitions that are not high explosive generate relatively little noise and the noise generated at Oscura and Centennial Ranges would not be expected to be audible outside of DoD-owned lands. The BNOISE2 program was used to calculate noise levels associated with the proposed munitions use at Red Rio Bombing Range. Under the Proposed Action, noise levels exceeding 62 CDNL would extend to approximately 1.4 nm from the range targets. The closest land not owned by the DoD to the targets at Red Rio Bombing Range is 3.4 nm away. Noise generated by munitions training at Red Rio Bombing Range may be audible to persons located outside of DoD-owned land. However, noise levels exceeding 62 CDNL would not extent outside of DoD-owned lands, and it is not expected that noise impacts associated with the proposed munitions training would be perceived as significant.

Several construction projects would be carried out at Oscura and Centennial Bombing Ranges to facilitate munitions training under the Proposed Action. Construction activities would generate noise near the build sites while construction is underway. The proposed construction sites are located on active military training ranges that are currently exposed to a wide variety of training-related noises and the sites are not located near any known noise-sensitive receptors. Construction workers would wear hearing protection, as required, in accordance with applicable laws and regulations.

**Roswell International Air Center (RIAC)** – Noise levels at RIAC under the Proposed Action were calculated using NOISEMAP version 7.3. Noise contours under baseline conditions and

the Proposed Action are shown in Table 4-1. An estimated 58 additional persons and 1,229 additional acres would be affected by noise levels greater than or equal to 65 dB DNL under the Proposed Action relative to baseline conditions (Table 4-3). Areas affected by increased noise levels consist primarily of agricultural land and relatively low-density residential areas. Persons residing and/or working in these areas would be more likely to become annoyed due to increased noise levels (Appendix B). No persons reside in areas that would be exposed to noise levels greater than or equal to 80 dB DNL and the risk of hearing loss among persons not employed by the airport would be expected to be minimal. Persons employed by the airport in known high-noise areas would continue to follow hearing protection guidelines, as required and in accordance with applicable laws and regulations. F-16 practice approaches would not be expected to occur during the late night (10:00 PM to 7:00 AM) and the likelihood of sleep disturbance by the proposed aircraft operations would be expected to be minimal. Livestock in the affected area would be accustomed to the sights and sounds of military and civilian aircraft and would not be expected to exhibit strong reactions to the aircraft operations. Significant adverse impacts would not be anticipated with the implementation of the Proposed Action.

Biggs AAF is proposed as an emergency landing field only so use by F-16 aircraft from Holloman is expected to be infrequent and unpredictable; therefore, no further noise analysis at Biggs AAF is needed.

#### **4.2.2.2 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. Therefore, there would be decreases in subsonic noise levels in the regional military airspace, reduced supersonic noise, and lower impulse noise level at the bombing ranges.

### **4.3 Safety**

#### **4.3.1 Affected Environment**

The affected environment or ROI for flight safety includes the airspace that supports aircraft operations for Holloman-based aircraft and includes the MOAs, ATCAAs, and restricted areas currently used by Holloman AFB aircraft for flight training activities. Mishaps and bird strikes associated with operations originating from Holloman AFB are described in 3.3.1.3.

##### **4.3.1.1 Auxiliary and Emergency Landing Fields**

RIAC is proposed as an auxiliary field for Holloman AFB-based F-16 aircraft. Biggs AAF is proposed as an emergency landing field only so its use is expected to be infrequent and unpredictable. Biggs AAF is regularly used by military aircraft so no further analysis of safety impacts is necessary. The F-22 does not currently conduct operations at RIAC. RIAC covers an area of 5,029 acres (2,035 hectares [ha]) and has three paved runways (runway 3/21: 13,001 x 150 feet (3,963 x 46 meters [m]), surface: asphalt/concrete; runway 12/30: 7,425 x 200 feet (2,263 x 61 m), surface: asphalt/concrete; and runway 17/35: 9,999 x 100 feet (3,048 x 30 m), surface is asphalt. In CY09, 48,726 aircraft operations occurred at RIAC (approximately 133 per day). Of these flights, approximately 51 percent were civilian and 49 percent were military aircraft.

## 4.3.2 Environmental Consequences

### 4.3.2.1 Flight Safety

**Aircraft Mishaps** – The F-16 would continue to use the existing airspace including MOAs, ATCAAs, restricted airspace, and MTRs under the same procedures as currently exist. There would be no increase in the safety risks associated with aircraft mishaps or increase the risks of those mishaps. It is impossible to predict the precise location of an aircraft accident should one occur. Major considerations in any accident include loss of life and damage to property. The aircrew's ability to exit from a malfunctioning aircraft depends on the type of malfunction encountered. The probability of an aircraft crashing into a populated area is extremely low, but cannot be totally discounted. Factors relevant in the ROI: (1) the immediate surrounding areas have relatively low population densities, (2) pilots of aircraft are instructed to avoid direct overflight of population centers at very low altitudes, and (3) the limited amount of time the aircraft is over any specific geographic area limits the probability that impact of a disabled aircraft in a populated area would occur.

Secondary impacts of an aircraft crash include the potential for fire or environmental contamination. The impacts of a crash are difficult to quantify since the extent of the secondary impact depends on the situation at the time of the crash. The terrain overflown in the ROI is diverse so if a mishap occurred in a highly vegetated area during a hot, dry summer the mishap would have a higher risk of fire than would a mishap in a more barren and rocky area during the winter. When an aircraft crashes, it may release hydrocarbons and the petroleum, oils, and lubricants not consumed in a fire could contaminate soil and water. The potential for contamination depends on several factors such as the porosity of the surface soils, which would determine how fast contaminants are absorbed, while the specific geologic structure in the region determines the extent and direction of the contamination plume. The locations and characteristics of surface and groundwater would also affect the extent of contamination.

F-16 aircraft carry a small quantity of hydrazine in a sealed canister that is designed to withstand crash impact damage. Hydrazine is a highly volatile propellant that contains toxic elements and the F-16 carries hydrazine as part of the emergency power unit. When used for this purpose, the hydrazine would be completely consumed and not pose a safety hazard. In any crash that is severe enough to rupture the canister, it is likely that fire would also be involved. In this case, the hydrazine would burn and be completely decomposed. In the unlikely event, that hydrazine is released but not consumed by fire; impacts on soils and groundwater are likely to be of minor consequence.

Hydrazine absorbs water at room temperature and is incombustible in a solution with water at concentrations of 40 percent or less and it evaporates at any given combination of constant meteorological conditions (i.e., temperature, humidity, wind speed, etc.) at a rate slightly slower (approximately 11 percent) than water. At 60°F, 50 percent humidity, and a wind speed of five miles per hour, a four square-foot pool of hydrazine would evaporate at a rate of about 0.0072 pounds per minute (0.12 ounces). In comparison, water would evaporate at a rate of approximately 0.0081 pounds per minute (0.13 ounces) (EPA 1999b). Movement of hydrazine through natural soils has been shown to be slow and limited. Due to its absorption and natural decomposition processes and the depth to groundwater, the probability of released hydrazine significantly contaminating groundwater is considered extremely low. If quantities of

hydrazine were to reach a body of surface water, aquatic life in areas experiencing high concentrations could be significantly impacted in the immediate area of those concentrations.

**Wildlife Strike Hazards** – BASH exists at Holloman AFB and regional training airspace due to resident and migratory bird species and other wildlife. Daily and seasonal bird movements create various hazardous conditions. To address the issues of aircraft bird strikes, the Air Force developed the Avian Hazard Advisory System (AHAS) to monitor bird activity and forecast bird strike risks. Using Next Generation Radar (NEXRAD) weather radars and models developed to predict bird movement, the AHAS is an online, near real-time, Geographic Information System (GIS) used for bird strike risk flight planning across the continental U.S. and Alaska. As part of an overall strategy to reduce BASH risks, the Air Force has developed a Bird Avoidance Model (BAM) using GIS technology as a key tool for analysis and correlation of bird habitat, migration, and breeding characteristics combined with key environmental and man-made geospatial data. The model was created to provide Air Force pilots and flight scheduler/planners with a tool for making informed decisions when selecting flight routes. The model was created to protect human lives, wildlife, and equipment during air operations. This information is integrated into required pilot briefings that take place prior to any sortie.

**Chaff and Flare Use within the Airspace** – Chaff and defensive flares are managed as ordnance. Flares and chaff are authorized for use in the existing MOAs and on Oscura, Rio, and Centennial Ranges. Use is governed by detailed operating procedures to ensure safety. Chaff, which is ejected from an aircraft to reflect radar signals, is small fibers of aluminum-coated mica packed into approximately four-ounce bundles. When ejected, chaff forms a brief “cloud” that temporarily masks the aircraft from radar detection. Although the chaff may be ejected from the aircraft using a small pyrotechnic charge, the chaff itself is not explosive (ACC 1997). Chaff used in the existing Holloman AFB airspace is specifically designed not to interfere with FAA radars. Chaff, although ejected from the aircraft by a pyrotechnic charge, is not explosive. The composition of chaff is similar to those components found in the Earth’s crust, and do not present health or safety risks to humans or animals.

Defensive training flares consist of small pellets of highly flammable material that burn rapidly at very high temperatures to provide a heat source other than the aircraft’s engine exhaust to mislead heat-sensitive/seeking targeting systems and decoy them away from the aircraft. The flare is a pellet of magnesium that ignites upon ejection from the aircraft and burns completely within about 3.5 to five seconds, or approximately 400 feet from its release point (ACC 1997). Flare use in Holloman AFB-managed airspace has a minimum release altitude of 5,000 feet MSL (approximately 4,500 AGL). Flares are not used in any Holloman AFB or other ARTCC managed MOA or MTR with a ceiling below 5,000 feet MSL. Flares may be deployed at lower altitudes above Oscura, Rio, and/or Centennial Ranges and may be dropped from a minimum altitude of 2,000 feet AGL within WSMR airspace. The minimum release altitude over Red Rio and Oscura Bombing Ranges is 500 feet AGL. Flares may not be deployed in WSMR airspace during very high or extreme fire danger conditions to limit the potential for a flare fire incident. Considering the short burn time of the flare (3.5 to five seconds), all combustible material is consumed approximately 400 feet from the release altitude, providing a margin of safety of approximately 4,000 feet and ensures that no burning material from a functioning flare contacts the ground. A pilot could accidentally release a flare at a lower than authorized altitude, the 4,000 foot safety margin is more than adequate to prevent a flare-ignited fire under the airspace.

A flare failure can occur if a flare does not ignite and remains in the aircraft, does not burn the prescribed duration or temperature, is ignited but is not dispersed, or does not ignite after ejection (a dud flare). Historically, range clean-up where flare use is intensive in a relatively constrained geographic area (such as Melrose Range in New Mexico and the Utah Test and Training Range) indicates that of all flares expended only an estimated 0.01 percent were actually found on the ground as duds (Holloman AFB 2006). Based on expected use, overall reliability data indicates that approximately two dud flares per year could impact the ground under the airspace. Holloman AFB provides instructions to fire departments and other organizations on how to identify a dud flare and who to contact at Holloman AFB if a suspected dud flare is found. It is extremely unlikely that a dud flare would fall from an aircraft and strike an exposed individual on the ground. Should such an extremely remote accident occur, it could result in injury or death.

Residual components of the M-206 and MJU-7 A/B flares fall to the ground following the ignition/ejection process. The M-206 components consist of two 1-inch by 1-inch by 1/8-inch plastic pieces, a felt spacer, and a piece of aluminized Mylar wrapping that could range from 1-inch by 1-inch up to 2-inch by 13-inch, depending upon the combustion of the flare. The residual materials that are deposited on the ground under the airspace are not expected to be a safety risk. Residual components of the MJU-7 A/B flare that are normally deposited on the ground after the ignition/ejection process include a hard plastic Safety and Initiation (S&I) device, a plastic piston, a plastic end cap, a piece of aluminum wrap that could range in size from 1-inch by 2-inches up to 3-inches by 13-inches, and one or two felt spacers. The typical weights and geometries of the plastic components are listed in Table 4-4.

**Table 4-4. Multi Jettison Unit (MJU)-7 A/B Flare — Major Component Properties**

Component	Geometry	Dimensions (inches)	Weight (Pounds)
Safety and Initiation (S&I)	Rectangular Solid	2 × 0.825 × 0.5	0.0453
Piston	Rectangular Open	2 × 0.825 × 0.5	0.0072
End Cap	Rectangular Plate	1 × 2 × 0.125	0.0072

When an object separates from an aircraft in flight, numerous physical factors act on the object that influence where, and with what force, the object impacts the ground. These factors include the size, shape, and weight of the object, as well as other aerodynamic forces that act on the object as it falls through the air. When an object is dropped, it is subject to the force of gravity and enters free-fall toward the ground. The force of gravity creates an acceleration of approximately 32.2 feet/sec<sup>2</sup>. The object's shape influences the effect of aerodynamic drag forces exerted on it. These forces reduce the rate of acceleration to varying degrees such that after a period, the object is no longer accelerating and has reached a state referred to as *terminal velocity*. When terminal velocity is reached, the object would continue to fall at that velocity indefinitely. Once terminal velocity is known, the momentum (in pound-seconds) can be calculated. Momentum is the metric used to quantify the relative hazard associated with a falling object striking a person or property on the ground. The terminal velocity and momentum of each MJU-7 A/B flare component is provided in Table 4-5 and are based on maximum (two square inches) and minimum (one square inch) areas. The actual velocity and momentum values would be expected to fall between the maximum and minimum values. The momentum values are the product of mass and velocity.

**Table 4–5. Multi Jettison Unit (MJU)-7 A/B Flare — Component Hazard Assessment**

Component	Maximum Surface Area			Minimum Surface Area		
	Area (square inch)	Terminal Velocity (feet per second)	Momentum (pound per second)	Area (square inch)	Terminal Velocity (feet per second)	Momentum (pound per second)
Safety and Initiation (S&I)	1.65	58	0.08	0.413	115	0.16
Piston	1.65	23	0.005	0.413	46	0.01
End Cap	2.0	21	0.005	0.125	84	0.02

As a basis of comparison, laboratory experiments in accident pathology indicates that there is a 90 percent probability that brain concussions would result from an impulse of 0.70 pound-seconds to an unprotected head and less than a 1 percent probability from impulses less than 0.10 pound-seconds (ACC 1997). People have been found to spend approximately 10 percent of their time outdoors (Klepeis *et al.* 2001). The MJU-7 A/B S&I device, with a maximum momentum value of 0.16 pound-seconds, could result in a bruise-like injury similar to a large hailstone if it struck an unprotected person. Approximately 20 percent of strikes to a person could be to the head and result in a more serious injury. The S&I would not be expected to damage a structure but could cause a cosmetic dent to a vehicle. A strike to the windshield of a moving vehicle could result in an impact comparable to a small stone kicked up by a truck tire. The likelihood of a person being struck by flare parts is remote given the large size of airspace, the small area occupied by individuals, and the relatively low density of persons in the area, but, anyone incurring damage or injury that results from Holloman AFB training activities should contact Holloman AFB directly to inquire about the Air Force damage claims process.

#### **4.3.2.2 Auxiliary and Emergency Landing Fields**

RIAC is proposed as an auxiliary field for Holloman AFB F-16 aircraft. The main runway at RIAC is over 13,000 feet long, providing for adequate stopping distances should an aircraft emergency occur. RIAC has the equipment to handle any potential safety issues associated with the operations of the F-16 aircraft therefore no impacts to the flight safety or resource areas for ground safety are anticipated for occasional utilization of these outlying fields.

Biggs AAF (about 70 miles from Holloman AFB) would provide a suitable emergency landing site for F-16 training operations. Biggs AAF could support the logistics of an emergency landing, but would require aircraft arresting gear as a supplementary method for stopping aircraft in an emergency if necessary, including a failure of breaking or deceleration systems.

#### **4.3.2.3 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. Therefore, there would be no changes to the current safety environment under the No Action Alternative.

### **4.4 Air Quality**

#### **4.4.1 Affected Environment**

Operation of proposed F-16 aircraft within training areas and aircraft flight routes between these locations and Holloman AFB would affect air quality within portions of New Mexico and Texas. These airspaces currently attain all of the NAAQS.



**Requirements for Class 1 Areas** — As part of the PSD Regulation, the CAA provides special protection for air quality and Air Quality Related Values (AQRV) (including visibility and pollutant deposition) in selected areas of the U.S. (National Parks greater than 6,000 acres or National Wilderness Areas greater than 5,000 acres). These Class 1 areas are where any appreciable deterioration of air quality is considered significant. In 1999, the EPA promulgated a regional haze regulation that requires states to establish goals and emission reduction strategies to make initial improvements in visibility within their respective Class 1 areas (EPA 1999a). Visibility impairment is defined as a reduction in the visual range and atmospheric discoloration. Portions of military training routes and airspaces proposed for use by the F-16 are close to pristine Class 1 areas in New Mexico and Texas, including the (1) White Mountain Wilderness Area, (2) Bosque del Apache Wilderness Area, (3) Gila Wilderness Area, (4) Salt Creek Wilderness Area, (5) Carlsbad Caverns National Park, and (6) Guadalupe Mountains National Park. Criteria to determine the significance of air quality impacts within Class 1 areas usually pertain to stationary emission sources, as mobile sources are generally exempt from permit review by regulatory agencies; however, Section 169A of the CAA states the national goal of prevention of any future impairment of visibility within Class 1 areas from manmade sources of air pollution. Due to the proximity of these pristine areas to proposed aircraft operations, this EA provides a qualitative analysis of the potential for proposed emissions to impact visibility within these areas. Table 4-6 presents an estimation of annual emissions due to existing F-22 aircraft operations within the Holloman AFB airspaces excluding F-22 aircraft operations within airspaces that occur above 3,000 feet AGL. Proposed F-16 aircraft operations would replace these existing F-22 airspace operations and their associated emissions.

**Table 4-6. Annual Emissions from F-22 Operations within Holloman AFB Airspaces**

Activity Type	Emissions in Tons per Year (TPY)						
	VOC	CO	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>
R-5107 (Lava East/West – WSMR)	0.01	0.93	24.70	1.25	1.57	1.57	3,881
R-5107 (Mesa Low/High – WSMR)	0.01	0.93	24.49	1.24	1.56	1.56	3,848
R-5107 (Yonder – WSMR)	0.01	0.86	22.68	1.14	1.44	1.44	3,563
R-5103 (Centennial Range/Fort Bliss)	0.00	0.02	0.51	0.03	0.03	0.03	80
<b>Total Existing Emissions</b> <sup>1</sup>	<b>0.03</b>	<b>2.74</b>	<b>72.38</b>	<b>3.66</b>	<b>4.60</b>	<b>4.60</b>	<b>11,372</b>
<b>Total Emissions – Year 2011</b> <sup>2</sup>	<b>0.02</b>	<b>1.60</b>	<b>42.22</b>	<b>2.13</b>	<b>2.68</b>	<b>2.68</b>	<b>6,634</b>

**Note:**

<sup>1</sup> Based upon operations from 36 F-22 aircraft.

<sup>2</sup> Based upon operations from 21 F-22 aircraft.

**Key:**

CO = Carbon Monoxide

CO<sub>2e</sub> = Carbon Dioxide Equivalent

NO<sub>x</sub> = Nitrogen Oxide

PM<sub>2.5</sub> = Particulate Matter less than 2.5 microns in diameter

PM<sub>10</sub> = Particulate Matter less than 10 microns in diameter

SO<sub>x</sub> = Sulfur Oxide

VOC = Volatile Organic Compounds

WSMR = White Sands Missile Range

#### 4.4.2 Environmental Consequences

Airspaces proposed for use by F-16 aircraft in New Mexico and Texas currently attain all NAAQS so the analysis used the PSD threshold for new major sources of 250 TPY as an indicator of significance for attainment pollutant emissions. If they exceed these levels, further analysis was conducted to determine whether impacts were significant. The analysis also evaluated how proposed aircraft emissions would affect air quality within federal Class 1 areas beside proposed airspaces.

#### 4.4.2.1 Proposed Actions

**Construction** — Proposed improvements within the Oscura and Centennial ranges would require the use of construction and earthmoving equipment producing combustive emissions due to the consumption of fossil fuels and fugitive dust emissions due to the operation of equipment on exposed soil. Proposed improvements would require relatively low to moderate usage of construction equipment. Annual construction emissions would not exceed any PSD threshold used to indicate significance or non-significance. In addition, the Air Force would implement standard construction practices to minimize fugitive dust generated from the use of construction equipment on exposed soils so construction emissions from proposed improvements at training ranges would produce less than significant impacts to air quality. The main sources of PM<sub>10</sub>/PM<sub>2.5</sub> emissions would occur as fugitive dust from the operation of equipment on base soils.

**Operations** — The impact analysis for air quality due to proposed F-16 operations within Holloman AFB airspace units is based on the net change in emissions between F-22 operations and by the proposed F-16 operations. The F-22 scenario starting point or base case period for comparison to F-16 operations is CY10 so the net change in annual operational emissions within the proposed airspace units is equal to emissions from the F-16 action for a given year, minus emissions from F-22 operations in the base case period.

Sources associated with the recapitalization of the 49 WG combat capabilities and capacities within the Holloman AFB airspace units and aircraft flight routes would include F-16 and F-22 aircraft operations.

Table 4-7 summarizes the net change in annual emissions that would occur from proposed F-16 operations within the Holloman AFB airspace units. These data exclude F-16 aircraft operations within airspaces that occur above 3,000 feet AGL. The data in Table 4-7 show operations from F-16 mission as compared to the base case period that would result in net decreases of emissions for all project years, except that the action would result in a nominal increase in VOC emissions beginning in CY12. These emission increases would remain well below the PSD thresholds used to indicate significance or non-significance so the Proposed Action would produce less than significant air quality impacts to NAAQS pollutant levels within affected airspace units.

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**Table 4–7. Net Change in Annual Operational Emissions  
within Holloman AFB Airspace due to the Proposed Action**

Year/Location	Emissions in Tons per Year (TPY)						
	VOC	CO	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>
<b>2011</b>							
Airspace Units – F-22 Only	0.02	1.60	42.22	2.13	2.68	2.68	6,634
IRs – F-22 Only	---	---	---	---	---	---	---
<b>Total Year 2011 Emissions</b>	<b>0.02</b>	<b>1.60</b>	<b>42.22</b>	<b>2.13</b>	<b>2.68</b>	<b>2.68</b>	<b>6,634</b>
<b>Total – 2010 Emissions</b>	<b>0.04</b>	<b>2.74</b>	<b>72.38</b>	<b>3.65</b>	<b>4.60</b>	<b>4.60</b>	<b>11,372</b>
<b>Net Change</b>	<b>(0.02)</b>	<b>(1.14)</b>	<b>(30.16)</b>	<b>(1.52)</b>	<b>(1.92)</b>	<b>(1.92)</b>	<b>(4,738)</b>
<b>2012</b>							
Airspace Units – F-22 + F-16	1.27	2.06	58.17	2.65	3.23	3.23	8,332
IRs – F-16	0.91	0.34	11.51	0.37	0.40	0.40	1,227
<b>Total Year 2012 Emissions</b>	<b>2.18</b>	<b>2.40</b>	<b>69.68</b>	<b>3.02</b>	<b>3.63</b>	<b>3.63</b>	<b>9,559</b>
<b>Total – 2010 Emissions</b>	<b>0.04</b>	<b>2.74</b>	<b>72.38</b>	<b>3.65</b>	<b>4.60</b>	<b>4.60</b>	<b>11,372</b>
<b>Net Change</b>	<b>2.14</b>	<b>(0.34)</b>	<b>(2.70)</b>	<b>(0.63)</b>	<b>(0.97)</b>	<b>(0.97)</b>	<b>(1,813)</b>
<b>2013</b>							
Airspace Units – F-16	2.51	0.94	31.89	1.04	1.10	1.10	3,398
IRs – F-16	1.81	0.68	23.03	0.75	0.79	0.79	2,453
<b>Total Year 2013 Emissions</b>	<b>4.32</b>	<b>1.62</b>	<b>54.92</b>	<b>1.79</b>	<b>1.89</b>	<b>1.89</b>	<b>5,851</b>
<b>Total – 2010 Emissions</b>	<b>0.04</b>	<b>2.74</b>	<b>72.38</b>	<b>3.65</b>	<b>4.60</b>	<b>4.60</b>	<b>11,372</b>
<b>Net Change</b>	<b>4.28</b>	<b>(1.12)</b>	<b>(17.46)</b>	<b>(1.87)</b>	<b>(2.70)</b>	<b>(2.70)</b>	<b>(5,521)</b>

**Note:** Only includes emissions for aircraft operations that occur below 3,000 Above Ground Level (AGL).

**Key:**

CO = Carbon Monoxide

CO<sub>2e</sub> = Carbon Dioxide Equivalent

IR = Instrument Route

NO<sub>x</sub> = Nitrogen Oxide

PM<sub>2.5</sub> = Particulate Matter less than 2.5 Microns in Diameter

PM<sub>10</sub> = Particulate Matter less than 10 Microns in Diameter

SO<sub>x</sub> = Sulfur Oxide

VOC = Volatile Organic Compounds

Due to the presence of pristine Class 1 areas within the project region, F-16 emissions that occur within proposed airspace units potentially impair visibility within these areas. The Class 1 area of most concern is the Bosque del Apache Wilderness Area in central New Mexico, as it is only a few miles west of the borders of the Lava and Mesa ranges. All other proposed airspace units would occur at a sufficient distance and/or have minimal F-16 operations that inconsequential air quality impacts would be produced within the remaining Class 1 areas in the project region. Visibility impairment could occur from proposed primary emissions of NO<sub>2</sub>, SO<sub>2</sub>, and PM<sub>10</sub> or secondary formation of visibility reducing particulate matter in the atmosphere due to precursor emissions of VOCs, NO<sub>2</sub>, or SO<sub>2</sub>. Visibility impairment from primary NO<sub>2</sub> emissions could occur as a brown-colored haze in the lower layer of the atmosphere, which would usually occur in the colder months when a lack of sunlight prevents the conversion of this pollutant to Nitrogen Oxide (NO) and oxygen (O). Visibility impairment due to primary PM<sub>10</sub> emissions would occur in the form of plume blight or atmospheric discoloration from contrails. Visibility impairment due to the secondary formation of nitrate or sulfate particulates in the atmosphere from emissions of NO<sub>x</sub> or SO<sub>2</sub> would usually occur in the warmer months of the year. This effect would take the form of regional haze, which would reduce regional visual range.

Proposed F-16 aircraft operations would result in a decrease of NO<sub>x</sub> emissions within the Lava and Mesa ranges compared to existing conditions for all project years. By CY13, NO<sub>x</sub> emission reductions would amount to 43.0 TPY within these airspaces. As a result, proposed F-16

operations beside the Bosque del Apache Wilderness Area would not substantially contribute to visibility impairment within this pristine area. Aircraft operations from the Proposed Action airspace units would produce less than significant contributions to visibility impairment within nearby Class 1 areas.

Bombing and gunnery operations would produce fugitive dust emissions upon impact. As these operations would occur in designated target areas, some ordnance impactions would occur on previously disturbed lands minimizing the potential for fugitive dust emissions. In addition, these operations would occur intermittently and the increase in emissions would not be expected to contribute to an exceedance of an ambient air quality standard. Since these operations would occur intermittently, emissions from the increase in proposed ordnance usage would not be expected to contribute to an exceedance of an ambient air quality standard.

#### **4.4.2.2 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. Therefore, aircraft training operations would gradually reduce and there would be fewer emissions in the regional airspace under the No Action Alternative.

## **4.5 Physical Resources**

### **4.5.1 Affected Environment**

This section describes physical conditions at the bombing ranges where proposed improvements and soil disturbing activities would occur.

#### **4.5.1.1 Soils**

Centennial, Oscura, and Red Rio Ranges are located in the Southern Desertic Basins, Plain, and Mountains Major Land Resource Area (MLRA) as defined by the USDA. Soils in this MLRA are generally moderately deep to very deep, well drained, and loamy or clay rich. Some soils are shallow or very shallow over a calcium carbonate hardpan or overlie a shallow bedrock layer (USDA 2006). Activities associated with the ranges have resulted in alteration of large areas of the soil surface so that existing soil profiles do not completely concur with soil survey descriptions of undisturbed areas.

**Centennial Range** — Generally, soils found on Centennial Range are loamy, well drained, calcareous (calcium carbonate rich), alkaline (pH~8), and very susceptible to wind erosion. Three soil series can be found on Centennial Range: Armesa, Lozier, and Philder (Air Force 1998). The surface layer of Armesa series soils is typically a dark yellowish brown very fine moist sandy loam, with a weak thin clay structure in the upper one inch and a weak fine granular structure below. They are well drained with moderately slow permeability and low to medium runoff with a low potential to be eroded by water, but a high potential for wind erosion (USDA 2008).

Lozier soils are a pale brown, strongly calcareous, very gravelly moist loam, with a weak fine granular and sub-angular blocky structure. On Centennial Range, Lozier soils have anywhere from 35 to 80 percent rock content. These soils are well drained with moderate permeability

and low runoff on slopes less than one percent, medium on slopes from three to five percent, and high runoff on slopes greater than five percent. Lozier soils have a moderate to high erosion potential by water and a low potential for wind erosion (USDA 2008).

Philder soils are a light brown, very gravelly moist loam with a weak fine angular blocky and weak very fine granular structure with fine roots found throughout. They are well drained with moderately slow permeability and high runoff potential. Philder soils have low potential for water erosion and a high potential for wind erosion (USDA 2008).

**Oscura and Red Rio Ranges** — Although site-specific data regarding the soils found on Oscura and Red Rio Ranges is not available (the most recent Natural Resources conservation Center [NRCS] soil survey was conducted in 1976 and was organized at a very broad scale), common characteristics of the soils in the area can be described. In general, soils on the Oscura and Red Rio ranges are either gravelly, sandy, or clay loams; gypsum and calcium carbonate rich soils; and erosional debris surrounding bedrock outcrops of limestone, sandstone, shale, gypsum, and basalt (Air Force 1998). On Oscura Range, soil erosion potential from wind is slight on areas with low slope and severe on areas with higher slopes. Soil erosion potential from water is moderate to severe as is the case with wind erosion, which is largely dependent upon soil type and slope. Erosion potential data for soils on Red Rio Range is not available.

#### **4.5.1.2 Water**

**Surface Water** — Centennial Range is located on the northwestern edge of the Salt Basin, a hydrologic basin with its upper portion in southeast New Mexico and continues south into the Texas panhandle. A portion of the basin in New Mexico covers approximately 2,400 square miles and includes the western portion of Otero Mesa and the southern slopes of the Sacramento foothills. The basin is characterized by small ephemeral streams that discharge towards the central areas of the basin. Small playas develop in low-lying areas during periods of high runoff and some streams that originate from the mountains are perennial in their upper reaches. The Sacramento River is the primary surface water feature in the area of the Centennial Range. Some surface waters derived from the river are captured and diverted to pipelines running through McGregor Range (Army 2007). Oscura and Red Rio Ranges are located on the northwestern flank of the Tularosa Basin, a closed hydrologic basin that comprises an area of approximately 6,500 square miles in south-central New Mexico. It is bounded on the east and west by the Sacramento and San Andres mountains, respectively, and fed largely by precipitation draining into ephemeral drainages. Much of the precipitation entering the basin either evaporates or quickly infiltrates the ground. There are no permanently flowing rivers or streams on the range (Air Force 1998). Oscura Range is drained by several small features that drain to Salt Creek, a perennial stream that eventually disappears into the ground or empties into playas and alkali flats north of Lake Lucero (WSMR 2002). Red Rio Range also drains to Salt Creek during periods of high precipitation and peak flows (Air Force 1998).

**Floodplains** — No 100-year floodplains are located on Centennial, Oscura, or Red Rio ranges.

**Groundwater** — Centennial, Oscura, and Red Rio Ranges are underlain by the Rio Grande aquifer system, a network of hydraulically interconnected aquifers in basin-fill deposits located along the Rio Grande Valley and other associated valleys. Recharge to the aquifer system

primarily originates as precipitation in the mountainous areas surrounding individual basins. Concentrations of dissolved solids in the portion of the aquifer underlying Oscura and Red Rio Ranges vary from about 3,000 to 10,000 ppm and from 1,000 to 3,000 ppm for Centennial Range (800 ppm is a generally acceptable threshold for drinkable water). Principal minerals in the groundwater in this portion of the aquifer include calcium sulfate, calcium chloride, magnesium sulfate, or magnesium chloride (USGS 1995). Groundwater development on all of the ranges has not been extensive (except a few livestock wells) due to high salinity content of the water. Groundwater on all ranges is generally not considered suitable for human consumption without treatment (Air Force 1998; Army 2007).

## **4.5.2 Environmental Consequences**

### **4.5.2.1 Proposed Action**

**Soils and Surface Water** — Operations of proposed F-16 aircraft within training areas would affect areas of Centennial, Oscura, and Red Rio Ranges through new construction, renovation/upgrade of existing facilities, and the continued use of chaff and flares for training flights. New ground disturbance would not occur in areas on ranges where similar disturbance has not already occurred. There would be minimal new construction and expansion of facilities requiring ground disturbance of approximately 12 acres on Oscura Range and approximately 20 acres on Centennial Range on previously disturbed ground and eight acres of newly disturbed area on Centennial Range. No new construction would take place on Red Rio Range under the Proposed Action.

Since more than one acre of area would be disturbed, a NPDES stormwater permit would be required. Under the permit, the ranges must either develop a construction SWPPP or adhere to current SWPPPs applicable to each range to eliminate or reduce sediment and non-stormwater discharges. The SWPPP would need to be completed in compliance with sediment and non-stormwater regulations/plans existing at Fort Bliss and WSMR, where applicable, that provide information relative to temporary and permanent sediment controls for construction activities to inhibit discharge or contaminated and non-contaminated sediments.

Such controls and standard construction practices relevant to new construction on Oscura and Centennial Ranges can include (but are not limited to) spraying water on exposed soil during construction to keep soil from becoming airborne (especially with soils susceptible to wind erosion), stabilizing areas of bare soil to reduce erosion (restore vegetative cover, mulch, and seed if possible), installing silt fencing and sediment traps, using proper soil stockpiling methods (if dig and/or fill methods are used in construction), adding soil binding materials to the ground surface, and revegetating any disturbed areas as soon as possible, as appropriate. In addition, on WSMR, contractors or range users must acquire a digging permit from the Directorate of Public Works Environmental Division prior to undertaking soil-disturbing activities. This process may involve an in-field review of the proposed project and flagging of areas approved for digging.

The only other potential impact to physical resources would result from the impacts of chaff or flare materials landing on the ground. As discussed in Appendix B, use of chaff and flares under the Proposed Action would be substantially less than current usage. Chaff and flares are authorized for use in the existing MOAs and on Oscura, Red Rio, and Centennial Ranges. Chaff

may be deployed in WSMR airspace, but not within 60 nm of El Paso or Albuquerque ATC radar facilities. Use of flares is approved at a minimum altitude of 2,000 feet AGL over WSMR airspace and 500 feet AGL over Red Rio and Oscura Ranges. Deployment of flares is not permitted in WSMR airspace during very high or extreme fire conditions.

RR-188 chaff used by F-16 aircraft consists of aluminum-coated silica fibers that are one inch or less in length, thinner than a human hair, and packed into approximately four-ounce bundles. Chaff disperses widely when deployed and the landing position of chaff depends upon the altitude of release and the prevailing winds at the time of release. Chaff rapidly breaks up to become particles of aluminum and silica that are generally indistinguishable from components found in native soils. Plastic components of the chaff package are inert and are not expected to be concentrated in any way that could impact soil or water resources. Mylar pieces (from the chaff wrapper) would disintegrate after prolonged exposure to sunlight and other weather conditions. No impact to soil or water resources would be anticipated from chaff, even in the case of a highly unlikely event such as an entire clump of undispersed chaff falling on the ground or into a small, confined water body.

Once ejected from an aircraft, the magnesium flare pellet is designed to be fully consumed before reaching the ground (there are also other components, which similar to those found in the chaff package). A flare failure that results in a dud on the ground is estimated to occur in 0.01 percent of flares used (under the Proposed Action, this would be the equivalent of approximately two flares per year). If a dud flare does reach the ground, the components that have the greatest potential to affect soil and water chemistry are small quantities of chromium, magnesium, aluminum, boron, and barium (Holloman AFB 2006). Only magnesium and boron showed levels in sufficient concentrations for concern in field and laboratory tests on flares, and then only in acidic environments that do not occur in soil or water within the ROI (ACC 1997). There would be no significant impacts to physical resources due to the chemical composition of flare materials that reach the ground.

**Floodplains** — Since there are no floodplains located on any of the training ranges, no impacts would occur due to the Proposed Action.

**Groundwater** — Activities associated with the Proposed Action would not result in groundwater withdrawal or other impacts to groundwater resources so no impacts would occur to groundwater due to the Proposed Action.

#### **4.5.2.2 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels (including current levels of chaff and flare use). There would be a reduced level of operations under the No Action Alternative and less potential disturbance at the ranges and under the airspace.



## 4.6 Biological Resources

### 4.6.1 Affected Environment

#### 4.6.1.1 Vegetation and Wildlife

##### 4.6.1.1.1 Training Airspace

Vegetation communities near the projects are determined by regional climate, especially precipitation, soils, slope and slope aspect, elevation, and the land use of southern New Mexico. Vegetation cover types that occur in the region under training airspace vary from desert grasslands to scrublands to forests and subalpine areas. Table 4-8 lists the vegetation and land cover types that occur under the primary use airspace, proposed for use by F-16s, and acreage, and percentage of the land overlain by the airspace covered by each type.

**Table 4-8. Vegetation/Land Cover Types under Primary 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
<b>Total</b>	<b>17,153,857</b>	<b>100</b>

Sources: AGZFD 2004.

Vegetation underlying primary 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.

**Grasslands** — The vegetation cover types for the lowest elevation in the ROI include the Semi-desert Grasslands and Plains-Mesa Grasslands. Grasslands cover approximately 50 percent of the lands under the proposed airspace units. The lower elevation limit of desert grassland occurs around 3,600 feet MSL and as an ecotone in the project region having shrubs intermixed with grasses (Dick-Peddie 1993). Ecologically important grasses are black grama (*Bouteloua eriopoda*) found on gravelly upland sites and tobosa (*Hilaria mutica*), the dominant grass on heavier soils in lowlands and swales. Other grasses include various grama grasses (*Bouteloua* spp.), red three awn (*Aristida longiseta*), hairy tridens (*Tridens pilosus*), and buffalograss (*Buchloe dactyloides*). Lupines (*Lupinus* spp.), filarees (*Erodium* spp.), and buckwheat (*Eriogonum* spp.) are common forbs. Cacti and succulent plants such as agaves (*Agave* spp.), sotol (*Dasylirion* spp.), and yucca are characteristic of Semi-desert Grasslands. Important shrubs include mesquite (*Prosopis* spp.), all thorn (*Koeberlinia spinosa*), and cat claw acacia (*Acacia greggii*). Grazing and drought have likely affected the encroachment of woody plants into the desert grasslands. Tarbush (*Flourensia cernua*) and creosote bush (*Larrea tridentata*) are examples of desert scrub species that have increased in grasslands in response to disturbance. In some areas, the native perennial bunchgrasses have been replaced by

exotic annual grasses and low-growing sod grasses, such as Lehmann lovegrass (*Eragrostis lehmanniana*) and curly mesquitegrass (*Hilaria belangeri*), respectively.

Plains-Mesa Grasslands are found between 4,000 and 7,500 feet MSL on plains, mesas, and low hills. Blue grama (*Bouteloua gracilis*), other grama grasses dominate within mixed, and shortgrass prairies. Other important grasses include buffalograss, Indian rice-grass (*Achnatherum hymenoides*), dropseeds (*Sporobolus* spp.), galleta grass (*Hilaria jamesii*), and lovegrass (*Eragrostis* spp.). Although shrubs have always been part of the Plains-Mesa Grasslands, the shrub component has increased in recent decades due to livestock grazing and fire suppression (Bailey 1995). Four-wing saltbush, winterfat (*Krascheninnikovia [=Ceratooides] lanata*), rabbitbrush (*Chrysothamnus* spp.), and snakeweed (*Gutierrezia* spp.) are common shrubs. Forbs, such as coneflowers (*Ratibida* spp.), globe mallows (*Sphaeralcea* spp.), and prickly-pear cacti (*Opuntia* spp.) are important in Plains-Mesa Grasslands.

**Chihuahuan Desert Scrub** — Chihuahuan Desert Scrub covers approximately 4,706,290 acres (27 percent) of the lands under the proposed airspace. Creosote bush is the most widespread and abundant plant in the Chihuahuan Desert Scrub, especially on gravel fans in lower elevation shrubland, occurring often with tarbush as a co-dominant species (Dick-Peddie 1993). On deep soils, honey mesquite (*Prosopis glandulosa*) becomes the dominant plant and cacti are abundant, particularly prickly pear. Other plants that are common to abundant in the province include yuccas, lechuguilla (*Agave lechuguilla*), and ocotillo (Bailey 1995). Cottonwoods (*Populus* spp.) occur along waterways where moisture is adequate.

**Coniferous and Mixed Woodlands** — Coniferous and Mixed Woodland vegetation communities constitute approximately 21 percent (3,543,564) acres of the lands under the proposed airspace. This community supports species such as the piñon pine (*Pinus edulis*) and one-seed juniper (*Juniperus monosperma*) that together are commonly called piñon-juniper woodland. This woodland is found between 4,900 and 7,500 feet MSL, particularly on rocky mesas, plateaus, slopes, and ridges (Dick-Peddie 1993). Understory vegetation includes grama grasses, galleta grass, Indian ricegrass, buckwheat, and lupines. Since the canopy is open, woody shrubs including thread-leaf groundsel (*Senecio longilobus*), snakeweed, four-wing saltbush, and cliffrose (*Cowania mexicana*) may grow between the piñons and junipers. Several species of hedgehog cacti (*Echinocereus* spp.), prickly pears, and chollas (*Opuntia* spp.) are present. Deciduous trees such as Gambel oak and other oak species and Texas madrone (*Arbutus xalapensis*) may also be present. Interior Chaparral (also known as Montane scrub) vegetation may intermix into woodland communities following burns and logging disturbances and typically persists until trees return. Chaparral vegetation in this region is dominated by mountain-mahogany (*Cercocarpus montanus*), gray oak (*Quercus grisea*), algerita (*Berberis haematocarpa*), sotol (*Dasyilirion wheeleri*), and sumacs (*Rhus* spp.).

**Montane Coniferous Forests** — Montane Coniferous Forests that occur from approximately 7,000 to 10,000 feet MSL are composed of Douglas fir (*Pseudotsuga menziesii* var. *glauca*), white fir (*Abies concolor*), blue spruce (*Picea pungens*), ponderosa pine, piñon pine, and various oak species (Dick-Peddie 1993). Montane Coniferous Forests were mapped on approximately 738,640 acres (4 percent) of lands under the project airspace. Abundant moisture in the form of rain and snow along with richer soils support a comparatively lush understory with a variety of woody shrubs, flowering forbs, and grasses. When moisture is adequate along riparian

drainages, cottonwood, salt cedar (*Tamarix ramosissima*), an invasive non-native species, and willows (*Salix* spp.) can occur at this elevation and continue into adjacent vegetation communities. The Beak MOAs are the only airspace units that overlie the Montane Coniferous Forests along with Cowboy and Ancho ATCAAs partially overlying the Beak MOAs.

**Subalpine Coniferous Forests — Alpine Tundra** — Subalpine Coniferous Forests occur at the upper elevations on approximately 110,689 acres (<1 percent) of lands in the proposed airspace from 9,500 feet MSL to the timberline at approximately 12,000 feet. In this harsh environment, the growing season is short with heavy snow cover, shallow soils, and extreme temperatures. Dominant tree species include Engelmann spruce (*Picea engelmannii*) and corkbark fir (*Abies lasiocarpa* var. *arizonica*) (Dick-Peddie 1993). Alpine Tundra occurs above the Subalpine Coniferous Forests and covers a very small portion of lands under the proposed project ROI (less than 1 percent). At this high elevation (above 11,500 feet MSL), habitat primarily supports low-growing cushion-type plants that are tolerant of intense sunlight, high winds, and cold temperatures. Common cushion plants include alpine avens (*Geum rossii*), bistort (*Polygonum bistortoides*), and alpine sage (*Artemisia scopulorum*) (Dick-Peddie 1993). A very small portion of the Beak MOA overlies the Subalpine Coniferous Forests – Alpine Tundra land cover types. Larger areas occur under Cowboy and Ancho ATCAAs.

**Closed Basin Scrub** — Closed Basin Scrub areas occur in broad, flat, undrained, or poorly drained basins where water tends to spread rather than run off (Dick-Peddie 1993). These areas can be large (although difficult to map at the scale of this project's airspace), typically have elevated salinity and alkalinity, and consequently support species tolerant of these conditions such as four-wing saltbush and burro grass (*Scleropogon brevifolius*).

In general, wildlife species are associated with specific habitats defined by the vegetation composition. Some species are dependent on specific habitats while other species are generalists and may occur in more than one habitat type. This section discusses the wildlife species associated with the primary vegetation types listed in Table 4-8 as occurring under the restricted airspace and MOAs.

Wildlife species for Holloman AFB (Section 3.6.1) are also common in other Chihuahuan Desert Scrub and Closed Basin Riparian Scrub vegetation types under the airspace. These include the black-throated sparrow (*Amphispiza bilineata*), greater roadrunner (*Geococcyx californianus*), curve-billed thrasher (*Toxostoma curvirostre*), Chihuahuan raven, scaled quail (*Callipepla squamata*), and Gambel's quail. Characteristic raptors that occur in the desert and basin areas include the golden eagle (*Aquila chrysaetos*), great horned owl (*Bubo virginianus*), red-tailed hawk, and ferruginous hawk (*Buteo regalis*). The Chihuahuan Desert Scrub supports a number of reptile species including the collared lizard (*Crotaphytus collaris*), Texas horned lizard, desert spiny lizard (*Sceloporus magister*), and various rattlesnakes (*Crotalus* spp.) (Bailey 1995).

Typical mammals associated with Plains-Mesa Grassland are the pronghorn, black-tailed prairie dog (*Cynomys ludovicianus*), swift fox (*Vulpes velox*), and plains pocket gopher (*Geomys bursarius*) (AZGFD 2004). Representative birds that occupy this habitat include the lesser prairie-chicken (*Tympanuchus pallidicinctus*), long-billed curlew (*Numenius americanus*), western burrowing owl (*Athene cunicularia hypugea*), lark bunting (*Calamospiza melanocorys*), and western meadowlark (*Sturnella neglecta*). Additional specialist species typically found in mixed grasslands include reptiles such as the six-lined racerunner (*Cnemidophorus sexlineatus*), many-lined skink (*Eumeces*

*multivirgatus*), Great Plains skink (*Eumeces obsoletus*), and plains black-headed snake (*Tantilla nigriceps*), and mammals such as thirteen-lined ground squirrel (*Spermophilis tridecemlineatus*) and hispid pocket mouse (*Chaetodipus hispidus*) (Parmenter *et al.* 1994). Agricultural development has affected much of the Plains-Mesa Grassland. Domestic livestock that occur on pasturelands under the airspace (Urban and Farmland cover type) include cattle, sheep, and horses. Many of the birds and small mammals listed occupy the edges of the agricultural areas.

Mammals common to the Desert Grassland vegetation type are the black-tailed jackrabbit, spotted ground squirrel (*Spermophilis spilosoma*), various species of kangaroo rats (*Dipodomys* spp.), and wood rats (*Neotoma* spp.). Birds associated with Desert Grasslands include Swainson's hawk, mourning dove (*Zenaida macroura*), greater roadrunner, ash-throated flycatcher (*Myiarchus cinerascens*), curve-billed thrasher, and Cassin's sparrow (*Aimophila cassinii*). Ornate box turtle (*Terrapene ornata*), western hognose snake (*Heterodon nasicus*), western hooknose snake (*Gyalopion canum*), and desert grassland whiptail (*Cnemidophorus uniparens*) are representative reptiles of the area.

The Plains-Mesa Sand Scrub is perhaps best known for its diversity and abundance of reptiles. Lizards include the Texas banded gecko (*Coleonyx brevis*), the greater earless lizard (*Cophosaurus texanus*), several species of spiny lizards (*Sceloporus* spp.), and whiptails (*Cnemidophorus* spp.). Snakes include the western hooknose snake, whipsnakes (*Masticophis* spp.), and rattlesnakes. Typical mammals found in Plains-Mesa Sand Scrub are the desert pocket gopher (*Geomys arenarius*), southern grasshopper mouse (*Onychomys torridus*), Texas antelope squirrel (*Ammospermophilis interpres*), and desert pocket mouse (*Perognathus penicillatus*). Scaled quail, Chihuahuan raven, cactus wren (*Campylorhynchus brunneicapillus*), and black-throated sparrow are representative birds.

Woodland species that inhabit the Coniferous and Mixed Woodlands include the piñon mouse (*Peromyscus truei*), scrub jay (*Aphelocoma coerulescens*), piñon jay (*Gymnorhinus cyanocephalus*), gray flycatcher (*Empidonax wrightii*), and gray vireo (*Vireo vicinator*). Piñon-juniper stands, as part of Mixed Woodlands, are also important habitat for wintering elk and mule deer (AGZFD 2004).

Typical wildlife species of the Montane vegetation types (including Montane Grasslands, Montane Scrub, and Montane Coniferous Forest) overlapping into the Subalpine Coniferous Forest in the ROI include ungulates such as elk (*Cervus elaphus*) and mule deer, black bear (*Ursus americanus*), and mountain lion (*Felis concolor*). The desert bighorn sheep (*Ovis canadensis mexicana*) is state-listed as endangered and is being restored to the San Andres National Wildlife Refuge (NWR) that occurs within WSMR, with habitats ranging from Montane to lower elevation grassland slopes (WSMR 2002). There are raptors from accipiters in the forests (e.g., goshawk [*Accipiter gentilis*] and Cooper's hawk [*Accipiter cooperii*]) to buteos and eagles in the foothills and grasslands (red-tailed hawk and golden eagle). Perching bird species include the gray jay (*Perisoreus canadensis*), Stellar's jay (*Cyanocitta stelleri*), mountain chickadee (*Parus gambeli*), mountain bluebird (*Sialia currucoides*), spotted towhee (*Pipilo erythrophthalmus*), and rock wren (*Salpinctes obsoletus*). There are also a few reptiles, primarily represented by rattlesnakes (*Crotalus* spp.) in the foothills and scrub.+

#### 4.6.1.1.2 Auxiliary and Emergency Landing Fields

RIAC is situated 100 miles to the northeast of Holloman AFB. Vegetation and wildlife species expected in the area would be somewhat similar to those described for Holloman AFB, especially species tolerant of human presence and disturbance. RIAC is currently operating as a civilian airport and as storage for a large number of mothballed airliners. The airfield environment is built up so there is little or no undisturbed habitat.

Biggs AAF is located within Fort Bliss, Texas, is adjacent to EPIA, approximately 70 miles south of Holloman AFB, and proposed as an emergency landing field for the F-16 mission. Even though Fort Bliss supports a relatively high diversity of habitats and wildlife, the area around Biggs AAF was mapped as having land cover primarily consisting of “Barren, Facilities, Non-native, Urban, No Data” (Army 2001). As a currently active AAF adjacent to the EPIA and other human development, species expected in this area would be accustomed to frequent air and ground vehicular traffic activity and local disturbance.

#### 4.6.1.2 Wetlands and Freshwater Aquatic Communities

##### 4.6.1.2.1 Training Airspace

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 2002). Other regional wetland features usually occur as ephemeral ponds, commonly known as playas that form in undrained or poorly drained basins with seasonal rainfall. Despite their limited geographic area in this arid region, wetlands and riparian areas are of extremely high importance for food, water, cover, breeding, brood rearing, and shade for most animal species, particularly migratory birds. Typical wetland plants in the region include cattail, bulrush, rushes, and sedges, often interspersed with willows. Most native riparian habitats in this region have been adversely affected by increased water demands and invasion by exotic species, particularly the woody plants salt cedar and Russian-olive. 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 river systems. Riparian scrublands, composed of several willow species, seep willow (*Baccharis salicifolia*), and salt cedar are found along floodplains and streams throughout the region. At the higher elevations of the ROI, 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*).

##### 4.6.1.3 Auxiliary and Emergency Landing Fields

No permanent or intermittent streams, ponds, or lakes occur at RIAC (Air Force 1989). In the region, artesian springs and other important wetlands in the Roswell area are located more than ten miles east of RIAC in association with the Pecos River, the Bitter Lake NWR, and the Bottomless Lakes State Park (USFWS 2008). These wetlands support many unique, endemic species as well as thousands of migratory birds. Playa lakes occur further east of RIAC in New Mexico and into western Texas. A study conducted for the Fort Bliss INRMP concerning arroyos and drainages did not identify probable waters of the U.S. in the Biggs AAF area (Army 2001). The INRMP stated that individual wetlands boundary delineations would occur on a

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project-by-project basis as needed on Fort Bliss. Most of the probable waters of the U.S. identified on Fort Bliss were not considered jurisdictional wetlands under Army Corps of Engineers (ACOE) criteria.

**4.6.1.4 Special Status Species**

**4.6.1.4.1 Training Airspace**

As part of the analysis process for this project, USFWS and the NMDGF were contacted for information on species of concern in the project area ROI, including airspace. Potential occurrence 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. The federally listed, proposed, and candidate species that are known to occur, or that may occur, under airspace and on ranges are presented in Table 4-9.

**Table 4-9. Federally Listed, Proposed, and Candidate Species Known to or That May to Occur under Primary Use Airspace or on Ranges\***

Common Name (Scientific Name)	Federal Status	Beak	Talon	McGregor	WSMR (Yonder, Lava West, Red Rio, Oscura, Mesa, R-5107s)	IR-133/142	IR-134/195	IR-192/194	VR-176	Auxiliary Field Rowell International Air Center (RIAC)	Aux. Field Biggs Army Airfield (AAF)
<b>MAMMALS</b>											
Meadow jumping mouse ( <i>Zapus hudsonius luteus</i> )	C	X	X	X	X	X	X		X		
Gunnison's prairie dog (Montane populations) ( <i>Cynomys gunnisoni</i> and <i>C.g. zuniensis</i> )	C					X					
<b>BIRDS</b>											
Least tern (Interior Population) ( <i>Sterna antillarum</i> )	E	X	X	X	X	X	X	X	X	X	X
Lesser prairie-chicken ( <i>Tympanuchus pallidicinctus</i> )	C	X	X			X		X		X	
Yellow-billed cuckoo (Western U.S. Distinct Population Segment [DPS]) ( <i>Coccyzus americanus occidentalis</i> )	C	X			X	X		X	X		X
Mexican Spotted Owl (MSO) ( <i>Strix occidentalis lucida</i> )	T	X+	X	X+	X	X	X+	X+	X+	X	X
Northern aplomado falcon ( <i>Falco femoralis septentrionalis</i> )	N-E & Exp	X	X	X	X	X	X	X	X	X	X
Piping plover ( <i>Charadrius melodus</i> )	T				X	X			X		
Southwestern Willow Flycatcher (SWFL) ( <i>Empidonax traillii extimus</i> )	E	X	X	X	X	X	X	X	X+	X	X
Sprague's pipit <i>Anthus spragueii</i>	C							X			
<b>AMPHIBIANS and REPTILES</b>											
Chiricahua leopard frog ( <i>Rana chiricahuensis</i> )	T				X	X			X		

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Common Name (Scientific Name)	Federal Status	Beak	Talon	McGregor	WSMR (Yonder, Lava West, Red Rio, Oscura, Mesa, R-5107s)	IR-133/142	IR-134/195	IR-192/194	VR-176	Auxiliary Field Rowell International Air Center (RIAC)	Aux. Field Biggs Army Airfield (AAF)
Sand dune lizard ( <i>Sceloporus arenicolus</i> )	C	X	X					X		X	
<b>FISH</b>											
Gila trout ( <i>Oncorhynchus gilae</i> )	E				X				X		
Rio Grande cutthroat trout ( <i>Oncorhynchus clarki virginalis</i> ) (New Mexico)	C	X	X	X	X		X		X		
Pecos bluntnose shiner ( <i>Notropis simus pecosensis</i> )	T	X	X					X+		X	
Pecos gambusia ( <i>Gambusia nobilis</i> )	E	X	X					X		X	
Rio Grande silvery minnow ( <i>Hybognathus amarus</i> )	E				X	X		X	X+		X
Noel's amphipod ( <i>Gammarus desperatus</i> )	E		X							X	
<b>INVERTEBRATES</b>											
Socorro isopod ( <i>Thermosphaeroma thermophilus</i> )	E				X	X			X		
Alamosa springsnail ( <i>Psuedotryonia alamosae</i> )	E				X	X			X		
Chupadera springsnail ( <i>Pyrgulopsis chupaderae</i> )	C				X	X			X		
Koster's springsnail ( <i>Juturnia kosteri</i> )	E	X	X							X	
Pecos assiminea snail ( <i>Assiminea pecos</i> )	E	X	X							X	
Roswell springsnail ( <i>Pyrgulopsis roswellensis</i> )	E	X	X							X	
Socorro springsnail ( <i>Pyrgulopsis neomexicana</i> )	E				X	X			X		
Texas hornshell (mussel) ( <i>Popenaias popei</i> )	C	X	X					X		X	
Noel's amphipod ( <i>Gammarus desperatus</i> )	E	X	X							X	
<b>PLANTS</b>											
Gypsum wild buckwheat ( <i>Eriogonum gypsophilum</i> )	T		X					X+			
Kuenzler hedgehog cactus ( <i>Echinocereus fendleri</i> var. <i>kuenzleri</i> )	E	X	X	X	X	X	X	X		X	
Lee pincushion cactus ( <i>Escobaria</i> [ <i>Coryphantha</i> ] <i>sneedii</i> var. <i>lei</i> )	T		X					X			
Pecos sunflower ( <i>Helianthus paradoxus</i> )	T	X	X		X	X				X	
Sacramento Mountains thistle ( <i>Cirsium vinaceum</i> )	T	X	X	X	X		X				
Sacramento prickly poppy ( <i>Argemone pleiakantha</i> ssp. <i>pinnatisecta</i> )	E	X	X	X	X		X				



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Common Name (Scientific Name)	Federal Status	Beak	Talon	McGregor	WSMR (Yonder, Lava West, Red Rio, Oscura, Mesa, R-5107/s)	IR-133/142	IR-134/195	IR-192/194	VR-176	Auxiliary Field Rowell International Air Center (RIAC)	Aux. Field Biggs Army Airfield (AAF)
Sneed pincushion cactus (Escobaria [Coryphantha] sneedii var. sneedii)	E		X		X			X			X
Todsen's pennyroyal (Hedeoma todsenii)	E	X	X	X	X		X+		X+		

**Note:** \*Occurrences were estimated based on data from these websites: New Mexico Department of Game and Fish (NMDGF) BISON-M, Texas Parks and Wildlife Department, and USFWS occurrence data. Estimates were made using one or more counties underlying the project airspace or containing the range/airfield as specific project area occurrences were not available. Species indicated as present may not actually occur under the airspace, on the range, or in the airfield.

**Key:**

- |   |   |
|---|---|
| C = Candidate for listing under the ESA           | T = ESA listed Threatened   |
| ESA = Endangered Species Act                      | USFWS = United States Fish and Wildlife Service                       |
| E = ESA listed endangered                         | N-E & Exp = Nonessential and Experimental (reintroduced) population   |
| Exp = Experimental                                | VR = Visual Route   |
| IR = Instrument Route                             | WSMR = White Sands Missile Range                                      |
| PT = Proposed for listing as threatened under ESA | X+ = USFWS critical habitat designated on lands beneath this airspace |

**Source:** NMDGF 2004, 2009; Army 2009; NMRPTC 1999; USFWS 2011a; TPWD 2011

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 MOA airspace associated with Holloman AFB were included in the INRMP (Holloman AFB 2010c) as well as other sources (AFI 13-201; Army 2001, 2009). An extensive literature review was conducted for this EA that included studies of military aircraft overflight and noise impacts to domestic animals and wildlife.

Considering the nature of the proposed uses of the project airspace and ranges and a thorough review of the relevant literature, no adverse impacts are anticipated for the sensitive mammals, reptiles, amphibians, fish, invertebrates, or plant species listed in Table 4-9 or their associated habitats that may occur in the project area. Ground disturbance would primarily occur on ranges where previous disturbance has already occurred, with about eight acres of new disturbance proposed within the boundary of the existing bombing range. Currently, ground-disturbing military activities are not allowed within the specific areas containing Todsen's pennyroyal populations. Eight known Todsen's pennyroyal populations lie beneath the Yonder Impact Area, portions of which are used for live-fire air-to-air activities. Use of Yonder Impact Area by the Air Force for the F-22A and Weapons System Evaluation Program (WSEP) was evaluated in a biological assessment and the USFWS concurred that these activities were not likely to affect Todsen's pennyroyal (WSMR 2009b) adversely. Another biological assessment determined that developing new test and training capabilities at the installation would have no adverse impact on Todsen's pennyroyal or critical habitat (Army 2009). The proposed use by F-16 would only include simulated aerial (air-to-air) training and munitions would not be discharged on Yonder Range. For these reasons, further impact discussion of these plants and the other primarily ground-based species listed in Table 4-8 will not be included. 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. Brief background information on those species is discussed in more detail below and potential impacts are analyzed in Section 4.5.2.1.

**Interior Least Tern** - The interior population of the least tern is listed as endangered under the ESA. It is the smallest member in the tern family and nests in colonies in unvegetated alluvial sand, gravel bars, or islands near water. Bare shorelines of saline lakes also are used for nesting as well as manmade sites such as sand or gravel pits, and dredge islands. Historically, the interior least tern bred along many major western rivers, but nest sparsely along only five rivers today, all north of New Mexico. Current threats to the interior least tern are habitat loss and modification due to water management for flood control, navigation, and irrigation (USFWS 1990). Occurrences of interior least terns have been recorded in counties over which all airspace units occur.

**Lesser Prairie Chicken** - This medium-sized, non-migratory grouse became a candidate for federal listing in 1997. Subsequent USFWS reviews have upheld its "warranted but precluded" for listing status. The lesser prairie chicken occupies mixed-grass dwarf shrub and the shinnery oak-bluestem communities in eastern New Mexico and small portions of four surrounding states. The lesser prairie-chicken may form flocks of up to 80 individuals in fall and winter but individuals spread out into territories in spring. Leks (breeding grounds) typically occur on knolls or low ridges with relatively short and/or sparse vegetation; some lekking behavior occurs on manmade areas such as well pads (NatureServe 2010). Males exhibit high fidelity to leks between breeding seasons and may defend these habitats all year. Nests are usually made in sand sagebrush or shinnery oak grasslands with high canopy cover. Most prairie-chicken occupied habitat occurs on private lands in New Mexico. Threats to this species include habitat removal and fragmentation due to energy development (including wind and solar) and other types of ground-disturbing developments. Lesser prairie-chickens have been recorded in counties over which Beak and Talon MOAs occur, under IR-133/142 and IR-192/194.

**Western Population of the Yellow Billed Cuckoo** - The two subspecies of yellow-billed cuckoo (eastern and western) are considered geographically separated by the Continental Divide (USFWS 2010). The western Distinct Population Segment (DPS) of the yellow-billed cuckoo was accepted as a candidate species under the ESA in 2001. Western yellow-billed cuckoos are migrants that prefer open woodland with clearings and thick, scrubby undergrowth along watercourses (USFWS 2010). Nesting occurs almost exclusively close to water. Based on historical accounts, this cuckoo was once considered locally common along a few river systems in New Mexico. Due to extensive riparian habitat loss, the overall range of the western yellow-billed cuckoo has decreased dramatically (USFWS 2010). Likely, the largest contributor to the decline of cuckoo habitat in the western U.S. is habitat loss and alteration attributable to management of the flow regimes of the major rivers that support riparian habitat. The yellow-billed cuckoo may occur on WSMR during migration but there is no record of their nesting there (NMNHP & WSMR 2002). This species has also been recorded in counties under Beak MOAs, VR-176, IR-192/194, and IR-133/142.

**Mexican Spotted Owl (MSO)** - The uncommon, secretive MSO, ESA-listed as threatened, prefers to nest and roost in closed-canopy, old growth coniferous forests or rocky canyons. MSOs may also nest on cliff ledges, in caves, in stick nests built by other birds, on debris

platforms in trees, and in tree cavities. Federally designated critical habitat for the MSO occurs in patches within the forested regions of eastern Arizona and western New Mexico. Critical habitat was mapped on lands below Beak MOAs, VR-176, IR-134/195, IR-192/194, and Ancho/Cowboy ATCAAs, and on a small portion of McGregor Range. Individual occurrences of MSOs have been recorded in counties under all airspace units.

**Piping Plover** - Piping plovers are divided into three breeding populations: the Northern Great Plains, Great Lakes, and Atlantic Coast populations (USFWS 2002a). The Great Lakes population is listed as endangered under the ESA, whereas the Northern Great Plains and Atlantic Coast populations are listed as threatened. Piping plovers have been reported from New Mexico on only seven occasions, most recently in April 2001, and they are not considered a breeding species in New Mexico (Williams 2001; NMDGF 2008). The nearest breeding records to the project ROI are from southeastern Colorado (NMDGF 2008). These plovers nest on pebbly mud found near interior alkali lakes, ponds, and wetlands adjacent to sparsely vegetated areas. This species is migratory, occurring in northern regions from late March through August. The piping plover population is threatened by changes in natural water regimes resulting in the alteration or loss of nesting sand bars and river islands as described for the interior least tern. Occurrences of this species have been recorded in counties in which WSMR occurs and under IR-133/142.

**Southwestern Willow Flycatcher (SWFL)** - Willow flycatchers (*Empidonax trailii*) are common throughout the southwest during migration but the endangered SWFL subspecies (*E. t. subsp. extimus*) only occurs during breeding season where it chooses dense, riparian habitats within a few scattered drainages in western New Mexico (WSMR 2009b) and elsewhere in the southwestern states. The historic breeding range of the SWFL is considered to have been primarily from the Rio Grande Valley westward including the Rio Grande, Chama, Zuni, San Francisco, and Gila watersheds in New Mexico with small numbers continuing to persist in all of these watersheds (USFWS 2002b). Willow flycatchers may occur on WSMR, but there is no record of them nesting there (WSMR 2002). Occurrences of the species have been mapped on counties that occur below all of the airspace units and a very small portion of the designated critical habitat for the SWFL was mapped to occur under VR-176, although the SWFL may occur in other habitats underlying airspace that are suitable during the breeding season.

**Northern Aplomado Falcon** - Historically, the northern aplomado falcon was infrequently observed in the project area and the species had not bred in the south/central New Mexico region since the early 1950s (Army 2001; WSMR 2002). The nearest known breeding population was in northern Chihuahua, Mexico about 125 miles south of Fort Bliss, Texas (Army 2001). The species does not have federally designated critical habitat, but suitable habitat for this species does exist under the proposed F-16 training airspace (BLM 2005; Young *et al.* 2005). The Air Force worked with USFWS on the reintroduction of northern aplomado falcons into southern New Mexico and Arizona to establish a viable resident population. Captive-bred northern aplomado falcons have been released in New Mexico on public and private lands and in Texas (WSMR 2009a). The reintroduced populations are designated by USFWS as “non-essential, experimental” in New Mexico and Arizona according to section 10(j) of the ESA of 1973, as amended. A few individual northern aplomado falcons have been observed on McGregor Range (Army 2001). WSMR has entered into a cooperative agreement with The Peregrine Fund to continue this project until this species is recovered and delisted. The USFWS does not expect

conflicts between falcon management and agricultural, oil and gas development, military, or recreational activities in the area (WSMR 2002).

**Sprague’s Pipit** – The USFWS reviewed the conservation status of Sprague’s pipit in 2010 and determined that the species warrants protection under the ESA, but that listing as threatened or endangered at this time is precluded by the need to complete other listing actions of a higher priority (USFWS 2011b). Thus, the species has federal candidate status. Sprague’s pipit is a relatively small bird endemic to the North American grasslands. The species currently is closely tied with native prairie habitat and breeds in the north-central U.S. and south-central Canada (USFWS 2011b). Wintering for Sprague’s pipits occurs in Arizona, Texas, Oklahoma, Arkansas, Mississippi, Louisiana, and New Mexico. This species has been recorded as occurring on counties under IR-192/194.

#### **4.6.1.5 Auxiliary and Emergency Landing Fields**

In an EA for additional development at RIAC, the interior least tern was described as a “regular” occurrence in Chaves County (Air Force 1989). As described above, this species requires perennial water for nesting, which does not occur at RIAC. The most abundant population of this endangered species breeds at the Bitter Lakes NWR about 15 miles from RIAC. Other sensitive species occur in Chaves County (as indicated in Table 4-10), but none are known to occur at RIAC. Since RIAC is an active airfield within an urban community, special status species are not expected to be present.

**Table 4–10. Potential Impacts to Federally Listed, Proposed, and Candidate Species Known to or that May Occur under Proposed Project Airspace**

Species	Potential Presence in Project ROI	Potential Adverse Impacts
Least Tern (Interior Population)	Sparse presence near perennial waters with sandbars under airspace and Military Training Routes (MTRs). Nesting colony within 15 miles of Roswell International Air Center (RIAC).	Introduction of the F-16 aircraft would represent a minimal departure from existing conditions to species under the airspace. F-16 overflight would not be expected to affect the interior least tern or its habitat adversely under the airspace. The potential for ‘take’ in the form of disturbance (i.e., harassment) from low-flying aircraft is extremely low due to of 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 National Wildlife Refuge (NWR), about 15 miles northeast of RIAC, could be near the flight path of F-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 Military Operations Areas (MOAs) and in which RIAC occurs.	Similar to impacts on other birds, introduction of the F-16 aircraft would represent a minimal departure from existing conditions and slight changes in the noise environment would not be expected to affect the lesser prairie chicken or its habitat adversely 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 F-16 aircraft would represent a minimal departure from existing conditions and slight changes in the noise environment would not be expected to affect the yellow-billed cuckoo adversely. 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.

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Species	Potential Presence in Project ROI	Potential Adverse Impacts
Mexican Spotted Owl (MSO)	Limited, specific habitat located in Montane forests and canyons under airspace and MTRs.	The potential for overflight impacts on the MSO have been studied in some detail. It has been noted that MSO responses to F-16 overflights were often less than responses to naturally occurring events such as thunderstorms. The White Sands Missile Range (WSMR) Biological Assessment (WSMR 2009) determined that training, including aircraft overflights, may affect, but is not likely to affect, the MSO or its critical habitat adversely. Past studies including Delaney <i>et al.</i> 1997; Johnson and Reynolds 2002; and ACC 2008 showed that noise associated with aircraft overflights has minimal impact on the MSO. With overflight elevational and seasonal restrictions in place for Holloman AFB, no adverse impacts are expected to MSO under the project airspace. The chance of accidental MSO-aircraft strike is so low as to be discountable.
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 Endangered Species Act (ESA) Endangered (E)/Non-Essential (N-) status with United States Fish and Wildlife Service (USFWS). No formal ESA Section 7 consultation is required regarding potential impacts of land uses on these populations. 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 will 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, introduction of the F-16 aircraft would represent a minimal departure from existing conditions and would slightly change the noise environment but would not be expected to affect the piping plover or its habitat adversely 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.
Southwestern Willow Flycatcher (SWFL)	Breeds in very localized, small, dense riparian habitats under airspace and MTRs.	Similar to impacts on other birds, introduction of the F-16 aircraft would represent a minimal departure from existing conditions and slight changes that may be present in the noise environment would not be expected to affect the SWFL adversely. 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.

**Note:** See Table 4–9 for species status and information on distribution with respect to areas proposed for use for F-16 training.

Reintroduced populations of aplomado falcon may occur on Fort Bliss, but breeding birds have not yet been identified there and would not be expected near the airfield. Fort Bliss maintains a 2001 INRMP (in revision) that frequently monitors on-base species and has developed detailed Endangered Species Management plans to provide protection for all sensitive species that are present. Since it is a heavily urban area with much disturbed ground and human activity, no sensitive species are known or expected to occur in and around Biggs AAF.

## 4.6.2 Environmental Consequences

### 4.6.2.1 Proposed Action

#### 4.6.2.1.1 Training Airspace and Ranges

**Construction** — No new ground disturbance would occur under airspace or on ranges where similar disturbance has not already occurred. Minimal new construction and expansion of facilities would occur on Oscura Range and on Centennial (within McGregor Range), that requires ground disturbance of approximately 32 acres on previously disturbed ground and eight acres of newly disturbed area. Since these bombing ranges are currently active with no listed, proposed, or candidate species known to be present, the upgrades would not be expected to affect sensitive species adversely, if any were present. Since active bird nests may be present in undisturbed areas, consultation with USFWS will occur to comply with the MBTA who may recommend that there be no ground disturbance during nesting season or may suggest nest surveys by a biologist prior to the ground disturbance.

**Operations** — All proposed airspace units that would be used by new squadrons of F-16s are

currently used as active military airspace by military jet aircraft including F-16s from other bases, GAF Tornados, and F-22s so no new types of impacts would be introduced into these areas nor would airspace modifications be needed due to the Proposed Action.

Under the Proposed Action, the change in total annual sortie-operations flown in the primary use training airspace units relative to baseline conditions would increase by about five per day in restricted areas and MOAs and about 80 per year in the MTRs, which is within the typical variation from year to year. The F-16s would conduct a greater proportion of required training at lower altitudes, at higher speeds, and during slightly more daylight hours than the F-22s and other aircraft that are currently present. Approximately 77 percent of F-16 airspace training would occur above 5,000 ft AGL, as given in Table 2-7, which lists percentages of time spent by F-16 aircraft in several altitude bands within military training airspace. Below this altitude, overflight noise rises relatively gradually from ambient to the peak noise level.

Impacts on biological resources that occur under airspace could result from low-level overflights and associated noise, sonic booms, munitions and countermeasures use, and bird-aircraft collisions. A comprehensive review of current literature evaluating potential impacts on wildlife and habitat from aircraft overflight, noise, sonic booms, and countermeasures was conducted as part of this analysis. Some important issues are discussed below.

**Low-level Overflight and Noise** — Animals living beneath airspace units may experience an incremental increase 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 and at altitudes where the noise generated would not be expected to startle animals and any 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 MTRs are expected to increase no more than 1 dB, no significant adverse impacts on vegetation or wildlife from overflights or noise are anticipated to be associated with the implementation of the Proposed Action.

**Sonic Booms** — 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 ROI would be expected to minimize response of birds, mammals, and domestic animals to sonic booms. It is not expected that the projected incremental increase in sonic booms associated with F-16 training in Red Rio and Oscura airspace would result in a

significant impact on wildlife. In the other training airspace units, supersonic noise levels would decrease slightly or remain the same. Sonic booms and seasonally frequent thunderclaps currently exist in the project airspace where most training flight occurs at altitudes above 5,000 feet AGL with the generally minimal response to sonic booms observed in free ranging wildlife.

**Munitions Use and Defensive Countermeasures** — Ground-disturbing operations that accompany F-16 beddown and training and that have the potential to disturb vegetation and wildlife include air-to-ground training using additional munitions sizes similar to those used by the GAF Tornado aircraft based at Holloman AFB. All ranges proposed for the use of inert munitions by F-16s currently support munitions use with the exception of Yonder Range at WSMR, which currently allows no munitions use. Munitions use is restricted to specific designated target areas on ranges within WSMR, which are maintained in a mowed or bladed (bare ground) condition to minimize fire hazard (WSMR 2002). Areas such as these would not likely attract wildlife species due to of limited habitat and resource availability so no new types of impacts on vegetation or wildlife from air-to-ground training would occur with the implementation of the Proposed Action.

F-16s would deploy chaff and flares as training to counter heat-seeking missiles, as do most other military jet aircraft. The F-16 would release fewer flares per year in all airspace compared to current F-22 use levels. 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 are 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 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 F-16 training will 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. 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 disease (Spargo 1999). 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. The projected chaff use by F-16s at Holloman AFB would decrease by 13,220 bundles per year compared to current use by F-22s. Bird-aircraft collisions would occur infrequently and would not represent a substantial source of mortality for bird species.

**Wetlands and Aquatic Communities** —Potential operational adverse impacts include the use defensive of countermeasures that could occur in airspace over areas that contain wetlands or



aquatic communities. Under the Proposed Action, F-16s would train with defensive chaff and flares in areas where their use is currently approved. 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 (Air Force 1997c). 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.

**Special Status Species** — The potential for adverse impacts of F-16 training in the airspace and at the auxiliary fields on endangered, threatened, or special status plants and wildlife is minimal for general vegetation and wildlife. Since adverse impacts on a single individual of a federally listed, endangered, or threatened species or its critical habitat are significant under ESA, a more detailed consideration of impacts is required for these species. Table 4-10 summarizes the projected impacts from F-16s activities in airspace overlying habitat that may be occupied by ESA-listed, proposed, or candidate species compared to existing conditions.

All F-16 flight activities would occur in existing airspace so no airspace modifications would be required. Training activities conducted by the two additional squadrons of F-16s on project ranges and in airspace units would be generally similar to existing use by military aircraft including F-16s. The F-16 mission is different from the F-22 mission and resulting training operations could be concentrated in different locations. Supersonic noise levels would increase very slightly in Oscura and Red Rio ranges. Due to an increase in the tempo of operations, 38 percent of F-16 flight hours would be spent below 10,000 ft AGL whereas 17 percent of the flight hours of F-22s are spent below 10,000 feet (Table 2-7). This may cause more frequent startle responses from some special status species, especially before individual animals gain experience and habituate to additional low-level flights.

The *Proposed Expansion of GAF Operations at Holloman AFB EIS* analyzed MTR usage similar to the usage proposed in this EA where the USFWS concurred that potential impacts to listed species may affect (but would not adversely affect) the SWFL, MSO, or northern aplomado falcon with mitigations (USACE 1998). The mitigation measures included in the biological opinion are that military overflights avoid known locations of MSO by 1,600 ft AGL and 2,900 ft laterally. In addition, military training route VR-176 is reduced to a single width corridor during the MSO breeding season (March to August). USFWS terms and conditions included a 10-year monitoring program of noise impacts to sensitive birds overflown by MTRs, reporting of which is still in progress (USACE 1998). The mitigation measures developed by the Air Force to support this opinion includes monitoring impacts of fires pre-flight briefings to aircrews of their obligations to protect listed species. With these and other existing mitigation measures in place, startle response for sensitive species present under project MTRs should be minimized during critical life stages such as breeding.

Guided munitions used for training with the F-16 would be confined to existing target areas within existing restricted airspace. As described for wildlife, impact areas do not support quality habitat and would be very unlikely to be used by sensitive species. The F-16 would conduct supersonic training in airspace units and at altitudes that are currently approved for supersonic training. For airspace units associated with Holloman AFB, supersonic flight is authorized at 10,000 ft MSL (5,500 ft AGL considering local elevations) or higher altitudes (Table 2-8). The addition of F-16 supersonic operations would occur concurrently with decreases in F-22 supersonic operations. Changes in the noise environment resulting from F-16 supersonic operations could range from a minor increase in CDNL at Red Rio and Oscura (where impulse noise is already occurring) to a reduction or no change in CDNL at other airspace units as compared to baseline conditions.

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. The probability of a bird-aircraft strike involving injury to a listed, endangered, or threatened species is so low as to be discountable. The likelihood of a munition affecting the endangered Todsén'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 Todsén's pennyroyal or its critical habitat are included in recent biological assessments (WSMR 2009b; Army 2009). No adverse impacts to endangered, threatened, and candidate species are expected. The Air Force received verbal communication on July 29, 2011 from Mr. Wally Murphy, of USFWS. Mr. Murphy stated that he had reviewed the 49 WG Combat and Capabilities and Capacities EA, which assesses the move of the F-16 to Holloman. He stated that their agency has no concerns regarding the proposed F-16 actions at Holloman AFB addressed in the EA.

#### **4.6.2.1.2 Auxiliary and Emergency Landing Fields**

For both RIAC and Biggs AAF, there are no wetlands or riparian areas at the airfields. Adverse impacts of F-16 operations at both RIAC and Biggs AAF on endangered, threatened, proposed, or candidate species are not expected since these species are not known to occur at RIAC or Biggs AAF. No significant impact for inserting aircraft arresting gear at Biggs AAF could result. Implementation of F-16 training would add 8,960 airfield operations per year at RIAC, representing an increase of 20 percent above baseline; however, these types of training exercises do not touch the ground. Given the long history as an airfield and the ongoing level of activity at RIAC, wildlife species near RIAC would be habituated to noise and overflights so it is not expected that they would be adversely affected by environmental changes from implementation of the Proposed Action.

Implementation of the Proposed Action would add occasional operations to Biggs AAF each year for emergency landings, which would be infrequent and unpredictable. As with RIAC, Biggs AAF has a long history and ongoing levels of airfield activities; therefore, nearby wildlife species would be habituated to noise and overflights and it is not expected that they would be adversely affected by the occasional additional aircraft use in emergencies that are associated with the F-16 training mission.

#### **4.6.2.2 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. Military training use of the airspace, ranges, and auxiliary fields would be less than the baseline. Impacts on vegetation, wildlife, wetlands, aquatic communities, and special status species would be reduced under the No Action Alternative.

### **4.7 Cultural Resources**

#### **4.7.1 Affected Environment**

The various blocks of airspace associated with the Proposed Action overlie at least part of ten New Mexico counties (Bernalillo, Chaves, Doña Ana, Eddy, Guadalupe, Lincoln, Otero, Sierra, Socorro, and Torrance). Almost 50 NRHP-listed properties have been identified under Holloman AFB Proposed Action-associated airspace. In addition, many more eligible or potentially eligible cultural resources associated with the history of the region are likely to underlie the airspace. Archaeological sites under the airspace include native burial sites, village and settlement sites, historic trails, battle sites, and historic mining sites (Holloman AFB 2010a). Architectural resources under the primary use MOAs, ATCAAs, and ranges include structures relating to mining, ranching, settlement, the railroad, and the military (Holloman AFB 2010a). The documented historic trails that crisscross New Mexico span the period from the first Spanish explorers to the 20th century. Many of these routes followed Native American travel and trading roads that long pre-dated the historic period. Many of these notable and historic trails located within or skirting the ROI, connected Santa Fe with points east and west. The Gila Trail originated in Arizona. The Santa Fe Trail ran north of the project area, as did the Old Spanish Trail that linked Santa Fe with Los Angeles, California. The Turquoise Trail proceeded north from Santa Fe. Route 66 passed north of the airspace, through Albuquerque, and followed roughly the route taken by Beale and his Camel Corps.

The Mescalero Reservation is partially under the Beak MOAs and it is likely that there are TCPs located within the reservation boundaries. It is also likely that other resources in the region could qualify as TCPs, but none was identified by any tribe. Many archaeological sites and natural features are considered traditional resources where the exact location is confidential.

##### **4.7.1.1 Beak A/B/C MOAs/Overlying ATCAA(s)**

The Beak MOAs/overlying ATCAA(s) airspace lies above portions of Lincoln, Otero, and Chaves counties in southeastern New Mexico. Eight NRHP-listed properties lie under the Beak MOAs/overlying ATCAA(s), all in Lincoln County (NMCRIS 2010). Parts of the Mescalero Apache Indian Reservation underlie Beak MOAs/overlying ATCAA(s) (DOI 2010).

##### **4.7.1.2 Talon MOA/Overlying ATCAA(s)**

The Talon MOA/Overlying ATCAA(s) airspace lies above portions of Chaves, Eddy, and Otero Counties in central New Mexico. Twenty-one NRHP-listed properties lie under the Talon MOA/overlying ATCAA(s), 15 of them in Eddy County (NMCRIS 2010). No federally recognized Native American lands underlie the Talon MOA/overlying ATCAA(s) (DOI 2010).

### 4.7.1.3 White Sands Missile Range (WSMR)

WSMR includes portions of Lincoln, Torrance, Socorro, Sierra, Otero, and Doña Ana Counties. There are NRHP-listed properties and two New Mexico State Register sites that are NRHP eligible. Additionally, there are two National Historic Landmark sites on WSMR, the LC-33 (V-2 launch site) and the Trinity site. The National Park Service also has a National Historic Monument in this area. Although there are historic era resources on WSMR (airspace R-5107), the majority of the listed properties are Native American archaeological sites and sites related to the longstanding military presence. The Gran Quivira, part of the three-part Salinas Pueblo Missions National Monument, is under the far northeastern corner of WSMR (airspace R-5107). In addition to the NRHP-listed properties, over 5,000 cultural resources have been recorded on WSMR, dating from the Paleoindian period through the modern historic era. Of the archaeological sites, approximately 1,300 are known to be NRHP-eligible properties, 500 not eligible and 1,300 sites of undetermined eligibility. Cultural resources on WSMR are managed in accordance with the WSMR ICRMP (WSMR 2005). Hundreds of NRHP-eligible resources underlie the various airspace components with many more that are of undetermined eligibility. The following provides details of federally recognized Native American lands and NRHP-listed properties that underlie specific WSMR airspace.

1. **R-5107 (Red Rio/WSMR)** - This airspace overlies Socorro and Lincoln counties in New Mexico. No NRHP-listed properties (NMCRIIS 2010) or federally recognized Native American lands underlie R-5107 (Red Rio-WSMR) (DOI 2010).
2. **R-5107 (Oscura/WSMR)** - This airspace overlies Otero and Lincoln counties in New Mexico. No NRHP-listed properties (NMCRIIS 2010) or federally recognized Native American lands underlie R-5107 (Oscura-WSMR) (DOI 2010).
3. **R-5107 (Lava East/West-WSMR)** - This airspace overlies Bernalillo, Sierra, and Socorro counties in Western New Mexico. Two NRHP-listed properties lie under R-5107 (Lava East/West-WSMR) (NMCRIIS 2010). No federally recognized Native American lands underlie R-5107 (Lava East/West-WSMR) (DOI 2010).
4. **R-5107 (Mesa Low/High-WSMR)** - This airspace overlies Torrance and Socorro counties in Western New Mexico. There is one NRHP-listed property under R-5107 (Mesa Low/High-WSMR) (NMCRIIS 2010). No federally recognized Native American lands underlie R-5107 (Mesa L/H WSMR) (DOI 2010).
5. **R-5107 (Yonder/WSMR)** - This airspace overlies Doña Ana, Lincoln, Otero, and Sierra counties in Western New Mexico. There are five NRHP-listed properties under R-5107 (Yonder-WSMR) (NMCRIIS 2010). No federally recognized Native American lands underlie R-5107 (Yonder-WSMR) (DOI 2010).

WSMR's Red Rio and Oscura Ranges are proposed for air-to-ground activities. After 50 years of bombing and gunnery use, both ranges were surveyed for cultural resources in the 1980s and 1990s, and numerous relatively intact archaeological sites were recorded. Holloman AFB project and site records research indicates that 27 sites located within the range boundary on Red Rio had been determined eligible (Table 4-11). Three of those sites were excavated to mitigate impacts of live bomb drops. Methods of minimizing or avoiding further impacts on the other 24 sites were agreed to by SHPO, WSMR, and Holloman AFB. The sites have been monitored at least annually since 1998. One outcome of this assessment of proposed F-16 range use will be further research in the records at WSMR, SHPO, and Holloman AFB, field

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verification, and then submission of updated site and eligibility consultation records to NMCRIS and SHPO.

**Table 4–11. Red Rio Range Sites Inside Weapons Danger Zone  
State Historic Preservation Office (SHPO) Consult Complete**

Site	Type	NRHP Status	Status, 2011 Observations, Recommendation	Citation
50191	Prehistoric	Eligible	Posted for avoidance, in target field, no apparent adverse impacts since 1998, update Global Positioning Satellite (GPS) data, monitor and program for testing and/or mitigation.	Laumbach & Kirkpatrick 1985 Webb 1995
50201	Prehistoric	Eligible SHPO 1992 Mitigated 93	Posted for avoidance, eroding terrain, targets moved away and two-track blocked since 1998 but site is not far from multiple other targets, update GPS data, monitor, and program for testing and or mitigation.	Laumbach & Kirkpatrick 1985 Webb 1995
50202	Historic Prehistoric	Eligible	Posted for avoidance, unable to find artifacts in 1994, three artifacts found in 2011, GPS map, re-evaluate, and consult on significance.	Laumbach & Kirkpatrick 1985 Webb 1995
50206	Historic	Eligible	Posted for avoidance, no apparent adverse impacts since 1998, no nearby targets, update GPS data, and monitor.	Laumbach & Kirkpatrick 1985 Webb 1995
50207	Prehistoric	Potentially Eligible (d)	Posted for avoidance, no apparent adverse impacts since 1998, no nearby targets, update GPS data, and monitor.	Laumbach & Kirkpatrick 1985 Webb 1995
50212	Prehistoric	Potentially Eligible (d)	Posted for avoidance, severely impacted prior to 1985, no apparent adverse impacts since 1998, no nearby targets, update GPS data, and monitor.	Laumbach & Kirkpatrick 1985 Webb 1995
51276	Prehistoric	Potentially Eligible (d)	Posted for avoidance, rough eroding terrain, very few artifacts but multi-material types, update GPS data, re-evaluate, and consult on significance.	Clifton 1985 Webb 1995
51277	Prehistoric	Eligible	Posted for avoidance, no apparent adverse impacts since 1998, Outside current Weapons Danger Zone (WDZ) but line-of-sight North to South 1,000 meters to major target complex, update GPS data, monitor.	Clifton 1985 Webb 1995
51278	Historic Prehistoric	Eligible	Posted for avoidance, pre-1994 crater, tracks and debris, line-of-sight North to South 800 meters to major target complex, update GPS data, monitor and re-evaluate for avoidance, testing or mitigation in light of future range uses.	Clifton 1985 Webb 1995
51279	prehistoric	Unknown	Posted for avoidance, pre-1994 crater, tracks, and debris, outside current WDZ, update GPS data, monitor, and re-evaluate for testing and/or mitigation in light of future range uses.	Clifton 1985 Webb 1995
51280	prehistoric	Eligible SHPO 1993	Posted for avoidance, pre-1994 craters, debris, outside of current WDZ but line-of-sight 900 meters to major target complex, update GPS data, monitor, and re-evaluate for testing and/or mitigation in light of future range uses.	Clifton 1985 Webb 1995
51282	Prehistoric	Eligible SHPO 1992	Posted for avoidance, pre-1994 small bombs and debris, no apparent recent impacts as of 2010, update GPS data, monitor and re-evaluate for late Apache components.	Clifton 1985 Webb 1995
51283	Prehistoric	Not Eligible SHPO 1992	Posted for avoidance, pre-1994 small bombs and debris, no apparent recent impacts as of 2010, update GPS data, monitor.	Clifton 1985 Webb 1995
59137	Prehistoric	Eligible	Posted for avoidance, pre-1994 small bombs and debris, away from major target areas, no apparent recent impacts as of 2010, update GPS data, monitor.	Clifton 1985 Webb 1995
59140	Prehistoric	Eligible SHPO 1992 Mitigated 93	Posted for avoidance, few pre-1994 small bombs and cartridges, peripheral to current WDZ, no apparent recent impacts as of 2010, update GPS data, monitor.	Laumbach 1986 Webb 1995

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Site	Type	NRHP Status	Status, 2011 Observations, Recommendation	Citation
59141	Historic Prehistoric	Eligible	Near live drop area, tested 1992, impacts mitigated in 1993, determination of no effect with periodic monitoring required per State Historic Preservation Office (SHPO) 1994.	Laumbach 1986 Shields 1992 Webb 1995 Bertram and Eidenbach 1994
59142	Historic	Eligible	Posted for avoidance, pre-1994 small bombs and debris, away from major target areas, no apparent recent impacts as of 2010, update GPS data, monitor.	Clifton 1985 Webb 1995
59143	Prehistoric	Potentially Eligible (d)	Posted for avoidance, outside the WDZ, very little military debris, away from major target areas, no apparent recent impacts as of 2011, update GPS data, monitor.	Clifton 1985 Webb 1995
59145	Prehistoric	Potentially Eligible (d)	Posted for avoidance, pre-1994 small bombs, rockets and debris, outside current WDZ, away from major target areas, no apparent recent impacts as of 2010, update GPS data, monitor.	Laumbach 1986 Webb 1995
59146	Prehistoric	Potentially Eligible (d)	Posted for avoidance, few cartridge casings, very little military debris, away from major target areas, no apparent recent impacts as of 2010, update GPS data, monitor.	Laumbach 1986 Webb 1995
59147	Prehistoric	Eligible	Posted for avoidance, few cartridge casings, very little military debris, away from major target areas, no apparent recent impacts as of 2010, update GPS data, monitor.	Laumbach 1986 Webb 1995
59148	Historic Prehistoric	Eligible	Posted for avoidance, many craters in 1994, many cartridge casings and military debris, now away from major target areas, no apparent recent impacts as of 2010, update GPS data, monitor.	Laumbach 1986 Webb 1995
59149	Prehistoric	Unknown	Posted for avoidance, many craters in 1994, many cartridge casings and military debris, now away from major target areas, no apparent recent impacts as of 2010, update GPS data, monitor.	Laumbach 1986 Webb 1995
59150	Prehistoric	Eligible SHPO 1993	Near live drop area, tested 1992, impacts mitigated in 1993, determination of no effect with periodic monitoring required per SHPO 1994.	Laumbach 1986 Shields 1992 Webb 1995 Bertram and Eidenbach 1994
59151	Prehistoric	Eligible SHPO 1992	Near live drop area, tested 1992, impacts mitigated in 1993, determination of no effect with periodic monitoring required per SHPO 1994.	Laumbach 1986 Shields 1992 Webb 1995 Bertram 1994
59152	Prehistoric	Not Eligible SHPO 1992	Near live drop area, tested 1992, impacts mitigated in 1993, determination of no effect with periodic monitoring required per SHPO 1994.	Laumbach 1986 Shields 1992 Webb 1995 Bertram and Eidenbach 1994 Eidenbach <i>et al.</i> 1994
59153	Prehistoric	Eligible	In live drop, tested and potential exhausted.	Shields 1992

On Oscura Range, 16 sites have been recorded, with ages ranging from 8,000 years old to the Cold War era (Table 4-12). Most of the archeological sites on these two ranges have been determined eligible for the NRHP; however, none of the sites on Oscura Range is located in an area that is planned to be impacted by bombing and gunnery. Proposed range changes are individually reviewed to prevent impacts. It is Holloman AFB cultural resources practice to protect any survey-recorded site as eligible until a more thorough evaluation is accomplished and an official determination of eligibility is made.

**Table 4–12. Oscura Range National Register of Historic Places (NRHP) Sites**

Site	Type	NRHP Status	Other Notes	Citation
60700	Historic	Not Eligible	No live drop; no historic property affected	Shields & Laumbach 1989
60701	Historic	Not Eligible	No live drop; no historic property affected	Shields & Laumbach 1989
86477	Prehistoric	Eligible	No live drop; no historic property affected	Kirkpatrick 1987
86478	Prehistoric	Eligible	No live drop; no historic property affected	Kirkpatrick 1987
86479	Prehistoric	Eligible	No live drop; no historic property affected	Kirkpatrick 1987
111308	Prehistoric	Eligible	No live drop; no historic property affected	Browning <i>et al.</i> 1997
111309	Prehistoric/Historic	Not Eligible	No live drop; no historic property affected	Browning <i>et al.</i> 1997
111310	Prehistoric	Not Eligible	No live drop; no historic property affected	Browning <i>et al.</i> 1997
111311	Prehistoric	Insufficient Evaluation (Potentially Eligible)	No live drop; no historic property affected	Browning <i>et al.</i> 1997
111312	Prehistoric	Not Eligible	No live drop; no historic property affected	Browning <i>et al.</i> 1997
111313	Prehistoric	Not Eligible	No live drop; no historic property affected	Browning <i>et al.</i> 1997
111314	Prehistoric	Eligible	No live drop; no historic property affected	Browning <i>et al.</i> 1997
111315	Prehistoric	Insufficient Evaluation (Potentially Eligible)	No live drop; no historic property affected	Browning <i>et al.</i> 1997
111316	Prehistoric	Not Eligible	No live drop; no historic property affected	Browning <i>et al.</i> 1997
111317	Prehistoric	Not Eligible	No live drop; no historic property affected	Browning <i>et al.</i> 1997
111442	Prehistoric	Not Eligible	No live drop; no historic property affected	Browning <i>et al.</i> 1997

#### 4.7.1.4 McGregor Range

McGregor Range lies in the south-central portion of Otero County. No NRHP listed properties are on the range, but over 4,000 prehistoric and historic archaeological sites have been recorded including almost 800 on Otero Mesa where the Air Force Centennial bombing and gunnery range is located. Of the sites on McGregor Range, over 500 are eligible for the NRHP including at least 12 historic landscapes (Fort Bliss 2008). Two 19th century ranch house complexes are also located on the McGregor Range and are used as recreation sites for range visitors. There are two New Mexico State Register-listed properties along the western edge of the range: the Escondido Ruin and the Grapevine Canyon Archaeological District. Although not listed on the NRHP, these locations are eligible for such listing. The following provides details of federally recognized Native American lands and NRHP-listed properties that underlie specific McGregor Range airspace. As with WSMR, there are hundreds of NRHP-eligible historic properties, as well as many that have undetermined NRHP eligibility, located on McGregor Range.

1. **R-5103 (Centennial Range/Fort Bliss)** – This airspace overlies Otero County in western New Mexico. No NRHP-listed properties (NMCRIIS 2010) or federally recognized Native American lands underlie R-5103 (Centennial Range-Fort Bliss) (DOI 2010).
2. **R-5103 (McGregor/Fort Bliss)** – This airspace overlies Otero County in western New Mexico. There is one NRHP-listed property under R-5103 (McGregor/Fort Bliss) (NMCRIIS 2010). No federally recognized Native American lands underlie R-5103 (McGregor/Fort Bliss) (DOI 2010).
3. **IR-133/142** – This airspace lies above Guadalupe, Lincoln, Otero, Socorro, and Torrance counties in New Mexico. Five NRHP-listed properties lie under IR-133/142, four of which are in Torrance County (NMCRIIS 2010). A portion of the Mescalero Apache Indian Reservation underlies IR-133/142 (DOI 2010).



Centennial Range would continue to be used for air-to-ground bombing and gunnery practice by the GAF, RPAs, and F-16s. The intensive pedestrian survey, conducted when Centennial Range was proposed in the mid-1990s, recorded 20 archaeological sites, and two modern fence lines (Table 4-13). SHPO eligibility concurrence (March 1, 1998) determined 11 were not eligible. Of the remaining nine sites, six were determined eligible and likely to be impacted were excavated to mitigate the proposed impacts of developing and using the range. The other three are considered eligible, but are in settings determined unlikely to be affected by continued range use. The two modern fence lines are not eligible.

**Table 4-13. Centennial Range National Register of Historic Places (NRHP) Sites**

Site	Type	NRHP Status/Date	Comments	Citation
99942	Historic	Undetermined	Modern fence line, near firebreak	Ft Bliss records
99943	Historic	Not Eligible	Modern fence line, near firebreak	Ft Bliss records
115551	Historic	Not Eligible (1998)		Browning <i>et al.</i> 1998
117703	Prehistoric	Not Eligible (1998)		Browning <i>et al.</i> 1998
117704	Prehistoric	Eligible	Impacts mitigated 2001	Quigg 2002
117705	Prehistoric	Eligible	Impacts mitigated 2001	Quigg 2002
117706	Prehistoric	Eligible	Impacts mitigated 2001	Quigg 2002
117707	Unknown	Not Eligible		Browning <i>et al.</i> 1998
117708	Unknown	Not Eligible		Browning <i>et al.</i> 1998
117709	Unknown	Eligible	Not in area affected by past or proposed range activities	Browning <i>et al.</i> 1998
117710	Prehistoric	Eligible	Impacts mitigated 2001	Quigg 2002
117711	Unknown	Not Eligible	Near proposed firebreak. No historic property affected	Browning <i>et al.</i> 1998
117712	Unknown	Eligible	Impacts mitigated 2001	Quigg 2002
117713	Prehistoric	Eligible	Impacts mitigated 2001	Quigg 2002
117714	Prehistoric	Not Eligible		Browning <i>et al.</i> 1998
117715	Unknown	Not Eligible		Browning <i>et al.</i> 1998
117716	Prehistoric	Not Eligible	Near proposed firebreak. No historic property affected	Browning <i>et al.</i> 1998
117717	Unknown	Not Eligible		Browning <i>et al.</i> 1998
117718	Prehistoric	Not Eligible		Browning <i>et al.</i> 1998
117719	Unknown	Not Eligible		Browning <i>et al.</i> 1998
117720	Unknown	Eligible	Tested 2001; not in area affected by past or proposed range activities	Quigg 2002
117721	Prehistoric	Eligible	Tested 2001; not in area affected by past or proposed range activities	Quigg 2002

## 4.7.2 Environmental Consequences

A summary of federal regulations and guidelines that have been established for the management of cultural resources is provided in Appendix B of this EA.

### 4.7.2.1 Proposed Action

#### 4.7.2.1.1 Training Airspace

Under the Proposed Action, 50 F-16 PAI would beddown at Holloman AFB and train in the primary use airspace units as described in previous sections. Overall, the F-16 would spend more time flying between 500 and 5,000 feet AGL than the F-22 (Table 2-7). Projected F-16 airspace use would increase slightly over existing use in the Beak and Talon MOAs/ATCAA(s),

R-5107 (Red Rio-WSMR), R-5107 (Oscura), R-5107 (Yonder-WSMR), R-5103 (Centennial Range-Fort Bliss), R-5103 (McGregor-Fort Bliss), and IR-133/142, IR-134/195, IR-192/194, and VR 176 (short) airspace. Projected airspace use would decrease in the remaining airspace (Table 2-8).

No impacts to historic properties under the airspace are expected under the Proposed Action. Historic properties under the airspace range from archaeological sites to historic structures to historic districts and can be found throughout the ROI. No traditional cultural resources have been specifically identified in the project area, but part of the Mescalero Apache Reservation lies beneath Beak B and C MOAs and the part of the Long Walk National Historic Trail traversed by the Mescalero Apache passes beneath Beak A, B, and C MOAs. Current conditions for all resources include overflights by military and non-participating aircraft including flights at supersonic speeds above 10,000 ft MSL throughout most of the airspace. Neither the noise nor the visual presence of these overflights has affected the NRHP eligibility of the resources.

Overall, subsonic noise would increase slightly under the airspace, but remain below 65dB (Section 4.2). There would be a slight increase in subsonic noise under the Red Rio, Oscura, and Centennial airspace, but it would not be sufficient to impact historic properties. F-16s would conduct more of their operations at lower altitudes than the F-22, but the F-16 flies supersonic fewer times per sortie than the F-22. Overall supersonic noise energy levels would decrease or remain the same in all airspace units except Red Rio and Oscura Range airspace, where CDNL would increase slightly (2dB or less). Impacts to historic properties from noise are not expected.

Time spent in supersonic flight would increase at lower elevations under the Proposed Action, but due to the difference in flight characteristics between the F-22 and the F-16, the exposure to supersonic noise would remain the same or decrease beneath most airspace units (Table 2-9 and Table 4-2). It is extremely unlikely that these supersonic events would produce conditions that could adversely affect cultural resources. The Mescalero Reservation has been identified as a population avoidance area for training flights and noise events would be spread out over the rest of the project area.

Chaff and flare use would drop by 63 percent and 31 percent, respectively (Table 2-11). Use of these defensive countermeasures is not expected to impact historic properties under the airspace. The material residue from both chaff and flares falls to the ground in a dispersed fashion and does not collect in quantities great enough to affect the NRHP status of archaeological or historical resources adversely (SAIC 2008). Existing use of flares by legacy aircraft is not known to have impacted these resources and their use by F-16 aircraft is not expected to result in impacts.

Indirect noise impacts to historic architectural resources outside the boundaries of RIAC on the land within the projected 65 dB DNL noise contour are not anticipated, as there are no known NRHP-listed properties. RIAC has not been surveyed systematically for cultural resources that may be potentially eligible for the NRHP.

Installation of arresting cables at Biggs AAF would require ground disturbance and it may be necessary to conduct a cultural resources survey prior to completing this part of the Proposed Action. Due to its proposed use as an emergency landing field, F-16 operations at Biggs AAF would be infrequent and unpredictable. Holloman AFB, in consultation with the New Mexico SHPO and in compliance with Section 106 of the NHPA obtained concurrence from SHPO on a

finding of no historic properties affected by implementation of the Proposed Action. Construction, demolition, and renovation will not affect any structures that are eligible for the National Register of Historic Places (NRHP) so no archaeological impacts are anticipated. Holloman AFB coordinated with tribal governments as part of the environmental process. The Mescalero Apache indicated there were no comments on the proposal after being contacted by a representative of Holloman AFB.

#### **4.7.2.1.2 Training Ranges**

Air-to-ground munitions use would increase on WSMR and McGregor Ranges. The Air Force coordinates, and would continue to coordinate, activity on these active bombing ranges with WSMR and Fort Bliss cultural resource managers to ensure compliance with Section 106 of NHPA, Air Force Instructions, and the relevant ICRMPs. In addition, WSMR and Holloman AFB will both be proposing the development of a Programmatic Agreement with the SHPO to manage cultural resources on the respective installations.

**Oscura and Red Rio Ranges, WSMR** – For both ranges there will be no historic properties affected. Examination of the records for Holloman AFB and NMCRIS records determined that improvements planned for Oscura Range on WSMR would not affect any known cultural resources including archaeological sites located on the range. On Red Rio Range, no new construction and no new targets are planned on the ground surface. Use of targets and munitions drop would occur in the same locations currently used, so there should be no impacts to cultural resources. Known sites on Red Rio are bounded by T-posts and are checked annually by the Holloman AFB cultural resources manager. They are also identified in the Range Manager’s GIS, range maintenance and clean-up crews are directed to avoid the areas, and at least one site (Prisoner of War Camp) is identified to pilots as an area to be avoided. These locations have suffered remarkably little damage since being clearly identified.

**Centennial Range, McGregor Range** – The proposed changes on Centennial (Range Tower, equipment storage lot, and road improvements) are planned where they would not affect any potentially eligible cultural resources. In addition to the 20 sites previously discussed, three additional site records were at first thought to indicate proximity of potentially eligible cultural resources. Two of these are relatively recent grazing allotment fence lines recorded for general history purposes, and the coordinates of the third were erroneously entered in NMCRIS. The new work at Centennial will not impact the remaining NRHP-eligible sites on this range.

**Native American Concerns** — Holloman AFB has an ongoing consultation process with the Mescalero Apache Tribe and when appropriate contacts the Fort Sill Apache Tribe, Ysleta del Sur Pueblo, Tigua Indian Reservation of Texas, and Zuni Tribal Council to invite them to express their concerns about potential actions. In accordance with Section 106 of the NHPA and EO 13175, the Air Force initiated consultation with the Mescalero Apache Tribe to consult on a government-to-government basis regarding their concerns about potential impacts to traditional resources and TCPs under the airspace associated with the Proposed Action.

Native Americans are likely to be concerned about potential impacts to traditional resources under the airspace. The Mescalero Reservation is partially under the Beak MOAs and it is likely that traditional cultural properties are located within the reservation boundaries. Other traditional resources are known to underlie this airspace. The Mescalero have identified no

TCPs in the area.

The slight increase in subsonic noise under some of the Holloman AFB-associated airspace units, as well as continued chaff, flare, and increased munitions use are likely to be considered by the Native Americans to be an impact to traditional use of the area. The Mescalero Apache indicated there were no comments on the proposal after being contacted by a representative of Holloman AFB.

#### **4.7.2.2 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. Existing military flight training operations would be less under the No Action Alternative with reductions in sonic booms and decreased impulsive noise. Cultural resources would continue to be managed in compliance with federal law and Air Force regulation.

### **4.8 Land Use and Recreation**

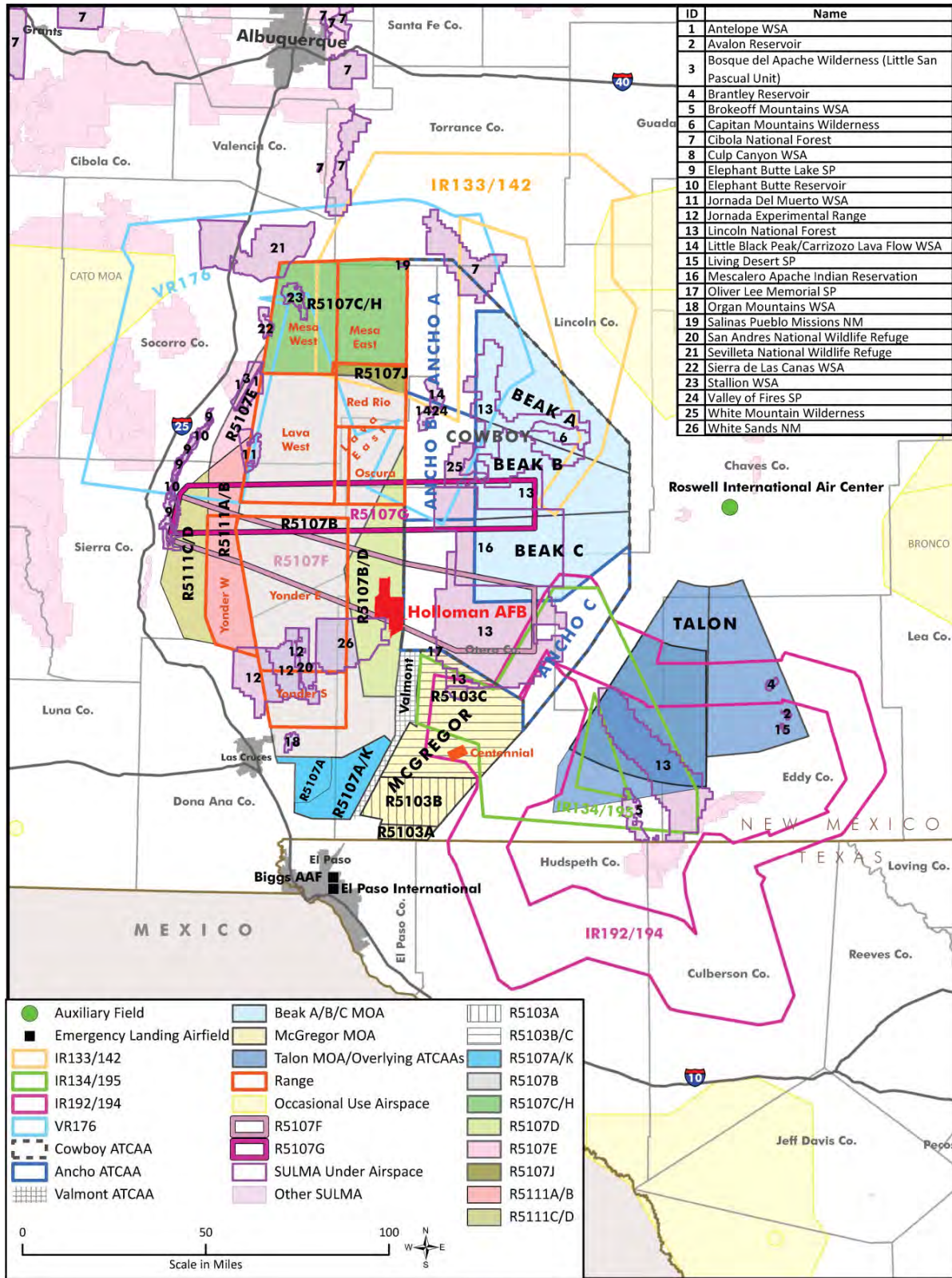
#### **4.8.1 Affected Environment**

##### **4.8.1.1 Land Use**

**Training Airspace** — This section summarizes land ownership and Special Use Land Managed Areas (SULMAs) underlying the airspace units associated with Holloman AFB and land uses associated with the auxiliary and emergency airfields. SULMAs include selected areas managed by federal and state agencies that provide recreational and scenic opportunities (e.g., parks, monuments, and scenic river corridors), solitude or a wilderness experience (e.g., forests and wilderness areas), conservation of natural or cultural resources (e.g., wildlife refuge areas and national monuments), and other special management functions (e.g., Native American reservation lands). SULMAs often provide a combination of these attributes and some SULMAs may include recreation-oriented sites such as campgrounds, trails, and visitor centers. Recreation is addressed separately below.

A description of the training airspace units overlying the SULMAs can be found in Section 2.2.5. Most of the primary use airspace overlies New Mexico with additional portions in Texas (Figure 4-2). The majority of federal land under the airspace is administered by BLM, followed by DoD, and then by the United States Forrest Service (USFS). Training ranges include DoD lands requiring special management for conservation. Figure 4-2 identifies 26 SULMAs that are located underneath one or more airspace units. Although MTRs are shown in Figure 4-2, any SULMAs that are underneath MTR airspace only are not shown. This is done because all MTRs would have increased noise of less than 1 dB DNL under the Proposed Action, which is a noise level imperceptible to humans. Table 4-14 lists each SULMA shown on the figure including size and other factors. The SULMAs include wilderness and Wilderness Study Areas (WSAs), national forests, national wildlife refuges, experimental ranges, national monuments, reservoirs, Native American reservation lands, and state parks. For the SULMAs, the highest subsonic noise level is 63 DNL<sub>mr</sub>. Under baseline conditions, supersonic noise levels do not exceed 59 CDNL under any primary use airspace unit. Supersonic flight is not authorized in Beak or Talon MOAs or on MTRs.

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**Figure 4-2. Special Use Land Managed Areas and Airspace for Holloman AFB**

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**Table 4–14. List of Special Use Land Managed Areas (SULMAs)  
Underlying Airspace Proposed for Use by F-16**

ID	SULMA Name	Airspace Name	Type	Agency	SULMA Acres	Intersection Acres	Airspace Acres	% SULMA in Airspace
1	Antelope WSA	LAVA WEST	WSA		21,480	2,839	988,236	13%
2	Avalon Reservoir	TALON MOA/ Overlying ATCAAs	Bureau of Reclamation	Reclamation	1,578	1,578	1,585	100%
3	Bosque del Apache (Little San Pascual Unit) Wilderness	R-5107E	WSA	FWS	23,334	17,436	269,119	75%
4	Brantley Reservoir	TALON MOA	Reclamation	Reclamation	4,362	4,362	1,585	100%
5	Brokeoff Mountains WSA	TALON MOA	WSA	N/A	31,140	4,364	1,585	14%
6	Capitan Mountains Wilderness	BEAK MOA	Wilderness FS	Forest Service	35,698	35,697	1,638,541	100%
7	Cibola National Forrest (NF)	CATO MOA/ Overlying ATCAAs	NF FS	Forest Service	1,949,394	38,252	2,253,297	20%
8	Culp Canyon WSA	R-5103B/C	WSA		11,071	11,070.88	553,644	100%
9	Elephant Butte Lake SP	R-5111C/D	WSA	State	63,970	11,308	269,119	24%
10	Elephant Butte Reservoir	R-5107E	SP	Reclamation	30,506	3,581	269,119	11%
11	Jornada Del Muerto WSA	LAVA WEST	WSA		29,558	16,012	988,236	54%
12	Jornada Experimental Range	YONDER	Agricultural Research Service ARS	Other	183,210	118,721	1,187,421	65%
13	Lincoln NF	BEAK MOA	FS	FS	1,182,587	373,741	16,38,541	32%
14	Little Black Peak/Carrizozo Lava Flow WSA	ANCHO ATCAA	WSA		25,517	25,518	1,920,478	100%
15	Living Desert SP	TALON MOA/ Overlying ATCAAs	SP	State	1,015	1,015	1,585,099	100%
16	Mescalero Apache Indian Reservation	BEAK MOA	Indian Reservations BIA	BIA	459,600	327,004	1,639	71%
17	Oliver Lee Memorial SP	R-5103C and McGregor MOA	SP	State	640	598	553,644 and 789,221	93.4%
18	Organ Mountains WSA	R-5107B	WSA	BLM	8,189	8,189	2,667	.31%
19	Salinas Pueblo Missions National Monument	R-5103C/H	National Monument NPS	NPS	1,172	1,172	553,644	100%
20	San Andres National Wildlife Refuge	YONDER W	National Wildlife Refuge FWS	FWS	40,882	40,882	1,187,421	100%
21	Sevilleta National Wildlife Refuge	MESA WEST	National Wildlife Refuge FWS	FWS	22,4623	6,047	696,859	3%
22	Sierra de Las Canas WSA	MESA WEST	WSA		12,320	2,262	696,859	18%
23	Stallion WSA	MESA WEST	WSA		21,574	21,574	696,859	100%
24	Valley of Fires SP	ANCHO ATCAA	SP	State	552	552	1,920,477	100%
25	White Mountain Wilderness	BEAK MOA	Wilderness FS	FS	45,779	3,574	1,638,541	8%
26	White Sands National Monument	YONDER W	National Monument NPS	NPS	145,812	74,384	1,187,421	51%

**Key:**

ARS = Agricultural Research Service  
 ATCAA = Air Traffic Controlled Assigned Airspace  
 BIA = Bureau of Indian Affairs  
 BLM = Bureau of Land Management

FS = Forest Service  
 FWS = Fish and Wildlife Service  
 MOA = Military Operations Area  
 N/A = Not Applicable

NPS = National Park Service  
 SP = State Park  
 WSA = Wilderness Study Area



**Auxiliary and Emergency Landing Fields** – RIAC is located on 4,600 acres of land five miles south of the central business district of the City of Roswell in Chavez County, New Mexico. The airfield is operated by the City of Roswell and has three runways. Dorms located on RIAC and operated by a government contractor were previously inhabited only for short periods each year and currently have no long-term inhabitants. Former military housing residences are located north of the airfield. Some are occupied by employees of current activities (Novabus, Eastern New Mexico University, airliner storage, and Boeing test programs) located in former Air Force facilities. Approximately 2,479 acres and a population of 44 persons are located under the 65 dB or greater contours outside of RIAC. Figure 4-2 and Table 4-14 shows those SULMAs underlying the primary use airspace identified for F-16 training. The underlying land reflects the same mosaic of federal, state, and private ownership with a similar range of outdoor recreational activities. Land underlying the MOAs and MTRs is mostly managed by BLM, USFS, and the Mescalero Apache Tribe. Lands under the restricted airspace are predominantly owned by DoD.

The affected region includes several camping sites such as the Apache Ski Area, four national forests (Apache, Lincoln, Cibola, and Gila), four wilderness areas, and about thirteen WSAs, three National Wildlife Refuges (San Andres, Sevilleta, and Bosque del Apache), and four State Parks (Valley of Fires, Sumner Lake, Elephant Butte Lake, and Living Desert). The area includes two national monuments; the Salinas Pueblo Mission and White Sands National Monument, both of which are open daily. In 2009, annual visitation at these monuments was about 38,000 and 472,000, respectively (NPS 2010). Trinity Site on WSMR is where the first atomic bomb was detonated, which is opened twice annually for the public. Otero Mesa on McGregor Range (under R-5103) is popular for recreational wildlife viewing, enjoying solitude in a natural setting, and hunting.

Hot air ballooning, both as a recreational sport and for commercial tourism, is popular in New Mexico, particularly near the larger towns and cities. Paragliding is also popular in the region at select locations due to relatively predictable strong convective air currents.

Most of the recreational facilities and attractions in the Roswell area are either located in the urbanized area (such as swimming pools, New Mexico Military Institute Golf Course, Spring River Golf Course, Spring River Park, Hondo Park, Cahoon Park, and outdoor ball fields) or at some distance from RIAC. Bitter Lakes NWR provides wildlife viewing approximately nine miles to the northeast. Bottomless Lakes State Park is popular for camping, scuba diving, swimming, and fishing and is located approximately 14 miles to the southeast.

**Training Ranges** – Centennial Range, located within McGregor Range on Fort Bliss opened as a new tactical target complex in 2002 (Figure 4-2 and Section 2.2.6). Centennial is used by Holloman's assigned aircraft and other Air Force and DoD users for air-to-ground training. Approximately 87 percent of McGregor Range (more than 2,428 square kilometers [600,000 acres]) is public land administered by the BLM and co-managed by Fort Bliss and the BLM under a Memorandum of Agreement (MOA), per Congressional withdrawal of public lands for military use (Public Law [PL] 106-65). Holloman AFB and other Air Force and DoD users the Centennial Bombing Range, consisting of approximately 5,200 acres on Otero Mesa South of Highway 506 for air-to-ground target training (US Army 2010). The target complex is approximately two by four miles surrounded by a 12 by 15 mile safety area. The target complex



is closed to the public, but the safety area is only closed when the range is in use. The range includes simulated tactical targets such as an airfield, industrial complex, radar, missile, and gun sites, and artillery.

Non-military uses are allowed on McGregor Range provided they do not conflict with military uses or pose safety risks to the public. Fort Bliss and the BLM share responsibilities for access permits on both the withdrawn lands and the Army fee-owned lands. Public recreation (primarily hunting) takes place on McGregor Range (Army 2010). BLM manages an active grazing program on McGregor Range. Centennial Range occupies portions of two grazing units. Due to the safety hazards when the military users are performing air-to-ground bombing, the BLM and Air Force deconflict schedules to accommodate one another's activities. Through an agreement, the Air Force uses Centennial Range Monday through Friday from 7:00 AM to 1:00 PM and the BLM and ranchers have access to the areas surrounding Centennial Range in the afternoons and on weekends (Urick 2011).

Red Rio and Oscura Bombing Ranges are both located on WSMR. No construction is proposed for Red Rio and therefore it is not discussed further here but is addressed with regard to noise in Section 4.8.2.1.1. Oscura Range was previously a Class A manned range and thus has the improvements to support live drops and the ability to upgrade to this classification again. Both ranges are in restricted areas with no public access.

## **4.8.2 Environmental Consequences**

### **4.8.2.1 Proposed Action**

#### **4.8.2.1.1 Training Airspace**

F-16 flight activities would take place in existing airspace and no airspace modifications would be required. Training would be consistent with existing airspace operations and would comply with established range and land management plans. Safety guidelines and plans for existing range management and land use would be updated to address F-16 operations, as necessary. Noise exposure associated with F-16 operations within the airspace is discussed in Section 4.2.

Noise compatibility considerations may differ for various types of specially managed areas. Recreation areas for example, vary in the degree to which quiet is desirable and is necessary for a high quality recreation experience. How much of an area is devoted to developed and undeveloped recreation and the remoteness of the area are factors. Managers of wildlife areas and preserves frequently consider sensitivity of wildlife to noise, such as startle effects due to sudden changes in noise. Noise impacts to recreation and wildlife are addressed separately in the recreation section and in Section 4.6.2.1.

Using GIS techniques and noise modeling, each individual airspace unit was evaluated to determine if there would be land use impacts on SULMAs located wholly or partially underneath the airspace. For SULMAs that are partially under airspace, noise in areas adjacent to airspace generally tends to fall off dramatically, particularly since pilots typically fly closer to the center of the airspace. The airspace noise modeling reflects this by tapering the density of operations down toward the edge of a MOA. In other cases, a SULMA may be located underneath more than one airspace unit or in airspace units that overlap each other, for example a MOA that overlaps an MTR. The experience of MTR overflight is different from MOA overflight, single, fast, and low on an MTR, versus potentially repeated overflights,

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typically at higher altitudes in MOAs. A 3 dB increase in instantaneous noise level is considered to be the level at which humans can perceive differences in noise. Appendix C discusses noise characteristics and different noise metrics in detail.

Sonic boom noise within the airspace is quite different from subsonic noise although both can result in annoyance. If sonic booms occurred in airspace with SULMAs underneath, depending on the characteristics of the particular SULMA, it could startle or disturb public recreation users and/or wildlife. Changes in the total number of overflights that could affect recreation areas are addressed in the recreation discussion.

Most noise from air-to-ground use of ranges for projected F-16 munitions training is assumed to occur within the ranges themselves and would have negligible effects on SULMAs and other land uses outside the ranges. Table 4-15 displays subsonic and supersonic noise levels for the airspace units and SULMAs. Under the Proposed Action, subsonic noise levels would decrease or remain the same except at Red Rio, Oscura, and Centennial Ranges. There are no SULMAs intersecting these locations and therefore no subsonic noise impacts. Noise levels would be below 65 dB DNL<sub>mr</sub> in all other areas.

**Table 4-15. Subsonic (DNL<sub>mr</sub>) and Supersonic (CDNL) by Airspace and Associated SULMAs for Holloman AFB Airspace for Baseline and Proposed Action**

SULMA Number	SULMA Name	SULMA Acreage	% of SULMA under Airspace	Baseline	Proposed Action		Baseline	Proposed Action	
				DNL <sub>mr</sub>	DNL <sub>mr</sub>	Change	CDNL	CDNL	Change
<b>BEAK Military Operations Areas (MOAs)</b>									
6	Capitan Mountains Wilderness	35,698	100	<45	<45	<1	N/A	N/A	N/A
13	Lincoln National Forest	1,182,587	32	<45	<45	<1	N/A	N/A	N/A
16	Mescalero Apache Indian Reservation	459,600	71	<45	<45	<1	N/A	N/A	N/A
25	White Mountain Wilderness	45,779	8	<45	<45	<1	N/A	N/A	N/A
<b>R-5107 – Lava East/West</b>									
1	Antelope WSA	21,480	13	61	61	<1	59	52	(7)
12	Jornada Del Muerto WSA	29,558	54	61	61	<1	59	52	(7)
<b>R-5103 – McGregor</b>									
8	Culp Canyon WSA	11,071	100	55	55	<1	46	45	(1)
13	Lincoln National Forest	1,182,587	4	55	55	<1	46	45	(1)
<b>R-5107 – Mesa Low/High</b>									
19	Salinas Pueblo Missions National Monument	1,172	100	63	63	<1	59	52	(7)
21	Sevilleta National Wildlife Refuge	224,623	3	63	63	<1	59	52	(7)
22	Sierra de Las Canas WSA	12,320	18	63	63	<1	59	52	(7)
23	Stallion WSA	21,574	100	63	63	<1	59	52	(7)
<b>R-5107 – Red Rio</b>									
	Red Rio	0	0	46	58	12	47	48	1
<b>R-5107 – Oscura</b>									
	No Public Access	0	0	47	56	9	<45	47	>2
<b>R-5103 – Centennial Range</b>									
	No Public Access	0	0	45	52	>7	48	47	(1)
<b>TALON MOA</b>									
3	Avalon Reservoir	1,578	100	54	54	<1	N/A	N/A	N/A
4	Brantley Reservoir	4,362	100	54	54	<1	N/A	N/A	N/A

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SULMA Number	SULMA Name	SULMA Acreage	% of SULMA under Airspace	Baseline	Proposed Action		Baseline	Proposed Action	
				DNL <sub>mr</sub>	DNL <sub>mr</sub>	Change	CDNL	CDNL	Change
5	Brokeoff Mountains WSA	31,140	14	54	54	<1	N/A	N/A	N/A
13	Lincoln National Forest	1,182,587	17	54	54	<1	N/A	N/A	N/A
15	Living Desert State Park	1,015	100	54	54	<1	N/A	N/A	N/A
<b>R-5107 – Yonder</b>									
12	Jornada Experimental Range	183,210	65	62	62	<1	62	53	(9)
20	San Andres National Wildlife Refuge	40,882	100	62	62	<1	62	53	(9)
27	White Sands National Monument	145,812	51	62	62	<1	62	53	(9)

**Note:** Noise levels associated with MTRs would increase by less than 1 dB DNL for the Proposed Action compared to baseline conditions, a change that is imperceptible to humans. Therefore, MTR noise levels are not displayed.

**Key:**

dB = decibel

DNL = Day-Night Average Sound Level

MTR = Military Training Route

N/A = Not Applicable

SULMA = Special Use Land Managed Area

WSA = Wilderness Study Area

Supersonic noise measured as CDNL would decrease or stay the same beneath all airspace units except Red Rio and Oscura where it would increase by less than 2 dB (and would stay below 62 CDNL in all areas). Subsonic and supersonic noise levels would both either stay the same or be slightly reduced for SULMAs underneath McGregor airspace (i.e., Culp Canyon WSA and a portion of the Lincoln National Forest).

Federal agencies are generally mandated to manage wilderness areas for their wilderness qualities, for example, maintaining the natural setting and allowing minimal human disturbance and development. Wilderness management goals could be negatively affected by increased noise and disturbance associated with military overflights. The quality of recreation experiences in wilderness areas, recreation areas, and other specially managed lands could also be affected, depending upon the type of recreation and remoteness of the area.

**Recreation** – The methodology and issues considered for recreational resources underlying training airspace are provided in Appendix B. In general, the diverse range of active and passive recreational activities occurring throughout the region already coexists within a context of some exposure to military overflight.

Airspace units identified for F-16 training already support some military use and underlying areas are exposed to noise from this training. To some degree, these areas and recreational activities have coexisted for decades, with noise levels fluctuating, and often higher than current levels. Under the Proposed Action, increases in average noise levels are projected for areas with no public access (Table 4-16). The table does not include MTRs since the projected change in noise for all MTRs is less than 1 dB DNL, which is imperceptible to humans. The table does not identify WSAs and special sites managed by BLM for particular resource values under training airspace. Many of these specially managed areas support recreational purposes in the affected region. The overall impact on recreation areas from changes in noise levels is expected to be minimal.

**Table 4–16. Average Noise Levels by Airspace and Associated Recreational Use Areas**

Airspace*	Recreational Resource	Projected Average Noise Level(DNL <sub>mr</sub> )	
		Baseline	Proposed Action
Beak MOAs/ATCAA	Capitan Mountain Wilderness, White Mountain Wilderness, Ski Apache, Lincoln NF(FS)	<45	<45
Talon MOA/ATCAA	Avalon Reservoir, Brantley Reservoir and State Park (SP), Living Desert State Park, NF	54	54
R-5107 (Red Rio)	No public access	46	58
R-5107 (Oscura)	No public access	47	56
R-5107 Lava East/West	Trinity Site, MacDonald Ranch Limited Public Access	61	61
R-5107 Mesa Low/High	Salinas Pueblo Missions New Mexico, Sevilleta NWR	63	63
R-5107 Yonder	San Andres NWR, White Sands National Monument	62	62
R-5103 Centennial	Otero Mesa- no public access	<45	52
R-5103 McGregor	Otero Mesa, Lincoln NF	55	55

**Note:** \* The airspace column does not include MTRs because the projected change in noise for the Proposed Action is less than 1 dB DNL, which is imperceptible to humans. Does not include a list of Wilderness Study Areas (WSAs).

**Key:**

ATCAA = Air Traffic Control Assigned Airspace                      FS = Forrest Service                      NF = National Forrest  
DNL<sub>mr</sub> = Day–Night Average Sound Level (subsonic noise)      MOA = Military Operations Area      NWR = National Wildlife Refuge

The total number of annual sortie-operations by various aircraft utilizing the airspace units would change as shown inThe proposed F-16 aircraft would routinely fly training flights in one or more of the Holloman AFB airspace units. Activities in the training airspace are termed sortie-operations, which is defined as the use of one airspace unit by one aircraft. Each time a single aircraft flies in a different airspace unit, one sortie-operation is counted for that unit. Thus, a single aircraft can generate several sortie-operations in the course of a mission. Table 2–8 presents the current and projected sortie-operations in MOAs, ATCAAs, MTRs, and restricted airspace used by Holloman AFB-based aircraft

Table 2–8. Much of the area underneath is not open to public access; therefore, the potential for annoyance from single overflights (Section 4.2) would be moderate. The potential would still exist for isolated events to interfere with persons who are engaging in recreational activities throughout the affected area.

**4.8.2.1.2 Training Ranges**

**Centennial Range** – Improvements to Centennial Range are shown in Figure 2–5. Proposed improvements such as a Range Control Tower, cable installation, strafe pit, and upgrades to the firebreak would be compatible with existing range improvements (e.g., simulated tactical targets sites). Up to 20 acres of disturbance in previously disturbed areas and eight acres of new disturbance would not affect existing range uses. The target complex would remain closed to the public and the safety area would be closed only when the range is in use. Munitions use would generally occur toward the center of the range and, along with the presence of safety zones and remoteness of location, munitions noise would not be expected to affect off-range land uses adversely. The proposed operations and munitions would not change the extent of the surface danger zones, nor the hours when training takes place. The proposed improvement of the firebreak as an access road to the new range control tower would also benefit access for BLM and grazing operations in the surrounding grazing area.

Noise levels from munitions and training operations would be similar to current and recent levels and the approved military uses of Centennial Range. Levels of 62 CDNL and above

would extend out about 1.4 nm from the target areas, but would not extend outside the McGregor Range boundary.

**Red Rio and Oscura Ranges** – No construction is proposed for Red Rio. Improvements to Oscura Range are shown in Figure 2-4. Proposed improvements such as a strafe pit, concrete pad, relocation of munitions holding area, would be compatible with existing range improvements. Up to 12 acres of disturbance in previously disturbed areas would not affect existing range uses. Munitions use would generally occur toward the center of the ranges and, along with the presence of safety zones and remoteness of location, munitions noise would not be expected to affect off-range uses adversely.

#### **4.8.2.1.3 Auxiliary and Emergency Landing Fields**

There would be no construction at RIAC. Noise levels near RIAC would increase the area within the 65 dB DNL or greater noise contour from approximately 2,500 acres under baseline conditions to approximately 3,700 acres with the Proposed Action for an increase of about 1,230 acres (Table 4-3). The population affected by the projected noise increase would be approximately 62 persons as compared to an estimated four persons affected by the baseline noise levels.

Areas affected by increased noise levels consist primarily of agricultural land, although some relatively low-density residential areas also exist within the affected area. Persons residing and/or working in these areas would be more likely to become annoyed due to increased noise levels (Appendix B). There are no outdoor recreational amenities near the airfield affected by noise from projected use of RIAC for F-16 training operations.

Biggs AAF is proposed for use as an emergency airfield and use is expected to be unpredictable and infrequent; therefore, no further noise analysis has been conducted. No changes in land use or recreation are anticipated from implementation of the Proposed Action.

#### **4.8.2.1.4 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. Noise levels would be less due under the No Action Alternative due to fewer military flight-training operations than under baseline conditions.

### **4.9 Socioeconomics**

#### **4.9.1 Affected Environment**

The ROI for socioeconomic resources under the airspace to be used by the F-16 includes the counties, or the portions of the counties, under the airspace. The definition of resources and methodology for analysis is described in Appendix B. The F-16 would utilize the similar airspace as currently used by the F-22 mission at Holloman AFB. The airspace to be used under the Proposed Action is discussed in Chapter 2 and Section 4.1. The F-16s would use low-level MTRs on a regular basis; however, these airspace units represent only narrow corridors of airspace that overfly only small portions of remote counties. It is unlikely that socioeconomic impacts would result from the F-16 utilizing these MTRs. Since no new airspace or airspace

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modifications are proposed for the F-16 beddown, no additional population would be affected by training overflights. GIS and 2010 Census data at the block group level were used to estimate the population under the training airspace (Table 4-17).

**Table 4-17. Population under the F-16 Training Airspace at Holloman AFB**

Airspace Unit	Counties Overflowed	Affected Population (2010)	Total Population of Counties Overflowed (2010)	Share of Total Affected Counties Population
Beak A/B/C MOAs	Chaves	20,000	65,645	13.3%
	Lincoln		20,497	
	Otero		63,797	
Talon Low/High West/High East MOA	Chaves	45,492	65,645	24.8%
	Eddy		53,829	
	Otero		63,797	
R-5107B – Yonder and Lava	Doña Ana	25,982	209,233	8.0%
	Lincoln		20,497	
	Otero		63,797	
	Sierra		11,988	
	Socorro		17,866	
R-5107 C/H – Mesa	Socorro	1,532	17,866	4.5%
	Torrance		16,383	
R-5107 B/J – Red Rio	Lincoln	402	20,497	1.0%
	Socorro		17,866	
R-5107 B/D – Oscura	Lincoln	710	20,497	0.8%
	Otero		63,797	
R-5103 – McGregor and Centennial	Otero	3,367	63,797	5.3%

**Source:** USCB 2010a and 2010b as analyzed by Geographic Information System (GIS).

In addition to use of airspace and the ranges at WSMR and Fort Bliss, the F-16 aircraft at Holloman AFB would utilize RIAC as an auxiliary airfield to support specific training events. Biggs AAF is identified as an emergency divert field only; therefore, no further analysis is conducted on use of Biggs AAF. No construction or personnel changes at RIAC are proposed as part of this training as the F-16 aircraft would use the airfield assets by performing practice approaches. Socioeconomic analysis therefore, focuses on the potential impacts to population and housing due to noise generated by the F-16 training events at RIAC.

RIAC is located south of the city of Roswell in Chaves County, New Mexico. The potentially affected region is near the airfield and potentially extends into the City of Roswell. The 2010 population of the city of Roswell was 48,366 persons, which is an increase from the 2000 population of 45,293 (USCB 2010a). In 2010, there were 19,743 housing units in the city of Roswell, which is an increase of 457 housing units since 2000. Current flight operations from RIAC affect an estimated four persons with noise levels between 65 and 69 dB DNL.

#### **4.9.2 Environmental Consequences**

The ROI for socioeconomic resources under the airspace to be used by the F-16 includes the counties, or the portions of the counties, under the training airspace. The definition of resources and methodology for analysis is described in Appendix B.

**4.9.2.1 Proposed Action**

F-16 aircraft using the airspace units listed in Table 4-18 would be governed by the same regulations and guidelines as the aircraft currently using the airspace. Supersonic operations would only take place above the minimum altitudes designated for each airspace unit. Flight safety guidelines are discussed in Section 3.3 and 4.3. The population under the training airspace is currently exposed to military aircraft overflights and supersonic operations. The population density under each airspace unit is relatively low (ranges from less than one person per square mile up to 17 persons per square mile depending on the airspace units). The average population density in the State of New Mexico is 15 persons per square mile.

**Table 4-18. Populations of Concern under the Primary Use Airspace**

Airspace Unit	Counties Overflown	Affected Population (2010)	Minority	Percentage of Minority	Low-Income	Percentage of Low-Income	Youth	Percentage of Youth
Beak A/B/C MOA	Chaves	20,000	8,097	40.5%	3,461	17.3%	4,196	21.0%
	Lincoln							
	Otero							
Talon Low/High West/High East MOA	Chaves	45,492	21,606	47.5%	7,862	17.3%	15,636	34.4%
	Eddy							
	Otero							
R-5107B — Yonder and Lava Ranges	Doña Ana	25,982	12,596	48.5%	4,555	17.5%	6,431	24.7%
	Lincoln							
	Otero							
	Sierra							
	Socorro							
R-5107 C/H — Mesa Ranges	Socorro	1,532	918	59.9%	338	22.1%	388	25.4%
	Torrance							
R-5107 B/J — Red Rio Range	Lincoln	17,933	10,284	57.3%	4,892	27.3%	3,980	22.2%
	Socorro							
R-5107 B/D — Oscura Range	Lincoln	802	328	40.8%	138	17.2%	228	28.4%
	Otero							
R-5103 — McGregor and Centennial	Otero	1,661	1,024	61.6%	450	27.1%	446	26.9%

**Source:** USCB 2010a, 2010b, Calculated using a Geographic Information System (GIS).

Noise levels in the training airspace are discussed in detail in Section 4.2. Table 4-2 shows the primary use airspace units under the Proposed Action and the resulting change in noise levels from F-16 flight operations. EPA has identified noise levels below 55 dB DNL to be a level protective of the public health and welfare. This represents a threshold below which adverse noise impacts are generally not expected. The FAA and DoD have identified residential use as incompatible with annual noise levels above 65 dB DNL unless special measures are taken to reduce interior noise levels for affected residences. The noise levels under training airspace units outside of military lands is generally expected to remain approximately the same as under baseline conditions; therefore, no property values or other socioeconomic resources in the areas would experience detrimental impacts.

Table 4-3 presents the estimated number of residents near RIAC exposed to noise levels greater than 65 dB DNL under the Proposed Action and the No Action Alternative. As discussed in Appendix B, residential properties exposed to noise levels greater than 75 dB DNL are not considered compatible according to the FAA and DoD. No residents near RIAC would be



exposed to noise levels greater than 75 dB DNL under the Proposed Action. Residents exposed to noise levels between 65 and 74 dB DNL may experience annoyance at the higher noise levels; however, no significant adverse impacts are anticipated on economic decisions, property values, or other socioeconomic resources due to the noise levels near RIAC.

Construction activities at the Centennial and Oscura Ranges would contribute additional employment and income into Otero and Lincoln counties. The benefits of additional construction activities and demand for materials would be temporary, lasting only for the term of the construction.

#### **4.9.2.2 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. Therefore, socioeconomic conditions would remain the same or less than those described in Section 4.9.1.

### **4.10 Environmental Justice**

#### **4.10.1 Affected Environment**

The ROI for environmental justice and protection of children under the airspace to be used by the F-16 includes the counties or the portions of the counties directly overflowed by the identified training airspace. The definition of resources and methodology for analysis is described in Appendix B. Using GIS analysis with the 2010 Census at the tract level (and block group level when available), the number of minority, low-income, and persons under the age of 18 under the primary use airspace was estimated (Table 4-18). Portions of the Mescalero Apache Reservation are located beneath the Beak MOAs/overlying ATCAAs.

As part of the environmental justice analysis, the minority, low-income, and youth populations are presented in Table 4-19 for the communities of concern that are represented by the counties and states in which the airspace resides.

**Table 4-19. Communities of Comparison under the Holloman AFB  
Airspace and Auxiliary Airfields**

Affected County	Total Population (2010)	Minority		Poverty		Youth	
		Number	Percent	Number	Percent	Number	Percent
Chaves	65,645	36,844	56.1%	13,917	21.2%	18,383	28.0%
Doña Ana	209,233	146,241	69.9%	51,471	24.6%	55,858	26.7%
Eddy	53,829	25,718	47.8%	8,127	15.1%	14,035	26.1%
Lincoln	20,497	6,897	33.6%	2,829	13.8%	3,888	19.0%
Otero	63,797	30,081	47.2%	12,058	18.9%	15,961	25.0%
Sierra	11,988	3,783	31.6%	3,045	25.4%	1,928	16.1%
Socorro	17,866	11,155	62.4%	5,199	29.1%	4,270	23.9%
Torrance	16,383	7,210	44.0%	3,178	19.4%	3,951	24.1%
New Mexico	2,059,179	1,225,369	59.5%	371,858	18.1%	518,672	25.2%

Source: USCB 2010a

In addition to the populations of concern under the airspace, the populations of concern were evaluated near the auxiliary airfield RIAC located in Chaves County, New Mexico, which is the

community of comparison. The focus of the environmental justice analysis for the auxiliary airfields is the area potentially adversely impacted by noise contours. Figure 4-1 presents the noise contours for the auxiliary airfield. Information on the populations of concern and the estimated number of residents affected by noise levels greater than 65 dB DNL under baseline and Proposed Action are presented in Table 4-20. Baseline noise levels above 65 dB DNL at RIAC would affect an estimated four persons, of whom 25.0 percent are minority and 25.0 percent are low-income. Two schools near RIAC are currently affected by noise levels between 70 and 74 dB DNL under baseline conditions.

**Table 4-20. Populations of Concern Affected by Noise Levels  
Greater than 65 dB DNL at RIAC**

	Total Affected Population	Number (Percentage) Minority	Number (Percentage) Low-Income
Baseline	4	1 (25.0%)	1 (25.0%)
Proposed Action	62	37 (59.6%)	14 (22.2%)

#### **4.10.2 Environmental Consequences**

The ROI for environmental justice and protection of children under the airspace to be used by the F-16 includes the counties, or the portions of the counties, directly overflown by the training airspace. The definition of resources and methodology for analysis is described in Appendix B.

##### **4.10.2.1 Proposed Action**

Noise levels in the training airspace under the Proposed Action would not generate disproportionately high and adverse human health or environmental effects impacting minority populations, low-income populations, or children living under the airspace since the noise levels generated in these airspace units under all of the scenarios would not exceed 65 dB DNL. Portions of the Mescalero Apache Tribe are located under the Beak MOAs/overlying ATCAAs. Further discussion of this tribe is provided in Section 4.7.

Noise levels at RIAC due to Holloman AFB F-16 training activities would increase compared to the baseline conditions. The community of comparison for RIAC is Chaves County and information on the populations of concern in Chaves County is presented in Table 4-19. Under the Proposed Action, the minority and low-income populations affected by noise levels greater than 65 dB DNL are comparable to the minority and low-income populations in Chaves County (Table 4-20). Therefore, flight operations from the F-16 at RIAC would not present a disproportionately high and adverse impact to minority populations.

##### **4.10.2.2 No Action Alternative**

Under the No Action Alternative, no F-16 FTU would be based at Holloman AFB and the F-22 squadrons and seven of the existing 11 T-38As would depart by the fourth quarter of FY13 while other military tenants and users would continue to operate at current levels. There would be no adverse impacts to minority or low-income populations under the training airspace. Near RIAC, populations of concern as well as the schools and childcare centers would continue to be exposed to noise levels as described in Section 4.10.1.

## 5 Holloman AFB Cumulative Effects and Irreversible and Irretrievable Commitment of Resources

CEQ regulations stipulate that the cumulative effects analysis should consider the potential environmental impacts resulting from “the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person (federal or non-federal) undertakes such other actions” (40 CFR 1508.7). In this section, an effort has been made to identify past and present actions in the Holloman AFB region and those reasonably foreseeable actions that are in the planning phase or unfolding at this time. Actions that have a potential to interact with the Proposed Action at Holloman AFB are included in this cumulative analysis. This approach enables decision makers to have the most currently available information to evaluate the environmental consequences of the relocation of two squadrons of F-16 aircraft to Holloman AFB, use of RIAC as an auxiliary airfield, and to perform training in associated airspace.

Holloman AFB is an active military installation that is home to the 49 WG and supports the training of aircrews in the F-22 Raptor aircraft and pilot and sensor operator training in the MQ-1 (Predator) and MQ-9 (Reaper) RPAs that were previously referred to as unmanned aircraft systems. The installation also supports tenant units including the GAF Tactical Training Center that provides aircrew training in Tornado aircraft and the 46th Test Group test mission performing high-speed sled track testing, navigation and guidance system tests, radar signature measurements, and weapon systems flight-testing at facilities on Holloman AFB and WSMR. The installation undergoes changes in mission and in training requirements in response to defense policies, current threats, and tactical and technological advances. The base requires new construction, facility improvements, infrastructure upgrades, and other maintenance and/or repairs on a nearly continual basis. Although known construction and upgrades are a part of the analysis contained in this document, some future requirements cannot be predicted. Future NEPA analyses will be conducted, as necessary when new requirements surface.

### 5.1 Past, Present, and Reasonably Foreseeable Actions

In the early 1990s, the primary unit at Holloman AFB was the 49th Tactical Fighter Wing, which was redesignated as the 49 FW. The last of its F-15s (which had operated at Holloman AFB from the late 1970s) departed and were replaced by the F-117 stealth fighter. Between 1977 and 1991, the 479th Tactical Training Wing (479 TTW) provided initial pilot training for pilots assigned to fly the F-15 Eagle. For this mission, the 479 TTW utilized up to four squadrons of AT-38B Talon aircraft for the training missions. In July 1993, the GAF Tactical Training Center began training at Holloman AFB using Air Force-owned F-4 aircraft. By the late 1990s, the GAF transitioned to German-owned Tornado aircraft while still training with Tornados and a small number of QF-4 drones.

The most recent change at Holloman AFB was the replacement of the F-117 with the F-22 Raptor aircraft. The mission continues to use regional training airspace with more training at higher altitudes. A combination of regional MOAs, MTRs, and restricted airspace are utilized on a daily basis. With the assignment of the RPA training mission to Holloman AFB, the 49 FW was transformed into the 49 WG.

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Table 5-1 summarizes past, present, and reasonably foreseeable actions within the region which could interact with the current proposal at Holloman AFB. Table 5-1 briefly describes each identified action, names the proponent or jurisdiction of the action, the timeframe (e.g., past, present/ongoing, future), and indicates which resources potentially interact with the action. Recent past and ongoing military actions in the region were considered as part of the baseline or existing conditions in the region surrounding Holloman AFB. In addition to these actions, Holloman AFB will continue to implement their General Plan and make improvements to the physical content on base. This includes a new parallel taxiway to the north of the prospective F-16 development area on the west ramp, which will disturb ten acres. In addition, a crash/fire/rescue station is planned to be located directly west of the proposed F-16 area.

**Table 5-1. Past, Present, and Future Actions at Holloman AFB and Associated Region**

Action	Proponent /Location	Timeframe	Description	Resource Interaction
<b>Military Actions</b>				
F-35A Training Environmental Impact (EIS) Statement	Air Education and Training Command (AETC), Holloman Air Force Base (AFB), Luke AFB	Present, Future	The AETC proposes to beddown an F-35A training mission at one or more of four locations including Boise Air Terminal Air Guard Station, Idaho; Holloman AFB, New Mexico; Luke AFB, Arizona; or Tucson International Airport Air Guard Station, Arizona. Luke AFB is the preferred alternative with 72 F-35A aircraft.	Airspace Management and Use, Noise, Air Quality, Socioeconomics, Infrastructure, Transportation, Hazardous Materials and Waste
Environmental Assessment (EA) for the MQ-1 Predator and MQ-9 Reaper Unmanned Aircraft System Second Formal Training Unit Beddown	Air Combat Command (ACC), Holloman AFB	Ongoing, Future	Beddown of multiple squadrons of Unmanned Aircraft Systems (UAS) now known as Remotely Piloted Aircraft (RPA) (38 total aircraft and approximately 600 personnel) at Holloman AFB with approximately 2,900 sorties per year using the White Sands Missile Range (WSMR) R-5107, R-5109, and R-5011 airspaces.	Considered in baseline conditions for noise analysis. Airspace Management and Use, Air Quality, Biological Resources, Cultural Resources, Transportation
Programmatic EA for Joint Training Exercise (JTX) Roving Sands	Headquarters, United States Army Forces Command/Joint Services, South Central New Mexico (NM)	Past, future	Joint Air Force and Army large force exercise uses military training airspace and surface areas throughout south central New Mexico. The exercise involves ground and airspace use at WSMR and Fort Bliss, New Mexico and has included Holloman AFB-managed airspace and aircraft in the past. A variety of aircraft, including helicopters, may use restricted and military airspace during such an exercise. The exercise has been less frequent in recent years and its future requirements and size are unknown. Areas of operation and activities during JTX Roving Sands could overlap with airspace for F-35A training at Holloman AFB.	Airspace Management and Use, Noise, Air Quality, Land Use and Recreation in training airspace and auxiliary airfields
EA 49th Material Maintenance Group BEAR Base Improvements, Holloman AFB	Holloman AFB	Past	Construction and development of facilities around airfield (using approximately 92 acres of land) increased impervious surface on Holloman AFB.	Represented in baseline conditions at the installation
Deactivation of 20th Fighter Squadron at Holloman AFB	Holloman AFB	Past	Squadron has been deactivated, with reduction in AT-38B aircraft and flight operations.	Represented in baseline conditions at the installation
EA Wing Infrastructure Development Outlook Projects at Holloman AFB	ACC, Holloman AFB	Past and present	Construction and physical improvements projects on Holloman AFB (completed), increased impervious surface on Holloman AFB.	Biological Resources, Infrastructure, Land Use and Recreation, Soil Resources, Water Resources
EA Transforming the 49 FW's Combat Capability	ACC, Holloman AFB	Past and present	Transformation of the 49 FW via the replacement of the F-117A (scheduled for retirement by the Air Force) and supporting T-38A aircraft with the beddown of two squadrons of F-22 aircraft. The Proposed Action required the renovation of existing facilities and the construction of new facilities to support F-22 activities. Much, if not all, of the airspace utilized for F-22 training could potentially be used for F-35A training.	Ongoing mission evaluated in F-35A alternatives and represented in baseline conditions
EA Repair Bonito Pipeline, Otero and Lincoln Counties, NM	Holloman AFB	Past, ongoing	Repairs to this 70-mile pipeline allowed Holloman AFB to utilize water from Bonito Lake, to use its water rights, and to fulfill a portion of its potable water supply from this source.	Water resources, infrastructure

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Action	Proponent /Location	Timeframe	Description	Resource Interaction
Runway improvements to Stallion Army Airfield (AAF) on White Sands Missile Range (WSMR)	Holloman AFB	Long-range future	Runway replacement and extension to the existing Stallion AAF 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, Infrastructure, Physical Resources, Hazardous Materials and Waste
Other planned Military Construction (MILCON) projects on Holloman AFB	ACC, Holloman AFB	Ongoing	Construction of a new parallel taxiway for runway 07/25 near the west ramp. Estimated ten acres of disturbed area to be generated.	Physical Resources, Safety, Water Resources
Air Force Special Operations Command (AFSOC) Assets Beddown at Cannon AFB, NM EIS	AFSOC, Cannon AFB	Past, ongoing	Sixty F-16 jets previously assigned to Cannon AFB replaced by AFSOC turboprop aircraft (C-130s with varying missions, CV-22s, Predator UAS, and additional aircraft). The current flight operations at Cannon AFB would be reduced approximately 40 percent. Includes operations in the Pecos MOA.	Airspace Management and Use, Biological Resources, Noise, Land Use and Recreation
Fort Bliss, Texas (TX) and NM, Mission and Master Plan Supplemental Programmatic EIS	United States Army Air Defense Artillery Center and Fort Bliss	Ongoing, future	Mission and Master Plan Supplemental EIS included a land use change in the main cantonment area to support units assigned to Fort Bliss under BRAC and in the Fort Bliss Training Complex to support construction of live fire ranges and for other training purposes. Approved the use of 352,000 acres in the Tularosa Basin portion of McGregor Range for off-road maneuver training. Expanded training missions would use of R-5103 airspace and approved development of new air-to-ground Centennial Range. Associated changes in personnel represent significant increases in population in the El Paso metropolitan area.	Air Quality, Cultural Resources, Land Use and Recreation, Noise, Water Resources
New Mexico Training Range Initiative (NMTRI) Final EIS	AFSOC	Past, ongoing	NMTRI modified configuration of existing airspace creating new airspace that authorized supersonic flight above 10,000 feet Mean Sea Level (MSL) within the airspace (or about 5,000 to 6,000 feet Above Ground Level [AGL]), and expanded the use of defensive countermeasures (chaff and flares) in new/modified airspace. Expanded size, operational altitudes, and usefulness of the Pecos MOAs and associated ATCAAs.	Airspace Management and Use, Noise
Army Growth and Force Structure Realignment EIS	United States Army Fort Bliss	Future	Expanded ground training for Stryker wheeled brigade and infantry brigade operations on Fort Bliss and McGregor Range including associated training operations and field training sites with new sites in Sacramento Mountains and Otero Mesa on McGregor Range and development within main cantonment. Land use changes allow for dismounted training in the northern part of the range in the Sacramento Mountains. Expansion of range camps and new temporary contingency operating locations throughout Tularosa Basin portions of Fort Bliss. Additional increases in soldiers and dependants at Fort Bliss residing on post and in El Paso area. Potential new railroad aligns US 54 linking Fort Bliss to range camps.	Air Quality, Land Use, Noise, Cultural Resources, Biological Resources, Physical Resources.
Final EIS for Development and Implementation of Range Wide Mission and Major Capabilities at White Sands Missile Range (WSMR), NM	United States Army, WSMR	Ongoing, future	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, Safety, Soil Resources, Transportation, Water Resources
<b>Nonmilitary Federal</b>				
Resource Management Plan Amendment (RMPA) and EIS for McGregor Range at Fort Bliss	Bureau of Land Management (BLM) Las Cruces Field Office	Ongoing, Future	RMPA and EIS to address the management of public land within the boundaries of McGregor Range in southern Otero County, New Mexico.	Biological Resources, Land Use and Recreation, Soil Resources, Water Resources
Plan revision and RMP/EIS for areas of Otero, Sierra, and Doña Ana counties in NM	BLM Las Cruces Field Office	Ongoing, Future	Revision of its 1986 White Sands Resource Management Plan, an amendment to its 1993 Mimbres Resource Management Plan, and EIS for management of public lands in tri-county area	Biological Resources, Land Use and Recreation, Water Resources

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Action	Proponent /Location	Timeframe	Description	Resource Interaction
Final Rule for Northern Aplomado Falcon in New Mexico	United States Fish and Wildlife Service	Ongoing	The northern Aplomado falcon is designated as endangered in New Mexico and could occur within the airspace to be used F-16 training. A final rule was published in the <i>Federal Register</i> on July 26, 2006 establishing a nonessential experimental population in Arizona and New Mexico under Section 10(j) of the Endangered Species Act (ESA). Reintroduction of the falcon (initiated in July 2007) is jointly managed by the State of New Mexico, United States Fish and Wildlife Service (USFWS), BLM, Department of Defense (DoD), and other private agencies.	Biological resources – represented in baseline and ongoing management
<b>Non-Federal State, Local</b>				
Alamogordo Desalination Plant	City of Alamogordo	Future	Alamogordo Regional Water Supply Project is a proposed desalination proposal to treat new water sources being developed for the city. The proposal would treat brackish water drawn from a proposed well field using water from the Tularosa basin aquifer.	Water Resources
Spaceport America	New Mexico State Land Office	Present, future	The New Mexico State Land Office has signed an agreement for the development of Spaceport America on 15,000 acres of state trust lands near Upham, New Mexico. The land is approximately 40 miles west of Holloman AFB and 40 miles north of Las Cruces, New Mexico under R-5111. Construction began in 2009 with completion scheduled for December 2010. Flight operations associated with the Spaceport could potentially overlap with portions of restricted airspace proposed for F-35A training.	Airspace Management and Use

## 5.2 Cumulative Impacts

The following analysis considers how the impacts of the actions in Table 5–1 might affect, or be affected by, the Proposed Action at Holloman AFB. The analysis considers whether such a relationship would result in potentially significant impacts not identified when the Proposed Action is considered alone. The actions with the greatest potential to change conditions affecting the regional environment are the proposed F-35 beddown, the beddown of the RPA units at Holloman AFB, Army Growth Structure and Realignment at Fort Bliss (that could increase dismounted training on McGregor Range north of Highway 506, off-road use of training areas in the Tularosa Basin), increased test and training on White Sands Missile Range (that could use R-5107), and runway improvements to Stallion Army Airfield. Table 5–2 summarizes the cumulative effects of these actions by resource.

**Table 5–2. Cumulative Impacts of the Proposed Action**

Resource, EA Section	Holloman AFB and Environs	Training Airspace and Ranges
Airspace Management and Use	50 to 60 percent increase in operations at the Holloman airfield should be within the capacity of the system that has supported multiple units historically.	Increased use of Talon and Beak Military Operations Areas (MOAs)/Air Traffic Controlled Assigned Airspace (ATCAA). Cumulative levels for R-5107 could warrant an independent capacity analysis. Increased used of R-5103 and Centennial Range for multiple air and ground-based users.
Noise	Cumulative operations not expected to increase noise levels at the airfield significantly with the F-22 mission leaving.	Noise impacts on some isolated rural residents and areas underlying military airspace, potentially significant cumulative impacts on residents around Roswell International Air Center (RIAC)
Safety	Risks of mishaps and bird strikes from increased operations at the airfield are low and manageable through adherence to existing procedures.	Risks of mishaps and bird strikes from increased operations in training airspace are low and manageable through adherence to existing procedures.
Air Quality	Increase in air emissions from additional air operations and construction that would require analysis based on locale of impact. Significant impacts not expected.	Increase in air emissions from additional air operations and construction that would require analysis based on locale of impact. Significant impacts not expected.

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Resource, EA Section	Holloman AFB and Environs	Training Airspace and Ranges
Physical Resources	Increased construction at Holloman AFB, but impacts to soils and water resources managed using sound management practices and compliance with permits.	The F-16 proposal would not overlap with other actions on the surface to cause a cumulative impact on soils or surface water resources. Expansion of the airfield at Stallion requires further evaluation.
Biological Resources	Additional construction on base with no impact on federal listed species, and follow procedures for avoiding or moving burrowing owls.	Increased air operations, primarily on Military Training Routes (MTRs) over Mexican Spotted Owl (MSO) areas would not be dissimilar to normal use of these routes.
Cultural Resources	Construction on base would need to undergo coordination with State Historic Preservation Office (SHPO) on specific buildings and areas.	Coordination with SHPO may be required for specific proposals with activities on the ground; otherwise, air operations are not likely to cause impacts.
Land Use and Recreation	Noise from aircraft operations are not expected to cause significant impacts with departure of F-22s, but may have localized moderate impact on White Sands National Monument visitor areas.	Increase in noise would primarily affect military lands and could have a moderate impact on joint-use public access uses (recreation primarily). Increase in noise under MOAs and MTRs could require selected avoidances and may cause occasional moderate impacts on individual recreational experiences.
Socioeconomics	May result in increases in population in southern New Mexico, could have some positive impact on local economies, but require additional investment in community services (schools, law enforcement).	May result in increases in population in southern New Mexico, could have some positive impact on local economies, but require additional investment in community services (schools, law enforcement).
Environmental Justice (EJ)	EJ impacts depend on location of specific action. Could have impact on Alamogordo populations if schools affected by additional students.	Impacts on EJ population in and around RIAC, otherwise, no overall effects likely. Specific locations may have impacts from increased military operations in the region, with some positive effects from economic stimulus.
Infrastructure	Use of water may impact local and regional water systems from population increase. Energy resources less likely to be impacted.	Use of water may impact local and water systems from population increase. Energy resources less likely to be impacted.
Transportation	May cause local impacts on roads and traffic, especially near military installations and access points. Could manage through widening roads at critical locations.	May cause local impacts on roads and traffic, especially near military installations and access points. Could manage through widening roads at critical locations.
Hazardous Materials and Waste	Holloman AFB able to absorb additional quantities as a large quantity generator. Procedures and safety practices in place to handle hazardous materials and wastes.	Cumulative impacts of hazardous materials and wastes not generally an issue for areas underlying airspace. Munitions residues at bombing ranges not expected to increase significantly over current and historic levels.

### 5.2.1 Holloman AFB

Most of the recent construction on Holloman AFB is already reflected in baseline conditions. F-16 development would add to total impervious surface on the base, particularly around the airfield. Any F-16 construction (including a new parallel taxiway and fire station) could overlap with ongoing implementation of programmed development projects at Holloman AFB. Sound engineering and management practices would minimize impacts of construction. Additional impervious surface at the airfield would require installation of appropriate stormwater system improvements that integrate with existing systems and constructed wetlands to the south of the airfield. Additional personnel (whether residing on base or in surrounding communities) would increase water consumption. Water supply is a growing issue in this arid area and prompted Alamogordo's proposal for a desalination plant. Increased demand for potable water and the balance of surface and ground water sources is a growing concern for this region. Alamogordo's current desalination proposal and Holloman AFB's improvements to the Bonito pipeline are part of continuing efforts to meet demands well into the future.

### 5.2.2 Auxiliary Airfield

RIAC is used infrequently to support Joint Training Exercise (JTX), which in the past was



known as Roving Sands. Combined operations of the F-16 training operations, civilian and commercial operations, and temporary staging support for any future major exercise could have short-term impacts at this site. This could cause some elevated noise levels surrounding the airfield and possibly extending to the outskirts of the City of Roswell residential areas. Responsibilities for ATC would spike if all these activities take place concurrently. Since JTX generally involves substantial on-the-ground planning and coordination, appropriate procedures and additional staff could be added to ease any potential workload and safety concerns (ground or air) during periods of peak operations.

### **5.2.3 Training Airspace**

Training airspace identified for the F-16 mission has supported military missions for units at Holloman AFB, Cannon AFB, WSMR and Fort Bliss, joint exercises, and transient military users for decades. The combination of users has resulted in variations in the utilization of MOAs, MTRs, and restricted airspace over time. The F-16 training relocation, in combination with ongoing and evolving operations at regional installations, could cause higher than usual noise levels in some underlying areas. This could cumulatively affect recreational sites, sensitive land uses, and isolated homesteads throughout the region.

Increasing projections for all these installations, if realized, could result in increasingly complex scheduling and airspace management challenges. Cumulative use of R-5107 for WSMR testing purposes (with expanding safety volumes for directed energy weapons tests), projected increase in use of restricted airspace for RPAs, and the increasing use for training purposes would place considerable pressure on scheduling and airspace management to maintain safe operating conditions. Releasing restricted airspace back to FAA for civilian transit would become less frequent. To address this trend, more centralized scheduling and ATC for the Fort Bliss, Holloman AFB, Cannon AFB, and WSMR airspace complex is under consideration.

R-5103 overlying McGregor and Centennial Range would experience increased use for the F-16 proposal. Additional surface activities for infantry training and placement of new field training sites would add to the overall level of activity affecting Otero Mesa. This area is highly valued for its natural setting and unique grassland habitat. More constrained public access to this area, coupled with higher noise levels, could degrade the qualities of this area that have regional ecological and recreational importance.

## **5.3 Irreversible and Irrecoverable Commitment of Resources**

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the impacts that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable timeframe. Irrecoverable resource commitments involve the loss in value of an affected resource that cannot be restored due to the action.

For the Proposed Action at Holloman AFB, most resource commitments are neither irreversible nor irretrievable. Most impacts are short-term and temporary such as air emissions from construction, or longer lasting, but negligible (e.g., public service increases). Increases in sonic booms would be negligible and the duration of individual booms would be extremely brief. If

the F-16 training mission were relocated to Holloman AFB, some land on the west side of the airfield would be disturbed. Much of this land was previously disturbed and heavily influenced by airfield development. Construction and renovation of base facilities would require the consumption of limited amounts of material typically associated with interior renovations (wiring, no heating, windows, and drywall) and exterior construction (concrete, steel, sand, and brick). An unknown amount of energy to conduct renovation, construction, and operation of these facilities would be expended and irreversibly lost.

Training operations would continue and involve consumption of nonrenewable resources such as gasoline used in vehicles and jet fuel used in aircraft. Use of training ordnance would involve continued commitment of defensive countermeasures. None of these activities would be expected to decrease the availability of minerals or petroleum resources. Personal vehicle use by the personnel continuing to support the existing missions would consume fuel, oil, and lubricants. The amount of these materials used would increase slightly; however, this additional use is not expected to affect the availability of the resources significantly.

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## Acronyms and Abbreviations

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## 8 Acronyms and Abbreviations

°F	degrees Fahrenheit
49 TTW	49th Tactical Training Wing
49 WG	49th Wing
AAF	Army Airfield
ACC	Air Combat Command
ACM	Asbestos-Containing Material
ACOE	Army Corps of Engineers
AFB	Air Force Base
AFH	Air Force Handbook
AFI	Air Force Instruction
AFOSH	Air Force Occupational and Environmental Safety, Fire Protection, & Health
AFSOC	Air Force Special Operations Command
AGE	Aerospace Ground Equipment
AGL	Above Ground Level
AHAS	Avian Hazard Advisory System
AICUZ	Air Installation Compatible Use Zones
AMU	Aircraft Maintenance Unit
ANSI	American National Standards Institute
APE	Area of Potential Effect
APZ	Accident Potential Zone
AQB	Air Quality Bureau
AQRV	Air Quality Related Values
ARTCC	Air Route Traffic Control Center
ASA	Acoustical Society of America
ASEL	A-Weighted Sound Exposure Level
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
AT/FP	Anti-Terrorism/Force Protection
BACT	Best Available Control Technology
BAI	Backup Assigned Inventory
BAM	Bird Avoidance Model
BASH	Bird-Aircraft Strike Hazard
BLM	Bureau of Land Management
BWWSA	Boles Well Water System Annex
CAA	Clean Air Act
CAS	Close Air Support
CDNL	C-Weighted Day-Night Average Sound Level (supersonic noise)
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations

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CO	Carbon Monoxide
CO <sub>2e</sub>	Carbon Dioxide equivalent
CSEL	C-Weighted Sound Exposure Level
CWA	Clean Water Act
CZ	Clear Zone
DEAD	Destruction of Enemy Air Defenses
dB	decibel
DDESB	Defense Department Explosives Safety Board
DLR	German Aerospace Center
DNL	Day-Night Average Sound Level
DNL <sub>mr</sub>	Day-Night Average Sound Level (subsonic noise)
DoD	Department of Defense
DPS	Distinct Population Segment
EA	Environmental Assessment
EIB	Environmental Improvement Board
EO	Executive Order
EPA	Environmental Protection Agency
EPIA	El Paso International Airport
ERP	Environmental Restoration Program
ESA	Endangered Species Act
ESRI	Environmental Systems Research Institute
FAA	Federal Aviation Administration
FICAN	Federal Interagency Committee on Aviation Urban Noise
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise
FL	Flight Level
FY	Fiscal Year
GAF	German Air Force
GCRMC	Gerald Champion Regional Medical Center
GHG	Greenhouse Gas
GIS	Geographic Information System
GOV	Government-Owned Vehicle
GWP	Global Warming Potential
H-70	Hydrazine
HAP	High Accident Potential
HUD	U.S. Department of Housing and Urban Development
Hz	Hertz
IAP	Initial Accumulation Point
ICRMP	Integrated Cultural Resources Management Plan
IFR	Instrument Flight Rules
IICEP	Intergovernmental Coordination for Environmental Planning
IMPLAN	Impact Analysis for Planning

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INRMP	Integrated Natural Resources Management Plan
IR	Instrument Route
IRSS	Improved Strafe Scoring System
ISR	Intelligence, Surveillance, and Reconnaissance
JTX	Joint Training Exercise
JLUS	Joint Land Use Study
kWh	kiloWatt-hour
LAAR	Light Attack Armed Reconnaissance Aircraft
LBP	Lead-Based Paint
$L_{eq}$	Equivalent Sound Level
$L_{eq-SD}$	Equivalent Sound Level during a typical School Day
$L_{eq-1hr(SD)}$	Equivalent Sound Level over a single hour during the School Day
MAD	Managed Areas Database
MBTA	Migratory Bird Treaty Act
MG	Million Gallons
MGD	Million Gallons per Day
$mg/m^3$	milligrams per cubic meter
MILCON	Military Construction
MJU	Multi Jettison Unit
MLRA	Major Land Resource Area
mm	millimeter
MMCF	Million Cubic Feet
MOA	Military Operations Area
MOU	Memorandum of Understanding
MR_NMAP	Military Operations Area-Range NOISEMAP
MSA	Munitions Storage Area
MSD	Municipal School District
MSL	Mean Sea Level
MSO	Mexican Spotted Owl
MTR	Military Training Route
NAAQS	National Ambient Air Quality Standards
NA	Number-of-events Above
NAL	Number-of-events Above a threshold Level
NEPA	National Environmental Policy Act
NEXRAD	Next Generation Radar
NHPA	National Historic Preservation Act
NIOSH	National Institute of Occupational Safety and Health
NIPTS	Noise-Induced Permanent Threshold Shift
NLR	Noise Level Reduction
nm	nautical miles
NM	New Mexico
NMAAQs	New Mexico Ambient Air Quality Standards

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NMAC	New Mexico Administrative Code
NMCRIS	New Mexico Cultural Resources Information System
NMDGF	New Mexico Department of Game and Fish
NMED	New Mexico Environment Department
NMRPTC	New Mexico Rare Plant Technical Council
NOTAM	Notice to Airmen
NMTRI	New Mexico Training Range Initiative
NO <sub>x</sub>	Nitrogen Oxide
NO <sub>2</sub>	Nitrogen Dioxide
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Center
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
O <sub>3</sub>	ozone
O&M	Operations and Maintenance
OCFFA	Otero County Fire Fighters Association
OSHA	Occupational Safety and Health Administration
PAI	Primary Assigned Inventory
Pb	lead
PCR	Program Change Request
PHL	Potential Hearing Loss
PL	Public Law
PM <sub>2.5</sub>	Particulate Matter less than 2.5 microns in diameter
PM <sub>10</sub>	Particulate Matter less than 10 microns in diameter
ppm	parts per million
PSD	Prevention of Significant Deterioration
psf	pounds square foot
POV	Personally Owned Vehicle
Q-D	Quantity-Distance
RANM	Realtors Association of New Mexico
RAMS	Radar Target Scatter Advanced Measurement Site
RATSCAT	Radar Target Scatter
RCRA	Resource Conservation and Recovery Act
RIAC	Roswell International Air Center
ROI	Region of Influence
RPA	Remotely Piloted Aircraft
SDWA	Safe Drinking Water Act
SEAD	Suppression of Enemy Air Defenses
SEL	Sound Exposure Level
SF	Square Feet
SO <sub>2</sub>	Sulfur Dioxide

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SHPO	State Historic Preservation Office
SPCCP	Spell Prevention, Control, and Countermeasures Plan
SUA	Special Use Airspace
SULMA	Special Use Land Managed Area
SWFL	Southwestern Willow Flycatcher
SWMU	Solid Waste Management Units
SWPPP	Stormwater Pollution Prevention Plan
TCP	Traditional Cultural Property
TSP	Total Suspended Particulate
TFW	Tactical Fighter Wing
UFC	Unified Facilities Criteria
µg/m <sup>3</sup>	micrograms per cubic meter
U.S.C.	United States Code
<i>USEPA Guidelines</i>	<i>USEPA Guidelines for Noise Impact Analysis</i>
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
VFR	Visual Flight Rules
VOC	Volatile Organic Compounds
VR	Visual Routes
WDZ	Weapons Danger Zone
WSA	Wilderness Study Areas
WSEP	Weapons System Evaluation Program
WSMR	White Sands Missile Range
WWTP	Waste Water Treatment Plan

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## Appendix A

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## Appendix A Public and Agency Outreach and Correspondence

### A.1 Intergovernmental Coordination for Environmental Planning (IICEP) Mailing List

The IICEP letters were mailed to the following recipients.

#### Federal

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**Federal**

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White Sands National Monument  
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New Mexico Department of Game and Fish  
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Environment and Safety Directorate  
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IMWE-BLS-PWE  
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Mayor, City of Carlsbad  
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Mayor, Village of Corona  
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Mayor, City of Ruidoso  
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The Honorable Del Jurney  
Mayor, City of Roswell  
425 North Richardson Avenue  
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Town of Carrizozo  
500 9th Street  
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The Honorable Tom Armstrong  
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Mr. Jason Baldwin, Director  
Cloudcroft Chamber of Commerce  
PO Box 1290  
Cloudcroft, NM 88317

Mr. Brad Treptow, Executive Director  
Ruidoso Chamber of Commerce  
720 Suddreth Drive  
Ruidoso, NM 88345

**Local**

Mr. Ed Brabson, Chair  
Committee of 50  
1301 North White Sands Blvd.  
Alamogordo, NM 88310

Mr. Gill M. Sorg, President  
Mesilla Valley Audubon Society  
PO Box 1645  
Las Cruces, NM 88004

Timberon Development Council  
PO Box 417  
Timberon, NM 88350

**A.2 Sample IICEP Letters**

The following pages provide sample IICEP letters to the Bureau of Indian Affairs, United States Fish and Wildlife Service, a generic letter for delivery to elected officials, letters to the various tribes, and to the State Historic Preservation Office (SHPO).

Environmental Assessment  
July 2011

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DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS 49TH WING (ACC)  
HOLLOMAN AIR FORCE BASE, NEW MEXICO

JAN 10 2011

Colonel David A. Krumm  
Commander, 49th Wing  
490 First Street, Suite 1700  
Holloman AFB NM 88330-8277

Bureau of Indian Affairs, Southwest Region  
Attn: Superintendent  
Mescalero Agency  
P O Box 189  
Mescalero NM 88340

Dear Superintendent

The United States Air Force Air Education Training Command (AETC) is in the initial stages of preparing an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) to assess the potential environmental impacts of relocating an F-16 Formal Training Unit (FTU) to Holloman Air Force Base (AFB), New Mexico. The FTU would be comprised of two squadrons of F-16 C/D aircraft.

The EA will analyze potential environmental effects associated with changes in personnel, construction of facilities and training activities in existing military airspace and ranges to support the proposed beddown. The EA will address the potential effects at Holloman AFB, the training airspace and the use of Roswell International Air Center (RIAC) in Roswell, New Mexico as an auxiliary airfield. Please refer to the attachment for a map of Holloman AFB, the training airspace and RIAC. A "No Action" alternative will also be examined that does not relocate F-16 aircraft to Holloman AFB. Airspace training would include the use of defensive countermeasures such as flares and chaff, supersonic flight in authorized airspace and the use of inert or live munitions at approved military ranges. F-16 training would occur within the current military airspace and ranges of Holloman AFB. We anticipate F-16 environmental effects will be similar to that of the F-22.

The Air Force intends to coordinate public involvement for the purpose of Section 106 review under the National Historic Preservation Act (NHPA) with public involvement in the EA prepared under the Environmental Impact Analysis process. Correspondence with public, agency and Native American stakeholders during the process will help identify the full range of reasonable alternatives, potential impacts and key issues to be considered in the environmental impact analysis process.

To ensure the Air Force has sufficient time to consider public and agency input in the preparation of the draft EA, we request comments be submitted to HQ AETC/A7C, Attn: Mr. David Martin, AETC NEPA Program Manager, 266 F Street West, Randolph AFB, Texas 78150-4319 within 30 days of receiving this letter.

*Global Power for America*

**Environmental Assessment**  
**July 2011**

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If you have specific questions about the proposal, we would like to hear from you. Please contact Mr. David Martin at (210) 652-1961. General questions may be directed to Mr. Andrew Gomolak at (575) 572-3931. Thank you for your assistance in this matter.

Sincerely

  
DAVID A. KRUMM  
Colonel, USAF  
Commander

2 Attachments:

1. Proposed Construction /Remodeling
2. Airspace Proposed Use by F-16 FTU



Environmental Assessment  
July 2011

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DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS 49TH WING (ACC)  
HOLLOMAN AIR FORCE BASE, NEW MEXICO

JAN 10 2011

Colonel David A. Krumm  
Commander, 49th Wing  
490 First Street, Suite 1700  
Holloman AFB NM 88330-8277

Mr. Steve Helfert  
DoD Liaison  
United States Fish & Wildlife Service  
500 Gold Avenue, SW  
Albuquerque NM 87102

Dear Mr. Helfert

The United States Air Force Air Education Training Command (AETC) is in the initial stages of preparing an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) to assess the potential environmental impacts of relocating an F-16 Formal Training Unit (FTU) to Holloman Air Force Base (AFB), New Mexico. The FTU would be comprised of two squadrons of F-16 C/D aircraft.

The EA will analyze potential environmental effects associated with changes in personnel, construction of facilities and training activities in existing military airspace and ranges to support the proposed beddown. The EA will address the potential effects at Holloman AFB, the training airspace and the use of Roswell International Air Center (RIAC) in Roswell, New Mexico as an auxiliary airfield. Please refer to the attachment for a map of Holloman AFB, the training airspace and RIAC. A "No Action" alternative will also be examined that does not relocate F-16 aircraft to Holloman AFB. Airspace training would include the use of defensive countermeasures such as flares and chaff, supersonic flight in authorized airspace and the use of inert or live munitions at approved military ranges. F-16 training would occur within the current military airspace and ranges of Holloman AFB. We anticipate F-16 environmental effects will be similar to that of the F-22.

Pursuant to the analysis of the proposed action and in compliance with the Endangered Species Act (ESA), we are requesting information regarding federally listed threatened, endangered, candidate and proposed-to-be-listed species that occur or may occur in the potentially affected area.

To ensure the Air Force has sufficient time to consider public and agency input in the preparation of the draft EA, we request comments be submitted to HQ AETC/A7C, Attn: Mr. David Martin, AETC NEPA Program Manager, 266 F Street West, Randolph AFB, Texas 78150-4319 within 30 days of receiving this letter.

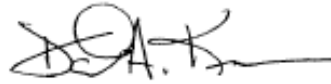
*Global Power for America*

**Environmental Assessment  
July 2011**

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If you have specific questions about the proposal, we would like to hear from you. Please contact Mr. David Martin at (210) 652-1961. General questions may be directed to Mr. Andrew Gomolak at (575) 572-3931. Thank you for your assistance in this matter.

Sincerely



DAVID A. KRUMM  
Colonel, USAF  
Commander

**2 Attachments:**

1. Proposed Construction /Remodeling
2. Airspace Proposed Use by F-16 FTU

Environmental Assessment  
July 2011



DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS 49TH WING (ACC)  
HOLLOMAN AIR FORCE BASE, NEW MEXICO

Colonel David A. Krumm  
Commander, 49th Wing  
490 First Street, Suite 1700  
Holloman AFB NM 88330-8277

JAN 10 2011

Addressee  
Organization  
Address

Dear \_\_\_\_\_:

The United States Air Force Air Education Training Command (AETC) is in the initial stages of preparing an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) to assess the potential environmental impacts of relocating an F-16 Formal Training Unit (FTU) to Holloman Air Force Base (AFB), New Mexico. The FTU would be comprised of two squadrons of F-16 C/D aircraft.

The EA will analyze potential environmental effects associated with changes in personnel, construction of facilities and training activities in existing military airspace and ranges to support the proposed beddown. The EA will address the potential effects at Holloman AFB, the training airspace and the use of Roswell International Air Center (RIAC) in Roswell, New Mexico as an auxiliary airfield. Please refer to the attachment for a map of Holloman AFB, the training airspace and RIAC. A "No Action" alternative will also be examined that does not relocate F-16 aircraft to Holloman AFB. Airspace training would include the use of defensive countermeasures such as flares and chaff, supersonic flight in authorized airspace and the use of inert or live munitions at approved military ranges. F-16 training would occur within the current military airspace and ranges of Holloman AFB. We anticipate F-16 environmental effects will be similar to that of the F-22.

Public and agency comments received by the Air Force throughout the environmental process will be considered in the preparation of the EA. As part of the EA development, the Air Force or its contractor, SAIC may contact you in their data collection efforts. To ensure the Air Force has sufficient time to consider public input in the preparation of the draft EA, we request comments be submitted to HQ AETC/A7C, Attn: Mr. David Martin, AETC NEPA Program Manager, 266 F Street West, Randolph AFB, Texas 78150-4319 within 30 days of receiving this letter.

If you have specific questions about the proposal, we would like to hear from you. Please contact Mr. David Martin at (210) 652-1961. General questions may be directed to Mr. Andrew Gomolak at (575) 572-3931. Thank you for your assistance in this matter.

Sincerely

  
DAVID A. KRUMM  
Colonel, USAF  
Commander

- 2 Attachments:  
1. Proposed Construction/Remodeling  
2. Airspace Proposed Use by F-16 FTU

*Global Power for America*

Environmental Assessment  
July 2011

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DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS 49TH WING (ACC)  
HOLLOMAN AIR FORCE BASE, NEW MEXICO

JAN 10 2011

Colonel David A. Krumm  
Commander, 49th Wing  
490 First Street, Suite 1700  
Holloman AFB NM 88330-8277

President Mark Chino  
Mescalero Tribal Government  
P O Box 227  
Mescalero NM 88340

Dear President Chino

The United States Air Force Air Education Training Command (AETC) is in the initial stages of preparing an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) to assess the potential environmental impacts of relocating an F-16 Formal Training Unit (FTU) to Holloman Air Force Base (AFB), New Mexico. The FTU would be comprised of two squadrons of F-16 C/D aircraft.

The relocation is needed for the Air Force to maximize the use of its assets and capitalize on existing fighter mission and support capabilities. This involves the consolidation and redistribution of units to utilize resources strategically. The F-16 FTU has been identified as a mission that can take advantage of the Holloman AFB existing infrastructure and access to airspace and other training resources.

The EA will analyze potential environmental effects associated with changes in personnel, construction of facilities and training activities in existing military airspace and ranges to support the proposed beddown. The EA will address the potential effects at Holloman AFB, the training airspace and the use of Roswell International Air Center (RIAC) in Roswell, New Mexico as an auxiliary airfield. Please refer to the attachment for a map of Holloman AFB, the training airspace and RIAC. A "No Action" alternative will also be examined that does not relocate F-16 aircraft to Holloman AFB. Airspace training would include the use of defensive countermeasures such as flares and chaff, supersonic flight in authorized airspace and the use of inert or live munitions at approved military ranges. F-16 training would occur within the current military airspace and ranges of Holloman AFB. We anticipate F-16 environmental effects will be similar to that of the F-22.

The Air Force desires to initiate government-to-government meetings, so you can express your comments, concerns and suggestions. These consultations conducted pursuant to Section 106 of the National Historic Preservation Act (NHPA), 36 CFR Part 800 and Executive Order 13175 will provide an excellent opportunity to exchange information, ask questions and advise the Air Force of any concerns or suggestions you may have. Please let me know when you would like to meet to discuss this proposal and to plan how our staffs will communicate during the consultations.

*Global Power for America*

**Environmental Assessment**  
**July 2011**

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If you have any questions about the NEPA process, please contact Mr. David Martin, AETC NEPA Project Manager at (210) 652-1961. General questions may be directed to Mr. Andrew Gomolak at (575) 572-3931.

The Air Force appreciates your continued interest in consulting on activities at Holloman AFB and looks forward to working with the Mescalero Apache Tribe in the NHPA Section 106 and NEPA processes on this proposal with AETC.

Sincerely



DAVID A. KRUMM  
Colonel, USAF  
Commander

2 Attachments:

1. Proposed Construction /Remodeling
2. Airspace Proposed Use by F-16 FTU

Environmental Assessment  
July 2011

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DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS 49TH WING (ACC)  
HOLLOMAN AIR FORCE BASE, NEW MEXICO

JAN 10 2011

Colonel David A. Krumm  
Commander, 49th Wing  
490 First Street, Suite 1700  
Holloman AFB NM 88330-8277

Ms. Jan V. Biella  
State Historic Preservation Officer  
State and Historic Preservation Office  
407 Galisteo St, Suite 236  
Santa Fe NM 87501

Dear Ms. Biella

The United States Air Force Air Education Training Command (AETC) is in the initial stages of preparing an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) to assess the potential environmental impacts of relocating an F-16 Formal Training Unit (FTU) to Holloman Air Force Base (AFB), New Mexico. The FTU would be comprised of two squadrons of F-16 C/D aircraft.

The EA will analyze potential environmental effects associated with changes in personnel, construction of facilities and training activities in existing military airspace and ranges to support the proposed beddown. The EA will address the potential effects at Holloman AFB, the training airspace and the use of Roswell International Air Center (RIAC) in Roswell, New Mexico as an auxiliary airfield. Please refer to the attachment for a map of Holloman AFB, the training airspace and RIAC. A "No Action" alternative will also be examined that does not relocate F-16 aircraft to Holloman AFB. Airspace training would include the use of defensive countermeasures such as flares and chaff, supersonic flight in authorized airspace and the use of inert or live munitions at approved military ranges. F-16 training would occur within the current military airspace and ranges of Holloman AFB. We anticipate F-16 environmental effects will be similar to that of the F-22.

The purpose of this correspondence is to initiate Section 106 process of the National Historic Preservation Act (NHPA) of 1966 (as amended) in the potentially affected areas. We are in the early stages of gathering information concerning previous archaeological and historical studies for the area under the affected region. Any assistance you could provide in identifying and retrieving this important information, as well as concerns you may have about the potential effects of the proposed action on significant cultural resources would be appreciated.

The Air Force intends to coordinate public involvement for the purpose of Section 106 review under the NHPA with public involvement in the EA prepared under the Environmental Impact Analysis process.

*Global Power for America*

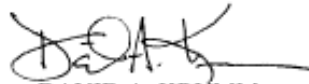
**Environmental Assessment**  
**July 2011**

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To ensure the Air Force has sufficient time to consider public and agency input in the preparation of the draft EA, we request comments be submitted to HQ AETC/A7C, Attn: Mr. David Martin, AETC NEPA Program Manager, 266 F Street West, Randolph AFB, Texas 78150-4319 within 30 days of receiving this letter.

If you have specific questions about the proposal, we would like to hear from you. Please contact Mr. David Martin at (210) 652-1961. General questions may be directed to Mr. Andrew Gomolak at (575) 572-3931. Thank you for your assistance in this matter.

Sincerely



DAVID A. KRUMM  
Colonel, USAF  
Commander

2 Attachments:

1. Proposed Construction /Remodeling
2. Airspace Proposed Use by F-16 FTU

**Environmental Assessment  
July 2011**

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**DEPARTMENT OF THE AIR FORCE**  
HEADQUARTERS 49TH WING (ACC)  
HOLLOMAN AIR FORCE BASE, NEW MEXICO

Colonel David Krumm  
Commander, 49th Wing  
490 First Street, Suite 1700  
Holloman AFB, NM 88330-8277

Ms. Jennifer Brady  
Roswell Airport  
1 Jerry Smith Circle  
Roswell, NM 88203

Dear Ms. Brady,

The U.S. Air Force Air Education Training Command (AETC) is in the initial stages of preparing an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) to assess the potential environmental impacts of relocating an F-16 Formal Training Unit (FTU) to Holloman Air Force Base (AFB), New Mexico. The FTU would be comprised of two squadrons of F-16 C/D aircraft.

The EA will analyze potential environmental effects associated with changes in personnel, construction of facilities, and training activities in existing military airspace and ranges to support the proposed beddown. The EA will address the potential effects at Holloman AFB (Attachment 1), the training airspace (Attachment 2), and the use of Roswell International Air Center (RIAC) in Roswell, New Mexico as an auxiliary airfield. A No Action Alternative will also be examined that does not relocate F-16 aircraft to Holloman AFB. Airspace training would include the use of defensive countermeasures such as flares and chaff, supersonic flight in authorized airspace, and the use of inert or live munitions at approved military ranges. F-16 training would occur within the current military airspace and ranges of Holloman AFB.

Public and agency comments received by the Air Force throughout the environmental process will be considered in the preparation of the EA. As part of the EA development, the Air Force or its contractor, SAIC, may contact you in their data collection efforts. To ensure the Air Force has sufficient time to consider public input in the preparation of the Draft EA, we are requesting that comments be submitted within 30 days of receiving this letter to HQ AETC/A7C, 266 F Street West, Randolph Air Force Base, Texas, 78150-4319, ATTN: Mr. David Martin, AETC NEPA Program Manager.

*Global Power for America*



**Environmental Assessment**  
**July 2011**

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If you have specific questions about the proposal, we would like to hear from you. Please contact Mr. David Martin at (210) 652-1961. General questions may be directed to Mr. Andrew "JR" Gomolak at (575) 572-3931. Thank you for your assistance in this matter.

Sincerely,



DAVID A. KRUMM  
Colonel, USAF  
Commander

- 2 Attachments:
1. Construction
  2. Airspace

### A.3 Responses to IICEP Letters



## United States Department of the Interior

FISH AND WILDLIFE SERVICE  
New Mexico Ecological Services Field Office  
2105 Osuna NE  
Albuquerque, New Mexico 87113  
Phone: (505) 346-2525 Fax: (505) 346-2542

Thank you for your recent request for information on threatened or endangered species or important wildlife habitats that may occur in your project area. The New Mexico Ecological Services Field Office has posted lists of the endangered, threatened, proposed, candidate and species of concern occurring in all New Mexico Counties on the Internet. Please refer to the following web page for species information in the county where your project occurs: [http://www.fws.gov/southwest/es/NewMexico/SBC\\_intro.cfm](http://www.fws.gov/southwest/es/NewMexico/SBC_intro.cfm). If you do not have access to the Internet or have difficulty obtaining a list, please contact our office and we will mail or fax you a list as soon as possible.

After opening the web page, find New Mexico Listed and Sensitive Species Lists on the main page and click on the county of interest. Your project area may not necessarily include all or any of these species. This information should assist you in determining which species may or may not occur within your project area.

Under the Endangered Species Act of 1973, as amended (Act), it is the responsibility of the Federal action agency or its designated representative to determine if a proposed action "may affect" endangered, threatened, or proposed species, or designated critical habitat, and if so, to consult with us further. Similarly, it is their responsibility to determine if a proposed action has no effect to endangered, threatened, or proposed species, or designated critical habitat. On December 16, 2008, we published a final rule concerning clarifications to section 7 consultations under the Act (73 FR 76272). One of the clarifications is that section 7 consultation is not required in those instances when the direct and indirect effects of an action pose no effect to listed species or critical habitat. As a result, we do not provide concurrence with project proponent's "no effect" determinations.

If your action area has suitable habitat for any of these species, we recommend that species-specific surveys be conducted during the flowering season for plants and at the appropriate time for wildlife to evaluate any possible project-related impacts. Please keep in mind that the scope of federally listed species compliance also includes any interrelated or interdependent project activities (e.g., equipment staging areas, offsite borrow material areas, or utility relocations) and any indirect or cumulative effects.

Candidates and species of concern have no legal protection under the Act and are included on the web site for planning purposes only. We monitor the status of these species. If significant declines are detected, these species could potentially be listed as endangered or threatened. Therefore, actions that may contribute to their decline should be avoided. We recommend that candidates and species of concern be included in your surveys.

Also on the web site, we have included additional wildlife-related information that should be considered if your project is a specific type. These include communication towers, power line safety for raptors, road and highway improvements and/or construction, spring developments and livestock watering facilities, wastewater facilities, and trenching operations.

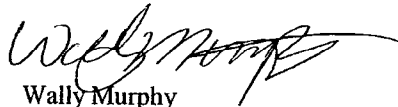
Under Executive Orders 11988 and 11990, Federal agencies are required to minimize the destruction, loss, or degradation of wetlands and floodplains, and preserve and enhance their natural and beneficial values. We recommend you contact the U.S. Army Corps of Engineers for permitting requirements under section 404 of the Clean Water Act if your proposed action could impact floodplains or wetlands. These habitats should be conserved through avoidance, or mitigated to ensure no net loss of wetlands function and value.

The Migratory Bird Treaty Act (MBTA) prohibits the taking of migratory birds, nests, and eggs, except as permitted by the U.S. Fish and Wildlife Service. To minimize the likelihood of adverse impacts to all birds protected under the MBTA, we recommend construction activities occur outside the general migratory bird nesting season of March through August, or that areas proposed for construction during the nesting season be surveyed, and when occupied, avoided until nesting is complete.

We suggest you contact the New Mexico Department of Game and Fish, and the New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division for information regarding fish, wildlife, and plants of State concern.

Thank you for your concern for endangered and threatened species and New Mexico's wildlife habitats. We appreciate your efforts to identify and avoid impacts to listed and sensitive species in your project area.

Sincerely,



Wally Murphy  
Field Supervisor

Environmental Assessment  
July 2011

Email: oteroadm@co.otero.nm.us  
COMMISSION / ADMINISTRATION  
(575) 437-7427  
FAX (575) 443-2904  
886-986-8376



1101 NEW YORK AVE.  
ALAMOGORDO, NM 88310-8935

State of New Mexico  
County of Otero

January 24, 2011

Mr. David Martin  
AETC NEPA Program Manager  
266 F Street West  
Randolph AFB, Texas 78150-4319

Re: Environmental Assessment of impacts in relocating the F16 Formal Training Unit

Dear Mr. Martin,

The Board of Otero County Commissioners received your letter explaining the AETC preparing an EA under the NEPA to assess the potential environmental impacts of relocating the F-16 Formal Training Unit to Holloman Air Force Base, New Mexico.

Holloman Air Force Base was originally established in 1942 and it is the home of the worlds longest and fastest test tract. Over the years it has supported the Active Duty, Guard, Reserve, retirees, DoD civilians, the German Air Force Flying Training Center and all of the families associated and we would like to see Holloman continue to serve at the forefront of military operations. Therefore, it is with great pleasure, we inform you that we are in total support of relocating the F-16 FTU to Holloman Air Force Base. We have no objections to the EA.

If you have any questions, please do not hesitate to contact us.

Sincerely,

Handwritten signature of Ronny Rardin in black ink.

Ronny Rardin, Chairman  
Board of Otero County Commissioners

Handwritten signature of Susan Flores in black ink.

Susan Flores, Vice-Chairperson  
Board of Otero County Commissioners

Handwritten signature of Tommie Herrell in blue ink.

Tommie Herrell, Member  
Board of Otero County Commissioners

Environmental Assessment  
July 2011



United States Department of the Interior

NATIONAL PARK SERVICE  
White Sands National Monument  
P.O. Box 1086  
Holloman AFB, NM 88330



IN REPLY REFER TO:  
L7619 (WWSA)

January 27, 2011

HQ AETC/A7C  
David Martin  
AETC NEPA Program Manager  
266 F Street West  
Randolph AFB, TX 78150-4319

Dear Mr. Martin:

Thank you for contacting White Sands National Monument with respect to scoping for the environmental assessment about the potential relocation of a Formal Training Unit to Holloman Air Force Base that would consist of two squadrons of F-16 C/D aircraft. White Sands National Monument and Holloman Air Force Base have maintained a good relationship as we each carry out our respective missions to the nation. We request that you consider the following items for analysis during your development of impact topics and development of alternatives:

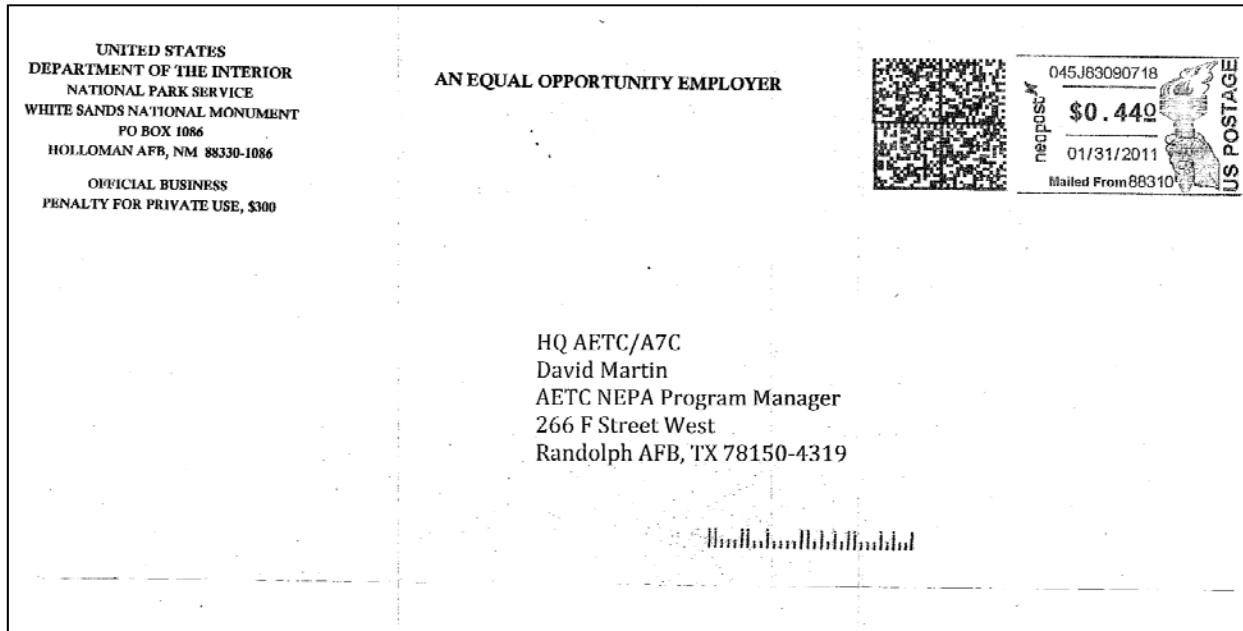
- Night lighting of additional or remodeled structures and effects to night sky darkness as experienced from the national monument
- Increases in the number of supersonic flights above the national monument and their effects to stability of historic structures and visitor experiences
- Increases and changes in types of training overflights and the effects to visitor safety at the national monument
- Increases in overflights and effects on resident wildlife in the national monument

Although the Air Force anticipates the F-16 environmental effects to be similar to those from the F-22 operation, we would like to remain engaged in the review process. If you need specific information from the national monument as you develop the environmental assessment, please contact Superintendent Kevin Schneider at (575) 679-2599, extension 210, or at the above address.

Sincerely,

Fred Armstrong  
Acting Superintendent

Environmental Assessment  
July 2011



Environmental Assessment  
July 2011



SUSANA MARTINEZ  
Governor

STATE OF NEW MEXICO  
**DEPARTMENT OF CULTURAL AFFAIRS**  
**HISTORIC PRESERVATION DIVISION**

BATAAN MEMORIAL BUILDING  
407 GALISTEO STREET, SUITE 236  
SANTA FE, NEW MEXICO 87501  
PHONE (505) 827-6320 FAX (505) 827-6338

February 17, 2011

Colonel David A. Krumm  
Commander, 49<sup>th</sup> Wing  
Department of the Air Force  
490 First Street, Suite 1700  
Holloman AFB, New Mexico 88330-8277

Re: Relocation of Two F-16 Formal Training Unit Squadrons to Holloman Air Force Base, New Mexico

Dear Colonel Krumm,

Thank for your letter dated January 10, 2011 and received in our office January 18, 2011 that briefly outlines the proposed action of the relocation of two F-16 Formal Training Unit Squadrons and identified areas of potential effect as Holloman Air Force Base, the proposed training airspace, and Roswell International Air Center (RIAC). We appreciate early initiation of the National Historic Preservation Act Section 106 process as Holloman is in the early stages of preparing an Environmental Assessment for this undertaking.

To address your request to provide assistance in identifying and retrieving previously surveyed and documented archaeological and historic properties, the firm preparing the EA should first consult with the Cultural Resources Manager (CRM) Program and Real Property Division of each installation to identify any historic properties in the areas of potential effect (APE). The Real Property Division would have a record of all buildings and the dates of construction and modifications. Historic buildings would include those of age fifty or older and Cold War Era buildings, or those of exceptional importance less than 50 years in age.

The CRM Program of each installation would have a record of the archaeological resources located on Holloman AFB and RIAC lands; however, archaeological sites and projects in New Mexico on the installation and outside these areas can be identified by qualified researchers through review of the New Mexico Cultural Resources Information System database located at this web address: <http://stubbs.arms.state.nm.us/arms/>. NMCRIS is managed by the Archaeological Records Management Section (ARMS) of the Historic Preservation Division (HPD). Many researchers who work in New Mexico have user agreements with ARMS. Holloman Air Force Base might consider entering into a data sharing agreement with ARMS. Please contact Derek Pierce, Program Manager at [derek.pierce@state.nm.us](mailto:derek.pierce@state.nm.us) or (505) 476.1287 for assistance with NMCRIS.

Consultation with Native American groups should also be initiated in this early stage of EA development in an effort to identify any cultural resources in areas below the military airspace to determine the potential for effect. The CRM Program for each of the installations should have a list of and contact information for the Native American groups that Holloman AFB and RIAC would consult. If not,

**Environmental Assessment  
July 2011**

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Re: Relocation of Two F-16 Formal Training Unit Squadrons to Holloman Air Force Base, New Mexico

the Historic Preservation Division (HPD) maintains a list of Native American tribes that reside in the state and those that have traditional use areas in New Mexico (<http://nmhistoricperservation.org>).

In order to provide a determination of effect to any of the cultural resources identified in the above research our office would need a detailed scope of work including related activities to be carried out in conjunction with the proposed undertaking (for example, construction and remodeling projects, ground disturbance, staging areas, equipment parks, access roads, etc.). Please include preliminary drawings or plans for each project. Any additional information on kind and amount of prior or existing surface disturbance should also be included. For projects involving existing buildings, include the approximate construction dates for each building or structure and include current overall exterior photos. Photos need to be clear enough for HPD staff to evaluate the historic integrity of the building(s). Also provide a legible photocopy of the U.S. Geological Survey 7.5 quadrangle map with the project area clearly marked on it. The name of the quadrangle, the Township, Range, and Section of the APE must be included in the description of a project or displayed on the map. Clearly mark the APE on a street map and provide street references. Guidance on the information needed for Section 106 submittals is also found on the HPD web site.

If you have any questions, please contact me at (505) 827-4045 or [Jan.Biella@state.nm.us](mailto:Jan.Biella@state.nm.us) or Terry Moody, State and National Register Coordinator at (505) 476-0444 or [Terry.Moody@state.nm.us](mailto:Terry.Moody@state.nm.us).

Sincerely,



Jan Biella  
Interim State Historic Preservation Officer



Environmental Assessment  
July 2011

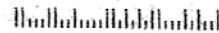
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State of New Mexico  
Department of Cultural Affairs  
**HISTORIC PRESERVATION DIVISION**  
Bataan Memorial Building  
407 Galisteo Street, Suite 236  
Santa Fe, New Mexico 87501



016H26524738  
**\$00.44**  
02/18/2011  
Mailed From 87501  
**US POSTAGE**

HQ AETC/ATC, ATTN: Mr. David Martin  
AETC NEPA Program Manager  
266 F Street West  
Randolph AFB,  
Texas 78150-4319



#### A.4 State Historic Preservation Office (SHPO) Package



DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS 49TH WING (ACC)  
HOLLOMAN AIR FORCE BASE, NEW MEXICO

MEMORANDUM FOR NEW MEXICO STATE HISTORIC PRESERVATION OFFICER  
ATTENTION: HARVEY KAPLAN

FROM: 49 CES/CEAO  
550 Tabosa Avenue  
Holloman AFB, NM 88330-8458

SUBJECT: Recommended National Register status of Cold War-Era buildings to be affected by the proposed relocation of the F-16 Flying Training Unit to Holloman AFB, New Mexico

1. Request your review and concurrence with the eligibility recommendations and effect determinations concerning these Cold War-Era properties.
2. Provided are the relevant supporting documentation from the Draft Environmental Assessment (DEA) "Recapitalization of the 49th WG Combat Capabilities and Capacities". The entire DEA has been previously provided to your office.
3. The undertaking addressed in the DEA would affect 3 post-Cold War buildings which are not further addressed. Eighteen Cold War-Era buildings would be affected. Impacts proposed in the DEA for Facility 920 have been cancelled and this one Cold War-Era building has been removed from the undertaking. The recommended Register eligibility of these 19 buildings is summarized in Attachment 1.
4. Attachment 2 provides photos, a brief description, and reasoning for the recommended eligibility status of the 19 Cold War-Era buildings. These recommendations are supported by a June 1997, consultation (NM SHPO Log #053384) and the results of a nationwide Air Combat Command assessment titled "HAFB Cold War-Era Historic Property Survey" (a copy of which was provided to your office in November 2009).
5. The HAFB POC for this consultation is Andrew Gomolak at 575-572-3931 or [andrew.gomolak@us.af.mil](mailto:andrew.gomolak@us.af.mil).

  
A. DAVID BUDAK 14 July 2011  
Deputy Base Civil Engineer

*Global Power for America*

**Environmental Assessment  
July 2011**

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2 Attachments:

1. Summary Table of F-16 FTU Facilities and Recommended National Register Status (1 page)
2. Recommended National Register Status of Cold War-Era Buildings to be affected by the proposed relocation of the F-16 Flying Training Unit to Holloman AFB, NM (38 pages)

1st Ind, NM SHPO

MEMORANDUM FOR 49 CES/CEA

Concur /Nonconcur with above discussed recommendation and determinations.

\_\_\_\_\_  
SHPO Signature

\_\_\_\_\_  
Date

Environmental Assessment  
July 2011

A.5 State Historic Preservation Office Package – Response



DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS 49TH WING (ACC)  
HOLLOMAN AIR FORCE BASE, NEW MEXICO



MEMORANDUM FOR NEW MEXICO STATE HISTORIC PRESERVATION OFFICE  
ATTENTION: DR. JAN BIELLA, DR. J. ROBERT ESTES

FROM: 49 CES/CEAO  
550 Tabosa Avenue  
Holloman AFB NM 88330-8458

SUBJECT: Consultation regarding the absence, avoidance, minimization and mitigation of effects on archaeological properties within Holloman Air Force Base and the Weapons Damage Zones of Centennial, Oscura and Red Rio Ranges

1. Request your review and concurrence with the eligibility recommendation and effect determination concerning these historic properties.
2. Attached to this correspondence is discussion and supporting documentation of archaeological sites and anticipated effects discussed in a Draft Environmental Assessment (DEA) titled "Recapitalization of the 49th WG Combat Capabilities and Capacities". That DEA proposes the movement of fifty aircraft and associated personnel to establish an F-16 Flying Training Unit (FTU) at Holloman. A copy of the DEA was provided to your office in mid June, 2011 and another is enclosed for your reference.
3. The on-base undertaking described in the DEA would affect Cold War-Era and post-Cold War buildings (Atch 1 Map, Summary Table) that are addressed in an architectural consultation forwarded to NM SHPO under separate cover. Professional surveys of those buildings recommended that they are not eligible to the National Register of Historic Places. We requested a determination of no effect on architectural historic properties for the F-16 FTU DEA proposed on-base construction and remodeling.
4. The on-base undertaking area of potential effect on archaeological sites is within the previously developed, paved or built portion of the base (see Atch 1 Map). The adjacent un-built areas have been surveyed and archaeological resources evaluated. No potentially eligible sites were found (See Atch 1 Map, Atch 2 Reference and Consultation) in the area to be affected by the F-16 FTU construction and remodeling. A determination of no effect on archaeological historic properties is requested for the on-base portion of the proposed F-16 relocation to Holloman.
5. The off-base undertaking proposed in the DEA is comprised of flying in the airspace surrounding HAFB (Atch 3), which is considered to have no effect on archaeological resources and the continued use of Centennial, Oscura and Red Rio Bombing and Gunnery Ranges (also on Atch 3), which does entail potential effects. The area of potential effect for each range is within the limit of the Weapons Damage Zone (WDZ) around the each range. The areas of direct effects are considerable smaller and are immediately surrounding the target sets arrayed within the WDZ.
6. As discussed on pages 4-40 and 41 of the DEA, cultural resources on Centennial Range were inventoried and evaluated in 1998. Twenty-one archaeological properties, one pipeline and two fence lines were recorded. Consultation on the archaeological sites with the NM SHPO resulted in 12 being considered not

*Global Power for America*

**Environmental Assessment  
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eligible, 4 eligible and likely to be impacted by range activities, 1 eligible but out of the area of proposed affects, and 4 remaining in undetermined status. (Atch 4, Reference 1)

The pipeline was further researched and portions excavated, to demonstrate that it is a recent polyvinylchloride construction, and not a historic property. The fence lines divided recent grazing parcels in use up to the time of range construction and are not associated with earlier users of the range. In 2001-2002, the four eligible sites were excavated to mitigate range use effects. The four undetermined sites were tested to evaluate eligibility; all 4 were found potentially eligible. Two were excavated to mitigate range use effects. Two are well away from the areas of weapons impact or proposed range support facilities, resulting in 3 sites remaining eligible but not in an area of any proposed affects. (Atch 4, Reference 2, Site List, Map)

These conditions have been monitored by HAFB annually since the range opened and there have been no apparent changes in the absence/presence of effects on historic properties. This was further confirmed by HAFB (Andrew Gomolak) and Ft Bliss (Sue Sitton) archaeologists during a joint field visit to the sites on May 2011. A determination of no effect on historic properties is requested for the proposed F-16 FTU use of Centennial Range as described in the DEA.

7. The Air Force also requests SHPO consultation regarding the F-16 FTU DEA proposed affects on Oscura Range, but remains aware that further consultation, site eligibility, avoidance, testing or mitigation recommendations on Oscura Range historic properties will originate from WSMR as it is the current real property administrator of the Joint Range where Oscura is located.

The area that comprises Oscura Range was surveyed and sites evaluated in the 1980s and 1990s, specifically for Oscura Range purposes, as well as the "Forward Area Air Defense System EIS" area that surrounded Oscura Range. Sixteen historic properties are on record within the fire break for Oscura, predominantly clustered in the southeast well away from the German AF Academic Target" that is the closest inert drop area (see Atch 5, Maps and Site list).

Only 2 (LA86477, 86478) sites are within slightly less than 1000 meters of a live fire or inert drop zone, but both are in settings near the existing range control tower and offices where misdirected fire is highly unlikely. These and the other sites within Oscura Range are reasonably expected to not be effected by the F-16 FTU range use proposed in the DEA and will be visited annually to monitor for accidental impacts. A determination of no effect on historic properties is requested for the proposed F-16 FTU use of Oscura Bombing and Gunnery Range.

8. The Air Force also requests SHPO consultation regarding the F-16 FTU DEA proposed affects on Red Rio Range, but remains aware that further consultation, site eligibility, avoidance, testing or mitigation recommendations on Red Rio Range historic properties will originate from WSMR as it is the current real property administrator of the Joint Range where Red Rio is located.

Red Rio Range was thoroughly surveyed in the 1990s and was the subject of long playing consultation and episodes of field work that resulted in the complete mitigation of one site; testing and a determination of no effect requiring long term monitoring for 4 sites; and an avoidance of effects plan for the remaining 22 sites, based on clearly marking sites on the ground and pilot's charts, combined with long term monitoring. (see Atch 6, map)

As a result of research done to support the statements made in the DEA, we have found that all the Red Rio site location and condition data in the White Sands Missile Range and NM State data bases are in need of minor corrections and upgrading to current professional standards. However, we have also discovered that the 1990s range use site impact avoidance arrangements appear to have worked quite well considering Red Rio is a very active range.



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There is a need to thoroughly compare the earlier (15 year old) site records to the currently present remains and evaluate the sites in light of current professional standards. This would include remapping the sites and boundaries to current GIS standards to improve the accuracy of avoidance measures and to establish a modern baseline for the continued monitoring of the presence or absence of affects on the Red Rio historic properties. (see Atch 7, existing Red Rio Site Records)

To assure long term compliance with the National Historic Preservation Act, HAFB will continue briefing pilots, ground users and maintainers of the requirement for awareness, avoidance and protection of archaeological sites at Red Rio Range. Further, the Air Force is funding a new archaeological survey to update the site data and National Register Status of sites in the Weapons Damage Zone of Red Rio Range. This will enhance the data available to HAFB and WSMR for long term consultation with the NM SHPO on site eligibility, avoidance, testing and/or mitigation measures.

Avoidance of effects on the Red Rio Range historic properties under terms of the previous consultation with NM SHPO appears to have been successful even though the range has hosted F-4, F-15, F-16, F-117, Tornado and rotary wing aircraft bombing and gunnery training. The DEA for the F-16 FTU relocation to HAFB proposes no new construction and no new targets on Red Rio Range so the use of the range will be little different from past and current uses and as a result, the condition of the historic properties should not be degraded by that use.

In light of that, we request the proposed use of Red Rio Range be given a continuation of the previous determination of no effects on historic properties, conditional upon upgrading the historic property data, assessing the previous 15 years of monitoring, and further consultation based on that improved data .

9. The HAFB POC for this consultation is [andrew.gomolak@us.af.mil](mailto:andrew.gomolak@us.af.mil) or phone 575-572-3931.

  
For CHRISTIAN J. KNUTSON, Lt Col, USAF  
Commander, 49th Civil Engineer Squadron

7 Attachments:

1. Map, Archaeological Sites and Historic Structures Main Installation Area
2. List, Main Base archaeological sites w/previous SHPO consultation
3. HAFB Airspace and Ranges locations
4. Historic Properties on HAFB Centennial Range, map, references
5. Historic Properties on HAFB Oscura Range, maps
6. Historic Properties on HAFB Red Rio Range, map
7. Red Rio Site Records (3 ring binder)

**Environmental Assessment  
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1st Ind, NM SHPO

MEMORANDUM FOR 49 CES/CEA

Concur/~~Nonconcur~~ with the above recommendations and determination of no effect on archaeological historic properties for F-16 FTU DEA proposed activities on Main Base Holloman.

  
SHPO Signature      7/29/2011  
Date

2d Ind, NM SHPO

MEMORANDUM FOR 49 CES/CEA

Concur/~~Nonconcur~~ with the above recommendations and determination of no effect on historic properties for the F-16 FTU use of HAFB Centennial Range. Annual monitoring required.

  
SHPO Signature      7/29/2011  
Date

3d Ind, NM SHPO

MEMORANDUM FOR 49 CES/CEA

Concur/~~Nonconcur~~ with the above recommendations and determination of no effect on historic properties for the F-16 FTU DEA proposed use of HAFB Oscura Range, subject to consultation with White Sands Missile Range and with annual monitoring required.

  
SHPO Signature      7/29/2011  
Date

4th Ind, NM SHPO

MEMORANDUM FOR 49 CES/CEA

Concur/~~Nonconcur~~ with the above recommendations and determination of no effect on historic properties for the F-16 FTU DEA proposed use of HAFB Red Rio Range, subject to consultation with White Sands Missile Range and with annual monitoring required.

  
SHPO Signature      7/29/2011  
Date

Environmental Assessment  
July 2011



DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS 49TH WING (ACC)  
HOLLoman AIR FORCE BASE, NEW MEXICO



MEMORANDUM FOR NEW MEXICO STATE HISTORIC PRESERVATION OFFICER  
ATTENTION; HARVEY KAPLAN

FROM: 49 CES/CEAO  
550 Tabosa Avenue  
Holloman AFB, NM 88330-8458

SUBJECT: Recommended National Register status of Cold War-Era buildings to be affected by the proposed relocation of the F-16 Flying Training Unit to Holloman AFB, New Mexico

1. Request your review and concurrence with the eligibility recommendations and effect determinations concerning these Cold War-Era properties.
2. Provided are the relevant supporting documentation from the Draft Environmental Assessment (DEA) "Recapitalization of the 49th WG Combat Capabilities and Capacities". The entire DEA has been previously provided to your office.
3. The undertaking addressed in the DEA would affect 3 post-Cold War buildings which are not further addressed. Eighteen Cold War-Era buildings would be affected. Impacts proposed in the DEA for Facility 920 have been cancelled and this one Cold War-Era building has been removed from the undertaking. The recommended Register eligibility of these 19 buildings is summarized in Attachment 1.
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5. The HAFB POC for this consultation is Andrew Gomolak at 575-572-3931 or [andrew.gomolak@us.af.mil](mailto:andrew.gomolak@us.af.mil).

  
A. DAVID BUDAK 14 July 2011  
Deputy Base Civil Engineer

*Global Power for America*



**Environmental Assessment**  
**July 2011**

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2 Attachments:

1. Summary Table of F-16 FTU Facilities and Recommended National Register Status (1 page)
2. Recommended National Register Status of Cold War-Era Buildings to be affected by the proposed relocation of the F-16 Flying Training Unit to Holloman AFB, NM (38 pages)

1st Ind, NM SHPO

MEMORANDUM FOR 49 CES/CEA

Concur /Nonconcur with above discussed recommendation and determinations.

 7/29/2011  
SHPO Signature                      Date

*as per following comments*

SHPO Comments:

Eligibility:

Building 877 is of **Undetermined** eligibility to the NRHP as per discussion of 7.27.2011.

Building 920 is of **Undetermined** eligibility as per your recommendations (but removed from project).

The other 17 buildings are **Not Eligible**.

Effect:

The project work will have **No Adverse Effect** on 1 Undetermined building.

In order to resolve the eligibility for Building 877, please provide photos of the building taken during the Cold War Era for further study, by the end of project work.

**A.6 Responses to Draft Environmental Assessment**



United States Department of the Interior  
BUREAU OF LAND MANAGEMENT

Pecos District  
Roswell Field Office  
2909 West Second Street  
Roswell, New Mexico 88201-2019  
www.nm.blm.gov



IN REPLY REFER TO:  
1600 (PO120)

HQ AETC/A7C  
266 F Street West  
Randolph AFB TX 78150-4440

Subject: Draft Environmental Assessment (EA) and draft Finding of No Significant Impact (FONSI) for the proposed Recapitalization of the 49<sup>th</sup> Wing (WG) Capabilities and Capacities, Holloman Air Force Base NM

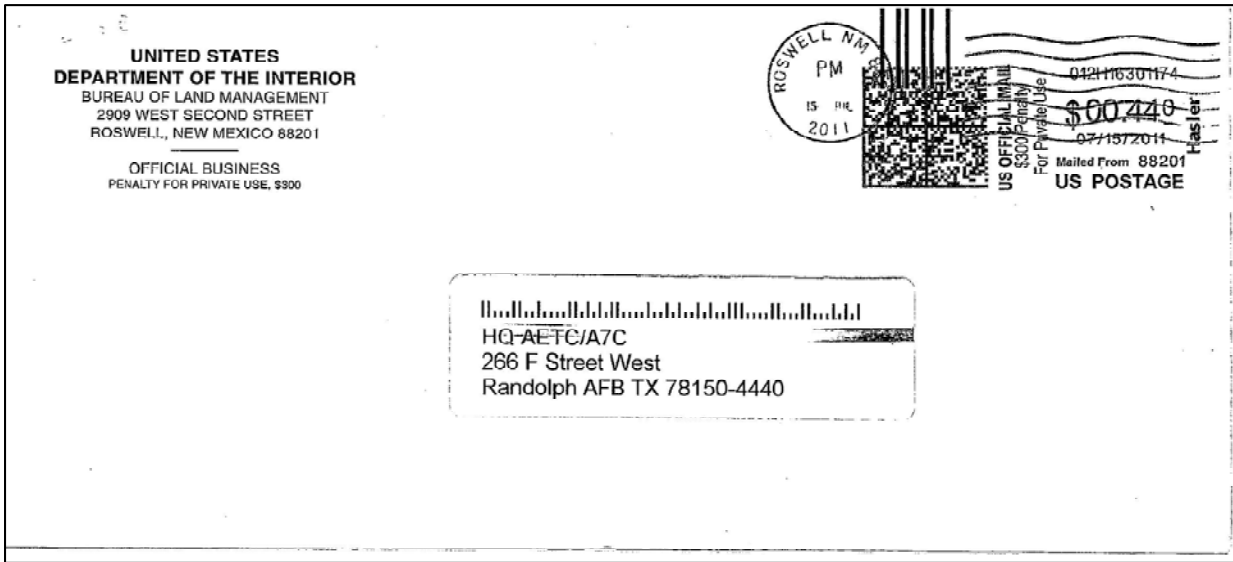
Dear Mr. Demartino:

Thank you for the June 6, 2011 letter in which you invited the Pecos District, Roswell Field office to comment on the subject EA and FONSI stated above. The Roswell field office does not have any comments.

The Roswell field office thanks the USAF for the opportunity to comment and contribute to this effort. If the USAF has any questions, feel free to contact me at (575) 627-0209.

Sincerely  
  
Glen Garnand  
Environmental and Planning Coordinator

Environmental Assessment  
July 2011



Environmental Assessment  
July 2011

GOVERNOR  
Susana Martinez



DIRECTOR AND SECRETARY  
TO THE COMMISSION  
Tod W. Stevenson

STATE OF NEW MEXICO  
DEPARTMENT OF GAME & FISH

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Las Cruces, NM

GERALD "JERRY" A. MARACCHINI  
Rio Rancho, NM

BILL MONTOYA  
Alto, NM

THOMAS "DICK" SALOPEK  
Las Cruces, NM

May 3, 2011

HQ AETC/A7CPP  
266 F Street West  
Randolph Air Force Base, TX 78150-4319  
Attn: Jim Holley

Re: 49<sup>th</sup> Wing Recapitalizaion Draft Environmental Assessment  
NMDGF No. 14427

Dear Mr. Holley,

In response to your letter dated 6 June 2011 regarding the above referenced project, the Department of Game and Fish (Department) does not anticipate significant impacts to wildlife or sensitive habitats.

For more information on listed and other species of concern, contact the following sources:

1. BISON-M Species Accounts, Searches, and County lists: <http://www.bison-m.org>
2. Habitat Handbook Project Guidelines:  
[http://wildlife.state.nm.us/conservation/habitat\\_handbook/index.htm](http://wildlife.state.nm.us/conservation/habitat_handbook/index.htm)
3. For custom, site-specific database searches on plants and wildlife. Go to Data then to Free On-Line Data and follow the directions go to: <http://nmmhp.unm.edu>
4. New Mexico State Forestry Division (505-827-5830) or  
<http://nnrareplants.unm.edu/index.html> for state-listed plants
5. For the most current listing of federally listed species **always** check the U.S. Fish and Wildlife Service at (505-346-2525) or <http://www.fws.gov/ifw2es/NewMexico/index.cfm>.

Thank you for the opportunity to review and comment on your project. If you have any questions, please contact Mark Watson, Habitat Specialist, at (505) 476-8115 or [mark.watson@state.nm.us](mailto:mark.watson@state.nm.us).

Sincerely,

Matt Wunder, Ph.D., Chief  
Conservation Services Division

MW/mlw

xc: Wally Murphy, Ecological Services Field Supervisor, USFWS

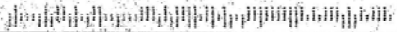
Environmental Assessment  
July 2011

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New Mexico Department of Game and Fish  
P. O. Box 25112  
Santa Fe, NM 87504

Hasler FIRST-CLASS MAIL  
07/22/2011  
US POSTAGE \$00.44<sup>0</sup>  
 ZIP 87507  
011D12601772

HQ AETC/A7CPP  
266 F Street West  
Randolph Air Force Base, TX 78150-4319  
Attn: Jim Holley

07/22 

**Environmental Assessment**  
**July 2011**

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To: Mr. Jim Holley, and Kimberly Fornof

I am taking this opportunity to comment on the Draft Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI) for the proposed Recapitalization of the 49<sup>th</sup> Wing (WG) Capabilities and Capacities, Holloman AFB, New Mexico. Environmental studies such as this EA should be based on common sense, and be fair and objective, free of biased views, but sometimes, that is not apparent. The EA contains vague comments, generalizations, and even discrepancies. Many impacts in the EA are minimized and generalized listed as minimal, no impact, no adverse affects, no impact expected. There needs to be accountability and responsibility for projects that go forward while having significant impact on the human environment.

Furthermore, the EA has had limited distribution and the issue has previously been called to your attention. It has also not been available for the 30 days for public review. If the document isn't available, it makes it difficult for the public to exercise their right to participate in the NEPA process. The EA mentions briefly at least 10 New Mexico Counties that are in part of the proposed airspace that the F-16 will potentially use. With that in mind, all these Counties should have had public notice, and should have had the EA available for at least 30 days within their community for the opportunity to review.

**The following are some of the areas of concern:**

**Aircraft Safety:** Class A mishaps are a safety risk which can have catastrophic consequences to the public now that airspace enhancements are allowing for operations over populated areas. These enhancements were made for the F-22 training without the AF conducting comprehensive Environmental Studies, EIS. An EA was done with "FONSI". These enhancements which allow for flight over populated areas continue to be a source of problems. The F-16 uses Hydrazine, a toxic and dangerous chemical. The effects during a mishap will be an issue, should the proposed action go forward, since the aircraft will be using airspace over populated areas. In June 2011, a Class A mishap involving an F-16 occurred in Wisconsin with the aircraft crashing in a residential area affecting a wide area with evacuations ordered according to media reports. Certain training has no place over populated areas and safety will continue to be an issue unless changes are made that don't allow the flights over populated areas. There have been various Holloman aircraft crashes in the recent past.

**Noise:** The EA contains generalizations, vague information, and discrepancies regarding noise levels. Although noise levels decibels are given for Holloman, AFB schools listing those levels at 70-74, and in regard to Holloman residential areas stating noise levels compatible with residential use is 65 decibels or lower, that same consideration was not provided for all other schools and residential areas in communities that will be affected by the proposed action. Holloman AFB, NM and its residences are not currently nor would they, under the proposed plan, be exposed to the same noise pollution as residents of many New Mexico communities including children, elderly, minorities, the poor, and all other people groups. The EA states that under the proposed action off base noise levels would not exceed 75 decibels therefore wouldn't affects residents, their properties, or socioeconomic conditions. Yet, in other places other information is listed in regards to noise levels stating the F-16 will train in decibels > or = to 65 decibels. This is very vague and doesn't provide the public with the information the public deserves. Thousands of Southern New Mexico people have been affected by the serious noise

pollution from the F-22 aircraft in communities under flight space used by the F-22. The decibel levels have been in the dangerous zones with negative effects experienced due to the extreme noise levels. Widows have broken, walls shaken, vehicles rocked and shaken, and humans and animals also have also been affected by F-22 noise pollution. Some animals have even died from sonic boom effects. The decibel levels have been above and beyond the 65 decibels considered compatible for residential use and also above and beyond what is acceptable for schools at the 75 decibel level or lower. These figures detailed for the off base community are questionable if the F-16 is going to train and test as the F-22 is currently doing. The document states there will be super sonic activity in areas currently being used by the F-22. Accurate information insures that there can be proper evaluation of the proposed action.

The EA document also mentions that, “The FAA and DoD have identified residential use as incompatible with noise levels above 65 dB DNL unless special measures are taken to reduce interior noise levels for affected residences. Schools and childcare centers are considered compatible with noise levels up to 75dB DNL with additional noise attenuation. For noise levels above 75 dB DNL, educational services are not compatible regardless of noise attenuation.” Currently affected communities which would also be affected under the proposed action have not been protected. F-22 operations are allowed in “enhanced” airspace and have been responsible for dangerous noise levels over populated areas. Although, the FAA and DoD have identified what noise levels are compatible to sustain a certain quality of life levels, they are the same agencies that have allowed dangerous noise levels over populated areas in New Mexico, over many children, minorities, the poor, private property, and furthermore, have ignored the public when we have questioned why the public is being subjected to dangerous noise levels and associated effects.

**Sonic booms:** The F-16 EA proposes sonic boom activity in the same flight space it is currently used by the F-22, but there are contradictions because the EA also states that the off base noise levels are not expected to exceed 75 decibels. Sonic boom noise can be double plus the 75 decibels listed, with focused booms and super booms magnified even greater. As per Major Richard M. Roberds, US Air Force, supersonic velocity maneuvers cause focused booms. He states that these focused booms are sonic booms magnified as high as five times under focusing conditions (Sonic Boom and the Supersonic Transport: Air Force University Review, July - August 1971.) The US Navy in it’s EIS RE: Supersonic Operating Area at Fallon Nevada, recognizes that “focus” booms may lead to startle-related accidents involving exposed individuals who are operating automobiles and other equipment. In addition there could be adverse effects on the autonomic nervous system including changes in the vascular respiratory, endocrine and gastrointestinal systems, and the more likely possibility of annoyance, irritability, tension, nervousness, hearing impairments, sleep disturbances, and the inability to concentrate. These same statements made by the Navy in the Fallon Nevada EIS have been made by a physician who witnessed firsthand, a small community in the Nevada desert being harmed by sonic booms from Navy aircraft.

There is sufficient, current research on the sonic boom as well as the effects of noise pollution which should have had a part in this EA with actual data regarding noise levels produced by sonic booms and the aircraft that Holloman is flying over populated areas. = to or > 65 or other such estimates are not sufficient when there’s potential for significant impact to the human environment. The Air Force knows the capabilities of their aircraft.



Furthermore, there are tens of thousands of people in New Mexico who have now been exposed to dangerous numbers of sonic booms many who might not be in agreement with statements in this EA which minimizes the effects that sonic booms and noise pollution can have on quality of life and even health. There is not a shortage of stories and experiences regarding the sonic boom situation in NM as a result of the sonic booming of the innocent public due to airspace enhancements over populated areas that are being used by 5<sup>th</sup> Generation Aircraft and others for supersonic activity and other training and testing. This has never been acceptable and wasn't acceptable even by the military, or FAA, but now many people in New Mexico, their properties, and animals, and environment are being exposed to this controversial sonic boom practice which should never have occurred while at the same time it's being reported that the FAA and DoD have established criteria for acceptable noise limits under 65 and 75 for various structures. No one, human or animal should be exposed to repeated sonic booms. I question any EA that would claim habituation to sonic booms over time occurs. The majority of those compiling information for a research project on noise or sonic booms have not been through any sonic booms. Even sonic booms at higher flight levels have effects.

Sonic booms are weapons of war and terror. They shouldn't have a place in airspace over our communities. Sonic booms were even unacceptable in the Middle East when Israel used sonic booms as a weapon in Gaza. "We simply think that [the sonic booms are] a violation of basic human rights, especially rights of children to live in peace and to be educated in peace." Khaled Abdul Shafi (UN spokesman in Gaza).

It's crucial that EA's and environmental studies be accurate and honest since thousands of people in NM have been exposed to great levels of sonic booms with accurate numbers not disclosed in the EA "FONSI" for the F-22 project. The amount of sonic booms listed as going to occur in a month period of time on the F-22 EA, regularly have been experienced in minutes instead of a month with other sonic booms throughout the month. This has been an injustice to humanity and every living thing. Various EA's for Holloman major projects, including this one being reviewed, have failed to provide the public with an accurate assessment of how dangerous loud jet noise levels, sonic booms, focused booms, and super booms can negatively impact health and the quality of life of those exposed to such noise pollution. Few resources were listed in this EA document for the purpose of compiling information relating to the realities of dangerous noise effects. Sonic booms should have never been allowed to take place over populated areas in the first place. Contrary to the claims that "habituation" takes place in animals and people, based on my experience and knowledge people and animals don't habituate to sonic booms or to excessive aircraft noise. Even "experts" who advise and provide consultation on the sonic boom state that the noise levels associated with the sonic boom is unacceptable and dangerous to the human ear. EA states airport personnel will follow "hearing protection guidelines", what guidelines have been provided for the public to follow? The F-16 isn't conducting supersonic training over the populated areas in Arizona so why does it have to train going super sonic in flight space over populated areas in New Mexico?

**Air Quality and Pollutants:** The EA mentions the chemical Hydrazine that is used by the F-16. The public needs to know more about this chemical and how the waste is handled as well as about contamination issues should a F-16 crash in a populated area. There has been a decline in air quality and increase in air pollution **since** the F-22 arrived to Holloman AFB, NM. The EA for the F-16 training mentions lack of visibility pollutants. The environment has been and is being impacted by pollutants from Holloman aircraft which find their way into the air, land, and



water. The military in NM have always had sufficient airspace and land for training and testing without enhancements to increase flight space. The decline is obvious due to the militarization of some communities.

- **Airspace and Use:** The EA is vague in its break down the percentage of flights in the different available airspace. The EA states that the F-16 will use existing airspace that is currently being used by the F-22. Some people and communities exposed to various F-22 flight operations are experiencing impacts; therefore, the F-16 operations in the same airspace would also have negative impact. Enhancements to airspace made without appropriate input from the public have allowed the space over our homes, workplaces, schools, hospitals, etc., to be used as a training range. The EA mentions acres involved, without providing specific information that is of importance in the evaluation of the EA. The EA does admit that increased military use of airspace is affecting recreational aircraft use due to space issues.
- **Table 2-8. Baseline and Projected Annual Sortie-Operations in Training Airspace:** The accuracy of the number of supersonic flights in restricted airspace by the F-22 Raptor aircraft is questionable. Thousands of people have been exposed to F-22 flights and are aware of what is taking place over our communities as well as WSMR airspace.
- **Table 2-6 Projected F-16 Training Activities:** The EA does not tell us what type of aircraft that will be used as a dissimilar aircraft. It also does not detail the number of aircraft and frequency of the dissimilar air operations.
- **Suppression of Enemy Air Defenses (SEAD):** The EA does not state what airspace units will be utilized. Will these flights occur over civilian populated areas.
- **Combat Search and Rescue (CSAR):** The EA does not state whether these flights will occur over civilian populated areas. The public needs to know this information.
- **2.28 Use of Defensive Countermeasures:** The EA fails to disclose whether Chaff will be used outside the restricted airspace and is vague in the amounts of chaff and flares which will be used
- **Environmental Justice Section:** The EA concludes that there would be no significant impact to low income and minority populations. Minority and low income individuals are being impacted by what is currently taking place in communities where there are dangerous noise levels and exposure to pollutants generated by Holloman AFB, NM aircraft presence that is also affecting air quality. Most of the individuals in such groups are at a disadvantage as they may not have the resources to voice their concerns regarding what is affecting them, or to be able to relocate to a safer community if they are being significantly impacted by negative affects from the aircraft activities since other resources may be scarce preventing or limiting their options.
- **Affected Environment-Schools and Children:** Many New Mexico children, including poor and minority children, are being affected by the militarization taking place in area civilian communities due to training and testing from Holloman AFB, NM. They are being exposed to dangerous noise levels while at school, home, and elsewhere. They are

also being exposed to many pollutants and are under danger zones should aircraft crash. Holloman AFB, NM children are not being affected by dangerous decibel levels from the aircraft noise, sonic booms, and focused booms as are the children in other NM communities nor will they be affected by the F-16 proposed action.

- **Biological and Cultural Resources:** These resources need to be protected and is the reason why there should be limits to the acreage that is taken by the military for its training and testing.
- **Table 3-11 Baseline Off-Base Land Uses within the 65db DNL and Greater Noise Contours:** The table shows “0” at 80dB and above levels, but does not say where that information came from.
- **Table 2-10. Current and Projected Annual Air-to-Ground Munitions:** Impact on air quality as a result of the increased disturbance to the ground during the bombing and gunnery operations at Oscura, Centennial & Red Rio ranges (Primarily particulate and elevated radiation levels).
- **Table 2-11 Current and Projected Annual-Chaff and Flare use:** The EA gives a number on how many chaff bundles and flares they use. Deploying over 7,000 bundles of chaff and 7,000 flares over our environment will have negative affects. Current chaff used by the F-22 continues to be a problem especially when it affects populated areas. Chaff and flares should not be used over populated areas or near populated areas where it is blown over the public and their property. These pollutants have found themselves in our community even in large amounts in some areas. Residual from chaff has been seen on private property. Military flare use has been evident in our skies, even recently in times of severe drought and extreme fire danger; although the EA states that flares won’t be used in during extreme drought and fire danger. New Mexico has been under severe drought and has experienced many fires, some covering large areas, for some time now. The AF needs to protect our environment.
- The EA does not give a review of complaints filed with HAFB Public Affairs and claims for damages caused by F-22 operations.

Mrs. Schuster

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## Appendix B

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## Appendix B Environmental Resource Definition, Region of Influence, and Applicable Laws

This chapter defines the environmental resources potentially affected by the Proposed Action. It also describes the region potentially affected by the action and any laws that govern the protection or management of the resource.

### B.1 Airspace Management and Use

Airspace management generally refers to the manner in which the Federal Aviation Administration (FAA), United States (U.S.) Department of Defense (DoD), and other responsible agencies coordinate and integrate the use of the nation's navigable airspace to ensure all aviation activities are conducted safely and efficiently. The following sections describe how the National Airspace System (NAS) airspace is structured, classified, and regulated to meet both military and civil aviation needs.

#### B.1.1 Regulatory Setting

Navigable airspace is above the minimum altitudes of flight prescribed by regulations under United States Code (U.S.C.) Title 49, Subtitle VII, Part A and includes airspace needed to ensure safety in the takeoff and landing of aircraft (49 USC 40102). This navigable airspace is a limited natural resource that Congress has charged the FAA to administer in the public interest to ensure the safety of aircraft and efficient use (FAA Order 7400.2G) (FAA 2008). Management of this resource considers how airspace is designated, used, and administered to accommodate the individual and common needs of military, commercial, and general aviation. The FAA considers multiple and sometimes competing demands for aviation airspace and other special needs to determine how the NAS can best be structured to address all user requirements.

The FAA has categorized U.S. airspace as controlled, special use, other, or uncontrolled airspace. Controlled airspace is airspace of defined dimensions within which Air Traffic Control (ATC) service is provided to Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) flights in accordance with the airspace classification. Controlled airspace is categorized into five separate classes: Classes A through E, with uncontrolled airspace designated as Class G. Each classification is described below and depicted in Figure B 1 as contained in the FAA Aeronautical Information Manual and the Pilot/Controller Glossary addendum to this Manual (FAA 2010). These classes identify airspace that supports airport and en route flight operations and also dictates pilot qualification requirements, rules of flight that must be followed, and the type of navigational and communications equipment necessary to operate within that airspace.

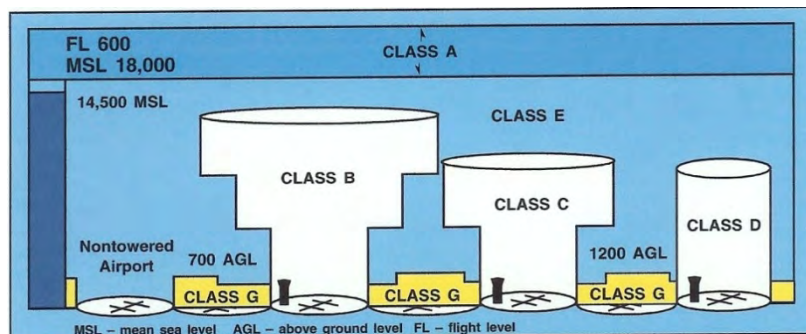


Figure B 1. Controlled and Uncontrolled Airspace Depictions

**Class A Airspace** - Is generally airspace from 18,000 feet above Mean Sea Level (MSL) up to and including 60,000 feet. Altitudes within this airspace are expressed as a Flight Level (FL). FL is the altitude above MSL that is based upon the use of a directed barometric altimeter setting and is expressed in hundreds of feet. Therefore, FL 600 is equal to approximately 60,000 feet MSL. Class A airspace includes the airspace overlying the waters within 12 nautical miles (nm) of the coast of the 48 contiguous states and Alaska (FAA 2008).

**Class B Airspace** – Is generally that airspace from the surface to 10,000 feet MSL around the nation’s busiest airports. The primary purpose of this class is to reduce the potential for midair collisions in the airspace surrounding those airports with high-density air traffic operations. The actual configuration of Class B airspace is tailored individually, but essentially resembles an inverted wedding cake consisting of a surface area and two or more layers, and is designed to contain all published instrument procedures for the runway environment (FAA 2008).

**Class C – Airspace** – Is generally airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports with an operational control tower, serviced by radar approach control, and with a certain number of IFR operations or passenger enplanements. Although the actual configuration of Class C airspace is individually tailored, it usually consists of a surface area with a five nm radius and an outer circle with a ten nm radius that extends from 1,200 feet to 4,000 feet above the airport elevation (FAA 2008). The primary purpose of Class C airspace is to improve aviation safety by reducing the risk of midair collisions in the terminal area and enhancing the management of air traffic operations therein.

**Class D Airspace** – Is generally airspace from the surface to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower. The configuration of each Class D airspace area is tailored individually and, when instrument procedures are published, the airspace is normally designed to contain those procedures. Arrival extensions for instrument approach procedures may be designated as Class D or Class E airspace (FAA 2008).

**Class E Airspace** – Consists of the following types of airspace that are not considered Class A, B, C, or D as defined above.

1. **Surface Area Designated for an Airport** - Airspace that is configured to contain all instrument procedures.
2. **Extension to a Surface Area** - These airspace areas serve as extensions to Class B, C, and D surface areas designated for an airport. This airspace provides controlled airspace to contain standard instrument approach procedures without imposing a communications requirement on pilots operating under VFR.
3. **Airspace Used for Transition** - These areas begin at either 700 or 1,200 feet Above Ground Level (AGL) for use in transitioning aircraft to/from the terminal or en route environment.
4. **En Route Domestic Airspace Areas** - These areas extend upward from a specified altitude to provide controlled airspace where there is a requirement for IFR en route ATC services, but where the federal airway system is inadequate.
5. **Federal Airways** - Victor Routes that are Class E airspace areas and, unless otherwise specified, extend upward from 1,200 feet to, but not including, 18,000 feet MSL.

6. **Other** - Unless designated at a lower altitude, Class E airspace begins at 14,500 feet MSL and extends upward to, but not including, 18,000 feet MSL and overlies the following:
  - a) The 48 contiguous states including the waters within 12 nm from the coast of the 48 contiguous states.
  - b) The District of Columbia.
  - c) Alaska, including the waters within 12 nm from the coast of Alaska and that airspace above FL 600.
  - d) Excludes the Alaskan Peninsula west of 160°00'00" west longitude and the airspace below 1,500 feet above the surface of the earth, unless specifically designated.
7. **Offshore/Control Airspace Areas** - This includes airspace areas farther than 12 nm from the coast of the U.S., wherein ATC services are provided (FAA 2008).

**Class G Airspace** – Airspace that has not been designated as Class A, B, C, D, or E. This is considered uncontrolled airspace in which ATC does not have authority over aircraft operations. This airspace follows the contours of the Earth's surface with vertical altitude limits up to 700 feet AGL, 1,200 AGL, or 14,500 MSL, as applicable. VFR general aviation pilots are the primary users of this airspace (FAA 2008).

**Special Use Airspace (SUA)** – Designated airspace within which flight activities are conducted that requires confinement of participating aircraft or placement of operating limitations on nonparticipating aircraft. The four types of SUA addressed in this EA include restricted areas, Military Operations Areas (MOAs), Air Traffic Control Assigned Airspace (ATCAA), and Military Training Routes (MTRs).

1. **Restricted Areas** - Designated under 14 Code of Federal Regulations (CFR) 73 as airspace within which the flight of aircraft, while not wholly prohibited, is subject to restriction. This airspace is used to support to ground or flight activities that could be hazardous to nonparticipating aircraft. Most restricted areas are designated joint use, where IFR/VFR operations may be authorized within the airspace by the controlling ATC facility when it is not being utilized by the using agency.
2. **MOAs** - Airspace of defined vertical and lateral limits established outside Class A airspace to separate and segregate certain nonhazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted. MOAs are considered "joint use" airspace. Nonparticipating aircraft operating under VFR are permitted to enter a MOA even when it is active for military use. Aircraft operating under IFR must remain clear of an active MOA unless approved by the responsible ATC agency. Flights by both participating and VFR nonparticipating aircraft are conducted under the "see-and-avoid" concept, which stipulates that "when weather conditions permit, pilots operating IFR or VFR are required to observe and maneuver to avoid other aircraft." Right-of-way rules are contained in CFR Part 91. The responsible ATC agency provides separation between MOA participants and IFR nonparticipating air traffic. The "see and-avoid" procedures mean that if a MOA were active during inclement weather, the general aviation pilot could not safely access the MOA airspace.
3. **Airspace for Special Use** – Includes MTRs and is further designated as either IFR routes or VFR routes. MTRs are flight corridors of defined vertical and lateral dimensions that permit low-altitude flight training at altitudes below 10,000 feet MSL and at airspeeds in



excess of 250 knots. These routes are developed in accordance with criteria defined in FAA Order 7610.4N (FAA 2009).

- a) **MTRs** - MTRs are flight corridors of defined vertical and lateral dimensions that permit low-altitude flight training at airspeeds below 10,000 feet MSL and at airspeeds in excess of 250 knots. These routes are developed in accordance with criteria defined in FAA Order 7610.4N.
- b) **ATCAAs** - ATCAAs are airspace of defined vertical and lateral limits located at 18,000 feet MSL and above. They are frequently structured and used to extend the horizontal and/or vertical boundaries of MOAs for higher altitude flight training within Class A airspace. It is assigned by ATC to provide air traffic segregation between military training activities and other IFR traffic.

The Air Force manages airspace in accordance with processes and procedures detailed in Air Force Instruction (AFI) 13-201, *Airspace Management*. AFI 13-201 implements Air Force Planning Document 13-2, *Air Traffic Control, Airspace, Airfield, and Range Management*, (Air Force 2007) and DoD Directive 5030.19, *DoD Responsibilities on Federal Aviation and National Airspace System Matters*. It addresses the development and processing of SUA and covers aeronautical matters governing the efficient planning, acquisition, use, and management of airspace required to support Air Force flight operations.

Air Force management of training ranges involves the development and implementation of those processes and procedures required by AFI 13-212 to ensure that Air Force ranges are planned, operated, and managed safely; that all required equipment and facilities are available to support range use; and that proper security for range assets is present. The overall purpose of range management is to balance the needs of the military to accomplish realistic testing and training while minimizing potential impacts on the environment and surrounding communities.

### **B.1.2 Methodology**

Potential impacts of the Proposed Action on airspace use at Holloman AFB, the SUA, and other training venues where F-16 sortie missions would be conducted were assessed by comparing projected operations (including F-22 consolidation) with the current baseline use of each operations environment. As no modifications or additions are proposed for the current airspace structure under the Proposed Action, this analysis focused on what impacts, if any, the additional F-16 operations combined with other aircraft basing activities may have on airspace use.

### **B.2 Noise**

Noise is defined as unwanted sound has the potential to affect several environmental resource areas. Appendix C describes noise impacts on human annoyance and health and potential physical impacts of noise on structures. Noise impacts on biological and cultural resources, land use and recreation, socioeconomic issues, and environmental justice are discussed in more detail in Sections B.6 (Biological Resources), B.7 (Cultural Resources), 2.7.8 (Land Use and Recreation), B.9 (Socioeconomics), and B.10 (Environmental Justice).

### **B.3 Safety**

Safety addresses the ground, explosive, and flight safety associated with the Proposed Action. Ground safety considers issues associated with facility construction/renovation, operations, and maintenance activities that support base operations, including fire response and Anti-Terrorism/Force Protection AT/FP measures. It also considers the safety of personnel and facilities on the ground that may be at risk from flight operations near the airfield and in the airspace. Although ground and flight safety are addressed independently, it should be noted that near the runway, risks associated with safety-of-flight issues are interrelated with ground safety concerns.

This EA addresses the F-16 Block 42 flight risks and safety issues associated with the conduct of aviation activities at the installation and in the airspace. Any F-16 accident at the airfield would have direct impact on the ground near the mishap due to explosion, fire, and debris spread. Class A mishaps and bird-aircraft strike hazards are addressed specifically.

#### **B.3.1 Regulatory Setting**

Numerous federal, civil, and military laws and regulations govern operations at Holloman AFB and the surrounding airspace. Individually and collectively, these laws and regulations proscribe measures, processes, and procedures to ensure safe operations and to protect the public, military, and property.

#### **B.3.2 Methodology**

The elements of the Proposed Action that could potentially affect safety are evaluated relative to the degree to which the action increases or decreases safety risks to the public or to private property. Ground, fire, and flight safety are assessed for the potential to increase risk and the capability to manage that risk by responding to emergencies.

The Defense Department Explosives Safety Board (DDESB) 6055.9-Standard and Air Force Manual (AFM) 91-201, *Explosives Safety Standards*, represent DoD and Air Force guidelines, respectively, for complying with explosives safety. These regulations, as well as AFI 91-204, identify explosives safety mishaps that involve both explosive and chemical agents. Explosives include ammunition, propellants (solid and liquid), pyrotechnics, warheads, explosive devices, and chemical agent substances and associated components that present real or potential hazards to life, property, or the environment.

Siting requirements for munitions and ammunition storage and handling facilities are based on safety and security criteria. Defined distances are maintained between Munitions Storage Areas (MSAs) and other types of facilities. These distances, called Quantity-Distance (Q-D) arcs are determined by the type and quantity of explosive material to be stored. Each explosive material storage or handling facility has Q-D arcs extending outward from its sides and corners for a prescribed distance. Within these Q-D arcs, development is either restricted or prohibited to ensure personnel safety and to minimize potential for damage to other facilities in the event of an accident. In addition, explosives storage and handling facilities must be located in areas where security of the munitions can be maintained at all times. Identifying the Q-D arcs ensures that construction does not occur within these areas.

Since flight operations for the F-16 would occur where military aircraft currently operate, Air Force accident classifications are utilized in this evaluation. The Air Force defines the following four categories of aircraft mishaps:

1. **Class A Mishap** - Results in a loss of life, permanent total disability, a total cost in excess of \$2 million, destruction of an aircraft, or damage to an aircraft beyond economical repair.
2. **Class B Mishap** - Results in total costs between \$500,000 and \$1 million, permanent partial disability, or inpatient hospitalization of three or more personnel but does not result in fatalities.
3. **Class C Mishap** - Reportable damage of more than \$20,000 but less than \$500,000 and a lost workday involving eight hours or more away from work beyond the day or shift during which it occurred or occupational illness that causes loss of work at any time.
4. **Class E Mishap (High Accident Potential [HAP] Incident)** - Minor incidents that do not meet any of the criteria for Class A, B, or C mishaps.

Class C mishaps and HAP incidents are the most common types of accidents and represent relatively unimportant incidents since they generally involve minor damage and injuries and rarely affect property or the public.

Class A mishaps are of primary concern due to their potentially catastrophic results. Analysis of flight risks correlates Class A mishap rates and bird/wildlife-aircraft strike hazards with projected airfield and airspace utilizations.

#### **B.4 Air Quality**

Air quality in a given location is defined by the size and topography of the air basin, the local and regional meteorological influences, and the types and concentrations of pollutants in the atmosphere, which are generally expressed in units of parts per million (ppm) or micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). One aspect of significance is a pollutant's concentration in comparison to a federal and/or state ambient air quality standard. These standards represent the maximum allowable atmospheric concentrations that may occur and still protect public health and welfare and include a reasonable margin of safety to protect the more sensitive individuals in the population. EPA established national standards, the National Ambient Air Quality Standards (NAAQS), which represent maximum acceptable concentrations that generally may not be exceeded more than once per year, except for the annual standards, which may never be exceeded. State standards, established by the New Mexico Environmental Improvement Board (EIB) and enforced by the New Mexico Air Quality Bureau (AQB), are termed the New Mexico Ambient Air Quality Standards (NMAAQS). The NMAAQS are at least as restrictive as the NAAQS and they include standards for Total Suspended Particulate matter (TSP) for which there is no national standards. Table B 1 presents the NAAQS and NMAAQS. Under the Clean Air Act (CAA), state and local agencies may establish air quality standard and regulations of their own, provided these are at least as stringent as the federal requirements. These state and local standards and regulations are described in detail in Section 3.4 of this EA.

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**Table B 1. National and New Mexico Ambient Air Quality Standards**

Pollutant	Averaging Time	New Mexico Standards	National Standards <sup>a</sup>	
			Primary <sup>b,c</sup>	Secondary <sup>b,d</sup>
Ozone (O <sub>3</sub> )	8-hour	—	0.075 ppm (147 µg/m <sup>3</sup> )	Same as primary
Carbon Monoxide (CO)	8-hour	8.7 ppm	9 ppm (10 mg/m <sup>3</sup> )	—
	1-hour	13.1 ppm	35 ppm (40 mg/m <sup>3</sup> )	—
Nitrogen Dioxide (NO <sub>2</sub> )	Annual	0.05 ppm	0.053 ppm (100 µg/m <sup>3</sup> )	Same as primary
	24-hour	0.10 ppm	—	—
	1-hour	—	0.10 ppm (188 µg/m <sup>3</sup> )	—
Sulfur Dioxide (SO <sub>2</sub> )	Annual	0.02 ppm	—	—
	24-hour	0.10 ppm	—	—
	3-hour	—	—	0.5 ppm (1,300 µg/m <sup>3</sup> )
	1-hour	—	0.075 ppm (105 µg/m <sup>3</sup> )	—
Particulate Matter less than 10 Microns in Diameter (PM <sub>10</sub> )	24-hour	—	150 µg/m <sup>3</sup>	Same as primary
Particulate Matter less than 2.5 Microns in Diameter (PM <sub>2.5</sub> )	Annual	—	15 µg/m <sup>3</sup>	—
	24-hour	—	35 µg/m <sup>3</sup>	—
Lead	Rolling 3-Month Period	—	0.15 µg/m <sup>3</sup>	Same as primary
	Calendar Quarter	—	1.5 µg/m <sup>3</sup>	Same as primary
Total Suspended Particulates (TSP)	<b>Annual (geometric mean)</b>	<b>60 µg/m<sup>3</sup></b>	—	—
	<b>30-day Average</b>	<b>90 µg/m<sup>3</sup></b>	—	—
	<b>7-Day</b>	<b>110 µg/m<sup>3</sup></b>	—	—
	<b>24-hour</b>	<b>150 µg/m<sup>3</sup></b>	—	—

**Notes:**

- <sup>a</sup> Standards other than those based on annual averages. Generally, are not to be exceeded more than once a year.
- <sup>b</sup> Concentrations are expressed first in units in which they were promulgated and equivalent units are given in parentheses.
- <sup>c</sup> Primary standards are the levels of air quality necessary, with an adequate margin of safety to protect the public health.
- <sup>d</sup> Secondary standards are the levels of air quality necessary to protect the public welfare from any known or anticipated adverse impacts of a pollutant.

**Key:**

ppm = parts per million                      mg/m<sup>3</sup> – milligrams per cubic meter                      µg/m<sup>3</sup> – micrograms per cubic meter

The federal 8-hour Ozone (O<sub>3</sub>) standard is attained when the measured average of the annual fourth-highest daily maximum 8-hour average concentration is less than or equal to 0.075 ppm. For carbon monoxide and Particulate Matter with an aerodynamic diameter of ten microns or less (PM<sub>10</sub>), the federal standards are not to be exceeded more than once per year. The federal annual nitrogen dioxide standard is attained when the annual arithmetic mean concentration in a calendar year is less than or equal to 0.053 ppm. The 1-hour nitrogen dioxide standard is attained when the 3-year average of the 98th percentile of the daily maximum 1-hour average concentration does not exceed 0.10 ppm. For sulfur dioxide, the primary federal standard is attained if the 1-hour concentration is less than or equal to 0.075 µg/m<sup>3</sup>. The federal standards for Particulate Matter with an aerodynamic diameter of 2.5 microns or less (PM<sub>2.5</sub>) are attained when the annual arithmetic mean concentration is less than or equal to 15 µg/m<sup>3</sup> and when the 98th percentile of 24-hour concentration is less than or equal to 65 µg/m<sup>3</sup>.

O<sub>3</sub> concentrations are the highest during the warmer months of the year and coincide with the

period of maximum insulation. Maximum O<sub>3</sub> concentrations tend to be homogeneously spread throughout a region, as it often takes several hours to convert precursor emissions to O<sub>3</sub> in the atmosphere. Inert pollutants, such as Carbon Monoxide (CO), tend to have the highest concentrations during the colder months of the year, when light winds and nighttime/early morning surface-based temperature inversions inhibit atmospheric dispersion. Maximum inert pollutant concentrations are usually found near an emission source.

**Greenhouse Gases (GHGs)** - Gases that trap heat in the atmosphere. These emissions are generated by both natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the Earth's temperature. The U.S. Global Change Research Program report, *Global Climate Change Impacts in the United States*, states the following (USGCRP 2009):

- Observations show that warming of the climate is unequivocal. The global warming observed over the past 50 years is due primarily to human-induced emissions of heat trapping gases. These emissions come mainly from the burning of fossil fuels (coal, oil, and gas), with important contributions from the clearing of forests, agricultural practices, and other activities.
- Warming over this century is projected to be considerably greater than over the last century. The global average temperature since 1900 has risen by about 1.5 degrees Fahrenheit (°F). By 2100, it is projected that the global average temperature would increase another two to 11.5 °F. The average temperature in the U.S. has risen by a comparable amount. It is very likely to rise more than the global average over this century with some variation from place to place. Several factors will determine future temperature increases. Increases at the lower end of this range are more likely if global heat-trapping gas emissions are cut substantially. If emissions continue to rise at or near current rates, temperature increases are more likely to be near the upper end of the range. Volcanic eruptions or other natural variations could temporarily counteract some of the human-induced warming that slows the rise in global temperature, but these impacts would only last a few years.
- Reducing emissions of carbon dioxide would lessen warming over this century and beyond. Sizable early cuts in emissions would significantly reduce the pace and the overall amount of climate change. Earlier cuts in emissions would have a greater impact in reducing climate change than comparable reductions made later. Reducing emissions of some shorter-lived heat-trapping gases, such as methane, and some types of particles, such as soot, would begin to reduce warming within weeks to decades.
- Climate-related changes have been observed globally and in the U.S. including increases in air and water temperatures; reduced frost days; increased frequency and intensity of heavy downpours; a rise in sea level; and reduced snow cover, glaciers, permafrost, and sea ice. A longer ice-free period on lakes and rivers, lengthening of the growing season, and increased water vapor in the atmosphere has also been observed. Over the past 30 years, temperatures have risen faster in winter than in any other season, with average winter temperatures in the Midwest and northern Great Plains increasing more than 7°F. Some of the changes have been faster than previous assessments had suggested.
- These climate-related changes are expected to continue while new ones develop. Likely future changes for the U.S. and surrounding coastal waters include more intense hurricanes with related increases in wind, rain, and storm surges (but not necessarily an

increase in the number of these storms that make landfall), as well as drier conditions in the Southwest and Caribbean. These climate-related changes will affect human health, water supply, agriculture, coastal areas, and many other aspects of society and the natural environment (USGCRP 2009).

GHGs include water vapor, carbon dioxide, methane, nitrous oxide, O<sub>3</sub>, and several hydrocarbons and chlorofluorocarbons. Each GHG has an estimated Global Warming Potential (GWP), which is a function of its atmospheric lifetime and its ability to absorb and radiate infrared energy emitted from the Earth's surface. The GWP of a particular gas provides a relative basis for calculating its Carbon Dioxide Equivalent (CO<sub>2e</sub>) or the amount of carbon dioxide that emissions of that gas would equal. Carbon dioxide has a GWP of one, and is, therefore, the standard by which all other GHGs are measured.

The potential impacts of GHG emissions from the Proposed Action are global. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, the GHG emissions from the project alternatives have been quantified to the extent feasible in this EA for information and comparison.

#### **B.4.1 Regulatory Setting**

The CAA and its subsequent amendments establish air quality regulations and NAAQS and delegate the enforcement of these standards to the states. The New Mexico AQB is responsible for enforcing air pollution regulations. The CAA establishes air quality planning processes and requires areas in nonattainment of an NAAQS to develop a State Implementation Plan (SIP) that details how the state will attain the standard within mandated timeframes. The requirements and compliance dates for attainment are based on the severity of the nonattainment classification of the area. The following summarizes the air quality rules and regulations that apply to the project actions.

**Requirements for Class 1 Areas** - As part of the Prevention of Significant Deterioration (PSD) Regulation, the CAA provides special protection for air quality and air quality-related values (including visibility and pollutant deposition) in selected areas of the U.S. (National Parks greater than 6,000 acres or National Wilderness Areas greater than 5,000 acres). These Class 1 areas are areas where any appreciable deterioration of air quality is considered significant. In 1999, EPA promulgated a regional haze regulation that requires states to establish goals and emissions reduction strategies to make initial improvements in visibility within their respective Class 1 areas. Visibility impairment is defined as a reduction in the visual range and atmospheric discoloration. Criteria to determine the significance of air quality impacts within Class 1 areas usually pertain to stationary emission sources, as mobile sources are generally exempt from permit review by regulatory agencies. However, Section 169A of the CAA states the national goal of prevention of any future impairment of visibility within Class 1 areas from manmade sources of air pollution. Therefore, due to the proximity of these pristine areas to proposed aircraft operations, this EA provides a qualitative analysis of the potential for proposed emissions to affect visibility within these areas.

**GHGs** - EPA has recently promulgated several final regulations involving GHGs under the authority of the CAA or as directed by Congress. None of which applies directly to the

Proposed Action. Under the CAA, EPA has recently promulgated an endangerment finding involving motor vehicle tailpipe emissions of GHGs (*Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act*, 74 FR 66496, December 15, 2009) (EPA 2009a); a regulation to control light-duty automobile exhaust emissions of GHGs (*Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards*, 75 FR 25324, May 7, 2010) (EPA and DOT 2010); and a tailoring rule establishing PSD thresholds for major stationary sources of GHGs (*Prevention of Significant Deterioration and Greenhouse Gas Tailoring Rule*, 75 FR 31514, June 3, 2010) (EPA 2010a). In addition, as directed by Congress, EPA promulgated a final GHG reporting rule (Mandatory Reporting of GHGs, 74 Federal Register 56260, October 30, 2009) (EPA 2010b).

In its final endangerment finding, EPA determined that GHGs threaten the public health and welfare of the American people and those GHG emissions from on-road vehicles contribute to that threat. In the light-duty vehicle rule precipitated by the endangerment finding, EPA and the Department of Transportation's National Highway Traffic Safety Administration finalized a joint rule to establish a national program consisting of new standards that apply to the manufacturers of model year 2012 through 2016 light-duty vehicles that will reduce GHG emissions and improve fuel economy. Resulting from the light-duty vehicle rule, EPA believed that the tailoring rule for PSD and Title V permitting was necessary.

The tailoring rule is necessary because with promulgation of the GHG rule for light-duty vehicles, PSD and Title V applicability requirements are triggered for stationary sources of GHG emissions as of January 2, 2011. The rule establishes two initial phase-in steps. Step 1 begins on January 2, 2011, and covers only sources and modifications that would otherwise undergo PSD or Title V permitting based on emissions of non-GHG pollutants. No additional PSD permitting actions or Title V permitting will be necessary solely due to GHG emissions during this period. A Best-Available Control Technology (BACT) review of the GHG emissions may be required if the PSD permit process is under way for non-GHG emissions and the net increase in GHG emissions exceeds 75,000 Tons Per Year (TPY) CO<sub>2e</sub>. Sources with Title V permits must address GHG requirements when they apply for, renew, or revise their permits. Step 2 begins on July 1, 2011 and covers new large sources of GHG emissions that have the potential to emit 100,000 TPY of CO<sub>2e</sub> or more (provided that they also emit GHGs or some other regulated New Source Review pollutant above the 100/250 TPY [mass based] statutory thresholds), and modifications at existing sources that increase net GHG emissions by 75,000 TPY CO<sub>2e</sub> or more (provided it also results in an increase of GHG emissions on a mass basis).

GHG emission sources that equal or exceed the 100,000 TPY CO<sub>2e</sub> threshold are required to obtain a Title V permit if they do not already have one. Under the mandatory reporting rule, fossil fuel and industrial GHG suppliers, motor vehicle and engine manufacturers, as well as facilities that emit 25,000 metric tons or more per year CO<sub>2e</sub>, will be required to report GHG emissions data to EPA annually (EPA 2010b). The first annual reports were submitted to EPA in early 2011 covering calendar year 2010. Affected facilities were required to have a monitoring plan in place by April 1, 2009.

On February 18, 2010, the Council on Environmental Quality (CEQ) released its *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions*, which suggests that proposed actions that would be reasonably anticipated to emit 25,000 metric tons or more per year CO<sub>2e</sub> should be evaluated by quantitative and qualitative assessments

(CEQ 2010). This is not a threshold of significance, but a minimum level that would require consideration in NEPA documentation. The purpose of quantitative analysis of CO<sub>2e</sub> emissions in this EA is for its potential usefulness in making reasoned choices among alternatives.

#### **B.4.2 Methodology**

The air quality analysis estimated the magnitude of emissions that would occur from proposed construction activities at Holloman AFB and F-16 operations at Holloman AFB and within affected airspaces. The estimation of proposed operational impacts is based on the net change in emissions between existing F-22 aircraft operations and projected F-16 operations within the Holloman AFB project region. Air quality impacts from proposed activities were reviewed for significance in light of federal, state, and local air pollution standards and regulations. The project region currently attains all NAAQS so the project's air quality analyses used the PSD regulation threshold for new major sources of 250 TPY of a pollutant as an indicator of the significance or non-significance of projected air quality impacts. The analysis also evaluated how proposed emissions would affect air quality within federal Class 1 areas that exist within the Holloman AFB project region.

**Construction** - Implementation of the Proposed Action would require construction and/or renovation of training facilities, hangars, F-16 parking aprons, maintenance and fueling facilities, and housing facilities. Air quality impacts due to proposed construction activities would occur from (1) combustive emissions due to the use of fossil fuel-powered equipment and (2) fugitive dust emissions (PM<sub>10</sub>/PM<sub>2.5</sub>) due to the operation of equipment on exposed soil. Equipment and truck activity data were used to estimate combustive and fugitive dust emissions from the proposed construction projects.

Factors needed to derive construction source emission rates were obtained from the *Compilation of Air Pollution Emission Factors*, AP-42, Volume I (EPA 1995), the EPA NONROAD model for nonroad construction equipment (EPA 2009b), and the MOBILE6.2 model for on-road vehicles (EPA 2003). The analysis reduced fugitive dust emissions generated from the use of construction equipment on exposed soil by 50 percent from uncontrolled levels to simulate implementation of best management practices for fugitive dust control. These best management practices for fugitive dust control include the following:

1. Use water trucks to keep areas of vehicle movement damp enough to minimize the generation of fugitive dust.
2. Minimize the amount of disturbed ground area at a given time.
3. Suspend all soil disturbance activities when winds exceed 25 miles per hour or when visible dust plumes emanate from the site and stabilize all disturbed areas with water application.
4. Designate personnel to monitor the dust control program and to increase watering, as necessary, to minimize the generation of dust.

**Operations** - Sources associated with proposed F-16 operations and existing F-22 operations replaced by proposed operations would include (1) operations and engine maintenance/testing of aircraft, (2) onsite Personal and Government-Owned Vehicles (POVs and GOVs), (3) offsite POV commutes, (4) Aerospace Ground Equipment (AGE), (5) nonroad mobile equipment, and



(6) stationary and other sources. Operational data used to calculate proposed F-16 aircraft emissions are consistent with those evaluated in the project noise analyses of this EA. Factors used to calculate combustive emissions for the F-16 aircraft were obtained from the Air Force (AFCEE 2009).

Emissions from proposed POV and GOV sources were estimated by multiplying emissions from existing operations at Holloman AFB by the ratio of the proposed F-16 and existing Holloman AFB populations. Emissions from nonroad and stationary sources were estimated by multiplying emissions for each source category due to existing operations by the ratio of proposed F-16 and existing aircraft numbers. Emissions from AGE usages for proposed F-16 aircraft are based on AGE usages for F-16 aircraft at Luke AFB (MACTEC 2004).

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

## **B.5 Physical Resources**

Physical resources encompass both soils and water. The term “soils” refers to unconsolidated materials formed from the underlying bedrock or other parent material. Soils play a critical role in both the natural and human environment.

Water resources include surface water, groundwater, and floodplains. Surface-water resources include lakes, rivers, and streams and are important for a variety of reasons including economic, ecological, recreational, and human health factors. Groundwater includes the subsurface hydrologic resources of the physical environment and its properties are often described in terms of depth to aquifer or water table, water quality, and surrounding geologic composition. Floodplains are areas adjacent to creeks and rivers that flood during major rain events. Either new construction must be completed outside designated floodplain boundaries or the proposed structures must be designed to withstand peak storm flows.

### **B.5.1 Regulatory Setting**

The Clean Water Act (CWA) of 1977 (33 USC § 1251 *et seq.*) and EPA’s Stormwater General Permit regulate pollutant discharges. Pollutants regulated under the CWA include “priority” pollutants, including various toxic pollutants such as biochemical oxygen demand, total suspended solids, fecal coliform, oil and grease, and pH. Section 404 of the CWA and Executive Order (EO) 11990, *Protection of Wetland*, regulate development activities in or near streams or wetlands. Potential development actions that may affect streams and/or wetlands require a permit from the United States Army Corps of Engineers (USACE) for dredging and filling in wetlands. EO 11988, *Floodplain Management*, requires that federal agencies take action to reduce the risk of flood damage by minimizing the impacts of floods on human safety, health, and welfare and by restoring and preserving the natural and beneficial values served by floodplains. Federal agencies are directed to consider the proximity of their actions to, or their location within, floodplains. Wetlands are discussed in more detail in Chapter 3, Section 3.6.1.2.

With respect to soil erosion, Section 402(p) of the CWA regulates non-point source discharges of

pollutants under the National Pollutant Discharge Elimination System (NPDES) program or under an equivalent state program. The State of New Mexico has entered into the state authorization process for taking control of the permitting process of the NPDES program (NMED 2010). This Section 402(p) amendment to the CWA required EPA to establish regulations for discharges from active construction sites. NPDES general construction permits require preparation of a Stormwater Pollution Prevention Plan (SWPPP) for projects greater than one acre.

### **B.5.2 Methodology**

Impact on soils and surface water can result from earth disturbance that exposes soil to wind or water erosion. Analysis of impacts on soils and surface water examines the potential for erosion and describes typical measures employed to minimize erosion. Soil limitations and typical engineering remedial measures are evaluated for proposed construction. Flooding impacts are evaluated by determining whether proposed construction is located within a designated floodplain. Groundwater impacts are evaluated by determining whether groundwater beneath the project site would be used for the Proposed Action and if so, to determine if there is the potential for an adverse impact on those groundwater resources. Soils and water resource impacts are not evaluated for the areas below the primary use airspace for the F-16.

## **B.6 Biological Resources**

Biological resources consist of native and naturalized plants and animals and their habitats, including wetlands. In this EA, biological resources have been divided into vegetation, wildlife, wetland and aquatic communities, and special status species. All of these resources are governed by similar and related regulations and are analyzed using similar methodologies.

### **B.6.1 Regulatory Setting**

The Sikes Act applies to federal land under DoD control and requires military services to establish Integrated Natural Resource Management Plans (INRMPs) to conserve natural resources for their military installations. The INRMPs include evaluations of threatened and endangered species, other fish and wildlife resources, wetlands, migratory bird habitat, and forestlands. INRMPs are developed in cooperation with United States Fish and Wildlife Service (USFWS) and state fish and wildlife agencies.

The CWA and the EPA's Stormwater General Permit regulate pollutant discharges. Section 404 of the CWA and EO 11990 regulate development activities in or near streams or wetlands. Potential development actions that may affect streams and/or wetlands require a permit from the USACE for dredging and filling in wetlands.

The Endangered Species Act (ESA) of 1973 (16 U.S.C. §§ 1531-1544, as amended) established measures for the protection of plant and animal species that are federally listed as threatened and endangered and for the conservation of habitats that are critical to the continued existence of those species. Federal agencies must evaluate the impacts of the Proposed Action through a set of defined procedures that can include the preparation of a biological assessment and can require formal consultation with USFWS under Section 7 of ESA.

Compliance with ESA requires communication and consultation with USFWS whenever a

federal action could affect listed, threatened, and endangered species; species proposed for listing; or candidates for listing. The primary focus of this consultation is to request a list of the protected species that may occur in the ROI. If any are present, a determination of the potential impacts on the species is made. If there are no protected species that would be affected by the Proposed Action, no additional action is required.

Letters were sent to the appropriate USFWS offices and state agencies informing them of the Proposed Action and requesting data regarding applicable protected species. Appendix A includes copies of relevant coordination letters sent by the Air Force.

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703 *et seq.*) governs potential impacts on migratory birds or their active nests including harm or harassment in the form of actions affecting reproductive success. While all forms of migratory bird “take” are prohibited, some exceptions for incidental take during military training is allowed under Section 315 of the 2003 National Defense Authorization Act. The MBTA allows DoD (military services) the unintentional take of migratory birds during military readiness activities. The Final Rule was published in the *Federal Register* on February 28, 2007 (USFWS 2007) directing the Armed Forces to assess the impacts of military readiness activities on migratory birds in accordance with NEPA. It also requires the armed forces to develop and implement appropriate conservation measures if a Proposed Action may have a significant adverse impact on a migratory bird population.

In 2006, DoD and USFWS entered into a Memorandum of Understanding (MOU) to promote the conservation of migratory birds in accordance with EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*. This EO outlines the responsibilities of federal agencies to protect migratory birds in accordance with the MBTA, the Bald and Golden Eagle Protection Act, the Fish and Wildlife Coordination Act, ESA, and NEPA. The MOU describes specific actions that should be taken by DoD to advance migratory bird conservation, avoid or minimize the take of migratory birds, and ensure DoD operations (other than military readiness activities) are consistent with the MBTA. The MOU also describes how USFWS and DoD will work together to achieve these ends.

### **B.6.2 Methodology**

Assessment of impacts to biological resources considers the local scale and regional level. The local scale is the area immediately surrounding Holloman AFB. This area and resources are most affected by proposed construction impacts. The regional level is used to look at a broader-scale including the operational impacts that may occur on resources that have suitable habitat under the project airspace units.

Mapping data for the biological resources affected environment included vegetation; wildlife; wetlands and aquatic communities; and threatened, endangered, and special status species were obtained from a number of federal and state agencies, primarily in Geographic Information System (GIS) format. The data were mapped along with proposed project components (bases/airports, auxiliary fields, and airspace) and acres of vegetation cover types and habitat were calculated in GIS. Impact analysis was conducted using knowledge of wildlife habitat and sensitive species occurrence data (where available) and was based on where construction-related ground disturbance, range impact, airfield operations (takeoffs, landings,

engine run-ups), and other activities would likely occur in airspace and MTRs. Assessing the significance of direct and indirect impacts on biological resources is based on federal and state determinations of the importance (legal, commercial, recreational, ecological, or scientific) of the resource; the rarity of a species or habitat regionally; the sensitivity of the resource to proposed construction and training activities; the proportion of the resource that would be affected relative to its occurrence in the region; and the duration of the impact.

Federal or state agencies consider impacts on biological resources to be greater if priority species or habitats are adversely affected, if substantial impacts occur over relatively large areas, and/or if disturbances cause reductions in population size or distribution of a priority species. Specialists also reviewed many similar regional project documents and used their professional judgment to interpret published findings of experimental and observational studies of overflight and noise impacts on wildlife.

## **B.7 Cultural Resources**

Cultural resources are districts, sites, buildings, structures, or objects considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. They include archaeological, historic architectural/engineering and traditional resources. Cultural resources that are eligible for listing in the National Register of Historic Places (NRHP) are called historic properties and are evaluated for potential adverse impacts from an action. Some cultural resources, such as Native American traditional or sacred sites may not be historic properties but are also evaluated under NEPA for potential adverse impacts from an action and are identified through consultation with appropriate Native American groups.

In compliance with the National Historic Preservation Act (NHPA) Section 106, the Area of Potential Effect (APE) (36 CFR 800.4[a][1]) for direct impacts equates to areas that would experience construction and construction-related activities including the main base area (cantonment) of Holloman AFB, which consists of approximately 8,000 acres within the southern portion of the base. Actual potential construction impacts would involve a much smaller area. It would also include range locations where construction is anticipated including the Oscura Range at White Sands Missile Range (WSMR), the Centennial Range at Fort Bliss' McGregor Range, and the Red Rio Range at WSMR. The cultural resources APE for indirect impacts related to airspace actions at Holloman AFB equates to the land area beneath the 65 dB contours at Holloman AFB, the airfield at RIAC, the emergency divert airfield at Biggs AAF, and the MOAs, MTRs, and other airspace to be utilized by the F-16s.

### **B.7.1 Regulatory Setting**

DoD Instruction 4715.16 and AFI 32-7065 outline and specify procedures for cultural resource management on Air Force installations. Laws pertinent to the Proposed Action include NHPA of 1966 (as amended), the Antiquities Act of 1906, the Historic Sites Act of 1935, NEPA of 1969 as amended, the Archaeological and Historic Preservation Act of 1974, the Archaeological Resources Protection Act of 1979, the Native American Graves Protection and Repatriation Act of 1990, and the American Indian Religious Freedom Act of 1978.

Under Section 106 of NHPA, the Air Force is required to consider the effects of its undertakings at the location for historic properties that are either listed or eligible for listing in the NRHP and to consult with the State Historic Preservation Office (SHPO) and other consulting parties

regarding potential impacts as per 36 CFR 800. Under Section 110 of NHPA, the location is mandated to maintain an active historic preservation program and provide stewardship of cultural resources “consistent with the preservation of such properties and the mission of the agency (Section 470 h-2(a))”. Federal regulations governing cultural resource activities include 36 CFR 800, *Protection of Historic Properties* (incorporating amendments effective August 5, 2004), 36 CFR 79, *Curation of Federally Owned and Administered Archaeological Collections*, 43 CFR 7, *Protection of Archaeological Resources*, 36 CFR 60, *National Register of Historic Places*, and 36 CFR 63, *Determinations of Eligibility for Inclusion in the National Register*.

Cultural resource-related EOs that may affect the alternative locations includes EO 11593, *Protection and Enhancement of the Cultural Environment*; EO 13007, *Indian Sacred Sites*; EO 13175, *Consultation, and Coordination with Indian Tribal Governments*; and EO 13287, *Preserve America*.

### **B.7.2 Methodology**

Under federal law, impacts on cultural resources may be considered adverse if the resources are eligible for listing (or are listed) in the NRHP or are important to Native American groups. An NRHP-listed or NRHP-eligible resource is a historic property. When an action impacts a historic property, it alters the resource’s characteristics including relevant features of its environment or use in such a way that it no longer qualifies for listing in the NRHP. Impacts on traditional resources are identified in consultation with affected Native American groups.

Historic properties within the APE were identified through previous documentations efforts. Cultural resources that have not been formally evaluated for NRHP eligibility are treated as historic properties (i.e., resources that are eligible for listing on the NRHP) until a formal evaluation is made. Impacts on historic properties are assessed in accordance with the implementing regulations for Section 106 of NHPA (36 CFR 800.5) and the management documents for each installation (Holloman, WSMR, and Fort Bliss). If there are no resources eligible for NRHP, then no historic properties are affected. Property that is not eligible for the NRHP, such as some that are of traditional cultural and religious importance to Native Americans, may be protected by other laws, regulations or practice.

Analysis of potential impacts on cultural resources considers both direct and indirect impacts. Direct impacts may occur by physically altering, damaging, or destroying all or part of a resource, altering characteristics of the surrounding environment that contribute to the resource’s significance, introducing visual or audible elements that are out of character with the property or alter its setting, or neglecting the resource to the extent that it deteriorates or is destroyed. Direct impacts can be assessed by identifying the types and locations of proposed activities and determining the exact location of cultural resources that could be affected. Indirect impacts generally result from the impacts of project-induced population increases and the need to develop new housing areas, utility services, and other support functions to accommodate population growth. These activities and the subsequent use of the facilities can affect cultural resources.

## **B.8 Land Use and Recreation**

**Land Use** - 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 and protect specially designated or environmentally sensitive areas.

The attributes of land use addressed in this analysis include the land use regulatory setting, general land use patterns within the installations/airports and in surrounding areas, and Special Use Land Managed Areas (SULMAs). The regulatory setting includes applicable federal, state, and local statutes and regulations, plans, programs, and ordinances. General land use patterns address the types of uses within a particular area. SULMAs generally include areas under the airspace that are identified by federal and state agencies as areas to be managed according to established plans and guidelines.

**Recreation** - Recreational resources are outdoor recreational activities that take place away from the residences of participants. This includes public facilities in suburban and urban areas (such as parks, playing fields, amphitheatres, and outdoor sports facilities) and natural areas (such as United States Forest Service [USFS] and U.S. Bureau of Land Management- [BLM]-managed land) and associated developed picnic areas, campgrounds, historical and educational sites, and trails that are designated or available for public outdoor recreational use.

### **B.8.1 Regulatory Setting – Land Use**

The regulatory setting for land use includes the key federal, state, and local statutes, regulations, plans, policies, and programs applicable to land use on and near Holloman AFB. In the Proposed Action, RIAC would serve as an auxiliary airfield and Biggs AAF would serve as an emergency airfield. For the purpose of this analysis, the land use discipline assumed the federal noise compatibility requirements as identified below.

**Airfield and Heliport Planning and Design - DoD UFC 3-260-01** - Several siting criteria have been established specific to land development and use at commercial and military airfields. To maintain safety, the Air Force adheres to guidelines set forth in Unified Facilities Criteria (UFC) 3-260-01, *Airfield and Heliport Planning and Design* (UFC 3-260-01). These criteria include Clear Zones (CZs), Accident Potential Zones (APZs), and other obstruction zones relative to airfield environments. These and other criteria related to safety, security, and other land use issues are used to assist planners and decision makers with appropriate siting of facilities affecting design and physical layout of Air Force installations.

**FICUN Land Use Guidelines (1980)** - In 1980, FICUN was formed to develop federal policy and guidance on noise. The committee included EPA, FAA, the Federal Highway Administration, DoD, the U.S. Department of Housing and Urban Development (HUD), and the U.S. Department of Veterans Affairs. The designations contained in the FICUN compatibility table for land use do not constitute a federal determination that any use of land covered by the program is acceptable or unacceptable under federal, state, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities.

The FICUN guidelines (FICUN 1980) consider areas with noise levels of 75 DNL or greater to be unacceptable living environments. Areas between 65–74 DNL are considered “generally unacceptable” for noise-sensitive land uses such as residences, schools, hospitals, and public services. Houses located in areas between 65–74 DNL may not qualify for federal mortgage insurance without installing noise attenuation. In the outdoor noise environment, levels greater than 65 DNL may be annoying to some people during communication. Generally, residential development is not recommended in areas experiencing noise levels of 65 dBA or greater. Although discouraged, residential development is compatible within the 65–69 dBA and 70–74 dBA contours, provided noise reduction levels of 25 dB and 30 dB, respectively, are achieved. Commercial/retail businesses are compatible without restrictions up to 69 dBA and compatible up to 79 dBA if noise reduction levels of 25 dB and 30 dB, respectively, are achieved for public areas. Industrial/manufacturing, transportation, and utility companies are compatible with a high noise-level and can be located within the higher noise zones.

**Air Installation Compatibility Use Zone (AICUZ) Program (DoD Instruction 4165.57) -** Establishes the AICUZ program, which is similar to the FAA’s Federal Aviation Regulations Part 150 program for civil airports. The AICUZ program is a DoD discretionary program designed to promote compatible land use around military airfields. The military services maintain an AICUZ program to protect the operational integrity of their flying mission.

- Areas around airfields are exposed to the potential of aircraft accidents despite well-maintained aircraft with highly trained aircrews. DoD developed the AICUZ program to aid in the development of planning mechanisms that protect the safety and health of personnel on and near military airfields and to preserve operational capabilities. The AICUZ program consists of three distinct parts: APZs, hazards to air navigation (height and obstruction criteria established by the FAA), and noise zones.
- Bases use the AICUZ program to provide land use compatibility guidelines for areas exposed to increased safety risks and noise near the airfield. The noise compatibility guidelines recommended in the AICUZ program are similar to those used by HUD and FAA to provide information to surrounding jurisdictions to guide planning and regulation of land use. When noise levels exceed a DNL of 65 dB, residential land uses are normally considered incompatible.

**Air Force Comprehensive Planning Program (AFI 32-7062) -** Establishes the Comprehensive Planning Program for Air Force installations, which is an Air Force discretionary program designed to establish a framework for decision making with regard to the development of Air Force installations. It incorporates Air Force programs such as operational, environmental, urban planning, and others to identify and assess development alternatives and ensure compliance with applicable federal, state, and local laws, regulations, and policies.

**General Plan -** The General Plan is a decision makers’ summary document that contains text, maps, plan graphics, photographs, and other information in a condensed format. It provides this information at an appropriate level of detail for the installation, command, and other decision makers to understand the character and structure of the installation and its development potential. The General Plan summarizes information from the component plans and other planning documents. It is updated as needed to provide flexibility in responding to command and installation mission changes.

- **Joint Land Use Study (JLUS) Program** – JLUS is managed by the Office of Economic Adjustment, Office of the Secretary of Defense. This program is a DoD initiative that provides grants to state and local governments to coordinate with Air Force installations in developing land use plans compatible with their flying mission. JLUS encourages cooperative land use planning between military installations and adjacent communities so that future community growth and development are compatible with the training and operational missions of the installation. Similar to the AICUZ program, JLUS is a cooperative land use planning effort between the affected local government and neighboring military installation(s). A local or regional agency takes the lead in conducting JLUS.
- **Holloman AFB AICUZ** - Identifies noise contours for noise levels that exceed 65 dB DNL from operations (Holloman AFB 2004a). These noise contours extend over Holloman AFB, the southeast portion of WSMR, the northeast portion of White Sands National Monument, and portions of unincorporated Otero County. Privately held land in noise-impacted areas is designated for open/agricultural/low-density uses and is considered compatible. One exception is an area located along Highway 70 known as Government Subdivision, a very small residential/commercial area now located inside the 65 dB DNL contour.
- **Holloman AFB General Plan** - Prepared in response to AFI 32-7062. The general plan is a component of the base's comprehensive plan, which guides overall organization and development of the base to support the mission. It defines 12 land use categories to achieve the most effective use of land and facilities. For the most part, existing land uses on the base have been developed within planning and safety criteria to be compatible with each other including safety and security restricted zones, contamination avoidance sites, and natural features such as floodplains, wetlands, and sensitive habitats.

**Otero County Comprehensive Plan** - Does not specifically designate a land use category or overlay for Holloman AFB although it is referred to as federal property (Otero County 2005). The goal of the county plan, as applicable to Holloman AFB, is to ensure that the Holloman AFB mission is not jeopardized by incompatible growth.

Most of the Otero County land that lies between the eastern boundary of Holloman AFB and the Alamogordo city limits is located within the extraterritorial jurisdiction of the City of Alamogordo. Joint city and county review of land development activities within a radius of five miles of the city limits is allowed by state statute. In addition, the City of Alamogordo is responsible for issuing all building and development permits in this area.

**Fort Bliss, Texas and New Mexico Mission and Master Plan (Army 2007)** - Addresses air operations, land uses, and other functions at Fort Bliss and other associated facilities, including Biggs AAF.

### **B.8.2 Regulatory Setting – Recreation**

Guidance and recommendations for noise compatibility with some recreational activities is provided in the same guidelines, regulations, and programs described in the above sections for land use. There are no specific regulations governing the availability of recreational resources. Under the Federal Land Policy and Management Act, federal land managers are responsible for preserving and managing public lands for the benefit of the public at large including access to,



and enjoyment of, public lands for recreational purposes. This requires balancing of uses to meet multiple needs of individuals and national interests.

### **B.8.3 Methodology – Land Use**

The ROI for land use includes lands within and surrounding Holloman AFB, RIAC (for use as an auxiliary airfield), and lands under the training airspace. Biggs AAF will serve only as an emergency airfield. The methodology for evaluating land use impacts includes identifying existing land uses on Holloman AFB using the General Plan and identifying surrounding land use near Holloman AFB using county land use data and overlaying baseline noise contours.

Once these features were identified, the degree to which on-base land uses would be affected by construction was addressed considering the proposed location of facilities. The extent to which off-base land uses would be affected was analyzed by evaluating the location of facility development to determine proximity to off-base areas. In addition, the acres of each land use and number of people affected by noise impacts related to the Proposed Action were estimated. The methodology for estimating the affected population is provided in Section 3.2, Noise.

Land use was classified according to a standardized set of land use classifications that are based on the generalized land use categories described in the Air Force Handbook (AFH) 32-7084, *The AICUZ Program Manager's Guide*). Since local land use classifications differ from categories in AFH 32-7084, some aggregation of local land use classifications was required. For example, all residential land uses were aggregated as simply residential for this analysis. Transportation is not listed specifically in the AFH 32-7084 generalized land use categories, but was a predominant feature in land use datasets provided by localities. Transportation is similar to open and agricultural land uses in terms of having relatively low noise sensitivity and similar noise compatibility criteria in the standard Air Force compatibility matrix for land use and was aggregated with open and agricultural in this analysis. Where the description of generalized land use types in AFH 32-7084 did not specifically state a land use type included in local land use data, the most appropriate land use was selected. Descriptions of the land use categories used in this analysis include:

**Residential** - All types of residential activity such as single- and multi-family residences and orphanages.

**Commercial** - Wholesale or retail establishments including offices, stores, restaurants, hotels, and motels. For this analysis, airports other than those specified in the Proposed Action, were classified as commercial.

**Industrial** - Manufacturing, warehouses, and other similar uses.

**Public/Quasi-Public** - Publicly owned lands and lands open to public access includes military reservations, prisons, public buildings, schools, churches, non-residential charitable establishments, cemeteries, and medical facilities (unless medical care is provided in home, in which case the land use was classified as residential).

**Recreational** - Land designated for recreational activity includes parks, golf courses, and wildlife and nature areas.

**Open** - Refers to undeveloped land.

**Agricultural** - Includes cropland, grazing lands, and livestock production. It may include single-family residences located within an agricultural parcel where the residence is the primary residence for persons engaging in agriculture.

**Resource Extraction** - Includes such activities as mining or quarrying.

**Transportation** - Includes roads, railroads, and other linear ground transportation infrastructure.

Other data sources for the land use analysis included existing environmental studies and reports, field visits, and personal communications. Descriptions of general land use patterns and land management practices are based on materials presented in installation and airport planning documents such as the general plans and airport master plans for the base. For land use surrounding Holloman AFB and other airfields, comprehensive plans and general plans prepared by local jurisdictions are used.

**Land Use Underlying Training Airspace** - To evaluate land uses underlying the airspace, SULMAs were identified by using the Environmental Systems Research Institute (ESRI) federal lands datasets and the Managed Areas Database (MAD). The ESRI federal lands dataset identified lands administered by various federal agencies such as USFS, USFWS, national parks, national monuments, and wilderness areas. The MAD dataset was filtered to show items at a state or local level since federal lands were already covered in the ESRI dataset. Examples of land included in the MAD dataset are state and local parks and state wildlife refuges. Wilderness Study Areas (WSAs) that are located in New Mexico are not on the ESRI federal lands dataset, but were included in the MAD dataset.

The area of each SULMA was calculated using GIS to determine the acreage and percentage of the SULMA below the airspace units. If a SULMA consisted of more than one part (i.e., polygon), the areas were totaled so that calculations included the entire area. Airspace units were calculated individually since some MOAs, MTRs, ranges, and restricted airspaces overlap each other. The affected SULMAs were exported in a tabular format listed by airspace unit. How the SULMAs would be affected by the various scenarios was evaluated by reviewing projected changes in noise levels compared to the baseline scenario for subsonic noise (DNL<sub>mr</sub>), supersonic noise (CDNL), and the daily number of sonic booms.

#### **B.8.4 Methodology – Recreation**

The ROI for recreation includes the area comprising Holloman AFB and the surrounding lands as well as lands underneath the airspace and near the auxiliary airfield. Evaluation of recreational resources considers whether proposed changes would preclude, displace, or alter the suitability of an area or facility for ongoing or planned recreational uses. This could be triggered by changes in noise, access, visual context, availability of recreational sites, or change in the desired qualities of an area that contribute to recreational opportunity. The analysis also considers the relative importance of the affected resource. This is a qualitative assessment of the resources' value based on popularity/visitation, management goals, and availability of similar recreational opportunities.

**Recreation Surrounding Primary and Auxiliary Airfields** - For the area surrounding airfields, the following effects are considered:

- **Aircraft Operations** - The effects on outdoor recreation areas or facilities due to the changes in noise levels and activities from aircraft operations at the airfields was considered. The analysis used the FAA’s recommended average sound levels (Table B 2. ) for land use compatibility of various recreational activities to evaluate impacts. Also considered was the degree of change in noise exposure, the change in frequency of operations, and the time of day. Changes of more than 3 dB DNL over current levels are usually noticeable to persons familiar with the local context.

**Table B 2. Recreational Land Use Compatibility  
with Yearly Day-Night Average Sound Levels (DNL)**

Recreational Land Use	Yearly Day-Night Average Sound Level (DNL) in Decibels					
	<65	65-70	70-75	75-80	80-85	>85
Outdoor Sports arenas and Spectator Sports	Y	Y*	Y*	N	N	N
Outdoor Music Shells and Amphitheaters	Y	N	N	N	N	N
Nature Exhibits and Zoos	Y	Y	N	N	N	N
Amusement Parks, Resorts, and Camps	Y	Y	Y	N	N	N
Golf Courses, Riding Stables, and Water Recreation	Y	Y	25	30	N	N

**Note:** \* Land use is compatible provided special sound reinforcement systems are installed.

**Key:**

Y = Land use and related structures are compatible without restrictions.

N = Land use and related structures are not compatible and should be prohibited.

25, 30 = Land use and related structures are generally compatible; recommend noise level reduction (outdoor to indoor) of specified dB through incorporation of noise attenuation in structures.

- **Construction Effects** - Effects from noise and dust or changes in visual context from construction on outdoor recreation activities or facilities. The analysis considers the distance of potential construction areas from recreational sites and the relationship and appearance of new facilities relative to surrounding recreational areas and uses.
- **Population Increase** - Effects of increased personnel and family members on local recreational resources surrounding the primary staging base. The analysis considers the relative change in population from the action in the given community and the degree to which it could affect the capacity of local recreational resources to serve area residents.

**Recreation Underlying Training Airspace** - The analysis of potential impacts of noise caused by military aircraft in training airspace on regional recreational resources considers the noise sensitivity of affected recreational sites or settings, degree of change in noise exposure, frequency of operations, altitudes of overflights, and time of day. Also considered is the relative popularity and value of recreational activities and opportunities for residents and visitors/tourists within the context of the region. The analysis emphasizes the potential change in noise exposure in areas that are relatively pristine or quiet and addresses increases in sound levels of specific events and sonic booms that can be startling to persons in outdoor settings.

Most impacts result from specific events affecting persons engaged in a recreational activity at a particular time. The varying levels of operations under the scenarios may increase the potential for effects from single events. The following paragraphs provide a review of the multiple considerations and the relativity of a noise-driven impact assessment on recreation.

Noise from aircraft operations can change the context in which recreation is undertaken. Recreational opportunity is classified by BLM partially by the type of challenge afforded to participants. One of the opportunity factors is degree of isolation and remoteness as quiet and naturalness is an intrinsic part of remote recreational experiences. Changes that affect quiet settings could affect the spectrum and quality of recreational opportunities in an area without affecting the actual use of the recreational area. Peoples' reactions to noise in recreational settings vary. A study by USFS found that visitors to wilderness areas did not generally notice high-altitude aircraft noise intrusions, although startle effects from low-flying, high-speed aircraft were noticed and reported as annoying by some visitors (USFS and NPS 1992).

Visitors have varying perspectives on whether aircraft overflights are a positive or detrimental factor to their outdoor experience. Some outdoor sporting participants generate localized noise using vehicles and mechanical equipment (such as portable generators). Others seek a more natural experience on foot and away from vehicles. Reactions vary depending on individual expectations and the context in which aircraft-caused noise occurs. These incidences are not likely to be persistent and would have only temporary impacts on any given experience. These events are not expected to change visitor habits or recreational land use overall, but intermittent overflight during individual recreational events could annoy some affected participants.

A common concern is the potential for noise to interfere with hunting activities. A sudden low-level overflight could startle an animal and a hunter preparing to shoot. Some game animals or birds may be susceptible to noise and scatter when a sudden loud noise occurs. Noise impacts on game species are addressed in Section 4.6, Biological Resources. Startle effects can also cause a safety risk for rock climbing or other physically challenging tasks requiring a high degree of concentration. Locations where training is performed on weekends would have a higher potential to affect recreation, as this is when most recreation activity takes place.

The noise impact of sonic booms could similarly disrupt or startle persons in outdoor settings. Even very infrequent sonic booms may cause annoyance for recreational activities where quiet is desirable such as remote hiking, camping, and hunting. Due to their infrequency, sonic booms may be startling, but should have a minimal impact on the overall quality of recreational opportunities or experiences. Sonic booms can startle animals and could cause a horse or pack animal to bolt or react, possibly resulting in infrequent accidents. There is no way to prevent a location from experiencing a sonic boom if aircraft are performing supersonic maneuvers in an overlying, or even a nearby, MOA, or ATCAA.

The interface between military aircraft and recreational use of airspace for flying, parasailing, gliding, and ballooning is an air safety concern. Since the F-16 would use existing military training airspace, these activities would already be known/identified with appropriate avoidance procedures or local protocols. An increase in military use could affect the availability of airspace for recreational uses in some locations. Current procedures and processes for coordinating and scheduling airspace would help ensure individual test, training, and other operational requirements are met including those required to complete F-16 syllabus training.

## **B.9 Socioeconomics**

Socioeconomics refers to features or characteristics of the socioeconomic environment including employment, earnings, population, and housing. Factors also include military payroll and

expenditures associated with activities at Holloman AFB. For population, consideration focuses on identifiable changes in the magnitude and geographical distribution of population, while housing addresses the composition of the housing stock and recent trends in the real estate market. The data, thus presented, can be assessed against local, regional, and national trends. The most recently published data were used for the analysis and the period is specified for each resource. The majority of impacts associated with implementation of the Proposed Action are likely to occur within a circumscribed geographical area. For Holloman AFB, the ROI includes the area immediately surrounding the base, the City of Alamogordo, Otero County, and the counties underlying the airspace proposed for use by the F-16 training mission.

### **B.9.1 Regulatory Setting**

Socioeconomics does not have an applicable regulatory setting. NEPA provides no specific thresholds of significance for socioeconomic impact assessment. Significance varies, depending on the setting of the proposed action (40 CFR 1508.27[a]), but 40 CFR 1508.8 states that indirect effects may include those that are growth inducing and others related to induced changes in the pattern of land use, population density, or growth rate.

### **B.9.2 Methodology**

The socioeconomic analysis focuses on the effects resulting from the incoming personnel, as well as construction programs under the Proposed Action, which contribute additional income and new demands for products and services on the local economy that would lead to additional population growth, employment growth, greater earnings, and increased demand for public services. The net change for each socioeconomic indicator is compared to the existing conditions in the ROI to identify the intensity of the effects. The magnitude of these effects is estimated through economic impact analysis, which models the relationship between industrial sectors and household expenditures.

Potential impacts on schools are evaluated by estimating the number of school-aged dependents accompanying military members and assessing the capacity of the schools, using state-mandated maximum class sizes. For the State of New Mexico, the maximum class sizes are dictated by the New Mexico Administrative Code (NMAC) Title 6, Chapter 29, Part 1. Potential impacts on public services are evaluated by estimating the additional number of law enforcement, firefighter, or medical services personnel to maintain the existing level of service following an increase in the population of the ROI. These analyses are estimates of potential impacts and are not indications of requirements. The capacity of schools and availability of public services are subject to the availability of tax revenues and other local economic conditions.

## **B.10 Environmental Justice**

Environmental justice refers to the evaluation, in accordance with requirements of EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, and EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks* of the potential for disproportionate impacts on minority and low-income populations and children from implementing the proposal. Minority populations include all persons identified by the 2010 Census as Blacks, American Indians, Eskimos, Aleuts, Asians, Pacific Islanders, and persons of Hispanic or Latino origin of any race.

The 2010 Census did not collect information on income or poverty levels. The U.S. Census Bureau now collects and releases data on poverty through the American Community Survey as five-year estimates down to the census tract level. The latest American Community Survey was released in 2010 providing estimates based on 2005-2009 data. Low-income populations include persons living below the poverty level (\$21,954 for a family of four in 2009, adjusted based on household size) as reported in the *2005-2009 American Community Survey* by the U.S. Census Bureau. The percentage of low-income persons is calculated as a percentage of all persons for whom the Census Bureau determines poverty status, which is generally a slightly lower number than the total population as it excludes institutionalized persons, persons in military group quarters and college dormitories, and unrelated individuals under 15 years old. For the purposes of this analysis, children are defined as persons age 17 and younger, as enumerated by the 2010 Census.

### **B.10.1 Regulatory Setting**

The objective of EO 12898 includes identification of disproportionately high and adverse health and environmental effects on minority and low-income populations that could be caused by a proposed federal action. Accompanying EO 12898 was a Presidential Transmittal Memorandum that referenced existing federal statutes and regulations (including NEPA) to be used in conjunction with the EO. The CEQ issued environmental justice guidelines under NEPA in December 1997 (CEQ 1997). Air Force guidance for implementation of the EO is contained in *The Interim Guide for Environmental Justice Analysis with the Environmental Impact Analysis Process*, dated November 1997 (Air Force 1997). The federal government maintains a government-to-government relationship with many Native American tribes so Native American populations may be addressed separately in the environmental justice analysis or they may be included in data that identify minority populations. The objectives of EO 13045 include identification and assessment of environmental health risks and safety risks caused by a federal action that may disproportionately affect children.

### **B.10.2 Methodology**

The demographic profile of the region provides the context within which the environmental justice analysis was conducted. To determine whether environmental impacts would disproportionately affect minority or low-income populations, it is necessary to establish an appropriate basis of comparison. This basis is the "community of comparison", which consists of the geopolitical units that encompass the noise impact footprint of the proposed project. The environmental justice analysis used this community of comparison to define the affected area. Most environmental effects from the alternatives are expected to occur within areas encompassing the base and on lands under the airfield noise contours. Noise impacts within the airspace associated with the F-16 beddown were also considered. If there were a potential increase in the number of persons adversely affected by the 65-DNL-and-above noise contour, then a more detailed evaluation would be completed. This includes estimating the percentage of minority and low-income persons that would be affected by the increased noise. A comparison is then made between these percentages and the ones previously calculated for the community of comparison to determine if there would be a disproportionate impact under the noise contour due to the Proposed Action.

Population estimates for geographic areas underlying the airfield noise contours (for existing

and proposed conditions) were calculated using data from the 2010 Census. Data for variables including total population, race, and ethnicity status were developed for block groups beneath the 65-DNL-and-above noise contours. Block groups, which are geographic units of analysis defined by the 2010 Census, are generally composed of one to four city blocks containing approximately 550 housing units, though in rural areas they contain larger areas defined by physical or political boundaries such as county lines. In cases where part of a block group was located under the noise contour, the percentage of the individual block group located under the contour was calculated and then used to multiply the census variables for greater accuracy. Data for the individual block groups were then summed to estimate the total population and minority population under the noise contours.

For estimates of the low-income population affected by airfield noise, data from the 2005-2009 *American Community Survey* (described in Section B.10) at the census tract level was used to estimate the percent of the population living below the poverty thresholds. This percent of impoverished individuals was then applied to the 2010 affected population to extrapolate the number of low-income persons affected by airfield noise.

For the analysis of EO 13045, counties underlying the 65-DNL-and-above airfield noise contours were identified and the percentage of children ages 17 and younger was calculated. Locations of schools and childcare centers were also analyzed as noise-sensitive receptors.

## **B.11 Infrastructure**

Infrastructure assets at each installation include electrical and natural gas, potable water, wastewater, solid waste, and the storm drainage system.

### **B.11.1 Regulatory Setting**

The primary laws and orders governing Air Force actions relative to infrastructure assets includes the Energy Policy Act of 2005, the Energy Independence and Security Act of 2007, and EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, Federal Register Part VII, *Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance* (October 2009). The legislative focus is to set goals for reducing use of energy and water and minimizing the generation of wastewater and solid materials. Goals are clearly defined as percentage reductions from a base year.

The CWA of 1977 (33 USC § 1251 *et seq.*) and the USEPA Stormwater General Permit regulate pollutant discharges that could affect aquatic life forms or human health and safety.

The Safe Drinking Water Act (SDWA) is the main federal law that ensures the quality of Americans' drinking water. Under SDWA, EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards.

### **B.11.2 Methodology**

Potential impacts on infrastructure elements are assessed in terms of effects of implementing construction projects and personnel changes on existing service levels. Impacts on utilities are assessed with respect to the potential for disruption or improvement of current utility systems, deterioration, or improvement of existing levels of service, and changes in existing levels of

utility safety. Impacts may arise from physical changes to utility corridors, construction activity, and changes in the demand for services caused by changes in personnel. The evaluation also provides a descriptive assessment of measures being implemented to achieve the Air Force's energy vision and strategies to meet reductions as set out in the laws and EOs. The analysis focuses on project elements that could impede progress toward desired goals for the installation and emphasizes the positive measures incorporated into projects and the installation as a whole that achieve benefits towards reaching sustainability goals.

## **B.12 Transportation**

Transportation resources include the infrastructure required for the movement of people, materials, and goods. The resource includes not only adequate sizing (capacity) but also access to the network to undertake travel as needed on a day-to-day basis.

### **B.12.1 Regulatory Setting**

There are no federal regulations specifically mandating thresholds for movement of people. Level-of-service on roadways (as a measure of traffic flow) on existing transportation networks is used by the Department of Transportation to plan system improvements and expansions.

### **B.12.2 Methodology**

To assess potential environmental consequences associated with transportation resources, increased utilization of the existing roadway system due to the potential increase of personnel is analyzed, as well as the potential effects of construction activities. Anticipated impacts on the operational characteristics of these roadways, using levels of service and other metrics are identified.

## **B.13 Hazardous Materials and Waste**

The terms "hazardous materials" and "hazardous waste" refer to substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act and the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act (RCRA) of 1976. In general, hazardous materials include substances that, due to their quantity, concentration, or physical, chemical, or infectious characteristic may present substantial danger to public health or the environment when released into the environment. Hazardous wastes that are regulated under RCRA are defined as any solid, liquid, contained gaseous, or semisolid waste, or any combination of wastes that exhibit either one or more of the hazardous characteristics of ignitability, corrosivity, toxicity, or reactivity. In addition, certain types of waste are listed or identified as hazardous in 40 CFR Part 261. The Environmental Restoration Program and Installation Restoration Program are DoD programs to identify, characterize, and remediate contamination from past activities at DoD installations.

### **B.13.1 Regulatory Setting**

Hazardous materials are identified and regulated under the Comprehensive Environmental Response, Compensation, and Liability Act; Occupational Safety and Health Administration; and Emergency Planning and Community Right-to-Know Act. Hazardous materials have been defined in AFI 32-7086, *Hazardous Materials Management*, to include any substance with special characteristics that could harm people, plants, or animals (AFI 32-7042). 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.

### **B.13.2 Methodology**

The qualitative and quantitative assessment of impacts from hazardous materials and waste management focuses on how (and to what degree) the Proposed Action may affect hazardous materials usage and management, hazardous waste generation and management, and hazardous waste disposal. An impact is considered significant if the generation of hazardous waste types or quantities could not be accommodated by the current management system and/or there were an increased likelihood of an uncontrolled release of hazardous materials that could potentially contaminate the soil, surface water, groundwater, or air.

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## Appendix C

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## Appendix C Noise Impact and Assessment Methods

Noise impacts can be quantified based on objective effects (such as hearing loss or damage to structures) or subjective judgments (such as community annoyance). Thus, assessment of impacts requires a combination of the physical measurement of noise as well as assessment of psycho-acoustic and socio-acoustic effects. Noise is defined subjectively as being any unwanted sound. The following sections discuss the description of noise, the potential effects that noise may have on its receivers, and the methods by which noise levels are predicted.

### C.1 Characteristics of Sound

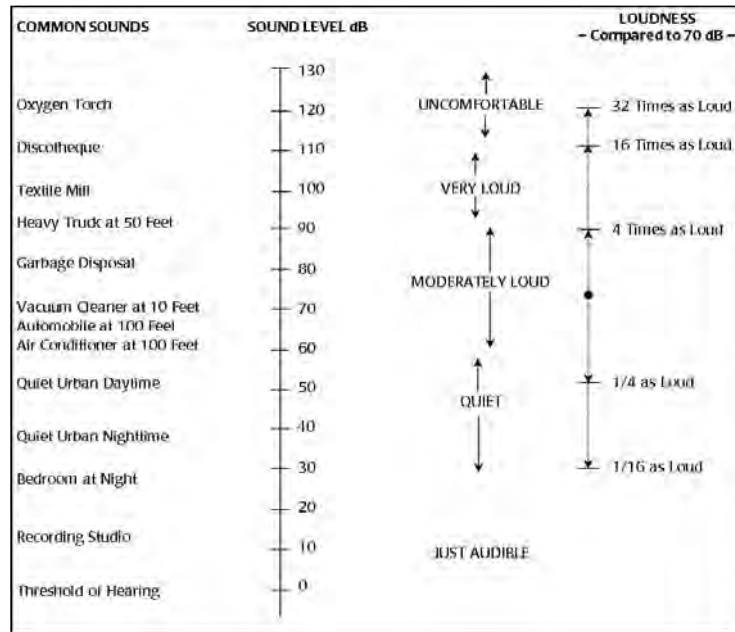
Sounds can be generally characterized based on three physical characteristics: amplitude, frequency, and duration. Amplitude is a measure of the strength of the sound and is directly measured in terms of the pressure of a sound wave. Frequency, which is perceived as “pitch”, is the number of times per second sound causes air molecules to vibrate. Duration is simply how long the sound lasts. All three characteristics are critical to determining impacts of a particular sound source and are discussed in more detail below.

#### C.1.1 Amplitude

The loudest sounds that can be comfortably heard by humans have acoustic energy one trillion times the acoustic energy of the quietest sounds that humans detect. Due to this vast range in magnitude, attempts to represent sound amplitude by direct expression of sound pressure are unwieldy. In addition, human hearing is proportional rather than absolute (i.e., detecting whether one sound is twice as big as another sound rather than detecting whether one sound is a given number of pressure units bigger than another sound). Sound is therefore, usually represented on a logarithmic scale, reflecting the way in which it is perceived, by using a unit named the decibel (dB).

The threshold (level at which an impact starts) of human hearing is approximately 0 dB and the threshold of discomfort is approximately 120 dB. Under laboratory conditions, differences in sound level of 1 dB can be detected by the human ear. In the community, the smallest change in average noise level that can be detected is about 3 dB. A change in sound level of about 10 dB is usually perceived by the average person as a doubling (or halving) of the sound’s loudness and this relation holds true for loud sounds and quieter sounds. A decrease in sound level of 10 dB represents a 90 percent decrease in sound intensity but only a 50 percent decrease in perceived loudness due to of the nonlinear response of the human ear.

Figure C 1 is a chart of A-weighted (the adjustment of the frequency content of the measured sound to correspond to the frequency sensitivity of the human ear when measuring community response to noise) sound levels from typical sounds. Some sounds (air conditioner, vacuum cleaner) are continuous and their levels are constant for some time. Other sounds (automobile, heavy truck) are the maximum sound during a vehicle pass-by. Some sounds (urban daytime, urban nighttime) are averages over some extended period.



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

Due to the logarithmic nature of the dB scale, sound levels do not add and subtract directly and are somewhat cumbersome to handle mathematically; however, some simple rules of thumb are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level only increases by 3 dB, regardless of the initial sound level. For example:

$$60 \text{ dB} + 60 \text{ dB} = 63 \text{ dB}, \text{ and } 80 \text{ dB} + 80 \text{ dB} = 83 \text{ dB}$$

The total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two sound levels. For example:

$$60.0 \text{ dB} + 70.0 \text{ dB} = 70.4 \text{ dB}.$$

Sound pressure of what is perceived as being continuous sound actually varies greatly over minute increments of time, so it is customary to deal with sound levels that represent averages over time. Levels presented as instantaneous (i.e., as might be read from the dial of a sound level meter) are based on averages of sound energy over either 1/8 second (fast) or one second (slow). This distinction becomes important when discussing sounds whose peak noise level lasts for only a short time, such as sonic booms.

### C.1.2 Frequency

The normal human ear can hear frequencies from about 20 hertz (Hz) to about 20,000 Hz. It is most sensitive to sounds in the 1,000 to 4,000 Hz range. When measuring community response to noise, it is common to adjust the frequency content of the measured sound to correspond to the frequency sensitivity of the human ear. This adjustment is called A-weighting (ANSI 1988). Sound levels that have been so adjusted are referred to as A-weighted and may be denoted dBA or dB(A). However, since use of A-weighting to express sound level is so prevalent, it can normally be assumed that dB is equivalent to dBA or dB(A). In this study, sound levels are reported in dB and are A-weighted unless otherwise specified.

A-weighting is appropriate for sounds that are perceived by the ear. Impulsive sounds, such as sonic booms, thunder, and other sudden “booming” sounds are perceived by more than just the ear; listeners may *feel* this type of sound as well as hear it. When experienced indoors, this type of sound may cause rattling of the structure and its contents. Since A-weighting would de-emphasize the intrusive low-frequency component of this type of sound; C-weighting (ANSI 1988) is applied, which only de-emphasizes frequencies that are outside the range of human hearing (about 20 Hz to 20,000 Hz). In this study, and in accordance with standard methodologies, C-weighted sound levels are used for the assessment of sonic booms, blasts from high explosives, and other impulsive sounds. C-weighting is specifically denoted as dBC whenever it is used in this study.

### **C.1.3 Duration**

Sound varies over time at almost all locations. Sound can be classified into the following four basic categories that define its basic time pattern:

**Ambient** - Ambient sound is the ever-present collection of background sounds at any given place. Ambient sound can be strictly natural such as frogs and cicadas in the deep woods; strictly mechanical such as street noise in a busy city; or a combination of both, like sounds occurring in the suburbs. It is important to consider the existing ambient soundscape since what exists already has much to do with how annoying people will find a new sound. For example, the hum of a generator may be tolerated better by those already living in an area with high-mechanized ambient noise than those living in the far woods.

**Steady State** - Steady-state sound is a consistent level and spectral content such as sounds that originate from ventilation or mechanical systems that operate more or less continuously. From a military perspective, generators and aircraft run-up sounds are the most prominent steady-state sounds. The longer a steady-state sound persists, the more annoyed people will be.

**Transient Sound** - Transient sound has a clearly defined beginning and end, rising above the background and then fading back into it. Transient sounds are typically associated with “moving” sound sources such as an aircraft overflight or a single vehicle driving by and they usually last for only a few minutes at the most. The annoyance caused by transient sounds is dependent upon both the maximum sound level and the duration.

**Impulsive Sound** - Impulsive sound is of short duration (typically less than one second), of high intensity, with abrupt onset, rapid decay, and often a fast-changing spectral composition. It is characteristically associated with such sources as explosions, impacts, the discharge of firearms, the passage of supersonic aircraft (sonic booms), and many industrial processes. Impulsive sound can be particularly annoying due to the “startle factor” where the receiver has no warning that exposure to a loud sound is imminent.

## **C.2 Noise Metrics**

To communicate sound levels, the Department of Defense (DoD) uses the three general types of noise-measuring descriptors, or metrics measuring the highest sound level occurring during a noise event; combining the maximum level of that single event with its duration, and describing the noise environment based on the total noise energy received over a specified length of time. The specific metrics used in this Environmental Assessment (EA) are described below.



**Maximum Sound Level ( $L_{max}$ )** – The highest sound level measured (using time integration of either 1/8 second or one second) during a noise event. For a listener observing an aircraft overflight, the noise level starts at the ambient or background noise level, rises to the maximum level as the aircraft flies closest to the observer, and returns to the background level as the aircraft recedes into the distance.  $L_{max}$  decreases as altitude or distance from the observer increases and varies according to the type of aircraft, airspeed, and power setting.

**Sound Exposure Level (SEL)** - A single-number representation of a noise energy dose for an entire aircraft overflight. This measure takes into account the impact of both the duration and intensity of a noise event by summing the noise energy from each second in an event, which typically lasts several seconds, into a single second.

SEL is useful for comparing aircraft that move at different speeds. As an example, fighter aircraft tend to create a high  $L_{max}$  but their noise level tends to drop off quickly as the plane moves away from the listener at high speed. On the other hand, cargo-type aircraft tend to be quieter but generally take more time to move past the listener and out of earshot. It is important to remember that SEL does not directly represent the sound level heard at any given time; it provides a measure of the exposure of the entire acoustic event. SEL is useful for predicting several noise impacts including sleep disturbance and animal escape response. SEL can be computed for C-weighted levels (appropriate for impulsive sounds) and the results denoted as C-Weighted Sound Exposure Level (CSEL). SEL for A-weighted sound is sometimes denoted as A-Weighted Sound Exposure Level (ASEL). Within this study, SEL is used for A-weighted sounds and CSEL for C-weighted. Table C 1 shows SEL values corresponding to several aircraft in departure and arrival configuration.

**Table C 1. Representative Sound Exposure Levels (SEL)**

Aircraft (Engine Type)	Power Setting	Power Unit	SEL Values (in decibels [dB]) at Varying Distances (in Feet)				
			500	1,000	2,000	5,000	10,000
<b>Takeoff/Departure Operations (at 300 knots airspeed)</b>							
A-10A	6200	NF	103	96	89	77	68
B-1	97.50%	RPM	130	123	117	107	99
F-15 (P-220)	90%	NC	117	112	106	97	88
F-16 (P220)	91%	NC	113	108	101	92	83
F-22	100%	ETR	124	119	113	104	95
<b>Landing/Arrival Operations (at 160 knots airspeed)</b>							
A-10A	5225	NF	98	92	83	67	55
B-1	90%	RPM	103	98	93	83	74
F-15 (P-220)	75%	NC	94	89	84	75	67
F-16 (P-220)	82.50%	NC	101	96	91	82	74
F-22	43%	ETR	115	109	103	94	85

**Key:**  
 ETR = Engine Thrust Request                      NF = Engine Fan Speed                      RPM = Revolutions Per Minute  
 NC = Engine Core Speed

**Onset-Rate Adjusted Sound Exposure Level ( $SEL_r$ )** - When an aircraft is flying fast and low to the ground, listeners may experience a very quick rise in noise as it flies overhead. To account for the resulting “surprise effect”, a penalty of up to 11 dB is applied to the SEL value for the overflight. SEL values with this “onset-rate adjustment” are denoted as  $SEL_r$ .

**Equivalent Sound Level ( $L_{eq}$ )** - To summarize noise levels over longer period, total sound is represented by the  $L_{eq}$ .  $L_{eq}$  is the average sound level over some period (often an hour or a day, but any explicit time span can be specified) with the averaging being done on the same energy basis as used for SEL. SEL and  $L_{eq}$  are closely related, differing by (1) whether they are applied over a specific period or over an event, and (2) whether the duration of the event is included or divided out. Just as SEL has proven to be a good measure of the noise impact of a single event,  $L_{eq}$  has been established to be a good measure of the impact of a series of events during a given time period. Cumulative noise metrics such as  $L_{eq}$  are useful since they represent a complicated set of noise events with a single number.

**Number-of-Events Above (NA) a Threshold Level (L)** - The Number-of-events Above metric (NA) provides the total number of noise events that exceed the selected noise level threshold during a specified period. Combined with the selected threshold Level (L), the NA metric is symbolized as NAL. The threshold L can be defined in terms of either the SEL or  $L_{max}$  metric and it is important that this selection be reflected in the nomenclature. For example, the number of events exceeding an SEL of 85 dB would be represented by the nomenclature NA85SEL. The period can be an average 24-hour day, daytime, nighttime, school day, or any other time appropriate to the nature and application of the analysis and this period must be stated in the text. A threshold level is selected that best meets the need for that situation.

**Day-Night Average Sound Level (DNL)** - Noise tends to be more intrusive at night than during the day. This effect is accounted for by applying a 10-dB penalty to events that occur after 10:00 PM and before 7:00 AM. DNL is similar to  $L_{eq}$  except DNL has a nighttime penalty added. DNL is the community noise metric recommended by the United States Environmental Protection Agency (USEPA) (EPA 1974) and has been adopted by most federal agencies (FICON 1992). It has been widely accepted that DNL correlates well with community response to noise (Schultz 1978; Finegold *et al.* 1994). This correlation is presented below in the section titled *Noise Impacts on Humans*. Furthermore, DNL has also been proven applicable to infrequent events (Fields and Powell 1985) and to rural populations exposed to sporadic military aircraft noise (Stusnick *et al.* 1992; Stusnick *et al.* 1993). For impulsive sounds, C-weighting is more appropriate than A-weighting. The DNL can be computed for C-weighted noise and is denoted CDNL or  $L_{cdn}$ . This procedure has been standardized and impact interpretive criteria similar to those for DNL have been developed (CHABA 1981).

**Onset Rate Adjusted Monthly Day-Night Average Sound Level ( $DNL_{mr}$ )** - Aircraft operations in military airspace (such as ranges, Military Operating Areas [MOAs], and warning areas) generate a noise environment somewhat different from other community noise environments. Overflights are sporadic, occurring randomly and varying from day to day and week to week. This situation differs from the noise environments of most communities where noise tends to be continuous or patterned. Individual military overflight events also differ from typical community noise events in that noise from a low-altitude, high-air-speed flyover can have a sudden onset. To represent these differences, the conventional DNL metric is adjusted to account for the "surprise" effect of the sudden onset of aircraft noise events on humans (Plotkin *et al.* 1987; Stusnick *et al.* 1992, 1993). For aircraft exhibiting a rate of increase in sound level (called onset rate) of from 15 to 150 dB per second, an adjustment or penalty ranging from 0 to 11 dB is added to the normal SEL. Onset rates above 150 dB per second require an 11 dB penalty, while onset rates below 15 dB per second require no adjustment. Due to the irregular

occurrences of aircraft operations, the number of average daily operations is determined by using the calendar month with the highest number of operations. The Onset-Adjusted Monthly Day-Night Average Sound Level is denoted as  $DNL_{mr}$ .

### **C.3 Noise Impacts**

#### **C.3.1 Annoyance**

The primary impact of aircraft noise on exposed communities is one of annoyance. Noise annoyance is defined by the USEPA as any negative subjective reaction on the part of an individual or group (EPA 1974). Studies of the levels of community annoyance resulting from numerous types of environmental noise show that DNL correlates well with how the noise impacts the community. Schultz (1978) showed a consistent relationship between DNL and percentage of the impacted population that was “highly annoyed” (9 or 10 on a scale of one through 10, with 10 being the most annoyed). A more recent study reaffirmed and updated this relationship (Finegold *et al.* 1994) (Table C 2). In general, correlation coefficients of 0.85 to 0.95 are found between the percentages of groups of people highly annoyed and the level of average noise exposure. The correlation coefficients for the annoyance of individuals are relatively low (0.5 or less). This is not surprising considering the varying personal factors that influence the manner in which individuals react to noise. As an extreme example, persons with autism are often very strongly affected by sudden noises (Grandin 2010; Jung Chang *et. al* 2002). Nevertheless, findings substantiate that, as a whole, communities’ level of annoyance to aircraft noise is represented reliably using DNL.

**Table C 2. Relationship between Annoyance and DNL**

Noise Exposure (DNL)	Percent of Population Highly Annoyed
<65	<12
65-70	12-21
70-75	22-36
75-80	37-53
80-85	54-70
>85	>71

Source: Finegold *et al.*, 1994

DNL does not represent the sound level heard at any particular time but rather it represents a cumulative sound exposure. DNL accounts for the sound level of individual noise events, the duration of those events, and the number of events. Its use is endorsed by the scientific community and is recognized as the standard methodology by most federal agencies (ANSI 1980, 1988; EPA 1974; FICUN 1980; and FICON 1992). The following commonly recognized thresholds for average noise level are based on expected community reaction:

**DNL of 65 dB** - Level most commonly used for noise planning purposes and represents a compromise between community impact and the need for activities like aviation that unavoidably result in noise. Areas exposed to DNL above 65 dB are generally not considered suitable for residential use.

**DNL of 55 dB** - Identified by the USEPA as a level “. . . requisite to protect public health and welfare with an adequate margin of safety” (EPA 1974). From a noise exposure perspective,

that would be an ideal selection; however, financial and technical resources are generally not available to achieve that goal. Most agencies have identified DNL of 65 dB as a criterion that protects those most impacted by noise and that can often be achieved on a practical basis (FICON 1992). This corresponds to about 12 percent of the exposed population being highly annoyed.

**DNL of 75 dB** - The lowest level at which adverse health effects could be credible (EPA 1974). Community annoyance from sonic booms, firing of heavy weaponry, and other impulsive noises is predicted using CDNL (C-weighted Day-Night Average Sound Level). The correlation between CDNL and annoyance has been estimated based on community reaction to impulsive sounds over several years (CHABA 1981). Values of the C-weighted equivalent to the Schultz curve are different from that of the Schultz curve itself. Table C 3 shows the relationship between percentage of the population highly annoyed, DNL, and CDNL. If both continuous and impulsive noise occurs in the same area, impacts are assessed separately for each.

**Table C 3. Relationship Between Annoyance, DNL, and CDNL**

CDNL (decibels)	% Highly Annoyed	DNL (decibels)
48	2	50
52	4	55
57	8	60
61	14	65
65	23	70
69	35	75

Source = CHABA 1981

### **C.3.2 Land Use Compatibility**

The inherent variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. When a community is considered as a whole, its overall reaction to noise can be represented with a high degree of confidence. The best noise exposure metric for this correlation is the DNL or  $L_{dnmr}$  for military overflights. Impulsive noise can be assessed by relating CDNL to an “equivalent annoyance” DNL.

In June 1980, the ad hoc Federal Interagency Committee on Urban Noise (FICUN) published guidelines (FICUN 1980) relating DNL to compatible land uses. This committee was composed of representatives from DoD, Transportation, Housing and Urban Development (HUD), USEPA, and the Veterans Administration. Since issuance of the FICUN guidelines, federal agencies have generally adopted the guidelines for their noise analyses (Table C 4). The designations contained in the table do not constitute a federal determination that any use of land covered by the program is acceptable or unacceptable under federal, state, or local law. The responsibility for determining the acceptable and permissible land uses, and the relationship between specific properties and specific noise contours, rests with the local authorities. The FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise-compatible land uses. The guidelines presented in Table C 4 are recommendations and compliance with them is not mandatory.

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**Table C 4. Land Use Compatibility with Yearly Day-Night Average Sound Levels (DNL)**

Land Use	Yearly Day-Night Average Sound Level (DNL) in Decibels					
	Below 65	65-70	70-75	75-80	80-85	Over 85
<b>Residential Use</b>						
Residential (other than mobile and transient lodgings)	Y	N <sup>1</sup>	N <sup>1</sup>	N	N	N
Mobile Home Parks	Y	N	N	N	N	N
Transient Lodgings	Y	N <sup>1</sup>	N <sup>1</sup>	N <sup>1</sup>	N	N
<b>Public Use</b>						
Schools	Y	N <sup>1</sup>	N <sup>1</sup>	N	N	N
Hospitals and Nursing Homes	Y	25	30	N	N	N
Churches, Auditoriums, and Concert Halls	Y	25	30	N	N	N
Government Services	Y	Y	25	30	N	N
Transportation	Y	Y	Y <sup>2</sup>	N <sup>3</sup>	Y <sup>4</sup>	Y <sup>4</sup>
Parking	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
<b>Commercial Use</b>						
Offices - Business and Professional	Y	Y	25	30	N	N
Wholesale and Retail - Building Materials, Hardware, and Farm Equipment	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
Retail Trade - General	Y	Y	25	30	N	N
Utilities	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
Communication	Y	Y	25	30	N	N
<b>Manufacturing and Production</b>						
Manufacturing - General	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
Photographic and Optical	Y	Y	25	30	N	N
Agriculture (except livestock) and Forestry	Y	Y <sup>6</sup>	Y <sup>7</sup>	Y <sup>8</sup>	Y <sup>8</sup>	Y <sup>8</sup>
Livestock Farming and Breeding	Y	Y <sup>6</sup>	Y <sup>7</sup>	N	N	N
Mining and Fishing, Resource Production, and Extraction	Y	Y	Y	Y	Y	Y
<b>Recreational</b>						
Outdoor Sports Arenas and Spectator Sports	Y	Y <sup>5</sup>	Y <sup>5,6</sup>	N	N	N
Outdoor Music Shells and Amphitheaters	Y	N	N	N	N	N
Nature Exhibits and Zoos	Y	Y	N	N	N	N
Amusements, Parks, Resorts, and Camps	Y	Y	Y	N	N	N
Golf Courses, Riding Stables, and Water Recreation	Y	Y	25	30	N	N

Notes: Data for this table were taken from the Standard Land-Use Coding Manual.

- <sup>1</sup> Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide an NLR of 20 dB; thus, the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year-round. The use of NLR criteria will not eliminate outdoor noise problems.
- <sup>2</sup> Measures to achieve NLR of 25 dB must be incorporated into the design and construction of the portion of the buildings where the public is received such as in office areas, noise-sensitive areas, or where the normal noise level is low.
- <sup>3</sup> Measures to achieve NLR 30 dB must be incorporated into the design and construction of the portion of the buildings where the public is to be received such as in office areas, noise-sensitive areas, or where the normal noise level is low.
- <sup>4</sup> Measures to achieve NLR 35 dB must be incorporated into the design and construction of the portion of the buildings where the public is received such as in office areas, noise-sensitive areas, noise-sensitive areas, or where the normal noise level is low.
- <sup>5</sup> Land use is compatible provided special sound reinforcement systems are installed.
- <sup>6</sup> Residential buildings that require an NLR of 25.
- <sup>7</sup> Residential buildings that require an NLR of 30.
- <sup>8</sup> Residential buildings not permitted.

Key:

Y (YES) = Land use and related structures compatible without restrictions.

N (No) = Land use and related structures are not compatible and should be prohibited.

25, 30, or 35 dB = Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structures.

### C.3.3 Hearing Loss

There is very little potential for hearing loss at noise levels below 75 dB DNL (CHABA 1977); however, there are situations where noise in and around airbases may exceed 75 dB DNL. The first of these is a result of exposure to occupational noise by individuals working in known high

noise exposure locations such as jet engine maintenance facilities or aircraft maintenance hangers. In this case, exposure of workers inside the base boundary area should be considered occupational, which is excluded from the DoD Noise Program by DoD Instruction 4715.13 and should be evaluated using the appropriate DoD component regulations for occupational noise exposure. DoD, Air Force, and the National Institute of Occupational Safety and Health (NIOSH) have all established occupational damage risk criteria for noise exposure (or “standard”) for hearing loss not to exceed 85 dB as an 8-hour time weighted average, with a 3 dB exchange rate in a work environment. The exchange rate is an increment of dBs that requires the halving of exposure time or a decrement of dB that requires the doubling of exposure time. For example, a 3 dB exchange rate requires that noise exposure time be halved for each 3 dB increase in noise level. Therefore, an individual would achieve the limit for risk criteria at 88 dB for a period of four hours, and at 91 dB for a period of two hours.) The standard assumes “quiet” (where an individual remains in an environment with noise levels less than 72 dB) for the balance of the 24-hour period. Also, the Air Force and the Occupational Safety and Health Administration (OSHA) occupational standards prohibit any unprotected worker exposure to continuous (i.e., of a duration greater than one second) noise exceeding 115 dB. OSHA established this additional standard to reduce the risk of workers developing noise-induced hearing loss.

The second situation where individuals may be exposed to high noise levels is when noise contours resulting from flight operations in and around the installation reach or exceed 80 dB DNL both on and off base. To assess the potential impacts of this situation, DoD published a policy for assessing hearing loss risk (USD AT&L). The policy defines the conditions under which assessments are required, references the methodology from a 1982 USEPA report, and describes how the assessments are to be calculated. The policy reads as follows:

“Current and future high performance aircraft create a noise environment in which the current impact analysis based primarily on annoyance may be insufficient to capture the full range of impacts on humans. As part of the noise analysis in all future environmental impact statements, DoD components will use the 80 Day-Night A-Weighted (DNL) noise contour to identify populations at the most risk of potential hearing loss. DoD components will use as part of the analysis, as appropriate, a calculation of the Potential Hearing Loss (PHL) of the at risk population. The PHL (sometimes referred to as Population Hearing Loss) methodology is defined in USEPA Report No. 550/9-82-105, *Guidelines for Noise Impact Analysis* (EPA 1982).

The USEPA *Guidelines for Noise Impact Analysis* (hereafter referred to as “USEPA Guidelines”) specifically addresses the criteria and procedures for assessing the noise-induced hearing loss in terms of the Noise-Induced Permanent Threshold Shift (NIPTS), a quantity that defines the permanent change in hearing level or threshold, caused by exposure to noise (EPA 1982). Numerically, the NIPTS is the change in threshold averaged over the frequencies 0.5, 1, 2, and 4 kilohertz (kHz) that can be expected from daily exposure to noise over a normal working lifetime of 40 years, with the exposure beginning at an age of 20 years. A grand average of the NIPTS over time (40 years) and hearing sensitivity (10 to 90 percentiles of the exposed population) is termed the Average NIPTS. The Average NIPTS attributable to noise exposure for ranges of noise level in terms of DNL is provided in Table C 5.

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**Table C 5. Average NIPTS and 10th Percentile NIPTS as a Function of DNL\***

Day-Night Average Sound Level (DNL)	Average Noise-Induced Permanent Threshold Shift (NIPTS) (decibels [dB])**	10th Percentile NIPTS (dB)**
80-81	3.0	7.0
81-82	3.5	8.0
82-83	4.0	9.0
83-84	4.5	10.0
84-85	5.5	11.0
85-86	6.0	12.0
86-87	7.0	13.5
87-88	7.5	15.0
88-89	8.5	16.5
89-90	9.5	18.0

**Notes:**

\*Relationships between DNL and NIPTS were derived from CHABA 1977.

\*\*NIPTS values rounded to the nearest 0.5 dB.

For a noise exposure within the 80-81 DNL contour band, the expected lifetime average value of NIPTS (hearing loss) is 3.0 dB. The Average NIPTS is estimated as an average of all people included in the at risk population. The actual value of NIPTS for any given person would depend on their physical sensitivity to noise, as some people would experience more loss of hearing than others would. The *USEPA Guidelines* provides information on this variation in sensitivity in the form of the NIPTS exceeded by 10 percent of the population, which is included in Table C 5 in the “10th Percentile NIPTS” column. As in the example above, for individuals within the 80 to 81 DNL contour band, the most sensitive of the population, would be expected to show no more degradation to their hearing than experiencing a 7.0 dB Average NIPTS hearing loss. While DoD policy requires that the risk of hearing loss be estimated for the population exposed to 80 dB DNL or greater, this does not preclude populations outside the 80 DNL contour (i.e. at lower exposure levels) from being at some degree of risk of hearing loss.

The actual noise exposure for any person living in the at-risk area is determined by the amount of time that person is outdoors and directly exposed to the noise. Many people living within the applicable DNL contour would not be present during the daytime hours as they may be at work, at school, or involved in other activities outside the at-risk area. Many would be inside their homes and thereby exposed to lower noise levels and benefitting from the noise attenuation provided by the house structure. The actual activity profile is usually impossible to generalize. For the purposes of this analysis, it was assumed that residents are fully exposed to the DNL level of noise appropriate for their residence location and the Average NIPTS taken from Table C 5.

The quantity of people to be reported is the number living within each 1 dB contour band inside the 80 dB DNL contour that are at risk for hearing loss provided by the Average NIPTS for that band. The average nature of Average NIPTS means that it underestimates the magnitude of the potential hearing loss for the population most sensitive to noise. In the interest of disclosure, the information to be reported includes both the Average NIPTS and the 10th percentile NIPTS (Table C 5) for each 1 dB contour band inside the 80 DNL contour.

According to the USEPA documents titled *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, and *Public Health and Welfare*

*Criteria for Noise*, changes in hearing levels of less than 5 dB are generally not considered noticeable or significant. There is no known evidence that a NIPTS of less than 5 dB is perceptible or has any practical significance for the individual. Furthermore, the variability in audiometric testing is generally assumed to be  $\pm 5$  dB. The preponderance of available information on hearing loss risk comes from the workplace where employees have continuous exposure throughout the day for many years. Clearly, this data is applicable to the adult working population. According to a report by Ludlow and Sixsmith, there are no significant differences in audiometric test results between military personnel, who as children lived in or near stations where jet operations were based, and a similar group who had no such exposure as children (Ludlow and Sixsmith 1999). Hence, for the purposes of PHL analysis, it can be assumed that the limited data on hearing loss is applicable to the general population, including children, and provides a conservative estimate of hearing loss.

### **C.3.4 Non-Auditory Health Effects**

Non-auditory health effects of long-term noise exposure, where noise may act as a risk factor, have not been found to occur at levels below those protective against noise-induced hearing loss. Most studies attempting to clarify such health effects have found that noise exposure levels established for hearing protection would also protect against any potential non-auditory health effects, at least in workplace conditions. The lead paper at the National Institutes of Health Conference on Noise and Hearing Loss held 22 through 24 January 1990 in Washington, DC, stated the following:

“The non-auditory effects of chronic noise exposure, when noise is suspected to act as one of the risk factors in the development of hypertension, cardiovascular disease, and other nervous disorders, have never been proven to occur as chronic manifestations at levels below these criteria (an average of 75 dBA for complete protection against hearing loss for an eight-hour day).”

At the 1988 International Congress on Noise as a Public Health Problem, most studies attempting to clarify such health effects did not find them at levels below the criteria protective of noise-induced hearing loss, and even above these criteria, results regarding such health effects were ambiguous. Consequently, it can be concluded that establishing and enforcing exposure levels to protect against noise-induced hearing loss would not only solve the noise-induced hearing loss problem, but also any potential non-auditory health effects in the work place (von Gierke, 1990).

Although these findings were directed specifically at noise effects in the work place, the findings are equally applicable to aircraft noise effects in the community environment. Research studies regarding the non-auditory health effects of aircraft noise are ambiguous at best and often contradictory. Yet, even those studies that purport to find such health effects use time-average noise levels of 75 dB and higher for their research.

The potential for noise to affect physiological health such as the cardiovascular system has been speculated; however, there is no unequivocal evidence to support such claims (Harris 1997). Conclusions drawn from a review of health effect studies involving military low-altitude flight noise, with its unusually high maximum levels and rapid rise in sound level, have shown no correlation to cardiovascular disease (Schwartz and Thompson 1993). Additional unsupported



claims include flyover noise that produces increased mortality rates, adverse effects on the learning ability of middle and low aptitude students, aggravation of post-traumatic stress syndrome, increased stress, increase in admissions to mental hospitals, and adverse effects on pregnant women and their unborn fetus (Harris 1997). Harris' comments are based on a report by The Health Council of The Netherlands (HCN 1996) that discusses two epidemiological studies that looked at the hearing abilities of children whose mothers had been exposed to occupational noise during pregnancy. The results were conditionally qualified by the committee concluding "...that equivalent sounds levels of 85 dB(A) or higher during an 8-hour working day appear to be detrimental to the hearing of the unborn child," but then they also recommended that further research be undertaken to verify that conclusion. In summary, there is no scientific basis to claim that potential health effects exist for exposure to aircraft time-average sound levels below 75 dB.

### **C.3.5 Performance Effects**

The impact of noise on the performance of activities or tasks has been the subject of many studies. Some of these studies have established links between continuous high noise levels and performance loss. Noise-induced performance losses are most frequently reported in studies employing noise levels in excess of 85 dB. Little change has been found in low-noise cases. It has been cited that moderate noise levels appear to act as a stressor for the more sensitive individuals performing a difficult psychomotor task. While the results of research on the general impact of periodic aircraft noise on performance have yet to yield definitive criteria, several general trends have been noted including:

- A periodic intermittent noise is more likely to disrupt performance than a steady-state continuous noise of the same level. Flyover noise, due to its intermittent nature, might be more likely to disrupt performance than a steady-state noise of equal level.
- Noise is more inclined to affect the quality than the quantity of work.
- Noise is more likely to impair the performance of tasks that place extreme demands on the worker.

### **C.3.6 Speech Interference**

Speech interference associated with aircraft noise is a primary cause of annoyance for communities. The disruption of routine activities such as radio or television listening, telephone use, or family conversation gives rise to frustration and irritation. The quality of speech communication is particularly important in classrooms and offices. In industrial settings, it can cause fatigue and vocal strain in those who attempt to communicate over the noise. Due to the potential for adverse effects on children's learning ability, the disruption of speech in the classroom is a primary concern. There are two aspects to speech comprehension:

**Word Intelligibility** - The percent of words transmitted and received. This might be important for students in the lower grades who are learning the English language and particularly for students who have English as a second language.

**Sentence Intelligibility** - The percent of sentences transmitted and understood. This might be important for high-school students and adults who are familiar with the language and who do not necessarily have to understand each word to understand sentences.

In 1974, EPA identified a goal of an indoor 24-hour average sound level  $L_{eq(24)}$  of 45 dB to minimize speech interference based on the intelligibility of sentences in the presence of a steady background noise (EPA 1974). Intelligibility pertains to the percentage of speech units correctly understood out of those transmitted and specifies the type of speech material used (i.e. sentences or words). The curve displayed in Figure C 2 (EPA 1974) shows the impact of steady indoor background sound levels on sentence intelligibility. For an average adult with normal hearing and fluency in the language, steady background sound levels indoors of less than 45 dB  $L_{eq}$  are expected to allow 100 percent intelligibility of sentences.

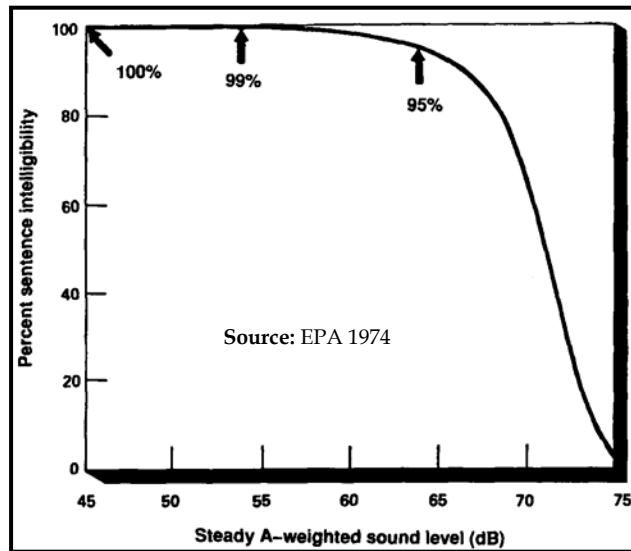


Figure C 2. Speech Intelligibility Curve

The curve in Figure C 2 shows 99 percent sentence intelligibility for background levels at a  $L_{eq}$  of 54 dB and less than 10 percent intelligibility for background levels above a  $L_{eq}$  of 73 dB. Note that the curve is especially sensitive to changes in sound level between 65 dB and 75 dB. An increase of 1 dB in background sound level from 70 dB to 71 dB results in a 14 percent decrease in sentence intelligibility, whereas a 1 dB increase in background sound level from 60 dB to 61 dB results in less than 1 percent decrease in sentence intelligibility.

### C.3.7 Effects on Children/Classroom Noise Criteria

The impact of aircraft noise on children is a controversial area. Certain studies indicate that, in certain situations, children are potentially more sensitive than adults are to noise. For example, adults average roughly 10 percent better scores than young children on speech intelligibility tests in high noise environments (FICAN 2004; ASA 2000). Some studies indicate that noise negatively impacts classroom learning (FICAN 2000; Shield and Dockrell 2008).

In response to noise-specific and other environmental studies, EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (1997), requires federal agencies to ensure that their policies, programs, and activities address environmental health and safety risks and identify any disproportionate risks to children. While the issue of noise impacts on children's learning is not fully settled, in May 2009 the American National Standards Institute (ANSI) published a classroom acoustics standard entitled *Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools* (ANSI S12.60-2009). At present, complying with the

standard is voluntary in most locations. Essentially, the criteria states that when the noisiest hour is dominated by noise from such sources as aircraft, the limits for most classrooms are an hourly average A-weighted sound level of 40 dB. The A-weighted sound level must not exceed 40 dB for more than 10 percent of the hour. For schools located near airfields, indoor noise levels would have to be lowered by 35–45 dBA relative to outdoor levels (ANSI 2009).

### **C.3.8 Sleep Interference**

The disturbance of sleep is a major concern for communities exposed to nighttime aircraft noise. There have been numerous research studies attempting to quantify the complex effects of noise on sleep. This section provides an overview of the major noise-induced sleep disturbance studies that have been conducted, with particular emphasis placed on those studies that have influenced U.S. federal noise policy. The studies have been separated into two groups:

1. Initial studies performed in the 1960s and 1970s where the research was focused on laboratory sleep observations.
2. Later studies performed in the 1990s up to the present where the research was focused on field observations and correlations to laboratory research were sought.

The relationship between noise levels and sleep disturbance is complex and not fully understood. Disturbance depends not only on the depth of sleep, but also on the previous exposure to aircraft noise, familiarity with the surroundings, the physiological and psychological condition of the recipient, and a host of other situational factors. The most readily measurable impact of noise on sleep is the number of arousals or awakenings so the body of scientific literature has focused on predicting the percentage of the population that will be awakened at various noise levels. Fundamentally, regardless of the tools used to measure the degree of sleep disturbance (awakenings, arousals, etc.); these studies have grouped the data points into bins to predict the percentage of the population likely to be disturbed at various sound level thresholds.

The Federal Interagency Committee on Noise (FICON) produced a guidance document that provided an overview of the most pertinent sleep disturbance research that had been conducted throughout the 1970s (FICON 1992). Literature reviews and meta-analysis conducted between 1978 and 1989 made use of the existing datasets that indicated the effects of nighttime noise on various sleep-state changes and awakenings (Pearsons *et al.* 1989). FICON noted that various indoor A-weighted sound levels, ranging from 25 to 50 dB, were observed to be thresholds below which significant sleep effects were not expected. Due to the large variability in the data, FICON did not endorse the reliability of the results; however, FICON did recommend the use of an interim dose-response curve (awaiting future research), which predicted the percent of the exposed population expected to be awakened as a function of the exposure to single event noise levels expressed in terms of SEL. This curve was based on the research conducted for the Air Force (Finegold *et al.* 1994). The dataset included most of the research performed up to that point, and predicted that 10 percent of the population would be awakened when exposed to an interior SEL of approximately 58 dB. The data utilized to derive this relationship were primarily the results of controlled laboratory studies.

It was noted in the early sleep disturbance research that the controlled laboratory studies did not account for many factors that are important to sleep behavior such as habituation to the

environment and previous exposure to noise and awakenings from sources other than aircraft noise. In the early 1990s, field studies were conducted to validate the earlier laboratory work. The most significant finding from these studies was that an estimated 80 to 90 percent of sleep disturbances were not related to individual outdoor noise events, but were instead the result of indoor noise sources and other non-noise-related factors. The results showed that there was less of an impact of noise on sleep in real-life conditions than had been previously reported from laboratory studies.

The interim FICON dose-response curve that was recommended for use in 1992 was based on the most pertinent sleep disturbance research that was conducted through the 1970s, primarily in laboratory settings. After that time, considerable field research was conducted to evaluate the sleep effects in peoples' normal, home environment. Laboratory sleep studies tend to show higher values of sleep disturbance than field studies since people who sleep in their own homes are habituated to their environment and, therefore, do not wake up as easily (FICAN 1997).

Based on the new information, Federal Interagency Committee on Aviation Urban Noise (FICAN) updated its recommended dose-response curve in 1997 as depicted in the lower curve in Figure C 3. This figure is based on the results of three field studies (Ollerhead *et al.* 1992; Fidell *et al.* 1995a and 1995b), along with the datasets from six previous field studies.

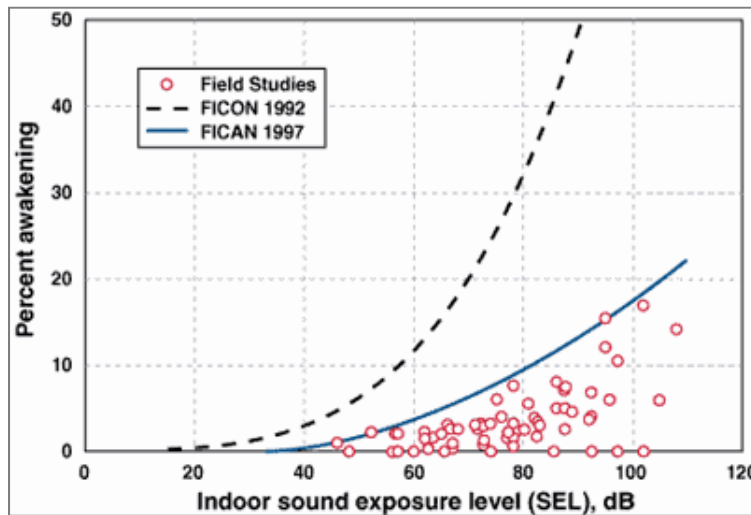


Figure C 3. FICAN's 1997 Recommended Sleep Disturbance Dose-Response Relationship

The new relationship represents the higher end, or upper envelope, of the latest field data. It should be interpreted as predicting the "maximum percent of the exposed population expected to be behaviorally awakened" or the "maximum percent awakened" for a given residential population. According to this relationship, a maximum of 3 percent of people would be awakened at an indoor SEL of 58 dB, compared to 10 percent using the 1992 curve. An indoor SEL of 58 dB is equivalent to an outdoor SEL of 73 and 83 dB respectively assuming 15 and 25 dB noise level reduction from outdoor to indoor with windows open and closed, respectively.

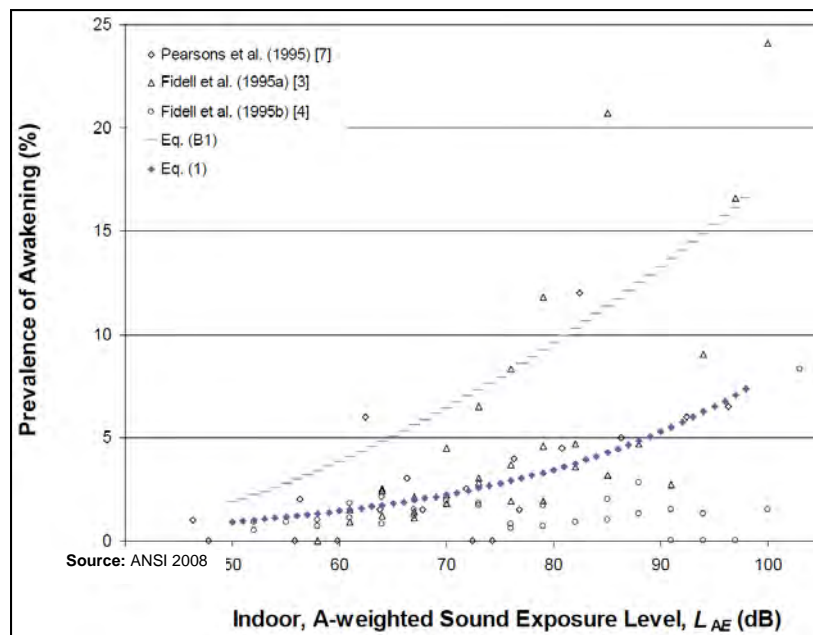
The FICAN 1997 curve is represented by the following equation:

$$\text{Percent Awakenings} = 0.0087 \times [\text{SEL} - 30]^{1.79}$$

Note the relatively low percentage of awakenings to fairly high noise levels. People think they are awakened by a noise event, but usually the reason for awakening is otherwise. For example, the 1992 UK Clean Air Act (CAA) study found the average person was awakened about 18 times per night for reasons other than exposure to an aircraft noise. Some of these awakenings are due to the biological rhythms of sleep and some to other reasons that were not correlated with specific aircraft events.

In July 2008, ANSI and the Acoustical Society of America (ASA) published a method to estimate the percent of the exposed population that might be awakened by multiple aircraft noise events based on statistical assumptions about the probability of awakening (or not awakening) (ANSI 2008). This method relies on probability theory rather than direct field research/experimental data to account for multiple events.

Figure C 4 depicts the awakenings data that form the basis and equations of ANSI S12.9-2008. The curve labeled “Eq. (B1)” is the relationship between noise and awakening endorsed by FICAN in 1997. The ANSI recommended curve labeled “Eq. (1)” quantifies the probability of awakening for a population of sleepers who are exposed to an outdoor noise event as a function of the associated indoor SEL in the bedroom. This curve was derived from studies of behavioral awakenings associated with noise events in “steady state” situations where the population has been exposed to the noise long enough to be habituated. The data points in Figure C 4 come from these studies. Unlike the FICAN curve, the ANSI 2008 curve represents the average of the data points for the field research.



**Figure C 4. Plot of Sleep Awakening Data versus Indoor SEL**

In December 2008, FICAN recommended the use of this new estimation procedure for future analyses of behavioral awakenings from aircraft noise. In that statement, FICAN also recognized that additional sleep disturbance research is underway by various research organizations and results of that work may result in additional changes to FICAN’s position. Until that time, FICAN recommends the use of ANSI S12.9-2008 (Figure C 5 and Figure C 6).

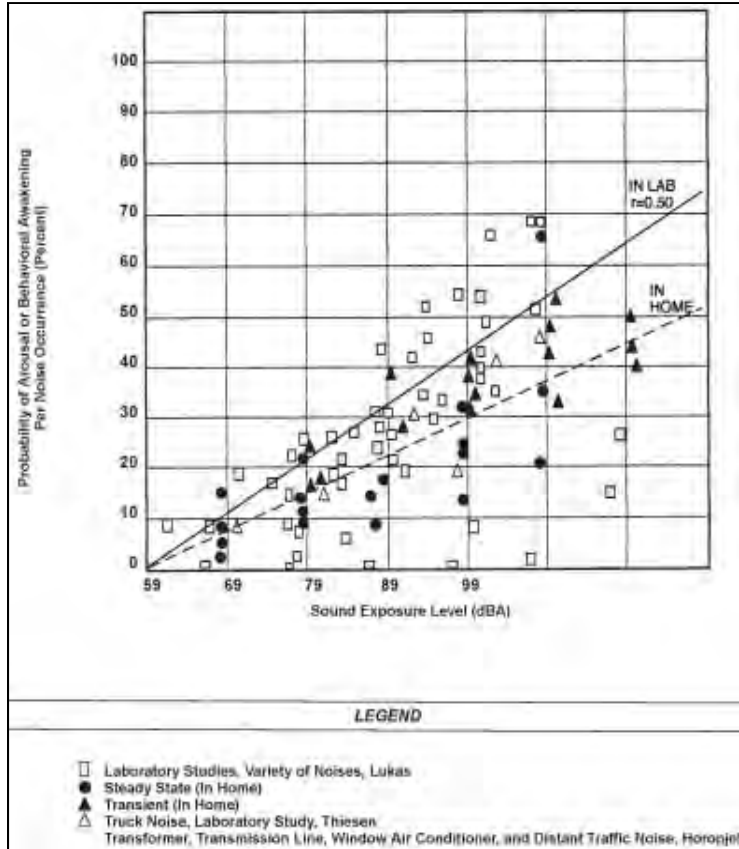


Figure C 5. Probability of Arousal or Behavioral Awakening in Terms of Sound Exposure Level

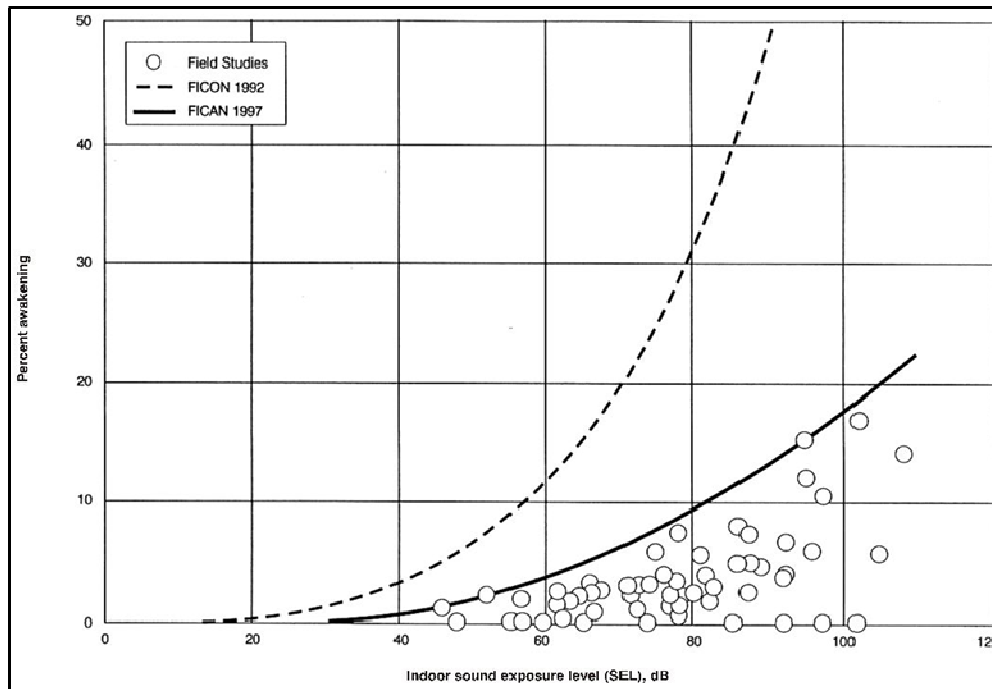


Figure C 6. Recommended Sleep Disturbance Dose-Response Relationship

### **C.3.9 Noise Effects on Domestic Animals and Wildlife**

Animal species differ greatly in their responses to noise. Each species has adapted, physically and behaviorally, to fill its ecological role in nature and its hearing ability usually reflects that role. Animals rely on their hearing to avoid predators, obtain food, and communicate with and attract other members of their species. Aircraft noise may mask or interfere with these functions. Secondary effects may include non-auditory effects similar to those exhibited by humans such as stress, hypertension, and other nervous disorders. Tertiary effects may include interference with mating and resultant population declines.

### **C.3.10 Subsonic Aircraft Noise Effects on Structures**

Normally, the most sensitive components of a structure to airborne noise are the windows and, infrequently, the plastered walls and ceilings. An evaluation of the peak sound pressures impinging on the structure is normally sufficient to determine the possibility of damage. In general, at sound levels above 130 dB, there is the possibility of the excitation of structural component resonance. While certain frequencies (such as 30 Hz for window breakage) may be of more concern than other frequencies, conservatively, only sounds lasting more than one second above a sound level of 130 dB are potentially damaging to structural components (CHABA 1977).

One study, directed specifically at low-altitude, high-speed aircraft showed that there is little probability of structural damage from such operations (Sutherland 1989). Sound levels at damaging frequencies (e.g., 30 Hz for window breakage or 15 to 25 Hz for whole-house response) produced by most military aircraft are rarely above 130 dB.

Noise-induced structural vibration may also cause annoyance to dwelling occupants due to induced secondary vibrations or “rattle” of objects (such as hanging pictures, dishes, plaques, and bric-a-brac) within the dwelling. Windowpanes may also vibrate noticeably when exposed to high levels of airborne noise, causing homeowners to fear breakage. In general, such noise-induced vibrations occur at sound levels above those considered normally compatible with residential land use. Thus, assessments of noise exposure levels for compatible land use should also be protective of noise-induced secondary vibrations.

### **C.3.11 Sonic Boom Effects on Structures**

Sonic booms are commonly associated with structural damage. Most damage claims are for windowpanes, glass, and plaster. Table C 6 summarizes the threshold of damage that might be expected at various overpressures. There is a large degree of variability in damage experience and much of the damage depends on the pre-existing condition of a structure. Breakage data of glass spans a range of two to three orders of magnitude at a given overpressure. While glass can suffer damage at low overpressures (as shown in Table C 6), laboratory tests of glass (White 1972) have shown that properly installed window glass will not break at overpressures below 10 pounds per square foot (psf), even when subjected to repeated booms. In general, structural damage from sonic booms should be expected only for overpressures above 10 psf.

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**Table C 6. Possible Damage to Structures from Sonic Booms**

Sonic Boom Overpressure Nominal pounds per square foot (psf)	Type of Damage	Item Affected
<b>0.5 - 2</b>	Plaster	Fine cracks; extension of existing cracks with more in ceilings, over doorframes, between some plasterboards.
	Glass	Rarely shattered, either partial or extension of existing.
	Roof	Slippage of existing loose tiles/slates, sometimes new cracking of old slates at nail hole.
	Damage to outside walls	Existing cracks in stucco extended.
	Bric-a-brac	Items carefully balanced or on edges can fall; fine glass, such as large goblets, can fall and break.
	Other	Dust falls in chimneys.
<b>2 - 4</b>	Glass, plaster, roofs, ceilings	Failures would have been difficult to forecast in terms of their existing, localized condition. Nominally in good condition.
<b>4 - 10</b>	Glass	Regular failures within a population of well-installed glass; industrial as well as domestic greenhouses.
	Plaster	Partial ceiling collapse of good plaster; complete collapse of very new, incompletely cured, or very old plaster.
	Roofs	High probability rate of failure in nominally good state, slurry-wash; some chance of failures in tiles on modern roofs; light roofs (bungalow) or large area can move bodily.
	Walls (out)	Old, free standing, but in fairly good condition, can collapse.
	Walls (in)	Inside ("party") walls known to move at 10 psf.
<b>Greater than 10</b>	Glass	Some good glass will fail regularly to sonic booms from the same direction. Glass with existing faults could shatter and fly. Large window frames move.
	Plaster	Most plaster affected.
	Ceilings	Plasterboards displaced by nail popping.
	Roofs	Most slate/slurry roofs affected, some badly; large roofs having good tile can be affected; some roofs bodily displaced causing gale-end and will-plate cracks; domestic chimneys dislodged if not in good condition.
	Walls	Internal party walls can move even if carrying fittings such as hand basins or taps; secondary damage due to water leakage.
	Bric-a-brac	Some nominally secure items can fall; e.g., large pictures, especially if fixed to party walls.

Source: Haber and Nakaki 1989

### **C.3.12 Noise Effects on Historical and Archaeological Sites**

Aircraft noise may affect historical sites more severely than newer modern structures due to the potential for increased fragility of structural components in historical buildings and at other historical sites. There are limited scientific studies of such effects to provide guidance for their assessment.

One study involved the measurement of sound levels and structural vibration levels in a superbly restored plantation house that was originally built in 1795. The house is now situated approximately 1,500 feet from the centerline at the departure end of runway 19L at Washington Dulles International Airport. These measurements were made in connection with the proposed scheduled operation of the supersonic Concorde airplane at Dulles (Wesler 1977). There was special concern for the building's windows since roughly half of the 324 windowpanes were original. No instances of structural damage were found. Interestingly, despite the high levels of noise during Concorde takeoffs, the induced structural vibration levels were actually less than those induced by touring groups and vacuum cleaning within the building itself. For the



effects of noise-induced vibrations of normal structures, assessments of noise exposure levels for normally compatible land uses should also be protective of historic and archaeological sites.

### **C.3.13 Noise Effects on Terrain**

Members of the public often believe that noise from low-flying aircraft can cause avalanches or landslides by disturbing fragile soil or snow structures in mountainous areas. There are no known instances of such effects and it is considered improbable that such effects will result from routine, subsonic aircraft operations.

In contrast to subsonic noise, sonic booms are considered a potential trigger for snow avalanches. Avalanches are highly dependent on the physical status of the snow and do occur spontaneously. They can be triggered by minor disturbances and there are documented accounts of sonic booms triggering avalanches. Switzerland routinely restricts supersonic flight during avalanche season. Landslides are not an issue for sonic booms. There was one anecdotal report of a minor landslide from a sonic boom generated by the Space Shuttle during landing, but there is no credible mechanism or consistent pattern of reports.

## **C.4 Noise Impact Modeling – Aircraft Noise**

### **C.4.1 Subsonic Aircraft Noise**

An aircraft in subsonic flight emits noise from two sources: the engines and flow noise around the airframe. To estimate noise impacts on the ground, DoD first measures noise from each aircraft in several flight configurations in straight and level flight at a reference altitude above an array of microphones. These measurements are stored in the NOISEFILE database. Next, this information on aircraft source noise is applied to a computer model to show how aircraft noise can be expected to propagate in real-world conditions. The algorithms at the core of these models account for spherical spreading, atmospheric absorption, and lateral attenuation. Spherical spreading is, in essence, the reduction in noise due to the spreading of sound energy away from its source. Sound energy decreases by approximately 6 dB every time the distance between the source and receiver is doubled. Daily and hourly variations in atmospheric conditions (such as humidity and clouds) can alter the amount of sound energy at a given location. The noise models use monthly average temperature and humidity conditions to derive acoustically average atmospheric absorption coefficients for each given location. Lateral attenuation, or the loss of sound energy due to reflection of sound by the ground, depends upon the altitude of the aircraft and the distance to the receiver.

The Air Force has developed a series of computer models to handle modeling of aircraft noise in various situations. To describe airfield noise near an installation, the model NOISEMAP (Version 7.0) was used. NOISEMAP extracts data (speed and power setting of the aircraft) from the NOISEFILE database. The noise from each segment of each flight track from each aircraft is then summed to generate a map of average noise levels on the ground, which are typically expressed using the DNL metric. The model accounts for all operations including both based and transient aircraft (Moulton 1992). Military Operations Area – Range NOISEMAP (MR\_NMAP) results have been field tested against actual long-term noise level measurements and found to be valid (Armstrong Laboratories 1991).

NOISEMAP was used to compute noise levels in the Military Operations Areas (MOAs) and

warning areas (Lucas and Calamia 1994). The primary noise metric computed by MR\_NMAP is  $L_{dnmr}$ , which is averaged over each airspace. MR\_NMAP also uses data from the NOISEFILE database based on aircraft speed and power setting, but it spreads the noise energy throughout specified volumes of airspace. Both models calculate the noise levels based on aircraft operations data obtained from aircrews and airspace managers. Data includes airspeed, duration of flight, altitudes of flight, distribution of aircraft in the airspace, and frequency of flight activities.

#### C.4.2 Supersonic Aircraft Noise

When an aircraft moves through the air, it pushes the air out of its way. At subsonic speeds, the displaced air forms a pressure wave that disperses rapidly. At supersonic speeds, the aircraft is moving too quickly for the wave to disperse, so it remains as a coherent wave. This wave is a sonic boom. When heard at the ground, a sonic boom consists of two shock waves (one associated with the forward part of the aircraft, the other with the rear part) of approximately equal strength and (for fighter aircraft) separated by 100 to 200 milliseconds. When plotted, this pair of shock waves (and the expanding flow between them) looks like the capital letter "N" so a sonic boom pressure wave is usually called an "N-wave". An N-wave has a characteristic "bang-bang" sound that can be startling. Figure C 7 shows the generation and evolution of a sonic boom N-wave under the aircraft.

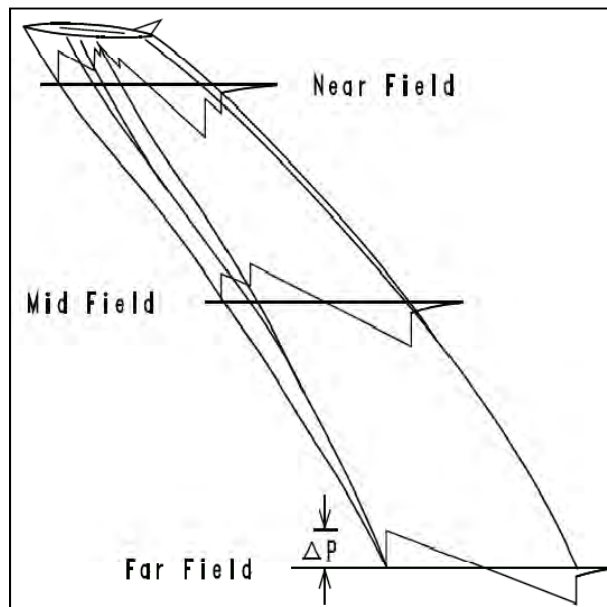
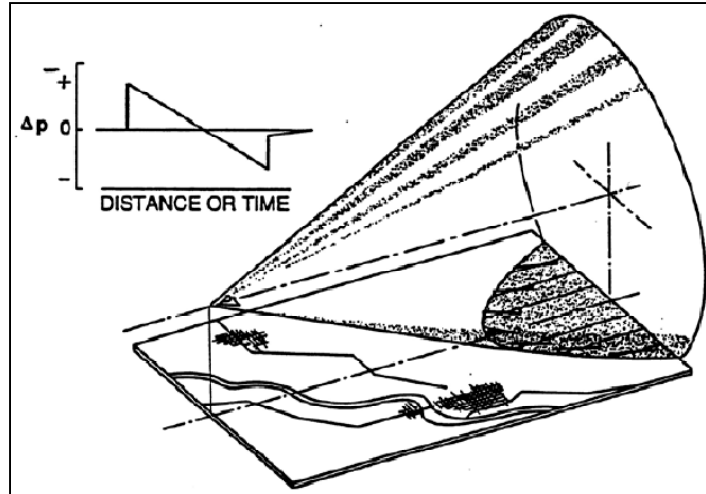


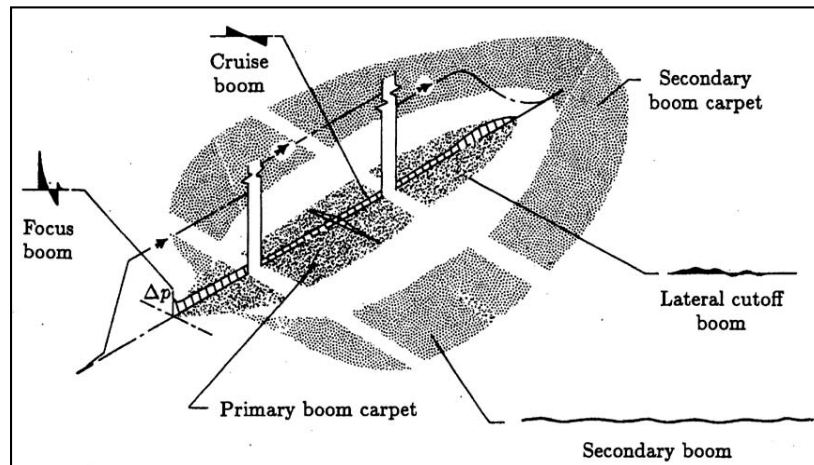
Figure C 7. Sonic Boom Generation and Evolution to N-Wave

Figure C 8 shows the sonic boom pattern for an aircraft in steady supersonic flight. The boom forms a cone that is said to sweep out a "carpet" under the flight track. The complete ground pattern of a sonic boom depends on the size, shape, speed, and trajectory of the aircraft. Even for a nominally steady mission, the aircraft must accelerate to supersonic speed at the start, decelerate back to subsonic speed at the end, and usually change altitude.



**Figure C 8. Sonic Boom Carpet in Steady Flight**

Figure C 9 illustrates the complexity of a nominal full mission. The Air Force's PCBoom4 computer program can be used to compute the complete sonic boom footprint for a given single event, accounting for details of a particular maneuver. Supersonic operations for the Proposed Action and alternatives are, however, associated with air combat training, which cannot be described in the deterministic manner that PCBoom4 requires. Supersonic events occur as aircraft approach an engagement, break at the end, and maneuver for advantage during the engagement. Long time cumulative sonic boom exposure (CDNL) is meaningful for this kind of environment.

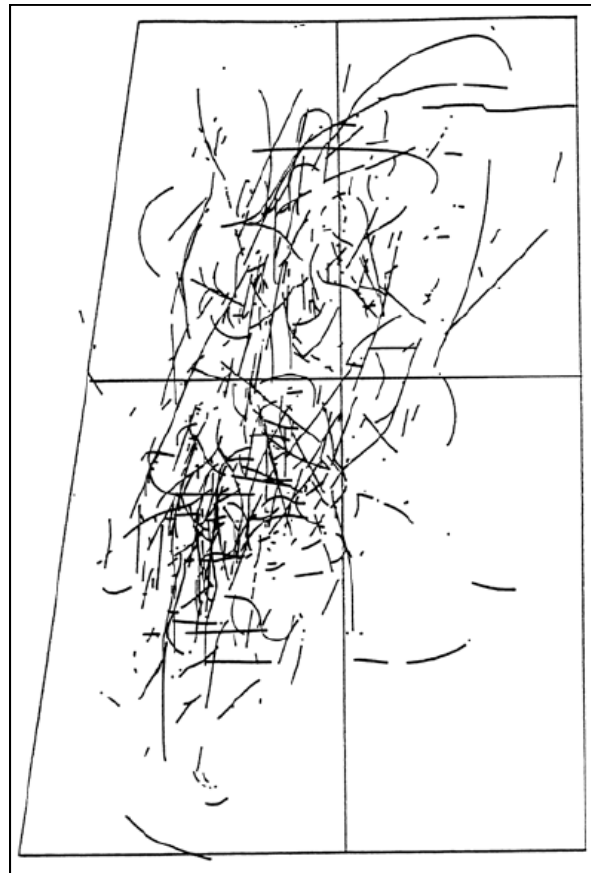


**Figure C 9. Complex Sonic Boom Pattern for Full Mission**

Aircraft exceeding Mach 1 (the speed of sound) always create a sonic boom; however, not all supersonic flight activities will cause a boom that can be heard at ground level. As altitude increases, air temperature decreases and the resulting layers of temperature change cause booms to be turned upward as they travel toward the ground. Depending on the altitude of the aircraft and the Mach number, many sonic booms are turned upward sufficiently that they never reach the ground. This same phenomenon, referred to as "cutoff", also acts to limit the width (area covered) of the sonic booms that reach the ground (Plotkin *et al.*, 1989).

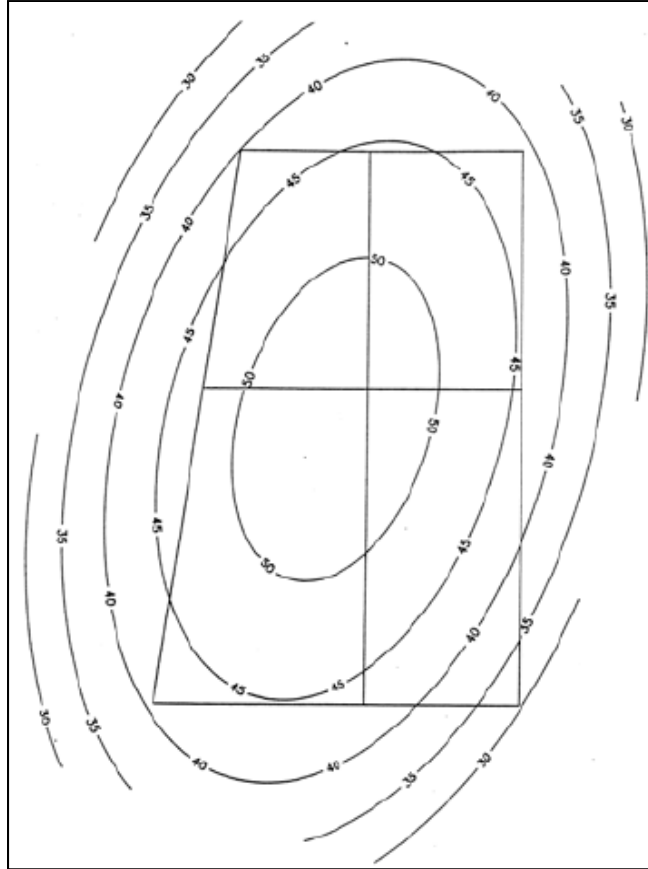
Long-term sonic boom measurement projects have been conducted in the following four supersonic air combat training airspaces: White Sands, New Mexico (Plotkin *et al.* 1989); the eastern portion of the Goldwater Range, Arizona (Plotkin *et al.* 1992); the Elgin MOA at Nellis AFB, Nevada (Frampton *et al.* 1993); and the western portion of the Goldwater Range (Page *et al.* 1994). These studies included analysis of schedule and air combat maneuvering instrumentation data and supported development of the 1992 BOOMAP model (Plotkin *et al.* 1992). The current version of BOOMAP (Frampton *et al.* 1993; Plotkin 1996) incorporates results from all four studies. Since BOOMAP is directly based on long-term measurements, it implicitly accounts for such variables as maneuvers, statistical variations in operations, atmosphere effects, and other factors.

Figure C 10 shows a sample of supersonic flight tracks measured in the air combat training airspace at White Sands (Plotkin *et al.* 1989). The tracks fall into an elliptical pattern aligned with preferred engagement directions in the airspace.



**Figure C 10. Supersonic Flight Tracks in Supersonic Air Combat Training Airspace**

Figure C 11 shows the CDNL contours that were fit to six months of measured booms in that airspace. The subsequent measurement programs refined the fit and demonstrated that the elliptical Maneuver Area is related to the size and shape of the airspace (Frampton *et al.* 1993). BOOMAP quantifies the size and shape of CDNL contours and number of booms per day in air combat training airspaces. That model was used for prediction of cumulative sonic boom exposure in this analysis.



**Figure C 11. Elliptical CDNL Contours in Supersonic Air Combat Training Airspace**

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