Draft
Environmental Assessment for Holloman Air Force Base F-16 Use in White Sands Missile Range R-5111 C/D Airspace

Prepared by

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Abstract

Responsible Agency: United States Air Force (USAF), 49th Wing, Holloman Air Force Base (AFB), Alamogordo, New Mexico.

Proposed Action: Use the White Sands Missile Range (WSMR) R-5111 C/D airspace to help meet F-16 Formal Training Unit (FTU) mission requirements.

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Report Designation: Draft Environmental Assessment (EA)

Abstract: The purpose of the Proposed Action is to expand F-16 pilot training flight into available restricted airspace that is not being used for F-16 training missions. To be useful, the airspace needs to be readily available in close proximity to Holloman AFB, to provide adequate training space size for air-to-air combat maneuvers, and to be approved for chaff and flare dispensing and supersonic operations. A permit would need to be obtained for chaff use prior to conducting training with chaff.

The R-5111 C/D portion of WSMR airspace is currently closed to F-16 pilot training as this airspace was not previously evaluated for the potential environmental impacts of flying F-16 training sorties. R-5111 C/D is situated west of and adjacent to R-5111 A/B, and both are west of the WSMR R-5107 airspace that is frequently closed for missile range test activities. The combined use of R-5111 A/B/C/D would provide adequate space for syllabus-required maneuvers to help make up for restricted airspace time lost to WSMR test missions. R-5111 C/D would support the USAF's need for optimized use of all available restricted airspace in the region.

In accordance with the focused nature of this EA, only two alternatives are being considered for the Proposed Action: the Preferred Alternative (using WSMR R-5111 C/D for F-16 pilot training) and the No-Action Alternative.

The following resources were carried forward for detailed analysis in this EA: airspace management and use; noise; aircraft safety and public safety; air quality; land use, recreation, and visual resources; biological resources; cultural resources; hazardous materials and waste; and environmental justice. Based on the analysis in the EA, implementing the Proposed Action would not result in significant adverse impacts on the human or natural environment; therefore, preparation of an environmental impact statement is not required.

Privacy Advisory Notice

Letters or other written comments provided may be published in the Final EA. As required by law, comments will be addressed in the Final EA and made available to the public. Any personal information provided will be kept confidential. Private addresses will be compiled to develop a mailing list for those requesting copies of the Final EA. However, only the names of the individuals making comments and their specific comments will be disclosed. Personal home addresses and phone numbers will not be published in the Final EA.

FINDING OF NO SIGNIFICANT IMPACT

FOR HOLLOMAN AIR FORCE BASE F-16 USE IN WHITE SANDS MISSILE RANGE
R-5111 C/D AIRSPACE
SIERRA COUNTY, NEW MEXICO

INTRODUCTION

The United States Air Force (USAF) proposes to use R-5111 C/D airspace managed by White Sands Missile Range (WSMR) to help meet F-16 Formal Training Unit (FTU) mission requirements at Holloman Air Force Base (AFB), New Mexico. The purpose of the Proposed Action is to expand the F-16 training areas into available restricted airspace near Holloman AFB that is currently not being used for F-16 training missions. The need for the Proposed Action is to provide additional training airspace to increase F-16 pilot production. Restricted airspace is needed to minimize interruptions in training from civilian aircraft permitted to travel through unrestricted airspace.

DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

Proposed Action

The USAF proposes to maximize the use of existing restricted airspace near Holloman AFB (Figure 2-1) to support F-16 FTU training missions; specifically, the USAF desires to use WSMR R-5111 C/D airspace (Figure 2-2) in conjunction with other WSMR-restricted airspace for flying F-16 FTU training sorties.

Alternatives Considered

Existing restricted airspace in the vicinity of Holloman AFB consists of R-5103, owned by Fort Bliss, and R-5107 and R-5111, owned by WSMR. Restricted airspace not currently being used for F-16 training consists of R-5103 A, R-5107 A/K, and R-5111 C/D.

R-5103 A has not been environmentally assessed and is restricted by the Federal Aviation Administration from F-16 use because of its proximity to El Paso International Airport; therefore, R-5103 is incompatible with the selection standards and not suitable for further consideration. Likewise, R-5107 A/K is not suitable for consideration for F-16 training because of high-volume, live-fire, army artillery training impacts in that airspace.

The R-5111 C/D portion of WSMR airspace is closed to F-16 pilot training because this airspace was not previously evaluated for the potential environmental impacts of flying F-16 training sorties. R-5111 C/D is situated west of and adjacent to R-5111 A/B, and both are west of the WSMR R-5107 airspace that is frequently closed for missile range test activities. If this EA finds that the F-16 training sorties in R-5111 C/D will not result in significant impacts to human health or the environment, this airspace can become available for F-16 pilot training. In that case, R-5111 A/B/C/D, combined, would provide adequate space for syllabus-required maneuvers to help make up for restricted airspace time lost to WSMR test missions. R-5111 C/D would support the UASF's need for optimized use of all available restricted airspace in the region.

The purpose and need of this Proposed Action are to maximize the F-16 training use to the full extent of restricted airspace in the vicinity of Holloman AFB. R-5111 C/D is the only restricted airspace not in use by F-16s that can support Holloman AFB's need to increase pilot production. Other, non-WSMR airspace optimization and expansion activities are being addressed under other EA and Environmental Impact Statement (EIS) efforts. Therefore, based on the limited usable airspace and the need for the action, the only reasonable selection standard is that the airspace being evaluated needs to fall within the limits of R-5111 C/D. Other potential selection standards that might apply to other airspaces do not apply to this action.

In accordance with the focused nature of this EA, only two alternatives are being considered for the Proposed Action: the Preferred Alternative (using WSMR R-5111 C/D for F-16 pilot training) and the No-Action Alternative.

AFFECTED ENVIRONMENT AND CONSEQUENCES

Airspace Management. Under the Proposed Action, no significant impacts to airspace management would occur. Implementation of the Proposed Action would expand training airspace to help increase pilot production and would not include any changes to the current operating hours or test mission schedules at WSMR. F-16 training units will be able to accomplish more training with the expanded airspace and would be able to depart Holloman AFB westbound, directly access WSMR airspace, and accomplish training without leaving the confines of restricted airspace. Implementation of the Proposed Action would not significantly impact general aviation pilots and would not interfere with air traffic control facilities or any underlying airports. Scheduling provisions will be made for New Mexico Department of Game and Fish (NMDGF) wildlife monitoring and capture flights. Although there will be an increase in airspace activity, Holloman AFB will continue airspace coordination with WSMR under current conditions. Therefore, no significant impacts to airspace management would occur.

Noise. Under the Proposed Action, no significant impact to noise receptors would occur. Under the Proposed Action, F-16 training would expand into the R-5111 C/D airspace and would increase the frequency of military aircraft operations in the area; however, the increase in frequency would not significantly increase the current noise level of the environment underlying the R-5111 C/D airspace. F-16 training would be conducted in accordance with the same rules and requirements as other training airspace; therefore, F-16 training activities in the R-5111 C/D airspace is not expected to exceed the 65 A-weighted day-night sound level (DNL) threshold. However, potential for noise level to vary briefly exceed 65 A-weighted DNL may occur during specific training maneuvers or exercises, such as sonic booms incidental to supersonic training. However, supersonic training would be conducted above 25,000 feet mean sea level (MSL) and is not expected to increase the average noise level at ground surface.

Safety. Under the Proposed Action, no significant impacts to safety are expected. The risk of mishap would remain consistent with the current risk of mishap because there is no projected change to training hours; therefore, the risk would be less than significant. The Holloman AFB,

WSMR Stallion Range Center, and Bureau of Land Management (BLM) have mutual aid support agreements, which would continue as they have under current conditions. Therefore, implementing the Proposed Action would have no effect on emergency and mishap response services. The Holloman AFB bird/wildlife aircraft strike hazard (BASH) plan establishes procedures to minimize bird and other wildlife strike hazards in low-level areas used by aircraft at the base. Air Force Pamphlet 91-212, "Bird/Wildlife Aircraft Strike Hazard (BASH) Management Techniques," provides guidance for implementing an effective bird/wildlife aircraft strike hazard reduction program. BASH would most likely occur during the climbing/descent of the aircraft and during low-level maneuvers. Other BASH considerations may include incorporating seasonal or elevation flight restrictions in light of bat feeding and migration trends associated with Jornada Cave adjacent to this airspace.

Specific considerations are

- birds typically migrate at night and generally fly between 1,000 and 2,500 feet above ground level (AGL);
- more than 96% of reported bird strikes occur below 3,000 feet AGL;
- approximately 25% of reported bird strikes occur between 10:00 PM and 7:00 AM;
- approximately 41% of bird strikes occur during the August through November months; and
- from June through September, bat feedings occur during dusk near Elephant Butte Reservoir and the Rio Grande.

Based on the information presented, specific avoidance measures may include:

- Limit night-time flights during the bird migration months of March through April and August through November over Elephant Butte reservoir;
- Limit flights to greater than 3,000 feet AGL near Elephant Butte Reservoir at all times of the year;
- During the months of June through September, aircraft flights may be limited at dusk along bat migration routes from Jornada Cave to Elephant Butte Reservoir and the Rio Grande. Holloman AFB will track any trends that might develop from bat feeding and migration patterns and implement safety measures if the need is identified.

Air Quality. Under the Proposed Action, no significant impacts to air quality are expected. There are no construction-related air emissions, such as from construction equipment, delivery trucks, and construction worker commuters. The R-5111 C/D airspace is in an attainment area; therefore, the R-5111 C/D airspace is not subject to the general conformity regulations and a general conformity applicability analysis is not required. Operational emissions would be expected from the use of the R-5111 C/D airspace for F-16 training. Combustion emissions from these aircraft using the existing airspace are largely related to JP-8 jet fuel. In addition to combustion emissions, exercises involving chaff and flare also contribute to pollutants generated within the airspaces. Previous studies have concluded that the use of chaff and flare does not result in a significant impact within the area or in areas adjacent to where the chaff and flares are deployed. Additionally, given the large area of airspace used, the contribution of chaff and flare to the total quantity of pollutants generated is negligible. Further, it is important to note that approximately 87% of aircraft

operations would be at an altitude where emissions would not affect ground-level concentrations of pollutants. Implementation of the Proposed Action would generate a negligible effect on ground-level concentrations and would not result in a violation of the National Ambient Air Quality Standards (NAAQS) in a local area because 87% of proposed operations would occur at an altitude above 3,000 feet AGL. Historically, the aviation sector is responsible for about 2.6% of the greenhouse gas emissions in the nation, with the U.S. military contributing only a small portion. Aircraft activities will generate small amounts of greenhouse gases primarily from emission products from internal combustion engines. However, these amounts are negligible and would not significantly contribute to greenhouse gases.

Land Use, Visual, and Recreational Resources. Under the Proposed Action, no significant impact to land use or visual and recreational resources is expected to occur. Elephant Butte Reservoir is the only avoidance area identified within the restricted Airspace R-5111 C/D where noise could impact recreational sports, hunting, fishing, and camping. Noise levels in the Elephant Butte area should continue to be characteristic of a sensitive, quiet environment with noise levels not expected to exceed 65 DNL from F-16 training. Ranches east of Elephant Butte Reservoir and Caballo and Fra Cristobal Mountains could potentially experience brief noise levels from an F-16 in flight above 85 decibels (dB) at or above 500 feet AGL. Occasional sonic booms may result from F-16 training but would not occur below 25,000 feet MSL. The continued use of chaff and flare within the restricted airspace R-5111 C/D would not impact underlying land uses. Furthermore, Holloman AFB would continue to maintain a hotline to identify noise-related issues and track trends associated with military aircraft operations under the Proposed Action. Therefore, implementation of the Proposed Action is not expected to have significant impacts on land use or visual and recreational resources.

Biological Resources. Under the Proposed Action, no significant impacts to biological resources are expected. When F-16 sorties approach the Caballo and Fra Cristobal Mountains, the aircraft will likely be above 5,500 feet MSL. Furthermore, F-16 training would avoid Elephant Butte Reservoir which provides habitat for a variety of wildlife species. Although overflight events east of Elephant Butte would be loud, most would occur in restricted airspace at altitudes where the noise generated would not be expected to startle animals, so negative impacts associated with startle responses would be limited. Animals living beneath airspace R-5111 C/D would experience sonic boom events from F-16 training; however, most training flights conducting sonic booms would occur above 25,000 feet MSL with distance attenuating (reducing) the noise levels, generally causing minimal response to sonic booms by livestock and wildlife. Training sorties may occur over wetlands, water bodies, and streams. 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. Special status species that could potentially be affected by the Proposed Action include several species of bats, hawks, eagles, and falcons that prey on the bats. As discussed in Safety, measures to avoid these special status species would be implemented in accordance to Air Force Pamphlet 91-212, “Bird/Wildlife Aircraft Strike Hazard (BASH) Management Techniques.” Therefore, the Proposed Action is not likely to have

an adverse effect on special status species if avoidance measures and BASH management techniques are implemented.

Cultural Resources. Under the Proposed Action, no impacts are expected to occur to cultural resources. F-16 training activities in restricted airspace R-5111 C/D would be conducted above 500 feet AGL. Aircraft operations at this altitude would not have the potential to cause structural damage to historical structures beneath this restricted airspace. Visual effects (the presence of military aircraft) on these resources would be negligible because the aircraft would only be visible from any given cultural resource for a few minutes per flying day. Further, no impacts to Native American sacred or traditional sites have been identified or would be expected.

Hazardous Materials and Wastes. Under the Proposed Action, no impacts to hazardous materials and wastes would occur. No ground-disturbing activities (construction or demolition) would occur as part of the Proposed Action. Consequently, there would be no increase in the temporary storage of construction-related hazardous materials and wastes. Military aircraft operating within R-5111 C/D would continue to adhere to USAF fuel dumping procedures when necessary (in life-threatening emergencies). Fuel dumping is not a component of any routine flight training and only occurs during in-flight emergency circumstances with a loss of life potential for the pilot. Under the Proposed Action, the storage, transport, and use of chaff and flare would continue to be implemented in accordance with current procedures and training operation requirements. Consequently, there would be no significant impacts to the physical or human environment as a result of chaff and flare use within the Proposed Action area.

Environmental Justice and Protection of Children. Under the Proposed Action, no impacts to environmental justice would occur. No minority/low-income populations or schools/daycares are located under the R-5111 C/D airspace. The Proposed Action would not disproportionately affect environmental and human health of minority or low-income populations or disproportionately affect environmental health and safety of children.

PUBLIC NOTICE

National Environmental Policy Act (NEPA) 40 *Code of Federal Regulations* (CFR) §§1500-1508 and 32 CFR 989 require public review of the EA before approval of the Finding of No Significant Impact (FONSI) and implementation of the Proposed Action. A Notice of Availability for public review of the draft EA was published in the Alamogordo Daily News, Las Cruces Sun News, Truth or Consequences Herald, and The Sierra County Sentinel. A printed copy of the Draft EA and findings will be available for review at the Truth or Consequences Public Library, Thomas Branigan Memorial Library, Alamogordo Public Library, and Ahrens Memorial Library; the documents will also be made available online at http://www.holloman.af.mil/EnvironmentalInformation.aspx. Through the Interagency and Intergovernmental Coordination for Environmental Planning process, Holloman AFB notified relevant federal, state, and local agencies (listed in Appendix A) and allowed them sufficient time to disclose their environmental concerns specific to the Proposed Action. The total review period for public and agency comments is 30 days. Letters received are in Appendix A of the Final EA.

FINDING OF NO SIGNIFICANT IMPACT

After careful review of the potential impacts of this Proposed Action as assessed in the *Environmental Assessment for Holloman AFB F-16 Use in WSMR R-5111 C/D Airspace*, I have concluded that the action's implementation would not have a significant impact on the quality of the human or natural environment or generate significant controversy. Accordingly, the requirements of the NEPA, Council on Environmental Quality regulations, and 32 CFR 989, et seq., have been fulfilled, and an EIS is not necessary and will not be prepared.

JAMES R. KEEN, Colonel, USAF
Commander

Date

EXECUTIVE SUMMARY

INTRODUCTION

The United States Air Force (USAF) proposes to use R-5111 C/D airspace managed by White Sands Missile Range (WSMR) to help meet F-16 Formal Training Unit (FTU) mission requirements at Holloman Air Force Base (AFB), New Mexico. The purpose of the Proposed Action is to expand the F-16 training areas into available restricted airspace in the vicinity of Holloman AFB that is currently not being used for F-16 training missions. The need for the Proposed Action is to provide additional training airspace to increase F-16 pilot production. Restricted airspace is needed to minimize interruptions in training from civilian aircraft permitted to travel through unrestricted airspace.

PROPOSED ACTION

The USAF proposes to maximize the use of existing restricted airspace near Holloman AFB to support F-16 FTU training missions; specifically, the USAF desires to use WSMR R-5111 C/D airspace in conjunction with other WSMR restricted airspace for flying F-16 FTU training sorties.

ALTERNATIVES CONSIDERED

Four alternatives were identified and considered during the planning stages of the proposed project. Two of these alternatives (R-5103 A and R-5107 A/K) were eliminated from further consideration because they did not meet the selection criteria. The R-5103 A airspace has not been environmentally assessed and is restricted by the Federal Aviation Administration from F-16 use because of its proximity to El Paso International Airport. The R-5107 A/K airspace is not suitable for consideration for F-16 training because of high-volume, live-fire, army artillery training impacts.

Alternative 1 (Preferred Alternative) is use of the R-5111 C/D airspace. The R-5111 C/D portion of WSMR airspace is closed to F-16 pilot training because this airspace was not previously evaluated for the potential environmental impacts of flying F-16 training sorties. R-5111 C/D is situated west of and adjacent to R-5111 A/B. R-5111 A/B/C/D, combined, would provide adequate space for syllabus-required maneuvers to help make up for restricted airspace time lost to WSMR test missions.

Under the No-Action Alternative, Holloman AFB will not expand F-16 pilot training into WSMR R-5111 C/D airspace. USAF would lose the efficiencies gained from the optimized use of all available restricted airspace in the region and would not meet pilot production goals.

AFFECTED ENVIRONMENT AND CONSEQUENCES

The Proposed Action would not significantly impact any of the resources analyzed. No significant impacts would occur from implementation of the Proposed Action on airspace management and use, noise, land use, visual and recreational resources, and biological resources. A listing of the resources analyzed and the consequences of the implementation of the Proposed Action is as follows:

- **Airspace Management** – No significant impact. Implementation of the Proposed Action would expand training airspace to help increase pilot production and would not include any changes to the current operating hours or test mission schedules at WSMR. F-16 training units will be able to accomplish more training with the expanded airspace and would be able to depart Holloman AFB westbound, directly access WSMR airspace, and accomplish training without leaving the confines of restricted airspace. Implementation of the Proposed Action would not significantly impact general aviation pilots and would not interfere with air traffic control facilities or any underlying airports. Scheduling provisions will be made for New Mexico Department of Game and Fish (NMDGF) wildlife monitoring and capture flights. Although there will be an increase in airspace activity, Holloman AFB will continue airspace coordination with WSMR under current conditions.

- **Noise** – No significant impact. Under the Proposed Action, F-16 training would expand into the R-5111 C/D airspace and would increase the frequency of military aircraft operations in the area; however, the increase in frequency would not heighten the current noise level of the environment underlying the R-5111 C/D airspace. F-16 training would be conducted in accordance with the same rules and requirements as other training airspace. Therefore, F-16 training activities in the R-5111 C/D airspace is not expected to exceed the 65 A-weighted DNL threshold. However, potential for brief spikes of noise above 65 A-weighted DNL may occur during specific training maneuvers or exercises, such as supersonic training. Supersonic training would be conducted above 25,000 feet mean sea level (MSL) and is not expected to increase the noise level at ground level. Overall, implementation of the Proposed Action would be expected to result in no significant impacts to the noise environment.

- **Safety** – No significant impact. The risk of mishap would remain consistent with the current risk of mishap because there is no projected change to training hours; therefore, the risk would be less than significant. The Holloman AFB, WSMR Stallion Range Center, and Bureau of Land Management (BLM) have mutual aid support agreements, which would continue as they have under current conditions. Therefore, implementing the

Proposed Action would have no effect on emergency and mishap response services. The Holloman AFB Bird/Wildlife Aircraft Strike Hazard (BASH) plan establishes procedures to minimize bird and other wildlife strike hazards at the base and in low-level areas used by aircraft at the base. Local flying procedures avoid direct overflight of areas where migratory birds (such as Elephant Butte Reservoir) predominantly nest. Air Force Pamphlet 91-212, "Bird/Wildlife Aircraft Strike Hazard (BASH) Management Techniques," provides guidance for implementing an effective bird/wildlife aircraft strike hazard reduction program. BASH would most likely occur during the climbing/descent of the aircraft and during low-level maneuvers. Other BASH considerations may include incorporating seasonal or elevation flight restrictions in light of bat feeding and migration trends associated with Jornada Cave adjacent to this airspace. Holloman AFB will track any trends that might develop from bat flight and migration patterns and implement safety measures if the need is identified.

- **Air Quality** – No significant impact. There are no construction-related air emissions, such as from construction equipment, delivery trucks, and worker commuters. The R-5111 C/D airspace is in an attainment area; therefore, the R-5111 C/D airspace is not subject to the general conformity regulations and a General Conformity Applicability Analysis is not required. Operational emissions would be expected from the use of the R-5111 C/D airspace for F-16 training. Combustion emissions from these aircraft using the existing airspace are largely related to JP-8 jet fuel. In addition to combustion emissions, exercises involving chaff and flare also contribute to pollutants generated within the airspaces. Previous studies have concluded that the use of chaff and flare does not result in a significant impact within the area or in areas adjacent to where the chaff and flares are deployed. Additionally, given the large area of airspace used, the contribution of chaff and flare to the total quantity of pollutants generated is negligible. Further, it is important to note that approximately 87% of aircraft operations would be at an altitude where emissions would not affect ground-level concentrations of pollutants. Aircraft activities will generate small amounts of greenhouse gases primarily from emission products from internal combustion engines. However, these amounts are negligible and would not significantly contribute to greenhouse gases (see Section 3.5.3).

- **Land Use, Visual and Recreational Resources** – No significant impact. Elephant Butte Reservoir is the only avoidance area identified within the restricted Airspace R-5111 C/D where noise could impact recreational sports, hunting, fishing, and camping. Noise levels in the Elephant Butte area should continue to be characteristic of a sensitive, quiet environment with noise levels not expected to exceed 65 decibels (dB) DNL from F-16

training. Additionally, an occasional sonic boom may result from F-16 training but would not occur below 25,000 feet MSL. The use of chaff and flare within the restricted airspace R-5111 C/D would not impact underlying land uses. Furthermore, Holloman AFB would continue to maintain a hotline to identify noise-related issues and track trends associated with military aircraft operations under the Proposed Action. Therefore, implementation of the Proposed Action is not expected to have significant impacts on land use, visual and recreational resources beneath the proposed restricted airspace R-5111 C/D for F-16 training.

- **Biological Resources** – No significant impact. It is expected that when F-16 sorties approach the Caballo and Fra Cristobal Mountains, that the aircraft will be above 500 feet AGL. Furthermore, F-16 training would avoid Elephant Butte which provides habitat for a variety of wildlife species. Although overflight events would be loud east of Elephant Butte, most would occur in restricted airspace at altitudes where the noise generated would not be expected to startle animals, therefore, negative impacts associated with startle responses would be limited. Animals living beneath airspace R-5111 C/D would experience sonic boom events from F-16 training; however, sonic booms would not occur below 25,000 feet MSL. Habituation to thunderclaps and rumble associated with seasonally frequent thunderstorms within the region is expected to minimize response of birds, mammals, and domestic animals to sonic booms. Most training flights occur above 5,000 feet AGL with distance attenuating (reducing) the noise to levels generally causing minimal response by livestock and wildlife. Supersonic speeds, and thus, sonic booms are limited to above 25,000 feet MSL that also attenuates the effect at ground level. Training sorties may occur over wetlands, water bodies and streams. 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. Special status species that could potentially be affected by the Proposed Action include several species of bats, hawks, eagles, and falcons that prey on the bats. Every night from June through September, bats that reside in the Jornada Caves (near the north border of R-5111 C/D) fly out of the caves at dusk to the Rio Grande. The average number of bats using the caves on a regular basis varies from 200,000 to 500,000, but as many as 5 million to 8 million use it during migration in the warm weather months and in years of high insect population. These bats feed in the Rio Grande riparian corridor and irrigated farm fields where swarms of insects gather. As discussed in Safety, BASH

considerations may include incorporating seasonal or elevation flight restrictions in light of bat feeding and migration trends associated with Jornada Cave adjacent to this airspace. With implementation of avoidance measures and BASH management techniques, the Proposed Action is not likely to have an adverse effect on special status species.

- **Cultural Resources** – No impact. Under the Proposed Action, the floor of the proposed F-16 training in restricted airspace R-5111 C/D would be at least 500 feet AGL. Aircraft operations at this altitude would not have the potential to cause structural damage to historical structures beneath this restricted airspace, which can occur with noise levels of approximately 130 dB. Visual effects (the presence of military aircraft) on these resources would be negligible because the aircraft would only be visible from any given cultural resource for a few minutes per flying day. Further, no impacts to Native American sacred or traditional sites have been identified or would be expected. Therefore, implementation of the Proposed Action would have less than significant impacts on cultural resources beneath the proposed restricted airspace R-5111 C/D.
- **Hazardous Materials and Wastes** – No impact. No ground-disturbing activities (construction or demolition) would occur as part of the Proposed Action. Consequently, there would be no increase in the temporary storage of construction-related hazardous materials and wastes. Under the Proposed Action, the storage, transport, and use of chaff and flare would continue to be implemented in accordance with current procedures and training operation requirements.
- **Environmental Justice and the Protection of Children** – No impact. No minority/low-income populations or schools/daycares are located under the R-5111 C/D airspace. The Proposed Action would be limited to airspace only and would not include any project components that would require or result in any facility construction, modification, or demolition resulting in disproportionally high or adverse human health or environmental effects on minority or low-income populations near the Proposed Action area from aircraft operations.

CUMULATIVE IMPACTS

The impacts of the Proposed Action when combined with impacts from other present or planned development in the surrounding area are not anticipated to result in significant adverse cumulative impacts.

MEASURES TO REDUCE EFFECTS

Implementing the Proposed Action would have no significant adverse effects, and no mitigation measures would be required. For many resource areas, Best Management Practices (BMPs) or

avoidance measures would be implemented to further minimize the potential effects of the Proposed Action.

- **Noise** – The need for avoidance of noise-sensitive areas during training operations would continue to be emphasized to pilots in training. Elephant Butte Reservoir was identified as an avoidance area due to recreational activity, bird habitats, bird and bat flyways, and feeding areas for bats from the Jornada Caves. This area is where overflights at low altitudes should be avoided to the maximum extent practicable. F-16 training activities would generally be limited to daytime weekday hours with less than 10% occurring between 10 PM and 7 AM, and all flights would be conducted above 500 feet AGL. Holloman AFB would continue to maintain a hotline to identify noise-related issues and track trends associated with military aircraft operations under the Proposed Action.
- **Biological Resources** – To minimize impacts to wildlife, Holloman AFB flight safety will track any trends that might develop from bat feeding and flight migration patterns. If a trend appears that warrants safety measures, they will be developed and implemented. Additionally, F-16 training will avoid low-level flyovers at Elephant Butte Reservoir during bird migration seasons.
- **Cultural Resources** – F-16 training activities will be conducted above 500 feet AGL to avoid noise impacts on cultural resources.
- **Safety** – The Holloman AFB BASH plan establishes procedures to minimize bird and other wildlife strike hazards at the base and low-level areas used by aircraft at the base (Holloman AFB general plan update). Local flying procedures would avoid direct overflight of areas where migratory birds (such as Elephant Butte Reservoir) predominantly nest. Air Force Pamphlet 91-212, "Bird/Wildlife Aircraft Strike Hazard Management Techniques," provides guidance for implementing an effective BASH reduction program. Two systems will be used to estimate wildlife strike hazard; the USAF's BAM and the Avian Research Laboratory's AHAS. These tools provide information regarding bird strike risk and allow pilots to make informed decisions about their routes with regards to wildlife strike risk. Other BASH considerations may include incorporating seasonal or elevation flight restrictions in light of bat feeding and migration trends associated with Jornada Cave adjacent to this airspace. Specific considerations are:
    - Birds typically migrate at night and generally fly between 1,000 and 2,500 feet AGL;
    - More than 96% of reported bird strikes occur below 3,000 feet AGL;

- Approximately 25% of reported bird strikes occur between 10:00 PM and 7:00 AM;
- Approximately 41% of bird strikes happen during the August through November months; and
- From June through September, bat feedings occur during dusk near Elephant Butte Reservoir and the Rio Grande.

Based on the information presented, specific avoidance measures may include:

- Limit night-time flights during the bird migration months of March through April and August through November over Elephant Butte reservoir;
- Limit flights to above 3,000 feet AGL near Elephant Butte Reservoir at all times of the year;
- During the months of June through September, flights may be limited at dusk along bat migration routes from Jornada Cave to Elephant Butte Reservoir and the Rio Grande. Holloman AFB will track any trends that might develop from bat feeding and migration patterns as well as overall BASH data and implement safety measures if the need is identified.

- **Hazardous Materials and Wastes** – Military aircraft operating within R-5111 C/D would continue to adhere to USAF fuel dumping procedures when necessary (in life-threatening emergencies). Under the Proposed Action, the storage, transport, and use of chaff and flare would continue to be implemented in accordance with current procedures and training operation requirements at the base and in the low-level flying areas used by aircraft from the base.

CONCLUSIONS

Based on the analysis presented in the environmental assessment, implementation of the Proposed Action alternative would not result in significant or major adverse impacts on any of the resources analyzed within this document and no further analysis or documentation, such as the preparation of an Environmental Impact Statement, is required. No significant impacts would occur from implementation of the Proposed Action on airspace management and use, noise, land use, visual and recreational resources, and biological resources. The impacts of the Proposed Action when combined with impacts from other present or planned development in the surrounding area are not anticipated to result in significant adverse cumulative impacts. The USAF will employ all practical and reasonable means to minimize the potential adverse impacts on the human and natural environment. Therefore, a Finding of No Significant Impact is warranted.

CONTENTS

FIGURES

TABLES

APPENDIX

ACRONYMS AND ABBREVIATIONS

ACC	Air Combat Command
AETC	Air Education and Training Command
AFB	Air Force Base
AFI	Air Force Instruction
AFSC	Air Force Safety Center
AGL	above ground level
AHAS	Avian Hazard Advisory System
AM	ante meridiem
APE	Area of Potential Effect
ARTCC	Air Route Traffic Control Center
ATC	air traffic control
ATCAA	Air Traffic Control Assigned Airspace
BAM	Bird Avoidance Model
BASH	Bird/Wildlife Aircraft Strike Hazard
BCC	Birds of Conservation Concern
BLM	Bureau of Land Management
BMP	Best Management Practices
BNSF	Burlington Northern Sante Fe
CAA	Clean Air Act
CDP	Census-designated place
CEQ	Council on Environmental Quality
CFA	Controlled firing area
CFR	*Code of Federal Regulations*
CO	carbon monoxide
CO_2e	Carbon Dioxide equivalent
COC	community of comparison
dB	Decibels
dBA	Decibel A-weighting
DNL	Day-night Sound Level
DNL_{mr}	Day-night Sound Level (subsonic noise)
DoD	Department of Defense
DOT	Department of Transportation
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
ESA	Endangered Species Act
EO	Executive Order
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FCC	Federal Communications Commission
FICON	Federal Interagency Committee on Noise
FONSI	Finding of No Significant Impact
FRA	Federal Railroad Administration

FTU	formal training unit
GAF	German Air Force
GHG	Greenhouse Gas
GIS	Geographic Information System
hz	hertz
ICRMP	Installation Cultural Resource Management Plan
IFR	Instrument Flight Rules
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
IR	instrument routes
JTX	joint training exercise
Ld_{nmr}	onset rate-adjusted monthly day-night average, A-weighted sound level
MBTA	Migratory Bird Treaty Act
MOA	Military Operations Area
MR_NMAP	MOA-Range NOISEMAP
mph	miles per hour
MSL	mean sea level
MTR	Military Training Routes
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
nm	nautical mile
NMDGF	New Mexico Department of Game and Fish
NMED	New Mexico Environmental Department
NOx	Nitrogen oxide
NPS	National Parks Service
NRHP	National Register of Historic Places
PCA	Positive Control Area
pH	potential of hydrogen
PM	post meridiem
POL	petroleum, oil, and lubricants
RA	restricted area
ROI	Region of Influence
RPA	remotely piloted aircraft
RSOP	Regional Special Use Airspace Optimization Plan
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SUA	Special Use Airspace
TCP	Traditional Cultural Property
TESF	Turner Endangered Species Fund
THPO	Tribal Historic Preservation Officer
TPF	The Peregrine Fund
UAS	unmanned aircraft systems
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAF	United States Air Force

USBR	U.S. Bureau of Reclamation
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VFR	Visual Flight Rules
VR	Visual Routes
WA	warning area
WCA	Wildlife Conservation Act
WSA	Wilderness Study Area
WSMR	White Sands Missile Range

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SECTION 1.0
PURPOSE OF AND NEED FOR THE ACTION

1.1 INTRODUCTION

Why does this document exist?

The United States Air Force (USAF) proposes to use R-5111 C/D airspace managed by White Sands Missile Range (WSMR) to help meet F-16 Formal Training Unit (FTU) mission requirements at Holloman Air Force Base (AFB), New Mexico.

This environmental assessment (EA) is being prepared to evaluate the potential environmental impacts of this Proposed Action in compliance with

- the National Environmental Policy Act of 1969 (NEPA)[1],
- the regulations of the President's Council on Environmental Quality (CEQ) that implement NEPA procedures[2], and
- the Air Force Environmental Impact Assessment Process (EIAP)[3].

1.2 PURPOSE OF THE ACTION

The purpose of the Proposed Action is to expand the F-16 training areas into available restricted airspace near Holloman AFB that is currently not being used for F-16 training missions.

1.3 NEED FOR THE ACTION

The need for the Proposed Action is to provide additional training airspace to increase F-16 pilot production. There is a particular need for existing restricted airspace to minimize interruptions in training from civilian aircraft that are permitted to travel through unrestricted airspace.

Restricted airspace currently used for F-16 pilot training is saturated with both training and testing operations; however, pilot production goals are not being met. To meet the goal set by the USAF Chief of Staff, additional existing airspace in the vicinity of Holloman AFB must be used to prevent additional transit time requirements that would detract from pilot training time and incur additional fuel costs per pilot.

[1] 42 United States Code (USC) 4331 et seq.

[2] 40 Code of Federal Regulations (CFR) 1500-1508

[3] Air Force Instruction (AFI) 32-7061 as promulgated in 32 CFR 989 (Secretary of the Air Force, 2003)

F-16 FTU training sorties[4] are flown in sections of WSMR airspace (controlled by the U.S. Army) and other airspaces controlled by the USAF. This EA addresses needs related to WSMR airspace only. Maximizing use of other non-WSMR airspace, including optimizing existing non-WSMR airspace and establishing new USAF-controlled airspace, is a separate effort being considered in the Regional Special Use Airspace Optimization Plan (RSOP) under development. The objective of the RSOP is for the USAF to modify airspaces controlled by the Albuquerque Center to keep pace with current USAF requirements. Potential environmental impacts of RSOP airspace actions will be addressed in separate EAs and Environmental Impact Statements (EISs), as appropriate, for each action.

1.4 DECISION TO BE MADE

This EA will guide Holloman AFB in implementing the Proposed Action in a manner consistent with USAF standards for environmental stewardship. The EA evaluates whether the Proposed Action would result in significant impacts to human health and the environment. If significant impacts are identified, Holloman AFB would undertake mitigation to reduce impacts to below the level of significance, undertake the preparation of an EIS addressing the Proposed Action, or abandon the Proposed Action.

1.5 INTERAGENCY AND INTERGOVERNMENTAL COORDINATION AND CONSULTATIONS

1.5.1 Interagency and Intergovernmental Coordination and Consultations

Executive Order (EO) 12372, "Intergovernmental Review of Federal Programs," requires intergovernmental notifications prior to making any detailed statement of environmental consequences. Federal, state, and local agencies with jurisdiction that could be affected by the Proposed Action have been notified and consulted during the development of this EA. A list of agencies consulted during the analysis and representative copies of correspondence are included as Appendix A of the EA.

1.5.2 Government to Government Consultations

The National Historic Preservation Act (NHPA)[5] directs federal agencies to consult with Native American tribal governments and seek their input when identifying archeological sites, historic properties, and traditional cultural properties (TCPs); evaluating TCP eligibility for the National Register of Historic Places; and, if eligible, resolving adverse effects of the Proposed Action. The

[4] See Section 2.1 for description

[5] 36 CFR Part 800

NHPA consultation process is distinct from NEPA and Interagency/Intergovernmental Coordination for Environmental Planning (IICEP) notification processes and has its own notification requirements and timelines. In accordance with the NHPA, the federally recognized tribes that are affiliated historically with the Holloman AFB geographic region (listed in Appendix A) have been invited to consult and provide comments.

1.6 PUBLIC AND AGENCY REVIEW OF THE EA

A Notice of Availability of the Draft EA and Draft Finding of No Significant Impact (FONSI), if appropriate, will be published in the

- *Alamogordo Daily News,*
- *Las Cruces Sun News,*
- *Truth or Consequences Herald,* and
- *The Sierra County Sentinel*

to announce the availability of the EA for review and invite the public to review and comment on the Draft EA during a 30-day comment period. A printed copy of the Draft EA and findings will be available for review at the

- Truth or Consequences Public Library,
- Thomas Branigan Memorial Library,
- Alamogordo Public Library, and
- Ahrens Memorial Library.

The documents will also be made available online at http://www.holloman.af.mil/EnvironmentalInformation.aspx.

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SECTION 2.0
DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

What are the Proposed Action and Alternatives?

The USAF proposes to maximize the use of existing restricted airspace near Holloman AFB (Figure 2-1) to support F-16 FTU training missions; specifically, the USAF desires to use WSMR R-5111 C/D airspace (Figure 2-2) in conjunction with other WSMR restricted airspace for flying F-16 FTU training sorties.

Restricted airspace R-5111 D extends from the ground surface up to but not including 13,000 feet above mean sea level (MSL). Restricted airspace R-5111 C is atop R-5111 D, shares the same horizontal/geographical boundaries, and starts at 13,000 feet MSL extending to an unlimited altitude. The horizontal limits of these airspaces are roughly 10 nautical miles (nm) wide and 37 nm long.

The WSMR R-5111 C/D airspace enables air-to-air maneuvering as well as chaff and flare use and supersonic operations within 100 nm of Holloman AFB. R-5111 C/D would primarily be used for aircraft maneuvers as are currently conducted in R-5111 A/B. Supersonic flights would be conducted at greater than 25,000 feet MSL. Use of supersonic speeds and the deployment of chaff and flares in R-5111 C/D would be the same as existing actions in adjacent restricted airspace following all regulations.

Airspace use would typically be from 7 AM to 10 PM, Monday through Friday; however, if the mission dictates, training may be accomplished on Saturdays and Sundays. Additionally, some aircraft training operations would be conducted after dark (about one hour after sunset). Air crews operating from Holloman AFB can normally fulfill the annual night flying requirements during winter months without flying during the late night period (10 PM to 7 AM); however, night training during the summer would necessitate flying during the late night period. Overall, less than 10% of total training sortie operations would occur (at least partially) after 10 PM However, the need to meet required training timelines may increase the percentage of training operations occurring past 10 PM.

A ***sortie*** represents a single takeoff, performance of a mission, and landing.
An ***operation*** is defined as a subset of a sortie that accounts for an individual flying activity within an individual piece of training airspace. There can be multiple operations per sortie.

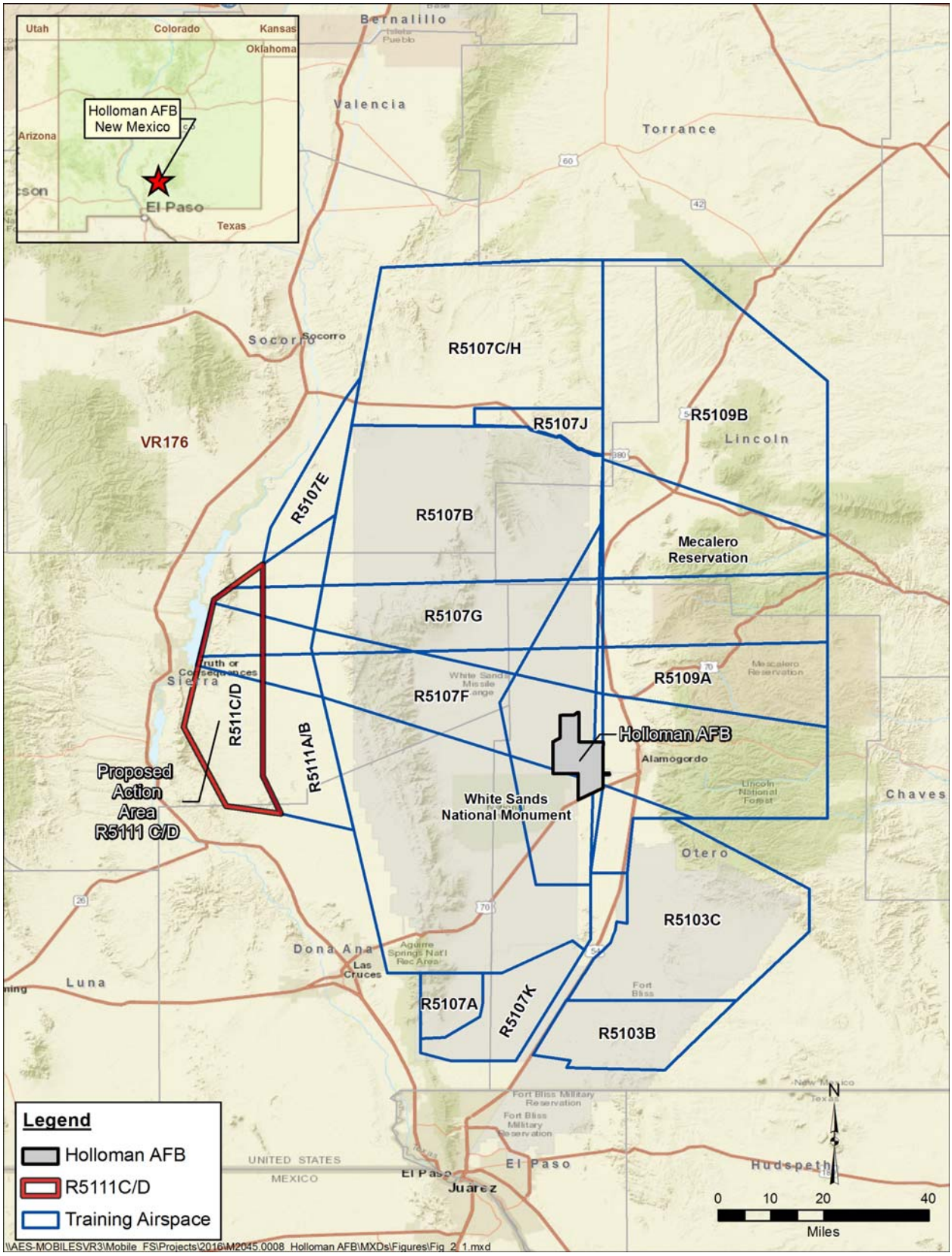

Figure 2-1 Project Location

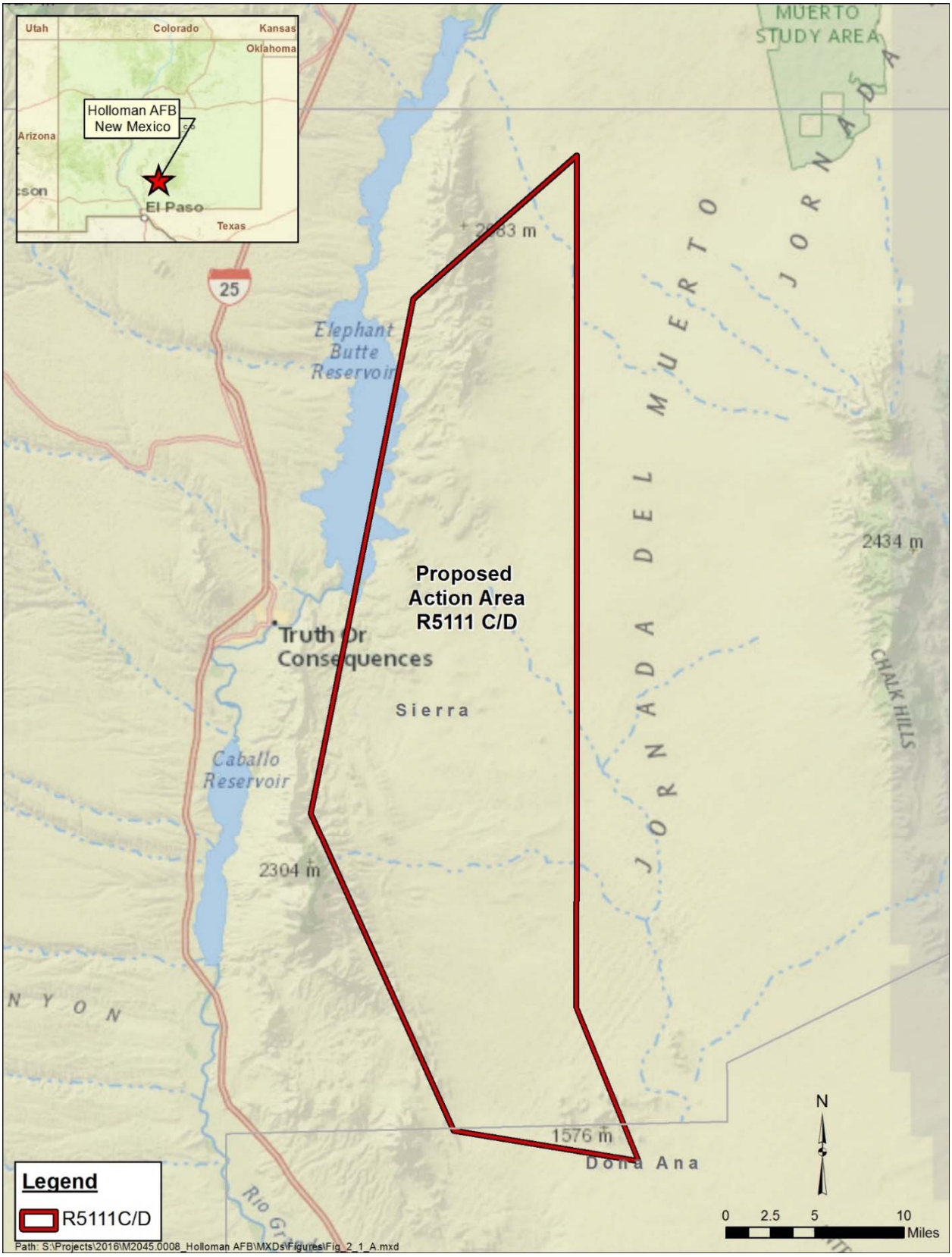

Figure 2-2 WSMR R-5111 C/D Airspace

The maximum number of training sorties would not exceed the 2,265 annual total currently flown in all WSMR airspace. The actual number of sorties involving R-5111 C/D airspace is reasonably expected to be substantially less than 2,265.

2.2 SELECTION STANDARDS

How are alternatives determined?

NEPA and the CEQ regulations mandate the consideration of reasonable alternatives for the Proposed Action. "Reasonable alternatives" are those that could meet the purpose of and need for the Proposed Action.

Per the requirements of the USAF EIAP regulations[6], the Air Force uses selection standards to identify alternatives meeting the purpose and need for the Proposed Action. The selection standard used for this action is identification of one or more areas of airspace in the vicinity of Holloman AFB that may be used for F-16 training purposes compatibly with its present uses. Specifically, the airspace will need to be readily available, within close proximity to Holloman AFB, allow for adequate training space sized for air-to-air maneuvering, approved for chaff, flare use, supersonic flight, and restricted for military purposes.

2.3 DESCRIPTION AND SCREENING OF ALTERNATIVES

Table 2-3 Alternatives Considered

Considered Airspace	Owner	Currently unused for F-16 Training
R-5103	Fort Bliss (Army)	R-5103 A
R-5107		R-5107 A/K
R-5111	WSMR (Army)	R-5111 C/D

R-5103 A has not been environmentally assessed and is restricted by the Federal Aviation Administration (FAA) from F-16 use because of its proximity to El Paso International Airport; therefore, R-5103 A is incompatible with the selection standards and not suitable for further consideration. Likewise, R-5107 A/K is not suitable because of high-volume, live-fire, army artillery training impacts in that airspace.

The R-5111 C/D portion of WSMR airspace is closed to F-16 pilot training because this airspace was not previously evaluated for the potential environmental impacts of flying F-16 training sorties. R-5111 C/D is situated west of and adjacent to R-5111 A/B, and both are west of the WSMR R-

[6] 32 CFR 989

5107 airspace that is frequently closed for missile range test activities. If this EA finds that the F-16 training sorties in R-5111 C/D will not result in significant impacts to human health or the environment, this airspace can become available for F-16 pilot training. In that case, R-5111 A/B/C/D, combined, would provide adequate space for syllabus-required maneuvers to help make up for restricted airspace time lost to WSMR test missions. R-5111 C/D would support the USAF's need for optimized use of all available restricted airspace in the region.

The purpose and need of this Proposed Action are to maximize the F-16 training use to the feasible extent of restricted airspace near of Holloman AFB. R-5111 C/D is the only restricted airspace not in use by F-16s that can support Holloman AFB's need to increase pilot production. Other, non-WSMR airspace optimization and expansion activities are being addressed under other EA and EIS efforts. Therefore, based on the limited usable airspace and the need for the action, the only reasonable selection standard is that the airspace being evaluated needs to fall within the limits of R-5111 C/D. Other potential selection standards that might apply to other airspaces do not apply to this action.

In accordance with the focused nature of this EA, only two alternatives are being considered for the Proposed Action: the Preferred Alternative (using WSMR R-5111 C/D for F-16 pilot training) and the No-Action Alternative.

2.3.1 Preferred Alternative – WSMR R-5111 C/D Airspace

The Preferred Alternative is to use WSMR R-5111 C/D for F-16 FTU training. The WSMR R-5111 C/D restricted airspace would provide additional airspace for pilot training, minimize interruptions in training, and prevent additional transit time requirements to distant restricted airspace units that would take away from pilot training time and incur additional fuel costs per pilot.

2.3.2 No-Action Alternative

Under the No-Action Alternative, Holloman AFB would not conduct F-16 training missions within WSMR R-5111 C/D. The No-Action Alternative would require the continued use of other WSMR and non-WSMR airspace, which is already insufficient to meet USAF pilot production goals because of high demand on limited space. Holloman AFB would continue to fall short of pilot production goals.

The No-Action Alternative fails to address the purpose and need for the action. However, the No-Action Alternative will be carried forward for further analysis, consistent with CEQ regulations, to provide a baseline against which the impacts of the Proposed Action can be assessed.

2.4 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

As described above, the purpose and need of this Proposed Action are to maximize the use of restricted airspace near Holloman AFB for F-16 pilot training. Other airspace optimization and expansion activities are being addressed under other EA and EIS efforts. Existing uses of Airspaces R-5103 A and R-5107 A/K are incompatible with F-16 training and not suitable for further consideration. Consequently, this EA focuses only on WSMR R-5111 C/D airspace and the No-Action Alternative.

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SECTION 3.0
AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 RESOURCES NOT CARRIED FORWARD FOR DETAILED ANALYSIS

What resources will not be impacted by the Proposed Action?

Per CEQ regulations[7], federal agencies may focus their NEPA analysis on those resource areas that could be affected and omit discussions of resource areas that would not be affected by a Proposed Action. The following resource areas have been reviewed and determined not to warrant further consideration because there would be no or negligible potential for effects from implementing the Proposed Action:

- geological and earth resources,
- water resources,
- utilities and infrastructure,
- traffic and transportation, and
- socioeconomics.

A brief description of each resource and the rationale for a determination of negligible or no effect is provided.

Geological and Earth Resources. The Proposed Action would be limited to airspace only and would not include any project components that would touch or otherwise directly disturb the topographic features, soils, or subgrade geological resources underlying the Proposed Action area. Geology, topography, and soils, including farmland soils, would remain unchanged from their current conditions. Consequently, there would be no impact to geological resources associated with the Proposed Action; therefore, this resource area was not carried forward for detailed analysis.

Water Resources. The Proposed Action would be limited to airspace only and would not include any project components that would touch or otherwise directly affect the quantity, flows, percolation rate, or accessibility of regional surface or groundwater resources. Consequently, there would be no direct impact to water resources, including wetlands and floodplains, as a result of the Proposed Action or alternatives. Analyses of potential water quality-related impacts (potential impacts from chaff and flare on water quality) are presented in Section 3.9, "Hazardous Materials and Wastes." Additionally, a presentation and analysis of aquatic habitat impacts as they relate to biological resources can be found in Section 3.7, "Biological Resources." The USAF anticipates

[7] 40 CFR 1501.7[a][3]

no short- or long-term adverse impacts and no significant impacts on water resources; therefore, this resource area was not carried forward for detailed analysis.

Utilities and Infrastructure. The Proposed Action would be limited to airspace only and its implementation would not require or result in any facility construction or modification, infrastructure upgrades, or demolition. F-16 training would occur at or greater than 500 feet above ground level (AGL) and would not impact any ground utilities or structures. As a result, the USAF anticipates no short- or long-term adverse impacts and no significant impacts; therefore, this resource area was not carried forward for detailed analysis.

Traffic and Transportation. The Proposed Action would be limited to airspace only and would not include any project components that would involve or otherwise directly affect the ground surface or existing transportation networks underlying the Proposed Action area. Local and regional road networks and transportation infrastructure would remain unchanged from their current conditions. Additionally, there would be no short- or long-term change in the volume of traffic experienced on these transportation networks as a result of the Proposed Action or its alternatives. Consequently, there would be no impact to ground transportation networks, carrying capacities, or other important transportation-related metrics associated with the Proposed Action; therefore, this resource area was not carried forward for detailed analysis.

Socioeconomics. The Proposed Action would have no appreciable effects on socioeconomics. The term socioeconomics describes demographics associated with the human environment, such as employment, industry, income, population, housing, and schools. The Proposed Action would use existing resources. No changes in personnel are expected. No impact is expected to affect employment, industry, income, population, housing, and schools. As a result, the USAF anticipates no short- or long-term adverse impacts and no significant impacts; therefore, this resource area was not carried forward for detailed analysis.

3.2 AIRSPACE MANAGEMENT AND USE

3.2.1 Definition of the Resource

What is airspace and how is it used?

Airspace management is defined by the USAF as the coordination, integration, and regulation of the use of airspace of defined dimensions. The objective is to meet military training requirements through the safe and efficient use of available navigable airspace in a peacetime environment while minimizing the impact on other aviation users and the public[8]. The two categories of airspace or

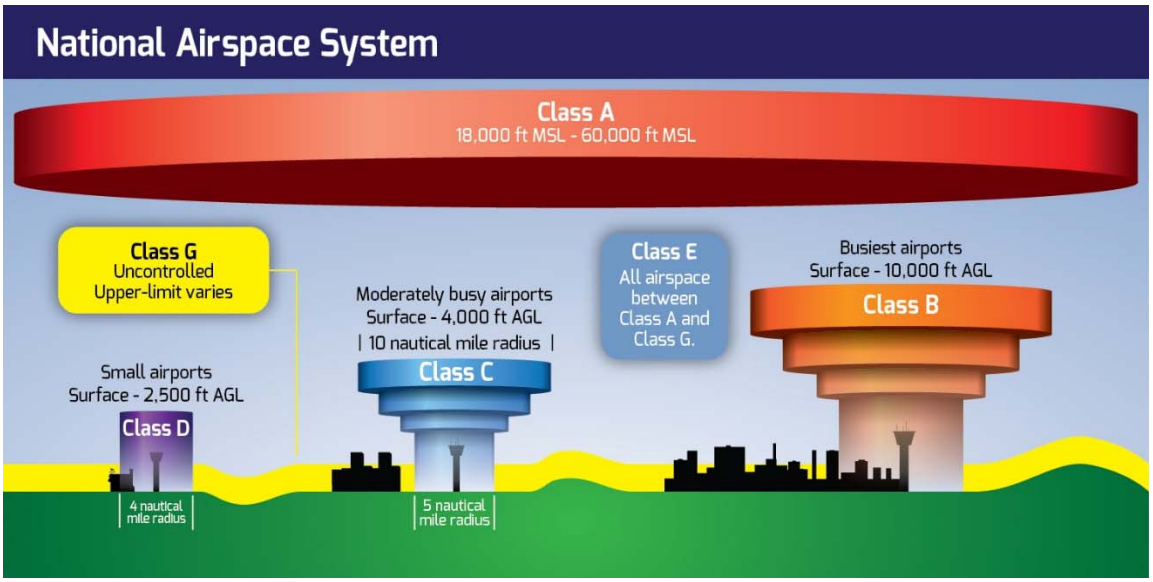
[8] AFI 13-201

airspace areas are regulatory and nonregulatory. Within these two categories, further classifications include controlled, uncontrolled, special use, and other airspace. The categories and types of airspace are dictated by the

- complexity or density of aircraft movements,
- nature of the operations conducted within the airspace,
- level of safety required, and
- national and public interest in the airspace.

Controlled Airspace

Controlled airspace is a generic term that encompasses the different classifications of airspace (Figure 3-1) and defines dimensions within which air traffic control service (ATC) is provided to Instrument Flight Rules (IFR) flights and to Visual Flight Rules (VFR) flights (U.S. [United States] Department of Transportation [DOT], 1994). All military and civilian aircraft are subject to Federal Aviation Regulations (FARs).



Source: http://ftstem.com/lessons/show/521

Figure 3-1 Classes of Airspace

Class A airspace includes all flight levels or operating altitudes over 18,000 feet above MSL, including the airspace overlying the waters within 12 nm of the coast of the 48 contiguous states and Alaska. Formerly referred to as a Positive Control Area (PCA), Class A airspace is dominated by commercial aircraft using routes between 18,000 and 60,000 feet MSL.

Class B airspace typically comprises contiguous cylinders of airspace, stacked upon one another, extending from the surface up to 10,000 feet MSL. To operate in Class B airspace, pilots must contact appropriate controlling authorities and receive clearance to enter the airspace. Additionally, aircraft operating within Class B airspace must be equipped with specialized electronics that allow air traffic controllers to track aircraft speed, altitude, and position. Class B airspace is typically associated with major metropolitan airports. No Class B airports are in New Mexico.

Class C can generally be described as controlled airspace that extends from the surface or a given altitude to a specified higher altitude. Class C airspace is designed and implemented to provide additional ATC into and out of primary airports where aircraft operations are periodically at high-density levels, such as Albuquerque International Sunport, approximately 112 miles north of R-5111 C/D. All aircraft operating within Class C airspace are required to maintain two-way radio communication with local ATC entities.

Class D airspace encompasses a 5-statute-mile radius of an operating ATC-controlled airport, extending from the ground to 2,500 feet AGL or higher. All aircraft operating within Class D airspace must be in two-way radio communication with the ATC facility.

Class E airspace can be described as general controlled airspace. It includes designated federal airways consisting of the high altitude (J or "Jet" Route) system and low altitude (V or "Victor" Route) system. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. Also included in this class of airspace are federal airways and airspace beginning at either 700 or 1,200 feet AGL used to transition to or from the terminal or en route environment and en route domestic and off-shore airspace, designated below 18,000 feet MSL.

Uncontrolled Airspace

Uncontrolled airspace or **Class G** airspace is airspace that has not been designated as Class A, B, C, D, or E and is not subject to restrictions that apply to controlled airspace. This airspace follows the contours of the Earth's surface with vertical altitude limits up to 700 feet AGL; 1,200 feet AGL; or 14,500 feet MSL, where applicable. VFR general aviation pilots are the primary users of this airspace (FAA, 2016).

Special Use Airspace

Special use airspace (SUA) consists of airspace within which specific activities must be confined or limits are imposed on aircraft not participating in those activities. Except controlled firing areas (CFAs), SUA is depicted on aeronautical charts, including hours of operation, altitudes, and the

agency controlling the airspace. All special use airspace descriptions are contained in FAA Order 7400.8.

Prohibited areas and restricted areas (RAs) (e.g., R-5111 A/B/C/D) are regulatory SUA and are established in FAR Part 73 through the rulemaking process. Warning areas (WAs), CFAs, and military operation areas (MOAs) are nonregulatory SUA. WAs are airspace of defined dimensions over international waters that contain activity that may be hazardous to nonparticipating aircraft. Because international agreements do not provide for prohibition of flight in international airspace, no restrictions to flight are imposed. Therefore, WAs are established in international airspace to alert pilots of nonparticipating aircraft to potential danger. CFAs are established to contain activities that would be hazardous to nonparticipating aircraft if not conducted in a controlled environment. The approval of a CFA shall only be considered for those activities that are either of short duration or of a nature that they could be immediately suspended upon notice that such activity might endanger nonparticipating aircraft. Examples of such activities include firing of missiles, rockets, anti-aircraft artillery, and field artillery; static testing of large rocket motors; blasting; and ordnance or chemical disposal.

MOAs are airspace areas designated outside Class A airspace to separate or segregate certain nonhazardous military activities from IFR traffic and to identify VFR traffic where these activities are conducted. IFR traffic may be cleared to enter and pass through the area if adequate IFR separation criteria can be met and procedures are described in a Letter of Agreement between the unit and the ATC controlling agency[9]. Nonparticipating VFR aircraft are not prohibited from entering an active MOA; however, extreme caution is advised when such aircraft transit the area during military operations. All MOAs within the U.S. are depicted on sectional aeronautical charts identifying the exact area, the name of the MOA, altitudes of use, published hours of use, and the corresponding controlling agency.

Air Traffic Control Assigned Airspace

An air traffic control assigned airspace (ATCAA) is above 18,000 feet MSL and designed to accommodate nonhazardous high-altitude military flight training activities. This airspace remains in FAA control and may be used to support civil aviation activities when not in use by military aircraft. ATCAA permits military aircraft to conduct high-altitude air-to-air combat training, practice evasion maneuvers, perform air refueling, and initiate or exit from attacks on targets within

[9] FAA Order 7400.2K

a range. ATC routes IFR traffic around this airspace when activated; ATCAA does not appear on any sectional or en route charts.

Military Training Routes

Military training routes (MTRs) provide a corridor for low-altitude navigation and training. Air crews may be required to fly at low altitudes for tens or hundreds of miles to avoid detection in combat conditions. To train realistically, the military and the FAA have developed MTRs. This system allows the military to train for low-altitude navigation at air speeds in excess of 250 knots. The two types of MTRs are instrument routes (IR) and visual routes (VR).

3.2.2 Affected Environment

The airspace environment established for R-5111 C/D and the surrounding region supports a diverse variety of aircraft types and mission activities. Albuquerque Center is the FAA's Air Route Traffic Control Center (ARTCC) responsible for the airspace near Holloman AFB, but the responsibility for air traffic management at Holloman AFB has been delegated to Holloman Approach Control[10] (Holloman AFB, 2006).

What is the current state of airspace in the area of the Proposed Action?

R-5111 C/D is restricted airspace operated by WSMR and has historically been used by the Department of Defense (DoD) for testing and training. As stated in Section 2.1, restricted airspace R-5111 D extends from the ground surface up to (but not including) 13,000 feet above MSL. Restricted airspace R-5111 C is atop R-5111 D, shares the same horizontal/geographical boundaries, and starts at 13,000 feet MSL and extends to an unlimited altitude. The horizontal limits of these airspaces are roughly 10 nm wide and 37 nm long. Airspace R-5111 A/B adjoins R-5111 C/D to the east; R-5107 E adjoins R-5111 C/D to the north; R-5107 F and R-5107 G overlay the northern portion of R-5111 C/D; and part of VR-176 underlays most of R-5111 A/B and C/D. As illustrated in Figure 3-2, VR-176 is a very large low level (100 feet to 1500 feet AGL) jet fighter pilot training airspace that is used by aircraft from Holloman AFB.

Current aircraft activity in the R-5111 C/D airspace includes WSMR test aircraft and Holloman AFB MQ-9 (Table 3-1). WSMR test aircraft includes F-22s, which had also been based at Holloman AFB from 2008 to 2014. Annual test operations for F-22s were reported to be 54 in R-5111 C and 39 in R-5111 D. Other activities assessed in the R-5111 C/D vicinity include up to

[10] Following AFI 13-201 "Airspace Management," which implements Air Force Planning Document 13-2 Air Traffic Control, Airspace, Airfield, and Range Management and Department of Defense (DoD) Directive 5030.19, DoD Responsibilities on Federal Aviation and National Airspace System Matters.

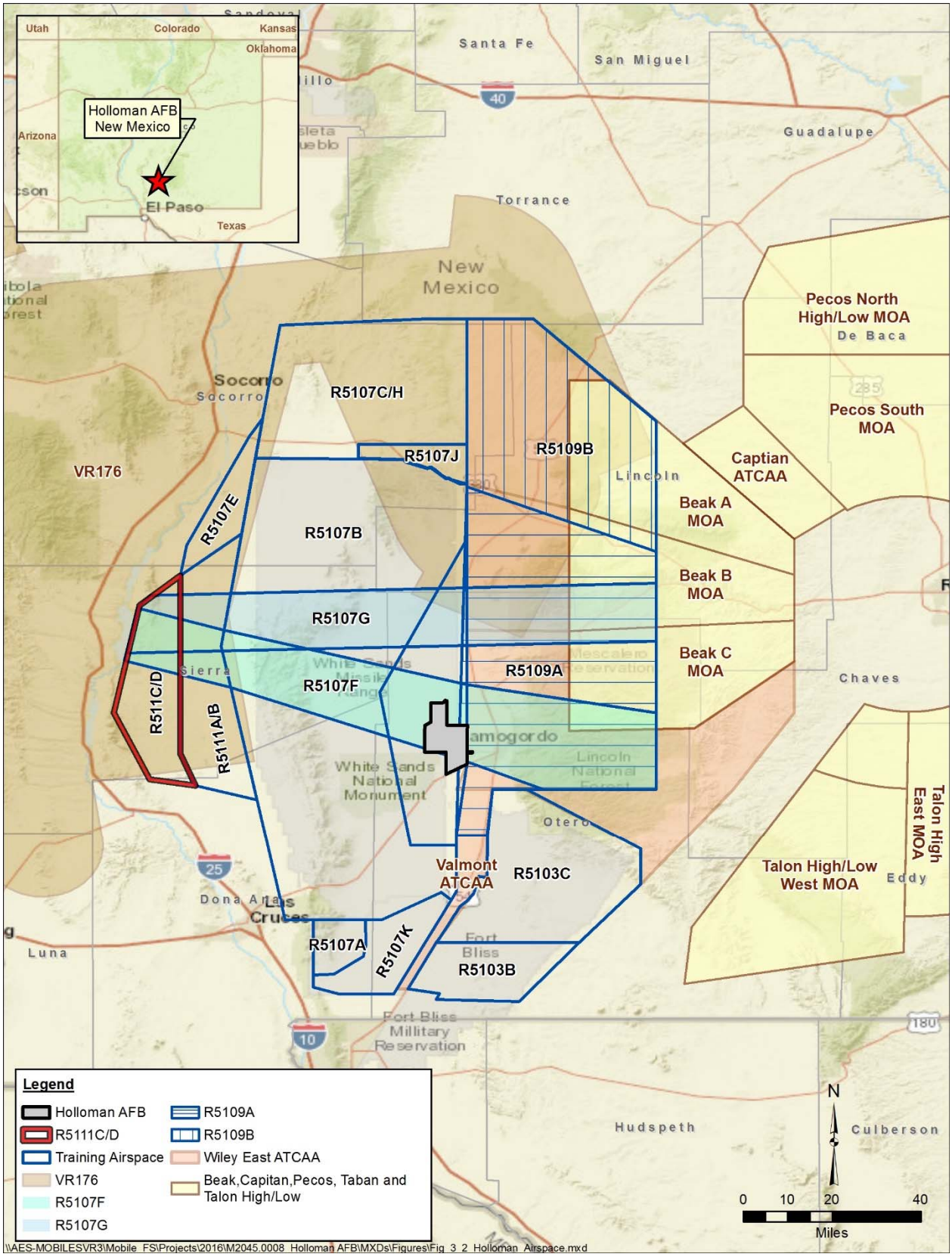


Figure 3-2 Airspace in the Vicinity of Holloman Air Force Base

1,600 low level flights in VR-176 each year, although records indicate that only 200+ have been flown in recent years.

Table 3-1 Current Military Activity in R-5111 C/D FY2016

Aircraft	R-5111 C Operations	R-5111 D Operations
WSMR-operated aircraft	296	306
Holloman AFB MQ-9	1,728	1,728

Source: WSMR 2016, Holloman AFB 2009

Public Airports

No public airports underlie the R-5111 C/D airspace. Truth or Consequences Municipal Airport is approximately 6 miles from the western boundary of R-5111 C/D. Hatch Municipal Airport is approximately 10 miles southwest of R-5111 C/D's southern border. Spaceport America is a commercial airport within the R-5111 A/B airspace and less than 2 miles from the southeastern boundary of the R-5111 C/D airspace.

Regional Non-Military Aviation Activity

The New Mexico Department of Game and Fish (NMDGF) conducts monthly fixed-wing, low-altitude telemetry flights for tracking bighorn sheep (*Ovis canadensis*) populations and occasional low-altitude helicopter sheep-capture flights over Fra Cristobal (along the northwestern border of the R-5111 C/D airspace) and Caballo Mountains (along the western border of the R-5111 C/D airspace). Airspace availability for NMDGF wildlife management flights will continue unchanged under the proposed action.

3.2.3 Environmental Consequences

3.2.3.1 Analysis Methodology

How is a significant impact on airspace determined?

The significance of potential impacts to airspace management depends on the degree to which the proposed F-16 use of R-5111 C/D would affect the regional military, commercial, and general aviation airspace environment. Potential impacts of the Proposed Action on airspace use at R-5111 C/D were assessed by comparing projected F-16 sortie training missions with the current baseline use of each operations environment. Because 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 activities may have on airspace use in R-5111 C/D. Significant impacts could result if the Proposed Action (Preferred Alternative)

- substantially affected movement of other air traffic in the area,
- compromised ATC systems or facilities, or
- caused an increase in midair collision potential between military and nonparticipating civilian operations.

3.2.3.2 Preferred Alternative - WSMR R-5111 C/D Airspace

How would the Proposed Action affect airspace?

The USAF proposes to increase pilot production using WSMR R-5111 C/D airspace to expand training airspace. This action would not include any changes to the current operating hours or test mission schedules at WSMR. F-16 training units will be able to accomplish more training with the expanded airspace and would be able to depart Holloman AFB westbound, directly access WSMR airspace, and accomplish training without leaving the confines of restricted airspace. Table 3-2 shows the maximum potential F-16 aircraft activity in R-5111 C/D under the proposed action. However, many of the annual total 2,265 F-16 sorties will be flown in other airspace.

Table 3-2 R-5111 C/D Current and Proposed Operations

Aircraft	R-5111 C Operations	R-5111 D Operations
WSMR-operated aircraft (current)	296	306
German Air Force AF VR-176 (current)	184[1]	184[1]
Holloman AFB MQ-9 (current)	1,728	1,728
NMDGF (current)	<20	<20
Holloman AFB F-16 (proposed)	2,265[2]	2,265[2]

Source: WSMR 2016, Holloman AFB 2009
1. GAF flights decrease to zero before December 2019
2. Maximum annual total F-16 operations

Despite the increase in airspace activity, Holloman AFB will continue airspace coordination with WSMR under current conditions. Therefore, the Proposed Action would not conflict with airspace requirements for ongoing research and development activities at WSMR.

Occasional, coordinated low level co-use of R-5111 C/D by NMDGF should not significantly impact F-16 training. NMDGF may coordinate scheduling with Holloman AFB through 49th Wing Scheduling[11], but NMDGF is required to schedule access to the airspace through WSMR. Additionally, coordination with Spaceport America activities will continue under current

[11] (575) 572-3536

conditions. No impacts to general aviation and other civil aircraft operating around the R-5111 C/D airspace are expected as a result of the Proposed Action. Therefore, no significant impacts to airspace management would occur.

3.3 NOISE

This section discusses the noise environment, the Proposed Action's consistency with the noise environment, and potential effects of the Proposed Action on the noise environment.

3.3.1 Definition of the Resource

How is noise defined?

Sound is defined as vibrations that travel through a medium, such as air, and are sensed by a receiver, such as the human ear. Noise is defined as unwanted sound. Whether or not sound is perceived as noise varies depending on factors including the time of day, the source of the sound, the distance between the sound source and the receiver, and the sensitivity of the receiver. Noise is generated by activities essential to daily life and the military mission such as construction, vehicle traffic, and aircraft operations. Noise impacts on land use, visual and recreational resources, biological resources, cultural resources, and environmental justice are discussed in more detail in their respective sections. See Appendix B for more information on the measurement of noise.

3.3.2 Affected Environment

What is the current noise level in the area of the Proposed Action?

The land areas beneath and in the immediate vicinity of the R-5111 C/D airspace are characterized by rural, low-density communities. According to the Federal Interagency Committee on Noise (FICON), these communities are assumed to experience ambient noise levels up to 55 decibels (dB) day-night sound level (DNL) based on their land use type, relative size, and population density (FICON, 1992). However, the Burlington Northern Santa Fe (BNSF) railway runs along the eastern border of the R-5111 C/D airspace. According to the Federal Railroad Administration (FRA), the BNSF railway travels along this track eight times per day[12] with a maximum speed of 49 miles per hour (FRA, 2017). This additional noise source may increase the ambient noise to as high as 90 dB during its occurrence.

DNL averages A-weighted sound levels during a 24-hour period, with an additional 10 dB penalty added to noise events occurring between 10:00 PM and 7:00 AM.

Additionally, the R-5111 C/D airspace has historically been used by the DoD for testing and

[12] Four times during the daytime (6 AM to 6 PM) and four times during the nighttime (6 PM to 6 AM)

VR flights (Table 3-1). The communities and natural environment underlying the R-5111 C/D airspace have generally been exposed to aircraft noise and other noise exceeding ambient levels.

Training flights are typically widely dispersed and random within MOAs, ATCAAs, and restricted areas, such as R-5111 C/D. Flight operations are constrained only by the boundaries of the airspace and any restrictions on training in the form of designated avoidance areas. The USAF has developed the MOA-Range NOISEMAP (MR_NMAP) program to compute 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 were found to be less than 65 dB Day-Night Average Noise Level (subsonic noise) (DNL_{mr}) under baseline conditions (Holloman AFB, 2011).

Military aircraft are not the only source of sound under the airspace. Aircraft noise must be compared with background or "ambient" noise and be evaluated on an absolute basis. In those areas where military aircraft noise levels would be greater than 55 dB DNL_{mr}, military aircraft noise could be noticed but would not add appreciably to overall noise levels. Sonic boom noise levels were calculated using the BOOM-MAP program. Under baseline conditions, sonic boom noise levels do not exceed 62 dB C-weighted DNL (Appendix B; Holloman AFB, 2011).

3.3.3 Environmental Consequences

3.3.3.1 Analysis Methodology

How is a significant impact on noise determined?

The Proposed Action area noise generation was evaluated against the current noise environment to see if it would appreciably increase ambient noise levels in the region of influence (ROI).

Effects on the noise environment would be considered significant if the proposed action would be in an area with a current noise level of 65 dB DNL or greater and be an incompatible land use for that noise level or result in an appreciable long-term increase in ambient noise levels[13].

3.3.3.2 Preferred Alternative - WSMR R-5111 C/D Airspace

How would the Proposed Action affect noise?

Under the Proposed Action, F-16 training would expand into the R-5111 C/D airspace and would increase the frequency of military aircraft operations in the area. However, the increase would not heighten the

[13] AFI 32-7070 Air Force Noise Program

current noise level of the environment underlying the R-5111 C/D airspace. F-16 training would be conducted following the same rules and requirements as other training airspace. Therefore, F-16 training activities in the R-5111 C/D airspace are not expected to exceed the 65 dB A-weighted DNL threshold. However, potential for transient noise levels to briefly exceed the 65 dB A-weighted DNL may occur during specific training maneuvers or exercises, such as supersonic training. Supersonic training would be conducted above 25,000 feet MSL and is not expected to significantly increase the noise level at ground level. Overall, implementation of the Proposed Action would be expected to result in no significant impacts on the noise environment.

3.3.3.3 No-Action Alternative

Under the No-Action Alternative, there would be no change to the existing noise environment, so there would be no impacts.

3.4 SAFETY

This section describes safety, including the capacity of emergency and mishap response services, and discusses potential effects the Proposed Action could have on those resources.

3.4.1 Definition of the Resource

What are the safety concerns with the Proposed Action?

The USAF practices Operational Risk Management[14], which provides a process to maintain readiness in peacetime and achieve success in combat while safeguarding people and resources. The safety analysis addresses issues related to the health and well-being of military personnel and civilians living under the R-5111 C/D airspace. Specifically, this section provides information on hazards associated with aviation safety (aircraft mishaps, emergency and mishap response, Bird/Wildlife Aircraft Strike Hazard [BASH]) in the Proposed Action area.

In addition to aircraft safety issues, safety issues associated with chaff and flare use, including fire risk and strike risk, have been included for analysis. Additional analyses regarding the potentially hazardous chemical components of chaff and flare can be found in Section 3.9, Hazardous Materials and Wastes, and in Appendix C.

Aircraft Mishaps has five classifications (A, B, C, D, and E). Class A mishaps result in a fatality or permanent total disability; total cost in excess of $2 million for injury, occupational illness, and property damage; or destruction or damage beyond repair to military aircraft. Class B mishaps result in a permanent partial disability; total cost in excess of $500,000 but less than $2 million for

[14] as outlined in AFI 90-802, Operational Risk Management (2017)

injury, occupational illness, and property damage; or hospitalization of five or more personnel. Class C mishaps result in total damages between $50,000 and $500,000, and Class D mishaps result in total damages between $2,000 and $50,000. The fifth mishap category, Class E, includes occurrences that do not meet reportable mishap classification criteria but are deemed important to investigate and/or report for mishap prevention (AFI 91-204, 2014).

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

Bird/Wildlife Aircraft Strike Hazards constitute a safety concern because of the potential for damage to aircraft or injury to air crews or local populations if an aircraft should crash in a populated area. Aircraft can encounter birds at nearly all altitudes up to 30,000 feet MSL. According to the USAF Safety Center BASH statistics, more than 60% of bird/wildlife strikes occur below 500 feet, and 90% occur at less than 2,000 feet AGL (Air Force Safety Center [AFSC], 2016). Waterfowl present the greatest BASH potential because of their congregational flight patterns and because they can be encountered at altitudes up to 20,000 feet AGL when migrating. Raptors also present a substantial hazard because of their size and soaring flight patterns. In general, the threat of bird/wildlife-aircraft strikes increases during March and April and from August through November because of migratory activities. The USAF BASH program was established to minimize the risk for collisions of birds/wildlife and aircraft and the subsequent loss of life and property. In accordance with AFI 91-202, "USAF Mishap Prevention Program," each flying unit in the USAF is required to develop a BASH plan to reduce hazardous bird/wildlife activity relative to airport flight operations. The intent of each plan is to reduce BASH issues at airfields by creating an integrated hazard abatement program through awareness, avoidance, monitoring, and actively controlling bird and animal population movements. Some of the procedures outlined in the plan include monitoring the airfield for bird and other wildlife activity, issuing bird hazard warnings, initiating bird/wildlife avoidance procedures when potentially hazardous bird/wildlife activities are reported, and submitting BASH reports for all incidents.

3.4.2 Affected Environment

Aircraft Mishaps

What are the current safety conditions?

The primary public concern regarding flight safety is the potential for aircraft accidents, which may occur because of weather, 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 USAF defines five major categories of aircraft mishaps: Classes

A, B, C, D, and E. This EA focuses on Class A mishaps because of 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 from enemy action. In addition, data presented are only statistically predictive. Table 3-3 presents mishap rates of the Holloman aircraft using (MQ-9) and proposed (F-16) to use the R-5111 C/D airspace. Both aircraft currently use the adjoining R-5111 A/B airspace.

Table 3-3 Mishap Rates by Aircraft Type

Aircraft Type	Class A Rate (10 Year Average)	Class B Rate (10 Year Average)	Total Hours Flown (as of FY 2016)
F-16	4.70	0.94	10,699,461
MQ-9	3.70	0.40	1,087,066

Source: AFSC 2016

Aircraft mishaps are sometimes caused by hazardous weather. Weather conditions may pose a safety hazard and may require a pilot to alter a flight plan. The Flight Service Station provides preflight briefings and in-flight weather information. In-flight advisories notify pilots of the possibility of encountering hazardous flying conditions that may not have been forecast at the time of the preflight briefing.

Fire and Flare Strike Risks

Some units operating in the R-5111 C/D airspace, including MQ-9 aircraft, release self-protection flares during military training operations. Military regulations[15] require precautions be taken to avoid injury or damage to persons or objects. This includes precautions for activities that increase the potential for fires, such as the release of flares. Based on information reported by Air Combat Command (ACC), fires are rare when release altitude and restrictions are based on site-specific conditions. Holloman AFB monitors fire probability conditions under the airspace and limits release elevations or prohibits flare use depending upon those conditions.

Flare materials that are not completely consumed during ignition and descent create the risk of striking a person or property. Given a set of assumptions regarding reliability rate, aircraft speed, aircraft height above ground, and behavior of the flare after release, USAF calculated the probability of a dud flare hitting a person in an area with a population density of 100 people per square mile would be one in 5.8 million (USAF, 1997).

[15] FAR 91.15 and AFI 11-202

Emergency and Mishap Response

Holloman AFB MQ-9 aircraft currently use R-5111 C/D airspace and F-16s currently use R-5111 A/B airspace, and that is addressed in emergency and mishap response plans that would be amended to include F-16 use of R-5111 C/D. Mishap response under R-5111 C/D would be from Holloman AFB with support possible from WSMR Stallion Range Center. If a mishap in R-5111 C/D resulted in wildfire, the Holloman AFB Fire Department, WSMR and the Bureau of Land Management (BLM) wildlands fire crews would respond. Holloman has fire response agreements with WSMR and BLM (Holloman AFB, 2011).

BASH Safety

Bird/wildlife aircraft strikes constitute a safety concern for the USAF because they can result in damage to aircraft or injury to aircrews or local human populations if an aircraft crashes. Because 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 96% of reported bird strikes occur below 3,000 feet AGL. Approximately 41% of bird strikes happen during the August through November months and almost 25% occur between 10:00 PM and 7:00 AM (AFSC, 2016).

Migratory waterfowl (ducks, geese, and sandhill cranes) are the birds most hazardous to low-flying aircraft because of their size and propensity for migrating in large flocks at a variety of elevations and times of day. Waterfowl vary considerably in size, from 1 to 2 pounds for ducks, 5 to 8 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 and 2,500 feet AGL. The R-5111 C/D airspace is within a minor migration corridor in the Central Flyway and its most common species of migratory birds are the Mallard, Northern Pintail, Blue-Winged Teal, Northern Shoveler, and Wilson's Phalarope. Elephant Butte Reservoir is close to the migratory flyway and provides a stopover site that could potentially contribute to bird strikes. The local waters sustain low numbers of breeding populations but support substantial migratory populations of waterfowl and shorebirds. Local flying procedures should avoid direct overflight of these areas during migration seasons.

Other BASH considerations include seasonal bat flights from Jornada Cave to the Rio Grande from June to September at dusk. Hundreds of thousands of bats fly to the Rio Grande in search of insects that are attracted to agricultural parcels and the riparian habitat (see Section 3.7 for more details).

3.4.3 Environmental Consequences

3.4.3.1 Analysis Methodology

How is a significant impact on safety determined?

Potential effects on safety and occupational health were analyzed by evaluating whether implementing the Proposed Action would result in unique or disproportionate risks to workers or the public or expose these populations to inherently unsafe or unhealthful environments. The Proposed Action would have a significant impact if it would

- result in disproportionately high and adverse environmental health or safety risks to workers or the public or
- place excessive constraints on emergency services (police, fire, emergency services) such as by not providing adequate site access for emergency responders, triggering the need for expanded capacity, or resulting in discernible reductions in the level of service provided.

3.4.3.2 Preferred Alternative - WSMR R-5111 C/D Airspace

Aircraft mishaps

How would the Proposed Action affect safety?

Under the Preferred Alternative, training space would be expanded into the R-5111 C/D airspace. By slightly increasing the amount of training space, aircraft would have more room for training, and more buffer space between aircraft would be available. This would reduce the risks of aircraft-to-aircraft collisions although a risk of an aircraft mishap resulting from an aircraft malfunction or human error would still exist. This risk of mishap would remain consistent with the current risk of mishap because there is no projected change to training hours; therefore, the risk would be less than significant. Additionally, consolidation of the existing airspace areas would result in a reduced potential for aircraft to "spill out" of the existing boundaries.

Daily operations follow applicable USAF safety regulations, published USAF technical orders, and standards prescribed by Air Force Occupational Safety and Health requirements. Detailed standard operating procedures have been established to fulfill health and safety requirements.

Fire and flare strike risks

Flare use creates a risk of ignition on the ground if the flare does not burn out prior to making contact with an ignitable material. However, flares typically burn out in 3.5 to 5 seconds and flares deployed at an altitude above the USAF minimum altitude of 700 feet AGL would burn out by 300 feet AGL (USAF, 1997). Flare use is not expected to occur below 2,000 feet AGL. These procedures and sensitivity to environmental conditions reduces the risk of flare-ignited fire on the ground, and impacts would be less than significant. 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 not be deployed in WSMR airspace during very high or extreme fire danger conditions to limit the potential for a flare fire incident (Holloman AFB, 2011).

Upon ejection, if a flare fails to ignite, it is possible that the flare cartridge could contact a person or habitable structure on the ground surface. However, based on a set of assumptions regarding reliability rate, aircraft speed, aircraft height above ground, and behavior of the flare after release, ACC calculated the probability of a dud flare hitting a person in an area with a population density of 100 people per square mile would be approximately one in 5.8 million (USAF, 1997).

Emergency and mishap response

Holloman AFB, WSMR Stallion Range Center and the BLM have mutual aid and wildland fire fighting response agreements that would continue unchanged under the Proposed Action. Implementing the Preferred Alternate would cause a miniscule incremental increase in the statistical probability of an aircraft mishap requiring an emergency response, but is reasonably expected to have no significant impact on emergency services and mishap response readiness.

BASH safety

The Holloman AFB BASH plan establishes procedures to minimize bird and other wildlife strike hazards at the base and low-level areas used by aircraft from the base (Holloman AFB general plan update). Local flying procedures avoid direct overflight of areas where migratory birds (such as Elephant Butte Reservoir) predominantly nest (Holloman AFB, 2006). Air Force Pamphlet 91-212, "Bird/Wildlife Aircraft Strike Hazard (BASH) Management Techniques," provides guidance for implementing an effective bird/wildlife aircraft strike hazard reduction program. The two systems for estimating wildlife strike hazard are the USAF's Bird Avoidance Model (BAM) and the Avian Research Laboratory's Avian Hazard Advisory System (AHAS). These tools provide information regarding bird strike risk and allow pilots to make informed decisions about their routes with regards to wildlife strike risk (FAA, 2008). Typical operating altitudes of the aircraft would be 5,000 to 30,000 feet AGL. BASH would most likely occur during the climbing/descent of the aircraft and during low-level maneuvers. Additionally, Flight Safety at Holloman AFB will track any trends that might develop from bat flight and migration patterns and implement safety measures if the need is identified. No significant impacts to BASH would be expected. Therefore, implementing the Preferred Alternative would have no significant impact on safety.

Implementation of the preferred action would provide improvements in airspace functionality and efficiency by providing contiguous training airspace. Overall impacts to safety would be beneficial.

3.4.3.3 No-Action Alternative

Under the No-Action Alternative, there would be no change to the environmental baseline conditions and no effects on safety, including emergency services, would be expected.

3.5 AIR QUALITY

This section describes air quality, including greenhouse gases (GHGs), and discusses potential effects the Proposed Action could have on this resource.

3.5.1 Definition of the Resource

What is air quality?

A ROI is a geographic area selected for analysis as the area where effects from implementing the Proposed Action might occur. The air quality ROI is Sierra County, which is in the El Paso-Las Cruces-Alamogordo Interstate Air Quality Control Region 153. The New Mexico portion of the El Paso-Las Cruces-Alamogordo Interstate Air Quality Control Region 153 is composed of Doña Ana, Otero, Sierra, and Lincoln Counties (New Mexico Environmental Department [NMED], 2017a).

The U.S. Environmental Protection Agency (USEPA) established National Ambient Air Quality Standards (NAAQS) under the Clean Air Act (CAA) Amendments of 1990. These standards represent the maximum allowable atmospheric concentration of designated air pollutants that are considered protective of public health and welfare. NAAQS have been set for six criteria pollutants: carbon monoxide (CO), ozone, nitrogen dioxide, sulfur dioxide, lead, and particulate matter.

Based on measured ambient air pollutant concentrations, the USEPA determines whether geographic areas are in compliance with the NAAQS. Areas in compliance with the NAAQS are designated as attainment areas; areas not in compliance are nonattainment areas. Nonattainment areas that subsequently achieve compliance with the NAAQS are designated maintenance areas to ensure air quality continues to comply with the NAAQS. Proposed Actions that would result in direct or indirect emissions in a designated nonattainment or maintenance area are subject to a conformity evaluation under the General Conformity Rule[16] and the USAF Environmental Impact Analysis Process for air quality[17].

GHGs are components of the atmosphere (water vapor, carbon dioxide, methane, and nitrous oxide) that trap heat near the surface of the earth, contributing to the greenhouse effect and climate change. GHGs are derived from natural sources, such as volcanic activity and forest fires, and from man-

[16] 40 CFR Part 93

[17] 32 CFR 989.30

made sources, such as the use of aerosols and the burning of fossil fuels. Global temperatures are likely to rise as atmospheric concentrations of GHGs increase (USEPA, 2016, and Intergovernmental Panel on Climate Change, 2014).

EO 13693, "Planning for Federal Sustainability in the Next Decade," outlines policies intended to ensure that federal agencies evaluate climate change risks and vulnerabilities and manage the short- and long-term effects of climate change on their operations and mission. The EO specifically requires DoD agencies to measure, report, and reduce their GHG emissions from direct and indirect activities. The DoD has committed to reduce GHG emissions from noncombat activities by 34% by 2020 (DoD, 2016).

3.5.2 Affected Environment

Climate

What is the current state of air quality in the area of the Proposed Action?

New Mexico has a mild, arid or semiarid, continental climate characterized by light precipitation totals, abundant sunshine, low relative humidity, and a relatively large annual and diurnal temperature range. Mean annual temperatures range from 64 degrees Fahrenheit in the extreme southeast to 40 degrees Fahrenheit or lower in high mountains and valleys of the north; elevation is a greater factor in determining the temperature of any specific locality than its latitude. Individual summer daytime temperatures often exceed 100 degrees Fahrenheit at elevations below 5,000 feet, but the average monthly maximum temperatures during July, the warmest month, range from slightly above 90 degrees Fahrenheit at lower elevations to the upper 70s at high elevations. Minimum winter temperatures below freezing are common; however, subzero temperatures are rare and can be found only at high elevations. Average annual precipitation ranges from less than 10 inches over much of the southern desert and the Rio Grande and San Juan Valleys to more than 20 inches at higher elevations in the state. A wide variation in annual totals is characteristic of arid and semiarid climates. Much of the winter precipitation falls as snow in the mountain areas, but it may occur as either rain or snow in the valleys. Average annual snowfall ranges from about 3 inches at the Southern Desert and Southeastern Plains stations to well over 100 inches at Northern Mountain stations. Wind speeds over the state are usually moderate although relatively strong winds often accompany occasional frontal activity during late winter and spring months. Frontal winds may exceed 30 miles per hour (mph) for several hours and reach peak speeds of more than 50 mph. Spring is the windy season. Blowing dust and serious soil erosion of unprotected fields may be a problem during dry spells. Winds are generally stronger in the eastern plains than in other parts of the state. Winds generally predominate from the southeast in summer and from the west in winter; however, local surface wind directions will vary greatly

because of local topography and mountain and valley breezes (Western Regional Climate Center, 2016).

Regional air quality

Most of R-5111 C/D airspace is in Sierra County, New Mexico, which is classified as an attainment area for all NAAQS. The southeastern tip of R-5111 C/D airspace crosses the Doña Ana County northern border. Doña Ana County is also an attainment area but has historically had air quality problems, including particulate matter and ozone pollution; however, much of the problem lies in the southern portion of the county. No nonattainment areas are under the R-5111 C/D airspace (NMED, 2016a). The air quality at Sierra County is considered good, according to state and federal air quality monitoring data (NMED, 2017, and USEPA, 2017).

3.5.3 Environmental Consequences

3.5.3.1 Analysis Methodology

How is a significant impact on air quality determined?

The 1990 amendments to the CAA require that Federal agency activities conform to the State Implementation Plan (SIP) with respect to achieving and maintaining attainment of NAAQS and addressing air quality impacts. Consistent with FAA Order 1050.1F, an air quality impact would be considered significant if it would exceed one or more of the NAAQS for any of the time periods analyzed (FAA, 2015a). The USEPA General Conformity Rule requires that a conformity analysis be performed that demonstrates a Proposed Action does not

- cause or contribute to any new violation of any NAAQS in the area;
- interfere with provisions in the SIP for maintenance or attainment of any NAAQS;
- increase the frequency or severity of any existing violation of any NAAQS; or
- delay timely attainment of any NAAQS or any interim emission reductions, goals, or other milestones included in the SIP.

Provisions in the General Conformity Rule allow for exemptions from performing a conformity determination only if total emissions of individual nonattainment area pollutants resulting from the Proposed Action (Preferred Alternative) and its alternatives fall below the significant threshold values.

3.5.3.2 Preferred Alternative - WSMR R-5111 C/D Airspace

How would the Proposed Action affect air quality?

No short-term effects to air quality would be expected; however, long-term minor impacts to air quality are expected. There are no construction-related air emissions, such as from construction equipment, delivery trucks, and construction worker commuters. The R-5111 C/D airspace is in an attainment area (NMED, 2016). Therefore, the R-5111 C/D airspace is not subject to the general conformity regulations[18] and a General Conformity Applicability Analysis is not required.

Operational emissions would be expected from the use of the R-5111 C/D airspace for F-16 training. Combustion emissions from these aircraft using the existing airspace are largely related to JP-8, the type of fuel generally used by the USAF. JP-8 is a kerosene-based fuel used in part because of its lower vapor pressure and reduced potential for fire and explosion. Emissions generated during the combustion of JP-8 include CO, nitrogen oxide (NOx), sulfur oxides (SOx), hazardous air pollutants, and volatile organic compounds. JP-8 is commercial grade Jet-A aviation kerosene with three additives: corrosion inhibitor/lubricity enhancer, fuel system icing inhibitor, and static dissipater additive. In addition to combustion emissions, exercises involving chaff and flare also contribute to pollutants generated within the airspaces (see Section 3.9, Hazardous Materials and Wastes, and Appendix C).

Chaff and flares are passive, defensive countermeasures deployed by military aircraft. Chaff and flare emissions are only generated during exercises featuring chaff and flare release (the routine storage and handling of chaff and flare do not inherently result in pollutant emissions). Previous studies have concluded that the use of chaff and flare does not result in a significant impact within the area or in areas adjacent to where the chaff and flares are deployed (National Guard Bureau, 2002; Air National Guard Readiness Center, 2003; and USAF, 1997). Additionally, given the large area of airspace used, the contribution of chaff and flare to the total quantity of pollutants generated is negligible. The use of chaff and flare is conducted in accordance with AFI 11-214, AFI 11-2MDS series, and local directives. AFI 11-214 allows chaff and flare use only in approved airspace and establishes a minimum altitude of 2,000 feet AGL for release of a flare over property not owned or controlled by the government. A permit through the FCC and FAA would need to be obtained for chaff use prior to conducting training with chaff.

Further, it is important to note that approximately 87% of aircraft operations (Holloman AFB, 2011) would be at an altitude where emissions would not affect ground-level concentrations of

[18] 40 CFR 6, 51, and 93

pollutants. A study conducted by the FAA determined that aircraft operations at or above the average mixing height of 3,000 feet AGL have a negligible effect on ground-level concentrations and could not directly result in a violation of the NAAQS in a local area (FAA, 2000) (Appendix B). Implementation of the Preferred Alternative would generate a negligible effect on ground-level concentrations and would not result in a violation of the NAAQS in a local area because 87% of proposed operations would occur at an altitude above 3,000 feet AGL (WIANG, 2016).

Historically, the aviation sector is responsible for about 2.6% of the greenhouse gas emissions in the nation, with the U.S. military contributing only a small portion. Military aviation used approximately 0.5% of the U.S. aviation fuel in 2000. Nonaviation transportation emits 25%, industry 41%, and other U.S. sources emit 31% of the greenhouse gases (USEPA, 2006a). Aircraft activities will generate small amounts of greenhouse gasses primarily from emission products from internal combustion engines. However, these amounts are negligible and will not significantly contribute to greenhouse gasses. Aircraft activities will not significantly affect the climate on a global or regional scale (USAF, 2009). Additionally, it should be noted that there is no net increase in air emissions in the area surrounding the R-5111 C/D airspace since F-16 training is currently being performed in the adjoining training airspace. Air emissions will be redistributed from the addition of the Proposed Action.

Therefore, implementation of the Preferred Alternative would not significantly impact air emissions.

3.5.3.3 No-Action Alternative

Under the No-Action Alternative, the R-5111 C/D airspace would not be used for F-16 training. Existing conditions related to air quality would be unchanged; therefore, no impacts would occur.

3.6 LAND USE, VISUAL AND RECREATIONAL RESOURCES

3.6.1 Definition of Resource

How are land use, visual resources, and recreational resources defined?

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

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

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

3.6.2 Affected Environment

3.6.2.1 Land Use

What is the current land use, visual resource, and recreational resource environment?

Land ownership under the Proposed Action area is presented in Figure 3-3 and is comprised of 268,845 acres. Approximately 112,627 acres are managed by the BLM and are mostly under the southern two thirds of the Proposed Action area. Approximately 118,472 acres are privately owned, including 100,344 acres of the Armendaris Ranch owned by Ted Turner, and are under the northern one third of the Proposed Action area. The remainder of the private lands are other ranches and small holdings. Approximately 28,619 acres are state-owned parcels scattered under the southern two thirds of the Proposed Action area. State-protected lands comprise the eastern shore of Elephant Butte Reservoir and make up approximately 9,126 acres under the Proposed Action area (BLM, 2017). Lands and land uses in and surrounding the action area underneath R-5111 C/D airspace include the:

- Armendaris Ranch to the north, comprised of an additional 262,000+ acres;
- Fra Cristobal Mountains, the Rio Grande, Elephant Butte Reservoir and Elephant Butte Lake State Park, the town of Truth or Consequences, Caballo Mountains and the Caballo Reservoir to the west;
- Jornada del Muerto, a large desert valley famous for the section of the Camino Real that passes through. This area is mostly managed by the BLM, the State of New Mexico and Armendaris Ranch. R-5111 C/D airspace is over the west side of the Jornada;

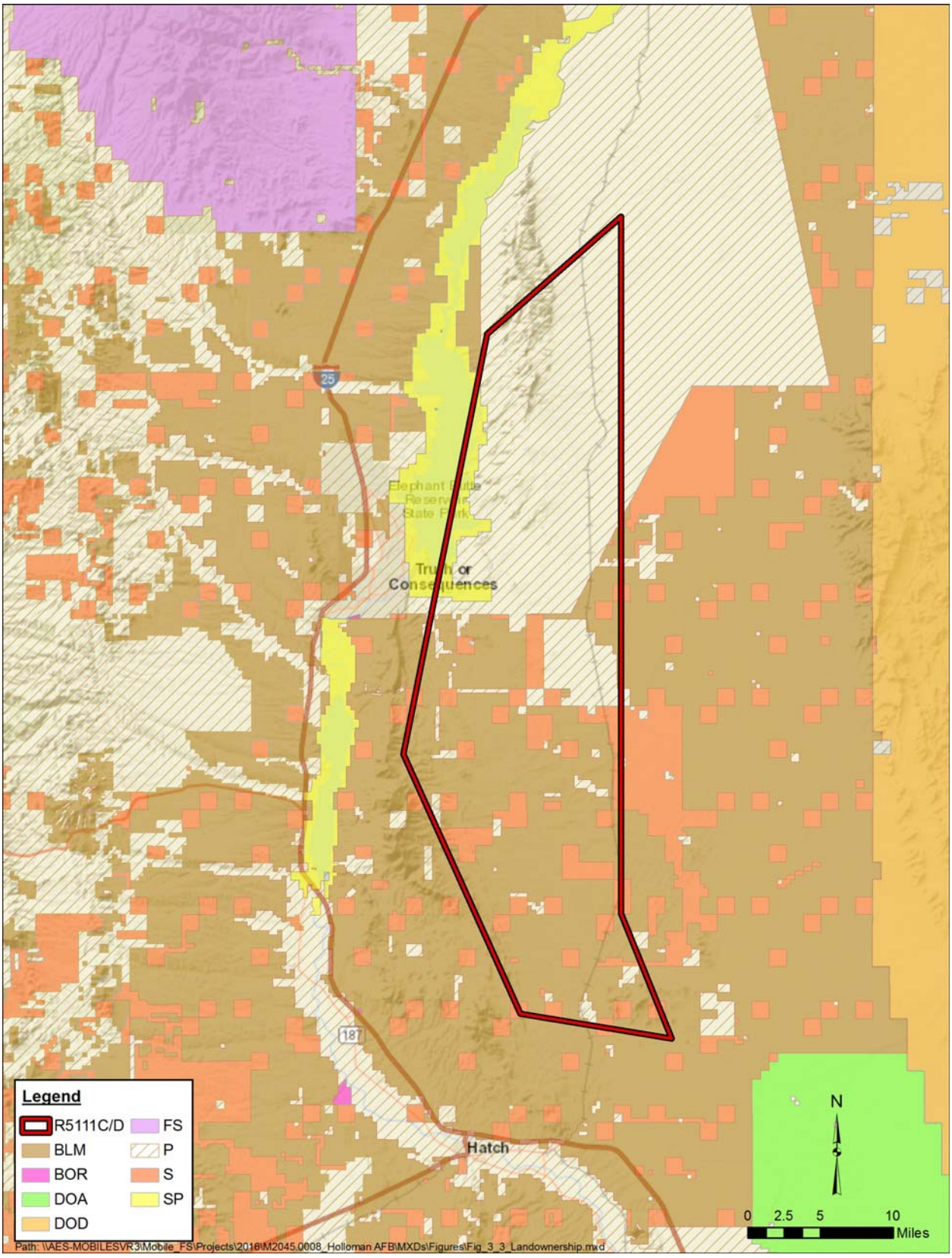


Figure 3-3 Land Use

- Restricted airspace R-5111 A/B abuts the entire east side of R-5111 C/D and is over the east side of the Jornada del Muerto valley. As with C/D, the north of A/B is over the Armendaris Ranch, and the rest is BLM, State of New Mexico and a few private holdings (Figure 3-3); and
- The State of New Mexico's Spaceport America is under R-5111 A/B, adjacent to C/D.

3.6.2.2 Visual and Recreational Resources

Restricted airspace R-5111 C/D is above the Jornada del Muerto desert, El Camino Real de Tierra Adentro National Historic Trail, Fra Cristobal Range, Caballo Mountain Range, Point of Rocks, Yost Draw, and the eastern shore of Elephant Butte Reservoir, presented in Figure 3-4. These areas are comprised of diverse landscapes and habitats, including desert, ungrazed grasslands, woodlands, lava flows, surface waters, riparian areas, wetlands, and canyons, which support a variety of plants and animals that create a diverse and unique visual environment. Areas of visual concern are locations where members of the general public who primarily have an interest in the aesthetic value of their surroundings may view the area under the action area. The nature of interest has been determined by the nature of the viewing areas themselves; therefore, these areas include outdoor recreation and historical sites within or near the action area. Descriptions of visual and recreational resources under the action area are provided in Appendix D.

3.6.3 Environmental Consequences

3.6.3.1 Analysis Methodology

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

How is a significant impact on land use, visual resources, and recreational resources determined?

Under the Air Incompatible Use Zone Program, three noise zones are identified for community compatibility purposes. Noise Zone I includes areas exposed to noise levels less than 65 dB using averaged sound levels that occur during the day and night (DNL). Zone I is generally considered compatible with all types of land uses, such as residential areas, schools, and churches. Zone II comprises those areas exposed to noise levels of 65 to 75 dB DNL. Exposure to noise within this area is normally compatible with commercial/retail/services, manufacturing, agriculture, and highways; however, residential areas, schools, and churches are generally considered incompatible,

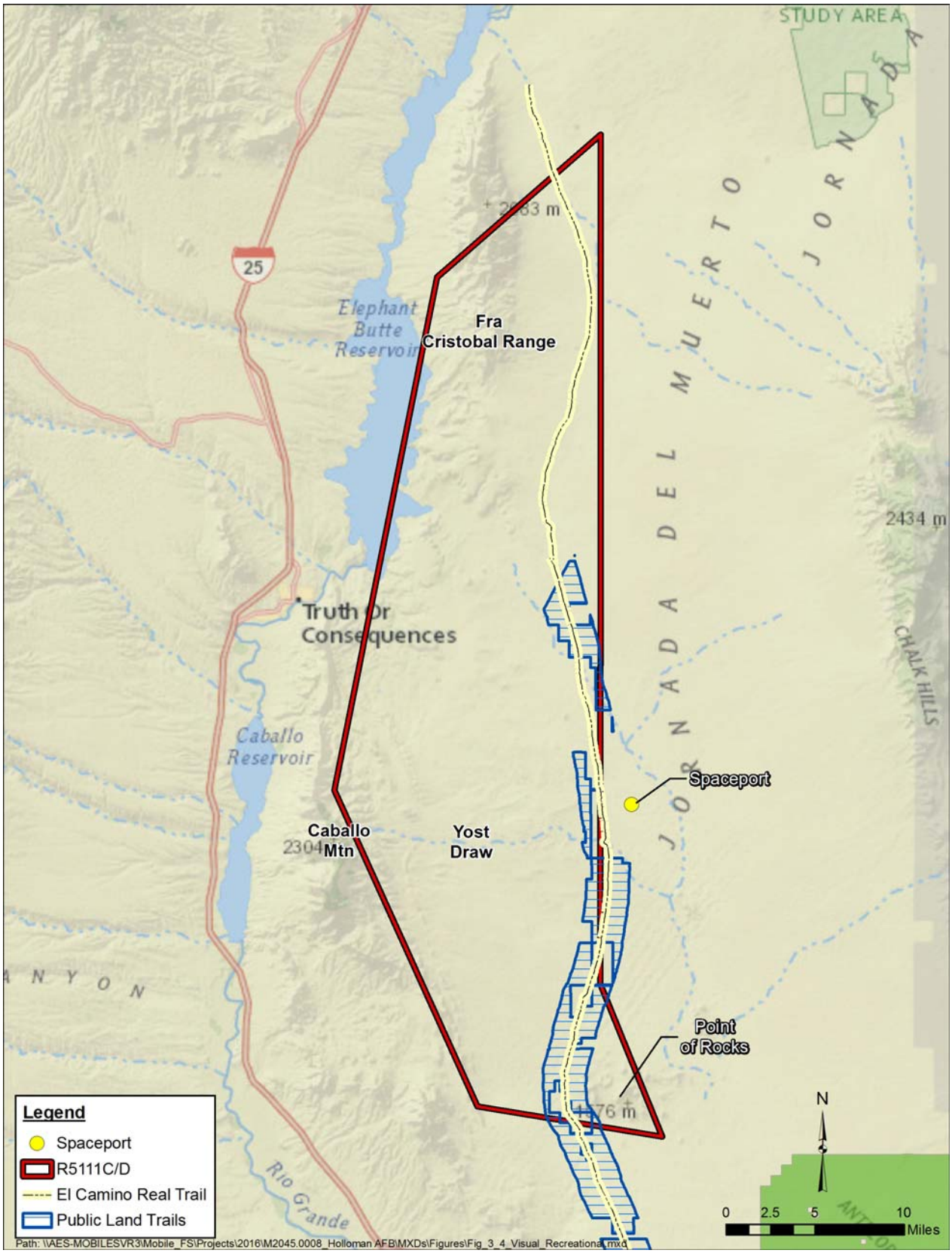


Figure 3-4 Visual and Recreational Resources

and communities are discouraged from introducing such land uses in this zone. Noise Zone III encompasses noise levels greater than 75 dB DNL. Land uses such as residential areas, hospitals, schools, and churches are incompatible and highly discouraged for development in this zone.

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

- be inconsistent or noncompliant with applicable land management plans or policies,
- preclude the viability of an existing land use activity,
- preclude the continued use or occupation of an area, or
- be incompatible with adjacent land uses.

3.6.3.2 Preferred Alternative - WSMR R-5111 C/D Airspace

How would the Proposed Action affect land use, visual resources, and recreational resources?

Elephant Butte Reservoir is the only avoidance area identified within the restricted Airspace R-5111 C/D where noise could impact recreational sports, hunting, fishing, and camping. Noise levels in the Elephant Butte area should continue to be characteristic of a sensitive, quiet environment with noise levels not expected to exceed 65 dB DNL from F-16 training. F-16 training sorties will occur above 500 feet AGL when approaching the Fra Cristobal and Caballo Mountains; therefore, transient noise levels near these mountains would be slightly above 65 dB. There are a few ranches scattered about in a 400 square mile area east of Elephant Butte Reservoir, Caballo and Fra Cristobal Mountains. These areas where flight training would occur at and above 500 feet AGL would potentially experience brief noise levels above 85 dB from F-16 flights, however, there are very few receptors under this airspace and most such events are reasonably expected to go unnoticed (Holloman AFB, 2011). Additionally, an occasional sonic boom may result from F-16 training but would not occur below 25,000 feet MSL. The continued use of chaff and flare within the restricted airspace R-5111 C/D would not impact underlying land uses (Holloman AFB, 2011). Furthermore, Holloman AFB would continue to maintain a hotline to identify noise-related issues and track trends associated with military aircraft operations under the Proposed Action. Therefore, implementation of the Proposed Action is not expected to have significant impacts on land use, visual and recreational resources beneath the proposed restricted airspace R-5111 C/D for F-16 training.

3.6.3.3 No-Action Alternative

Under the No-Action Alternative, the R-5111 C/D airspace would not be used for F-16 training. Existing conditions related to noise would be unchanged; therefore, no impacts to noise receptors would occur.

3.7 BIOLOGICAL RESOURCES

3.7.1 Definition of the Resource

How are biological resources defined?

Biological resources include native or naturalized plants and wildlife and the habitats in which they occur. Sensitive biological resources are defined as those plant and wildlife species listed or proposed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS) and the state of New Mexico. The Federal Endangered Species Act (ESA) of 1973 protects listed species against take, which includes killing, harming, harassing, or any action that may damage their habitat. Federal Species of Concern are not protected by the Federal ESA; however, these species warrant consideration because they could become listed and protected at any time. The NMDGF is required by the New Mexico Wildlife Conservation Act (WCA) to develop recovery plans for species listed by the state of New Mexico as threatened or endangered[19]. The Bald and Golden Eagle Protection Act of 1940 and Migratory Bird Treaty Act (MBTA) prohibit the taking or harming (harassment, sale, or transportation) of bald eagles or golden eagles – including their eggs, nests, or young – without appropriate permit.

3.7.2 Affected Environment

3.7.2.1 Vegetation and Wildlife

What is the current biological resource environment?

The Proposed Action area is above approximately 268,000 acres of various habitat types that sustain an abundance of wildlife with the help of BLM, the USFWS, the state of New Mexico, nonprofit organizations, and the private sector. Figure 3-5 presents the vegetation coverage of the following community habitats that occur underneath R-5111 C/D airspace: Chihuahuan Desert Scrub, Plains-Mesa Sand Scrub, Desert Grassland, Coniferous Mix Woodlands, and Urban (Figure 3-5). Descriptions of the habitats are provided in Appendix E.

[19] 17-2-40.1 NMSA 1978

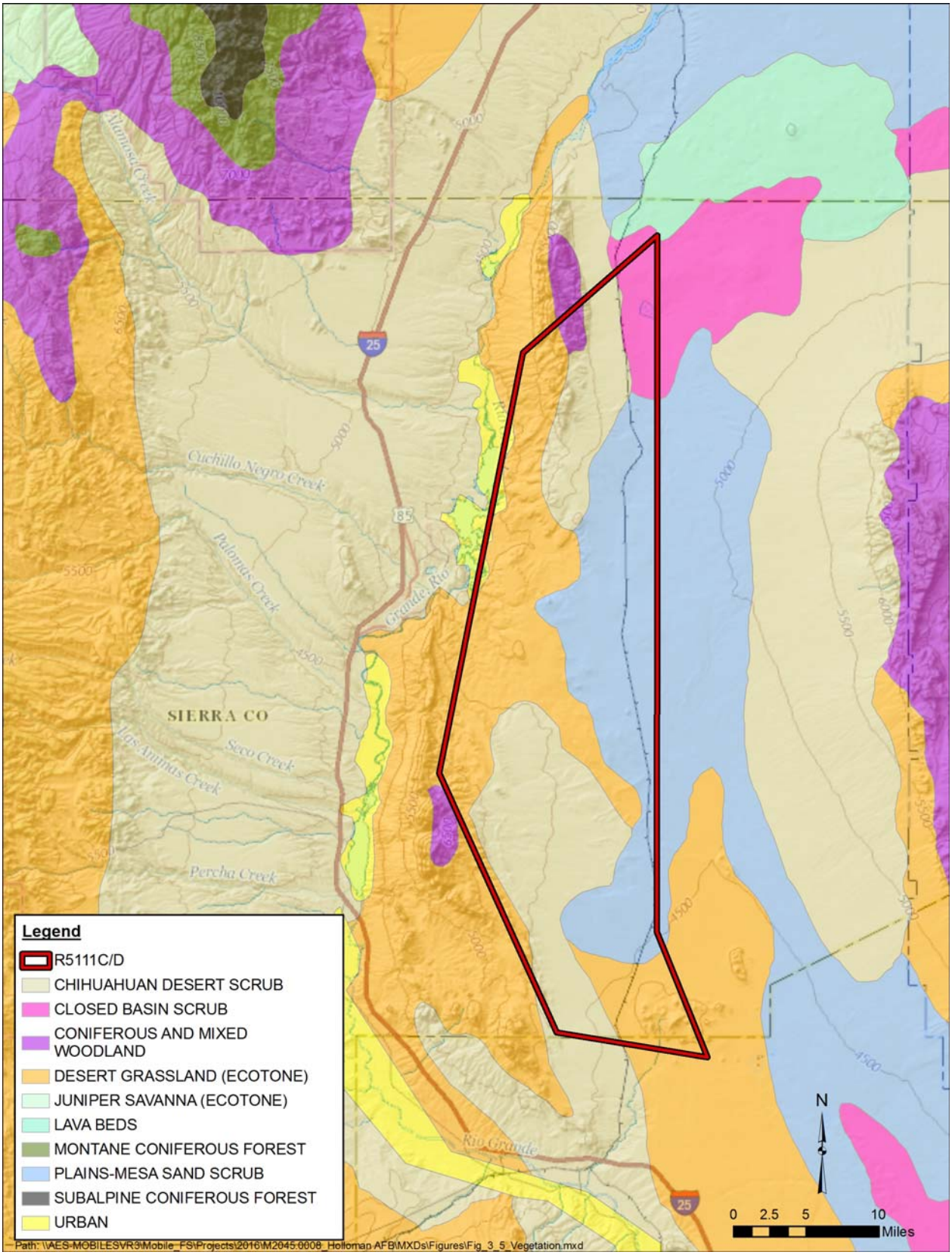


Figure 3-5 Vegetation

Wildlife in the vicinity of Elephant Butte Reservoir

Typical avian wildlife found in and around the lake habitats include white pelicans, sandhill cranes, snow geese, Western & Clark's grebes, terns, and migratory birds in spring and fall. Additionally, a bald eagle nest has been identified on the east side of the Elephant Butte Reservoir by an Armendaris Ranch biologist (see Figure 3-6). Hiking, fishing, and hunting are popular recreation activities at Elephant Butte. Typical fish caught at Elephant Butte include black, white, and striped bass; crappie, catfish, walleye; and bluegill. Recreational hunting includes the following big game: elk, deer, mountain lion, bear, oryx, antelope, Barbary sheep, javelina, addex, Corsican ram, ibex, and desert bighorn sheep. People come from all over the world for the big game hunts. Duck hunting includes hunts for gadwalls, wigeons, mallards, shovelers, pintails, canvas backs, and teal (Elephant Butte, 2017).

Wildlife on Armendaris Ranch

This 362,885-acre ranch is in south central New Mexico along the Rio Grande (Figure 3-6). Approximately 100,000 acres of this ranch lies beneath R-5111 C/D airspace. The vegetation is Chihuahuan and semidesert grasslands with cottonwood, willow, and salt cedar riparian zone along the river. The Fra Cristobal Mountain range is home to a successfully reintroduced and subsequently delisted desert bighorn sheep. Big game species on the ranch include bison, pronghorn, desert mule deer, mountain lion, javelina, and oryx. The lava tubes of Jornada lava field provide the summer home for one of the largest bat populations in North America.

Wildlife researched on the Armendaris Ranch include scaled quail, bobcats, kit foxes, badgers, bison, and prairie dogs. Research has also been conducted on the effect of fire on range grasses and recovery of native riparian species after removal of salt cedar. Endangered species on the Armendaris Ranch are managed by the Turner Endangered Species Fund (TESF). Projects include the aplomado falcon and bolson tortoise along with populations of silvery minnows and willow flycatchers present on the ranch.

The historic Camino Real de la Tierra Adentro, a 1,000-mile trail from Mexico City to Santa Fe, traverses the ranch over a 42-mile distance. A Spanish mine dating back to 1658 is also on the ranch in the Fra Cristobal Mountains.

The following wildlife species found on the Armendaris Ranch are discussed in more detail in Appendix E.

- Aplomado Falcon
- Bald Eagle
- Bolson Tortoise
- Bats
- Desert Bighorn Sheep (*Ovis canadensi mexicana*)

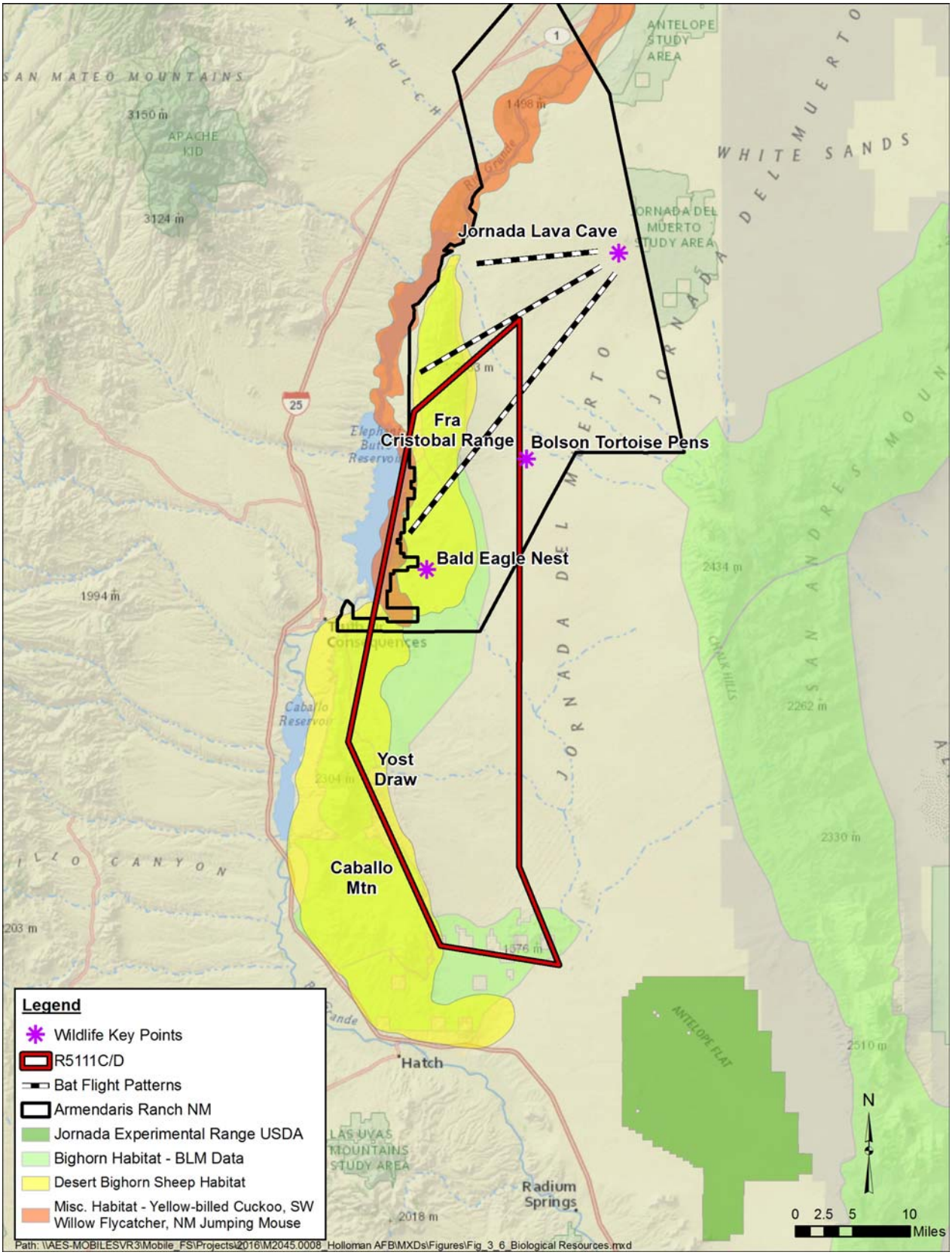


Figure 3-6 Biological Resources

BLM wildlife management areas

BLM manages Wilderness Study Areas (WSAs) for their characteristics (size, naturalness, outstanding opportunities, and supplemental values) until designated as wilderness by Congress. Although the R-5111 C/D airspace does not intersect with the WSA boundaries, knowledge of their locations can help in the planning of flight training avoidance measures. BLM also manages certain national monuments; however, none are within the R-5111 C/D airspace.

3.7.2.2 Special Status Species and Migratory Birds

A list of special status species in Sierra and Dona Maria Counties compiled from information obtained through the BISON-M and USFWS IPaC websites (Appendix E, Table E-1). No critical habitats are within the Proposed Action area for federally listed species. The closest critical habitat for the Mexican spotted owl is 15 miles northwest of the Proposed Action area. The closest critical habitat for the Todsen's pennyroyal is 30 miles east of the northeastern boundary of the Proposed Action area.

The MBTA protects more than 1,500 migratory bird species[20] in the U.S. and its territories. This act and EO 13186 protect migratory bird species, including their nests and eggs. EO 13186 directs federal agencies to implement the MBTA and contribute to the conservation and management of migratory birds and their habitats. The BLM and USFWS in 2010 entered into a Memorandum of Understanding to implement the order (BLM, 2010).

The project site is in the Chihuahuan Desert Bird Conservation Region, for which 66 bird species of concern are listed. As categorized in the New Mexico Bird Conservation Plan, habitat in the project area is primarily Chihuahuan Desert Shrub and grassland (New Mexico Partners in Flight, 2007).

A review of the current USFWS species list for Dona Anna and Sierra Counties (USFWS, 2017) and the current BLM New Mexico sensitive species list (BISON-M, 2017), indicates there is potential for 81 special status species to occur in the project area. Habitat in the Proposed Action area and species distribution information indicate there is reasonable potential for at least 33 birds of conservation concern (BCC) to occur at the site at least part of the year (Appendix E).

[20] 50 CFR 10.13

3.7.3 Environmental Consequences

3.7.3.1 Analysis Methodology

How is a significant impact on biological resources determined?

Various resources such as BLM Geographic Information System (GIS), the Armendaris Ranch website and GIS, and the USFWS and NMDGF database were used to assess current site vegetation, wildlife, and potential presence of sensitive species, which include federal- and state-listed threatened and endangered species and migratory birds. A qualitative analysis was used to assess the Proposed Action's potential to affect biological resources. The Proposed Action would have a significant effect on biological resources if it would

- substantially adversely affect the amount or diversity of common vegetation or wildlife,
- result in a take of a federal- or state-listed species or an adverse modification of designated critical habitat, or
- have a substantial adverse effect on birds protected by the MBTA.

3.7.3.2 Preferred Alternative - WSMR R-5111 C/D Airspace

Low-level overflight and noise

How would the Proposed Action affect biological resources?

Animals living beneath airspace R-5111 C/D would experience an increase of loud overflight noise events per day. WSMR has been conducting annual test missions with various aircraft in R-5111 C/D (WSMR, 2009 and Holloman AFB, 2009). 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). However, 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; and Brown et al., 1999). Although overflight events would be loud, most would occur in restricted airspace at altitudes where the noise generated would not be expected to startle animals, so negative impacts associated with startle responses would be limited. It is expected that, when F-16 sorties approach the Caballo and Fra Cristobal Mountains, the aircraft will be above 500 feet AGL. Furthermore, F-16 training would avoid Elephant Butte which provides habitat for a variety of wildlife species. Based on the previous exposure of wildlife to military aircraft training, no adverse impacts on vegetation or wildlife from overflights or noise are anticipated to be associated with the implementation of the Proposed Action.

Sonic booms

Animals living beneath airspace R-5111 C/D would experience sonic boom events from F-16 training; however, sonic booms would not occur below 25,000 feet MSL. 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. 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 and Krausman et al., 1998) and habituation to more frequent sonic booms may occur (Workman et al., 1992 and Ellis et al., 1991). Similar habituation to thunderclaps and rumble associated with seasonally frequent thunderstorms within the region would be expected to minimize response of birds, mammals, and domestic animals to sonic booms. Most training flights conducting sonic booms would occur above 25,000 feet MSL with distance attenuating (reducing) the noise levels, generally causing minimal response to sonic booms by livestock and wildlife.

Munitions use and defensive countermeasures

Ground-disturbing operations that may accompany F-16 training and that have the potential to disturb vegetation and wildlife are limited to deployment of chaff and flares. If a flare were to reach the ground while still burning, it could ignite dry vegetation and start a wildland fire. In fire-prone areas, flare use during periods of very high or extreme fire danger is restricted to minimize the potential for a burning flare to reach the ground. Generally, the duration of a flare burn is a few seconds, and the flare burns out within a few hundred feet of its release altitude. 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 would appreciably increase the incidence of fires; therefore, impacts on vegetation and wildlife would be less than significant. Because of 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 the chemical components of training chaff (silica, aluminum, stearic acid) are toxic at very high concentrations, such levels could only be reached through the ingestion of many chaff bundles or billions of chaff fibers, which is highly unlikely to occur (Marr and Velasco, 2005). Chaff particles can degrade to small pieces; however, they are still too large for inhalation. Additionally, the number of degraded or fragmented particles in any one place is insufficient to result in adverse health effects. Chaff is similar in form and softness to a strand of

very fine human hair and is unlikely to cause negative reactions if animals were to be exposed to it inadvertently (see Appendix C for more information on chaff).

Wetlands and aquatic communities

The use of defensive countermeasures could occur in airspace over areas that contain wetlands or aquatic communities. Under the Proposed Action, F-16 pilots would train with defensive chaff and flares in areas where their use is approved. A permit through the FCC and FAA would need to be obtained for chaff use prior to conducting training with chaff. 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 potential of hydrogen (pH) could the aluminum present in chaff become soluble and toxic. These conditions are rare, and few organisms would be present in water bodies with such extreme pH levels. Given the small amount of diffuse or aggregate chaff material that could possibly reach water bodies, it is not expected that the water chemistry would be affected. Similarly, the magnesium in flares can be toxic at extremely high levels, a situation that could occur only under repeated and concentrated use in localized areas, which would not occur because of the widely dispersed nature of flare deployment. In addition, there would be a very low probability that an unburned flare or material from a flare would reach an aquatic or wetland environment. Research studies indicate that no adverse impacts on wetlands and water bodies have been observed from the use of chaff and flares (Wilson et al., 2002).

Special Species Status Species and Migratory Birds

Special status species that could potentially be affected by the Proposed Action include the bats, hawks, eagles, and falcons that prey on the bats (Appendix B). As mentioned previously, from June through September, bats that reside in the Jornada Caves stream (fly) out of the caves at dusk to the Rio Grande every night. The average number of bats using the caves on a regular basis varies from 200,000 to 500,000, but as many as 5 million to 8 million use it during migration in the warm weather months and in years of high insect population. These bats use the Rio Grande corridor to head to the irrigated farm fields, where swarms of insects gather.

Historically, F-22s and F-16s conducted training in the R-5111 A/B and R-5107 E airspace over the Jornada cave and bat flyways and have not experienced any major collisions with bats or birds of prey (Holloman AFB, 2017a). However, Holloman AFB flight safety will track any trends that might develop from bat feeding and flight migration patterns. If a trend appears that warrants safety measures, then they will be developed and implemented.

Additionally, F-16 training will avoid low-level flyovers at Elephant Butte Reservoir during bird migration seasons. Therefore, no implementation of the Proposed Action is not likely to have an adverse effect on special status species and migratory birds.

3.7.3.3 No-Action Alternative

Under the No-Action Alternative, the R-5111 C/D airspace would not be used for F-16 training. Existing conditions related to biological resources would be unchanged; therefore, no impacts would occur.

3.8 CULTURAL RESOURCES

3.8.1 Definition of the Resource

How are cultural resources defined?

Cultural resources include archaeological resources, historic properties, and traditional cultural properties. Archaeological resources include sites from the prehistoric through the early 20th century. These resources are protected under the Archaeological Resource Protection Act[21] and under NHPA. Historic properties include prehistoric or historic districts, sites, buildings, structures, or objects included in or eligible for inclusion in the National Register of Historic Places (NRHP). Regulations[22] require federal agencies to consult with State Historic Preservation Offices (SHPOs) on the effects of a project on historic properties. Eligible properties receive the same level of protection as properties actually listed on the National Register until determined ineligible by the USAF and SHPO. Traditional cultural properties are historic properties to which an Indian Tribe attaches religious and cultural significance. Regulations[23] require federal agencies to allow Indian tribes the opportunity to present their concerns about the adverse effects of a project on traditional cultural properties and to participate in the resolution of those effects. DoD and Air Force instructions mandate all bases have an Integrated Cultural Resources Management Plan (ICRMP) that will be a decision document for management and protection of cultural resources. The instructions include a provision that the ICRMP be a component of the base master plan and be revised every five years. Holloman AFB has updated its ICRMP in 2017 (Holloman AFB, 2017).

[21] 16 USC 470aa- 470mm, P.L. 96-95, and amendments

[22] Section 106 of the NHPA and 36 CFR Part 800

[23] Section 106 of the NHPA and 36 CFR Part 800

3.8.2 Affected Environment

3.8.2.1 Area of Potential Effect

What is the current cultural resources environment?

The area of potential effect (APE) for cultural resources encompasses those areas underlying the airspace where noise is generated by aircraft overflights. The APE is three dimensional, and includes subsurface, surface, and airspace lying above the potentially affected surface. The APE for this project encompasses the ground footprint under the R-5111 C/D airspace (see Figure 3-7). Notification of the Proposed Action was sent to the New Mexico SHPO, Mescalero Apache Tribe, and Fort Sill Apache Tribe early in the environmental analysis process (Appendix A). Numerous archaeological and historic architectural resources within the APE were identified using the records of the NRHP, New Mexico SHPO, National Historic Landmarks, and Holloman AFB GIS database. These sites include but are not limited to

- Elephant Butte Dam,
- Elephant Butte Irrigation District,
- Elephant Butte Historic District,
- Point of Rocks,
- El Camino Real de Tierra Adentro,
- Jornada Lake,
- Rincon Arroyo, and
- Fort McRae.

See Figure 3-7 for site locations and Appendix F for descriptions. Locations of numerous archaeological sites located in the area underlying the R-5111 C/D airspace are exempt from the Freedom of Information Act and are not presented in this EA in order to protect the integrity of those sites.

3.8.3 Environmental Consequences

3.8.3.1 Analysis Methodology

How is a significant impact on cultural resources determined?

Properties identified in the APE are evaluated according to the NRHP criteria, in consultation with the SHPO, Tribal Historic Preservation Officer (THPO), and other parties. Typically, for NHPA Section 106 purposes, the SHPO, THPO, interested parties and the USAF consult regarding the NRHP eligibility[24] of, and the proposed action specific potential impacts to historic properties identified in an APE. Significant impacts to cultural resources would occur only if the Proposed Action/Preferred Alternative would adversely affect historic properties. Effects (impacts) to historic properties are defined as "alteration to the

[24] 36 CFR 800.4[c][2]

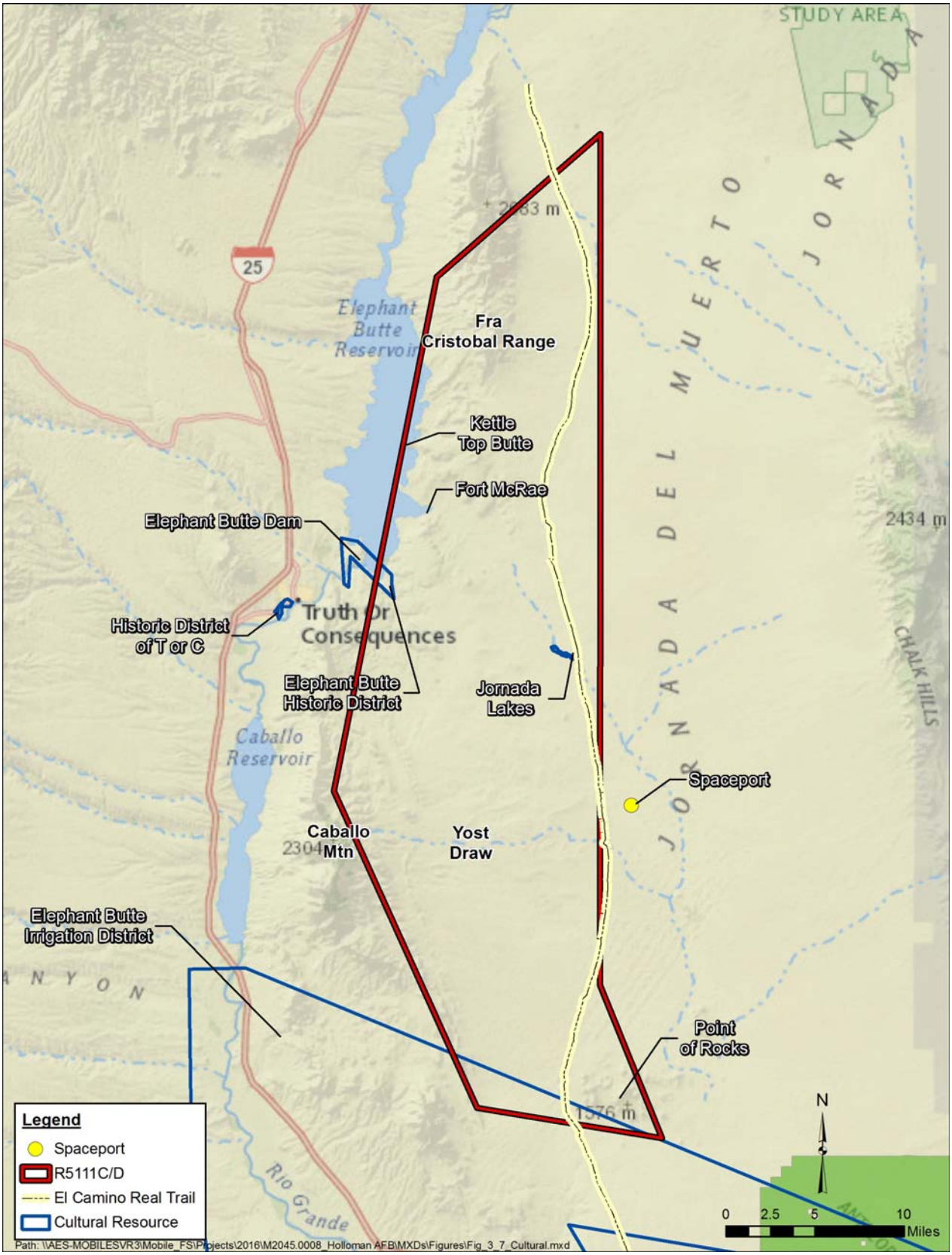


Figure 3-7 Cultural Resources

characteristics of an historic property qualifying it for inclusion in or eligibility for the National Register"[25]. For this analysis, effects are discussed as either adverse or not adverse. "An adverse effect is found when an underaking may alter, directly, or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feelings, or association"[26]. In accordance with DoD Instruction 4710.02, "DoD Interactions with Federally-Recognized Tribes," government to government consultation related to this action was initiated in January 2017 with two federally recognized Native American tribes, Mescalero Apache Tribe, and Fort Sill Apache Tribe. These tribes were contacted for project-specific consultation during IICEP and contacted again when the EA was released for public comment. The USAF's findings of effect and request for concurrence were transmitted to the New Mexico SHPO prior to the public release of this EA. It is reasonably expected that there will be no adverse effects on historic properties (Appendix B).

3.8.3.2 Preferred Alternative - WSMR R-5111 C/D Airspace

How would the Proposed Action affect cultural resource?

Under the Proposed Action (Preferred Alternative), the floor of the proposed F-16 training in restricted airspace R-5111 C/D would be at least 500 feet AGL. At 500 feet AGL, an F-16 produces a momentary sound exposure of 100 dB (A weighted Lmax). However, up to 140 sorties per day (30,800 per year, far more than the maximum possible 2,256 sorties proposed for R-5111 C/D) at mixed elevations only result in an Ldnmr of 58 dB. The noise level where structural damage is considered likely to occur is at 130 dB and above (USAF, 2007b). Thus the aircraft operations proposed for R-5111 C/D are reasonably expected to not cause structural damage to historic properties (or modern properties for that matter) beneath this airspace. Visual effects (the presence of military aircraft) on these resources would be negligible because the aircraft would only be visible from any given cultural resource for a few minutes per flying day. Further, no impacts to Native American sacred or traditional sites have been identified or would be expected. Therefore, implementation of the Proposed Action would have less than significant impacts on cultural resources beneath the proposed restricted airspace R-5111 C/D.

[25] 36 CFR 800.16[i]

[26] 36 CFR 800.5[a][1]

3.8.3.3 No-Action Alternative

Under the No-Action Alternative, the R-5111 C/D airspace would not be used for F-16 training. Existing conditions related to cultural resources would be unchanged; therefore, no impacts would occur.

3.9 HAZARDOUS MATERIALS AND WASTES

This section describes hazardous materials and wastes, and discusses potential effects the Proposed Action could have on this resource.

3.9.1 Definition of the Resource

What are hazardous materials and wastes?

Hazardous materials are defined as substances with strong physical properties of ignitability, corrosivity, reactivity, or toxicity, which may cause an increase in mortality, a serious irreversible illness, incapacitating reversible illness, or pose a substantial threat to human health or the environment. Hazardous wastes are defined as any solid, liquid, contained gaseous, or semisolid waste or any combination of wastes that pose a substantial present or potential hazard to human health or the environment.

To protect habitats and people from inadvertent and potentially harmful releases of hazardous substances, DoD has dictated that all facilities develop and implement Hazardous Waste Management Plans and Spill Prevention and Response Plans. Also, DoD has developed the Environmental Restoration Program, intended to facilitate thorough investigation and cleanup of contaminated sites located at military installations. These plans and programs, in addition to established legislation[27] are intended to protect the human and natural environments.

Issues associated with hazardous materials and wastes typically center on ground-disturbing activities in the vicinity of underground storage tanks; aboveground storage tanks; and areas used for the storage or transport of pesticides, bulk fuel, and petroleum, oils, and lubricants (POL). When such resources are improperly handled, they can threaten the health and well-being of vegetation, soil systems, water resources, wildlife species, and people. However, because no change in ground-disturbing activities is included in the Preferred Alternative or its alternatives, these issues are not discussed in detail.

[27] Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA)

3.9.2 Affected Environment

Emergency Fuel Dump Operations

What are the current hazardous material and wastes conditions?

Under extremely rare emergency circumstances where potential exists for loss of life for the pilot, excess aircraft fuels must be dumped as a safety precaution to facilitate landings during in-flight emergencies. If the fuel load is not jettisoned prior to an emergency landing, it can cause the aircraft to land too heavily, resulting in critical damage to the aircraft and potential loss of life for the pilot operating the aircraft. Emergency fuel dumping is not part of routine training missions and occurs only during emergency circumstances (FAA, 2015).

Chaff and Flare

Chaff and flares are passive, defensive countermeasures deployed by military aircraft. Their purpose is to confuse and divert radar-guided or infrared-guided anti-aircraft missiles fired by other aircraft or from ground installations. Deployment of chaff and flare is a regular element of realistic, mission-oriented training exercises conducted during F-16 training. Chaff and flares are managed as ordnance and are authorized for use in the existing MOAs and on other permitted airspace. Use is governed by detailed operating procedures to ensure safety; these procedures are described in Section 3.4.

Effects of Chaff Use

Chaff used by units training within the R-5111 C/D airspace is composed of aluminum coated silica fibers stored on-board the aircraft in tubes. When an aircraft is threatened by radar-guided threats, the pilot ejects the contents of these tubes into the turbulent wake of air behind the plane. The chaff reacts with the turbulent air and blooms into a decoy cloud of metallic material with a radar signature much larger than the aircraft itself. Depending on the altitude of release and wind speed and direction, the chaff from a single bundle can be spread over distances ranging from less than a quarter mile to more than 100 miles (USAF, 1997). The most confined distribution would be from a low-altitude release in calm conditions.

The principal components of chaff (aluminum, silica glass fibers, and stearic acid) do not pose an adverse risk to human and environmental health based upon the general low-level toxicity of the components, their dispersion patterns, and the unlikelihood that the components would interact with other substances in nature to produce synergistic toxic effects (USAF, 1997). The materials in chaff are generally nontoxic except in exorbitantly large quantities, which humans or wildlife would not encounter as a result of chaff use associated with F-16 training. See Appendix C for more information on chaff.

Effects of Flare Use

Chemical flares comprise magnesium pellets ejected from tubes to ignite in the wake behind the aircraft. Countermeasure flares are designed to burn out before reaching the ground to minimize fire hazards. Even when deployed at 500 feet AGL, most system debris would decelerate to terminal velocity before reaching the ground surface; for details, see Section 3.4. The primary components of flare combustion are magnesium oxide, magnesium chloride, and magnesium fluoride. These components, similar to chaff, do not pose an adverse risk to human and environmental health at the concentrations experienced in flare use (USAF, 1997).

Flares used during training operations burn out shortly after being deployed. Individual emissions from a single flare are negligible. Additive emissions from flare usage within an airspace occur over large areas and during long periods of time and, therefore, have not previously resulted in any violations (declarations of nonattainment status with regard to NAAQS; see Section 3.5). Flare ash is widely dispersed by wind, and the likelihood that a sufficient quantity would accumulate in a particular pond, stream, or estuary to measurably affect its chemical make-up is also remote (USAF, 1997).

3.9.3 Environmental Consequences

3.9.3.1 Analysis Methodology

How is a significant impact on hazardous material and wastes determined?

Numerous local, state, and federal laws regulate the storage, handling, disposal, and transportation of hazardous materials and wastes; the primary purpose of these laws is to protect public health and the environment. The significance of potential impacts associated with hazardous substances is based on their toxicity, ignitability, and corrosivity. Impacts associated with hazardous materials and wastes would be significant if the storage, use, transportation, or disposal of hazardous substances substantially increases the human health risk or environmental exposure.

3.9.3.2 Preferred Alternative - WSMR R-5111 C/D Airspace

Short-term Impacts

How would the Proposed Action affect hazardous materials and wastes?

No ground-disturbing activities (construction or demolition) would occur as part of the Preferred Alternative. Consequently, there would be no increase in the temporary storage of construction-related hazardous materials and wastes. Therefore, short-term impacts associated with hazardous materials and wastes would not occur as a result of implementation of the Proposed Action.

Long-term Impacts

Implementation of the Preferred Alternative would not result in a change in the handling, storage, or use of POL at Holloman AFB. Established safe handling, storage, and use procedures would continue to be implemented. Consequently, long-term impacts associated with hazardous materials and wastes would be less than significant.

Fuel Dumping

Military aircraft operating within R-5111 C/D would continue to adhere to USAF fuel dumping procedures when necessary (in life-threatening emergency situations). As described earlier, fuel dumping is not a component of any routine flight training and only occurs during in-flight emergency circumstances with a loss of life potential for the pilot. Fuel dumping procedures would remain unchanged under the Preferred Alternative and fuel venting would not be anticipated to occur within preferred action area. Therefore, no significant impacts associated with fuel dumping are expected.

Chaff and Flare

Under the Preferred Alternative, the storage, transport, and use of chaff and flare would continue to be implemented in accordance with current procedures and training operation requirements. Consequently, there would be no significant impacts to the physical or human environment as a result of chaff and flare use within the Proposed Action area.

3.9.3.3 No-Action Alternative

Under the No-Action Alternative, the R-5111 C/D airspace would not be used for F-16 training. Existing conditions related to hazardous materials and waste resources would be unchanged; therefore, no impacts would occur.

3.10 ENVIRONMENTAL JUSTICE AND THE PROTECTION OF CHILDREN

This section discusses environmental justice and the protection of children and the potential effects of the Proposed Action on those populations.

3.10.1 Definition of the Resource

Environmental Justice

How is environmental justice defined?

Environmental justice addresses race, ethnicity, and the poverty status of populations in the ROI. On February 11, 1994, the president issued EO 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. The EO is designed to focus the attention of federal agencies on the human health and environmental conditions in

minority and low-income populations. Environmental justice analyses are performed to identify potential disproportionately high and adverse human health or environmental effects from proposed federal actions on minority or low-income populations.

The U.S. Census Bureau identifies minority populations as Black or African American, Native American and Alaska Native, Asian, Native Hawaiian and other Pacific Islander, some other race, people of two or more races, and people of Hispanic or Latino origin (ethnicity). Per CEQ guidance, minority populations should be identified where either the minority population of the affected area exceeds 50% or the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ, 1997).

Poverty thresholds established by the U.S. Census Bureau are used to identify low-income populations. Poverty status is reported as the number of people or families with income below a defined threshold level.

Protection of Children

What is Protection of Children?

EO 13045, "Protection of Children from Environmental Health and Safety Risks," requires federal agencies to identify and assess environmental health and safety risks that might disproportionately affect children to the extent permitted by law and mission. It also directs federal agencies to ensure that their policies, programs, activities, and standards address disproportionate risks to children that result from environmental health or safety risks. Relevant risks are those attributable to products or substances a child is likely to come into contact with or ingest. These risks are most likely to be encountered in areas where children are present, such as schools, playgrounds, daycare facilities, and neighborhoods with high concentrations of children.

3.10.2 Affected Environment

Environmental Justice

What is the current state of environmental justice?

To determine if minority and low-income populations constituting an environmental justice community are present in the ROI, methodologies were used as specified by the USAF's *Guide for Environmental Justice Analysis* under the Environmental Impact Analysis Process (Department of the Air Force, 2014) and the CEQ's Environmental Justice Guidance under NEPA (CEQ, 1997).

Effects on environmental justice communities would be directly related to effects from other environmental resource areas covered in this EA (air quality, noise). The ROI for the

environmental justice analysis includes the villages, cities, and census-designated places (CDPs) that encompass the area subject to potential environmental effects from implementing the Proposed Action. The community of comparison (COC) is the region surrounding the environmental justice ROI and is the demographic area used to compare and analyze potential environmental justice effects. The COC is defined as Sierra County and Doña Ana County. Minority and low-income communities in the environmental justice ROI and the COC are specifically considered to assess the potential for disproportionately high and adverse human health or environmental effects from Proposed Action on these communities.

Minority and low-income data for the municipalities and CDPs that are near the Proposed Action area are presented in Table 3-4. Sierra County, west of WSMR R-5111 C/D, includes the City of Truth or Consequences, the Village of Williamsburg, the City of Elephant Butte, and the following CDPs: Arrey, Las Palomas, Caballo, Oasis, and Hot Springs Landing. Doña Ana County, south of WSMR R-5111 C/D, includes the Village of Hatch and the following CDPs: Rodey, Rincon, Placitas, and Salem. Data are provided for the COC (Sierra and Doña Ana Counties), and data for comparison are presented for the United States and New Mexico.

Table 3-4 Minority and Low-Income Populations and Environmental Justice Populations

Geographic area/affected census tract	Percent minority	Environmental[a] justice minority populations present (yes or no)	Percent low-income[b]	Environmental[a] justice low-income populations present (yes or no)
COC and other comparison data				
United States	37	--	15.5	--
New Mexico	59.3	--	21	--
Sierra County (COC)	30.5	--	20.8	--
City of Truth or Consequences	32.5	Yes	25.9	Yes
Village of Williamsburg	7.6	No	39.1	Yes
City of Elephant Butte	7.8	No	10.1	No
Arrey CDP	84	Yes	11.9	No
Las Palomas CDP	31.2	No	0	No
Caballo CDP	14.3	No	0	No
Hot Springs Landing CDP	16.4	No	0	No
Doña Ana County	70.1	--	NA	--
Village of Hatch	87	Yes	36.6	Yes
Rincon CDP	89.7	Yes	100	Yes
Salem CDP	98	Yes	37.4	Yes
Rodey CDP	96.2	Yes	72.2	Yes

Geographic area/affected census tract	Percent minority	Environmental[a] justice minority populations present (yes or no)	Percent low-income[b]	Environmental[a] justice low-income populations present (yes or no)
Placitas CDP	97.4	Yes	NA	NA

Source: U.S. Census Bureau 2010
Notes:
COC = Community of Comparison; CDP = Census Designated Place; NA = not applicable
[a] A census tract is deemed to have an environmental justice minority or low-income population if the census tract percentage is higher than that of the general population (i.e., the COC, which is defined as either Sierra or Doña Ana County for this project) or is at least 50 percent.
[b] Percent low-income is the percentage of persons whose income is below poverty level thresholds established by the U.S. Census Bureau ($12,085 of annual income, or less, for an individual and $24,259 of annual income, or less, for a family of four [U.S. Census Bureau 2016b]).

As shown by the data in Table 3-4 environmental justice populations are present in the nearby census tracts because these tracts have either a higher percentage of minority people or a higher percentage of people whose income is below poverty level compared to that of the COC or have a percentage of minority people or people whose income is below poverty level that is greater than 50%.

Protection of Children

The protection of children ROI for WSMR R-5111 C/D is defined as the school and daycares in Sierra County and in Doña Ana County in the villages, cities, and CDPs near the WSMR R-5111 C/D. Table 3-5 lists schools and childcare facilities within a 10-mile radius from WSMR R-5111 C/D.

Table 3-5 Schools, Childcare Facilities, and Distance from WSMR R-5111 C/D

Facility Name	Distance (miles)
Truth or Consequences Elementary School	3.2
Truth or Consequences Middle School	4
Hot Springs High School	3.9
Geronimo Trails Academy	9.8
Appletree Educational Center	4.5
Whitehead Childcare Center	3.4
Enchantment Child Development	2.9
Arrey Elementary School	10.5
Hatch Valley Elementary School	8.7
Hatch Valley Middle School	8.6
Hatch Valley High School	8.4
Rio Grande Elementary School	8.4
Garfield Elementary School	9.6
Little Footprints	8.9
Little Bear Child Development	8.4
All Aboard Pre-School	9

3.10.3 Environmental Consequences

3.10.3.1 Analysis Methodology

How is a significant impact on environmental justice determined?

Environmental justice analysis addresses potential impacts on minority and low-income populations per EO 12898. Following CEQ guidance, minority populations are identified where either the minority population of the affected area exceeds 50% or the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ, 1997). Low-income populations are identified using poverty thresholds established by the U.S. Census Bureau. The thresholds are an annual income of $12,085 or less for an individual or $24,259 or less for a family of four (U.S. Census Bureau, 2015b).

Potential effects on the protection of children were analyzed by evaluating whether implementing the proposed project would result in disproportionate health or safety risks to children or expose children to inherently unsafe or unhealthful environments. Risks to children could include an increase in a child's risk of exposure to an environmental hazard (through contact, ingestion, or inhalation) or the risk of potential substantial harm to children's safety during operation of the Proposed Action.

Impacts on identified environmental justice (minority and low-income) communities and the protection of children would be considered significant if one or more of the following would occur:

- Activities or operations substantially altering lifestyles or quality-of-life of households living near the R-5111 C/D airspace,
- Disproportionately high and adverse environmental or human health impacts on an identified minority or low-income population that appreciably exceed those to the general population around the project area, and
- Disproportionately high and adverse environmental health or safety risks to an identified population of children.

3.10.3.2 Preferred Alternative - WSMR R-5111 C/D Airspace

How would the Proposed Action affect environmental justice?

No minority/low-income populations or schools/daycares are located under the R-5111 C/D airspace. The Proposed Action would be limited to airspace only and would not include any project components that would require or result in any facility construction, modification, or demolition resulting in disproportionally high or adverse human

health or environmental effects on minority or low-income populations near the Proposed Action area. Therefore, implementation of the Proposed Action would have no significant impacts on minority or low-income populations and protection of children.

3.10.3.3 No-Action Alternative

Under the No-Action Alternative, the R-5111 C/D airspace would not be used for F-16 training. Existing conditions related to environmental justice and protection of children would be unchanged; therefore, no impacts would occur.

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SECTION 4.0
CUMULATIVE EFFECTS

What is cumulative effects?

Cumulative effects on environmental resources result from the incremental effects of an action when combined with other past, present, and reasonably foreseeable future projects in the area (40 CFR 1508.7). Cumulative effects can result from individually minor but collectively substantial actions taken over a period of time. In accordance with NEPA, a discussion of cumulative effects is required (CEQ, 1997). This section describes past, present, and reasonably foreseeable actions in the area and an evaluation of potential cumulative effects.

4.1 PAST, PRESENT, AND REASONABLY FORSEEABLE FUTURE ACTIONS

WSMR has been using the R-5111 C/D airspace for research and test missions since the mid 1990s (FAA, 1995). Sixty-one types of aircraft, including F-16s, have been used by WSMR for test missions in the R-5111 C/D airspace. Approximately 300 sorties were used for test missions during Fiscal Year 2016.

Are there any past, present, or future projects in the area of the Proposed Action?

Currently, Holloman AFB operates MQ-9 aircraft in the R-5111 C/D airspace. Non-military uses of the airspace include the NMDGF annual fixed wing low altitude telemetry flights for tracking bighorn sheep (*Ovis canadensis*) and occasional low altitude helicopter sheep capture flights over Fra Cristobal and Caballo Mountains.

Table 4-1 summarizes the past and present actions within the region that could interact with the current Proposed Action.

Table 4-1 Past, Present, and Future Actions at R-5111 C/D and Surrounding Region

Action	Proponent/ Location	Timeframe	Description	Resource Interaction
Military Actions				
Regional Special Use Airspace Optimization Plan (2018)	Southern New Mexico	Future	The objective of the RSOP is for the USAF to modify airspaces controlled by the Albuquerque Center to keep pace with current USAF requirements. The RSOP is a broad, regional effort that would not necessarily include specific analysis of the R-5111 C/D airspace for F-16 operations.	Airspace Management and Use, Noise, Air Quality, Land Use and Recreation in affected airspace

Action	Proponent/ Location	Timeframe	Description	Resource Interaction
F-16 Interim Basing EA/FONSI (2017)	Holloman AFB	Ongoing	Analysis of the interim basing of two F-16 squadrons at Holloman AFB and Joint Base San Antonio (JBSA)-Lackland	Airspace Management and Use, Noise, Air Quality, Land Use and Recreation in affected airspace
EA for the MQ-1 Predator and MQ-9 Reaper Unmanned Aircraft System Second Formal Training Unit Bed Down (2009)	ACC, Holloman AFB	Past, Ongoing	Bed down of multiple squadrons of UAS now known as RPA (38 total aircraft and approximately 600 personnel) at Holloman AFB with approximately 2,900 sorties per year using the WSMR R-5107, R-5109, and R-5111 airspaces.	Considered in baseline conditions for noise analysis. Airspace Management and Use, Air Quality, Biological Resources, Cultural Resources
Programmatic EA for JTX Roving Sands	Headquarters, United States Army Forces Command/ Joint Services, South Central New Mexico	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-16 training at Holloman AFB.	Airspace Management and Use, Noise, Air Quality, Land Use and Recreation in training airspace and auxiliary airfields
Final EIS for Development and Implementation of Range Wide Mission and Major Capabilities at WSMR, New Mexico (2009)	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, and Safety
Nonmilitary Federal				

Action	Proponent/ Location	Timeframe	Description	Resource Interaction
Plan revision and RMP/EIS for areas of Otero, Sierra, and Doña Ana counties in New Mexico	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
Final Rule for Northern Aplomado Falcon in New Mexico	USFWS	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 *Federal Register* on July 26, 2006, establishing a nonessential experimental population in Arizona and New Mexico under Section 10(j) of the ESA. Reintroduction of the falcon (initiated in July 2007) is jointly managed by the State of New Mexico, USFWS, BLM, DoD, and other private agencies.	Biological resources – represented in baseline and ongoing management
Non-Federal State, Local				
Spaceport America	New Mexico State Land Office	Past, ongoing	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-16 training.	Airspace Management and Use

4.2 CUMULATIVE IMPACTS

What are the impacts of the Proposed Action when combined with any past, present, or future projects?

The following analysis considers how the impacts of the actions in Table 4-1 might affect, or be affected by, the Proposed Action. 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 ongoing MQ-9 training and increased test and training at WSMR. Table 4-2 summarizes the cumulative effects of these actions by resource.

Table 4-2 Cumulative Impacts of the Proposed Action

Resource	R-5111 C/D Airspace
Airspace Management and Use	Increased cumulative use of R-5111 C/D Airspace would occur. No significant impacts from cumulative actions are expected. However, any future airspace activity may warrant an independent capacity analysis for cumulative impacts to airspace management and use in R-5111 C/D.
Noise	Noise impacts on some isolated rural residents and recreational activities (such as camping and hunting) underlying R-5111 C/D airspace could potentially become significant. However, if measures to reduce effects are implemented, no cumulative adverse impacts are expected.
Safety	Risks of mishaps and bird strikes from increased operations training in R-5111C/D airspace are low and manageable through adherence to existing procedures. If measures to reduce effects are implemented, no cumulative adverse impacts are expected.
Air Quality	Cumulative increase in air emissions from additional air operations would occur. No significant impacts from cumulative actions is expected because of the altitude of aircraft operations.
Land Use, Visual and Recreational Resources	Cumulative increase in noise would primarily affect BLM, state and private lands and could have a moderate impact on public access uses (recreation primarily). Increase in noise under R-5111C/ may cause occasional moderate impacts on recreational experiences. However, if measures to reduce effects for noise are implemented, no cumulative adverse impacts are expected.
Biological Resources	Cumulative increase in air operations, primarily over Fra Cristobal and Caballo Mountains and Elephant Butte Reservoir could potentially impact migratory birds and special status species. However, if measures to reduce effects are implemented, no cumulative adverse impacts are expected.
Cultural Resources	Cumulative increased air operations are not likely to cause impacts to cultural resources.
Hazardous Materials and Waste	Cumulative impacts of hazardous materials and wastes is not generally an issue for areas underlying airspace. No cumulative adverse impacts are expected.
Environmental Justice	Cumulative impacts to environmental justice and protection of children are not likely to occur.

The R-5111 C/D airspace has supported military missions for units at WSMR and Holloman AFB for many years. Increasing projections for R-5111 C/D, if realized, could result in increasingly complex scheduling and airspace management challenges. Cumulative use of R-5111 C/D for WSMR testing purposes, projected increase in use of restricted airspace for remotely piloted aircraft, and the increasing use for training 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 air traffic control for the Holloman AFB and WSMR airspace complex are under consideration (Holloman AFB, 2011).

4.3 IRREVERSIBLE AND IRRETRIEVABLE 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. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored due to the action.

Training operations would continue and involve consumption of nonrenewable resources, such as jet fuel used in aircraft. Use of training ordnance and defensive countermeasures would involve continued commitment of the constituent materials. None of these activities would be expected to decrease the availability of minerals or petroleum resources.

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SECTION 5.0
FINDINGS AND CONCLUSIONS

This EA considers the effects of implementing the Proposed Action, Holloman F-16 use of WSMR R-5111 C/D Airspace and the No-Action Alternative.

5.1 SUMMARY OF ENVIRONMENTAL EFFECTS

Table 5-1 provides a comparison of the potential effects of implementing the Proposed Action or No-Action Alternative relative to the environmental resources evaluated. Implementing the Proposed Action would result in short- and long-term minor to moderate adverse effects and some beneficial effects; no significant impacts would occur. Implementing the No-Action Alternative would have no effects. Cumulative effects would not be significant.

Table 5-1 Summary of Environmental Effects

Resource Area	Proposed Action	No-Action Alternative
Airspace Management	No significant impact	No impact
Noise	No significant impact	No impact
Safety	No significant impact	No impact
Air Quality	No significant impact	No impact
Land Use, Visual and Recreational Resources	No significant impact	No impact
Biological Resources	No significant impact	No impact
Cultural Resources	No impact	No impact
Hazardous Materials and Wastes	No impact	No impact
Environmental Justice and the Protection of Children	No impact	No impact

5.2 MEASURES TO REDUCE EFFECTS

Implementing the Proposed Action would have no significant adverse effects and no mitigation measures would be required. For many resource areas, Best Management Practices (BMPs) and avoidance measures would be implemented to further minimize the potential effects of the Proposed Action. The BMPs and avoidance measures presented in Section 3 are summarized here.

Noise. The need for avoidance of noise-sensitive areas during training operations would continue to be emphasized to pilots in training. Elephant Butte Reservoir was identified as an avoidance area due to recreational activity, migratory bird habitats, and flyaway and feeding areas for bats from the Jornada Caves. This area is where overflights at low altitudes should be avoided to the maximum extent practicable. F-16 training activities would generally be limited to daytime, weekday hours with less than 10% occurring between 10 PM and 7 AM and would be conducted

above 500 feet AGL. Holloman AFB would continue to maintain a hotline to identify noise-related issues and track trends associated with military aircraft operations under the Proposed Action.

Safety. The Holloman AFB BASH plan establishes procedures to minimize bird and other wildlife strike hazards at the base and low-level areas used by aircraft at the base (Holloman AFB general plan update). Local flying procedures would avoid direct overflight of areas where migratory birds (such as Elephant Butte Reservoir) predominantly nest. Air Force Pamphlet 91-212, "Bird/Wildlife Aircraft Strike Hazard Management Techniques," provides guidance for implementing an effective BASH reduction program. Two systems will be used to estimate wildlife strike hazard; the USAF's BAM and the Avian Research Laboratory's AHAS. These tools provide information regarding bird strike risk and allow pilots to make informed decisions about their routes with regards to wildlife strike risk (FAA, 2008). Other BASH considerations may include incorporating seasonal or elevation flight restrictions in light of bat feeding and migration trends associated with Jornada Cave adjacent to this airspace. Specific considerations are:

- Birds typically migrate at night and generally fly between 1,000 and 2,500 feet AGL;
- More than 96% of reported bird strikes occur below 3,000 feet AGL;
- Approximately 25% of reported bird strikes occur between 10:00 PM and 7:00 AM;
- Approximately 41% of bird strikes happen during the August through November months; and
- From June through September, bat feedings occur during dusk near Elephant Butte Reservoir and the Rio Grande.

Based on the information presented, specific avoidance measures may include:

- Limit night-time flights during the bird migration months of March through April and August through November over Elephant Butte reservoir;
- Limit flights to above 3,000 feet AGL near Elephant Butte Reservoir at all times of the year;
- During the months of June through September, flights may be limited at dusk along bat migration routes from Jornada Cave to Elephant Butte Reservoir and the Rio Grande. Holloman AFB will track any trends that might develop from bat feeding and migration patterns and implement safety measures if the need is identified.

Land Use, Visual and Recreational Resources. As stated in Noise, Holloman AFB would avoid training sorties over Elephant Butte Reservoir and continue to maintain a hotline to identify noise-related issues and track trends associated with military aircraft operations under the Proposed Action..

Biological Resources. Similar to Safety measures, to minimize impacts to vegetation and wildlife, Holloman AFB flight safety will track any trends that might develop from bat feeding and flight migration patterns. If a trend appears that warrants safety measures, then they will be developed and implemented. Additionally, F-16 training will avoid low-level flyovers at Elephant Butte Reservoir during bird migration seasons as discussed in Safety.

Cultural Resources. F-16 training will stay above 500 feet AGL to avoid noise impacts on cultural resources.

Hazardous Materials and Wastes. Military aircraft operating within R-5111 C/D would continue to adhere to USAF fuel dumping procedures when necessary (in life-threatening emergencies). Under the Preferred Alternative, the storage, transport, and use of chaff and flare would continue to be implemented in accordance with current procedures and training operation requirements.

5.3 CONCLUSIONS

On the basis of the analysis, the Proposed Action would have no significant impacts on human health or the environment and a finding of no significant impact is appropriate. Preparation of an environmental impact statement is not required.

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Appendix A
Interagency and Intergovernmental Coordination for Environmental Planning

DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

9 December 2016

MEMORANDUM FOR DISTRIBUTION

FROM: 54 FG/CC

SUBJECT: Interagency/Intergovernmental Coordination for Environmental Planning (IICEP)

1. The United States Air Force (USAF) 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 Holloman Air Force Base (AFB) F-16 Formal Training Unit (FTU) use of White Sands Missile Range (WSMR) R-5111 C/D airspace.

2. The Proposed Action is to expand the F-16 training areas into available restricted airspace to support pilot production goals. F-16s are currently prohibited from utilizing R-5111 C/D airspace. R-5111 C/D is situated west of and adjacent to R-5111 A/B, and both are west of the WSMR R-5107 airspace (see Attachment 1, Proposed Action Area). If this EA finds F-16 flight in R-5111 C/D will not result in significant impacts to human health or the environment, this airspace can be made available. In that case, R-5111 A/B/C/D combined would provide adequate space for syllabus required maneuvers.

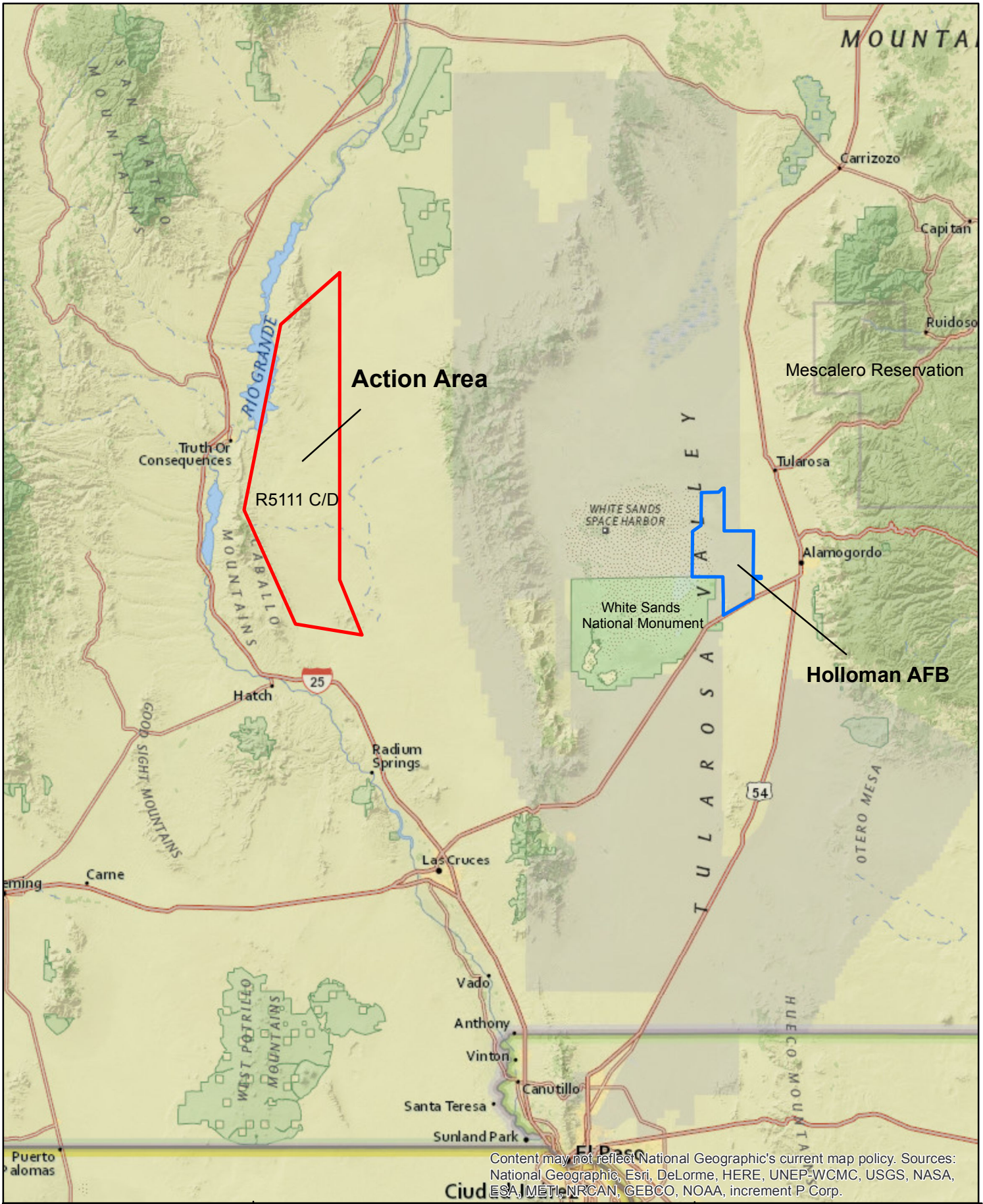
3. The EA will assess the potential consequences associated with the Proposed Action and alternatives. It will examine the cumulative effects when combined with past, present, and reasonably predictable future proposals. We request your input to identify general or specific issues or areas of concern you feel should be addressed in the EA

4. To ensure the Air Force has sufficient time to consider public and agency input in the preparation of the Draft EA, please submit comments to Mr. Andrew Gomolak at 550 Tabosa Avenue, Holloman AFB, NM 88330-8458 or andrew.gomolak@us.af.mil within 30 days from the date of receiving this letter.

5. If you have any questions about the proposal, we would like to hear from you. Please contact Mr. Andrew Gomolak, Cultural Resources Manager/NEPA Advisor, at (575) 572-3931. Thank you in advance for your assistance in this effort.

JAMES R. KEEN, Colonel, USAF
Commander

2 Attachments:
1. Proposed Action Map
2. IICEP Distribution List


Action Area
R5111 C/D
Holloman AFB
Mescalero Reservation
White Sands
National Monument
WHITE SANDS
SPACE HARBOR
Truth Or
Consequences
Hatch
Radium
Springs
Las Cruces
Carne
Alamogordo
Tularosa
Carrizozo
Capitan
Ruidoso
Vado
Anthony
Vinton
Canutillo
Santa Teresa
Sunland Park
Puerto
Palomas
RIO GRANDE
SAN MATEO
MOUNTAINS
CABALLO
MOUNTAINS
GOOD SIGHT MOUNTAINS
WEST POTRILLO
MOUNTAINS
TULAROSA
VALLEY
OTERO MESA
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ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
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Proposed Action Area Map
Holloman AFB, New Mexico
0 5 10 20 30 40
Miles
Legend
Action Area R5111 C/D
Holloman AFB

Revised 11/17/2016

Holloman AFB
IICEP Distribution List

Agency	Name	Division and/or Title	Street Address	City, St, Zip
Federal				
Bureau of Land Management, New Mexico State Office	Mr. Aden L. Seidlitz	State Director (Acting)	301 Dinosaur Trail	Santa Fe, NM 87508
Bureau of Land Management, Las Cruces District Office	Mr. Bill Childress	District Manager	1800 Marquess Street	Las Cruces, NM 88005
Bureau of Land Management, Las Cruces District Office	Ms. Ikumi Doucette	Planning and Environmental Coordinator	1800 Marquess Street	Las Cruces, NM 88005
Federal Aviation Administration	Mr. Greg Byus		8000 Louisiana Blvd NE	Albuquerque, NM 87109
Federal Aviation Administration, Southwest Region	Ms. Kelvin L. Solco	Regional Administrator	10101 Hillwood Parkway	Fort Worth, TX 76177-1524
Federal Aviation Administration, Southwest Region	Mr. Michael O'Harra	Deputy Regional Administrator	10101 Hillwood Parkway	Fort Worth, TX 76177-1524
National Trails System, National Park Service	Ms. Nancy Skinner		PO Box 728	Santa Fe, NM 87504
U.S. Bureau of Reclamation	Mr. Brent Rhees	Regional Director, Albuquerque Area Office	555 Broadway NE, Suite 100	Albuquerque, NM 87102-2352
U.S. Environmental Protection Agency, Region 6	Mr. Robert Houston	Chief, Office of Planning & Coordination	1445 Ross Avenue	Dallas, TX 75202
U.S. Fish and Wildlife Service, Southwest Region	Dr. Benjamin Tuggle	Regional Director	500 Gold Avenue SW	Albuquearque, NM 87102
U.S. Fish and Wildlife Service, Southwest Region	Mr. Steve Helfert	Department of Defense Liaison	500 Gold Avenue SW	Albuquerque, NM 87102
U.S. House of Representatives	The Honorable Steve Pearce	New Mexico Representative, District 2	1101 New York Avenue, Room 115	Alamogordo, NM 88310
U.S. Senate	The Honorable Martin Heinrich	New Mexico Senator	505 South Main Street, Suite 148	Las Cruces, NM 88001
U.S. Senate	The Honorable Tom Udall	New Mexico Senator	201 N. Church Street, Suite 201B	Las Cruces, NM 88001
White Sands Missile Range	Ms. Deborah Hartell	NEPA Support Division	Building 163, Springfield Street	White Sands Missile Range, NM 88002
White Sands Missile Range	Mr. Ken Lance	Airspace Manager	2506 East Ridge	Alamogordo, NM 88310
State				
NM Dept of Transportation Aviation Division	Mr. Steve Summers	Director	PO Box 9830	Albuquerque, NM 87119
NM Dept of Game and Fish	Ms. Alexa Sandoval	Director	PO Box 25112	Santa Fe, NM 87507
NM Dept of Game and Fish, Conservation Services	Mr. Matt Wunder	Division Chief	PO Box 25112	Santa Fe, NM 87507
NM Energy, Minerals and Natural Resources Dept	Ms. Beth Wojahn	Communications Director	1220 South St. Francis Drive	Santa Fe, NM 87505
NM Energy, Minerals and Natural Resources Dept	Ms. Christy Tafoya	State Parks Division Director	1220 South St. Francis Drive	Santa Fe, NM 87505
NM Historic Preservation Division	Jeff Pappas, PhD	State Historic Preservation Officer	407 Galisteo Street, Suite 236	Santa Fe, NM 87501
NM Spaceport Authority	Daniel Hicks	CEO	901 E. University Ave, Suite 965L	Las Cruces, NM 88001
NM State Land Office	Ms. Audry Dunn	NM State Land Commissioner	PO Box 1148	Santa Fe, NM 87504
NM SPOC Energy and Environmental Policy Advisor	Mr. Ned Farquhar		State Capitol Building, Suite 400	Santa Fe, NM 87501
Office of Military Base Planning & Support	Hanson Scott, BGen USAF (Ret)	Director	1100 St. Francis Drive, Room 1060	Santa Fe, NM 87505
State of New Mexico	The Honorable Susan Martinez	Governor	490 Old Santa Fe Trail, Room 400	Santa Fe, NM 87501
Tribal				
Bureau of Indian Affairs, SW Regional Office	Mr. Bill Walker	Regional Director	1001 Indian School NW	Albuquerque, NM 87104
Bureau of Indian Affairs, SW Region Mescalero Agency	Mr. Charles Riley	Superintendent	PO Box 189	Mescalero, NM 88340
Mescalero Apache Tribe	Mr. Danny Breuninger	President	PO Box 227	Mescalero, NM 88340
Fort Sill Apache Tribe	Jeff Haozous	Chairman	43187 US Hwy 281	Apache, OK 73006
Local				
Alamogordo Airport	Mr. Jim Talbert	Airport Manager	13769 E 9th Street	Alamogordo, NM 88310
Alamogordo Chamber of Commerce	Mr. Regina Colbert	Chair	1301 North White Sands Blvd.	Alamogordo, NM 88310
Alamogordo Chamber of Commerce	Mr. Michael Espiritu	OCEDC President/CEO	1301 North White Sands Blvd.	Alamogordo, NM 88310
Alamogordo City Commission			1316 East 9th Street	Alamogordo, NM 88310
City of Alamogordo	The Honorable Susie Galea	Mayor	1376 East 9th Street	Alamogordo, NM 88310
City of Truth or Consequences	The Honorable Steve Green	Mayor	505 Sims Street	Truth or Consequences, NM 87901
City of Truth or Consequences	Mr. Gerald Lafont	Airport Advisory Board	505 Sims Street	Truth or Consequences, NM 87901
Dona Ana County	Ms. Julia T. Brown	County Manager	845 North Motel Boulevard	Las Cruces, NM 88007
Dona Ana County Commission			845 North Motel Boulevard	Las Cruces, NM 88007
Mesilla Valley Audubon Society	Ms. Jennifer Montoya	President	PO Box 1645	Las Cruces, NM 88004
Otero County Commission			1101 New York Ave, Room 101	Alamogordo, NM 88310
Sierra Blanca Regional Airport	Mr. David Pearce	Airport Director	313 Cree Meadows Drive	Ruidoso, NM 88345

Revised 11/17/2016

Holloman AFB
IICEP Distribution List

Agency	Name	Division and/or Title	Street Address	City, St, Zip
Sierra County	Mr. Bruce Swingle	County Manager	855 Van Platten Street	Truth or Consequences, NM 87901
Sierra County Commission			855 Van Patten Street	Truth or Consequences, NM 87901
Socorro County	Ms. Delilah Walsh	County Manager	PO Box I	Socorro, NM 87801
Socorro County Commission			PO Box I	Socorro, NM 87801
Truth or Consequences Municipal Airport (TCS)	Mr. Steve Spaw	Airport Attendant	NM-181	Truth or Consequences, NM 87901

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Appendix B

Noise

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Noise

Noise is defined as unwanted sound and has the potential to affect several environmental resource areas. Because of the wide range of sound levels, sound is expressed in decibels (dB), a unit of measure based on a logarithmic scale. A 10 dB increase in noise level corresponds to a 100% increase (doubling) in perceived loudness. As a general rule, a 3 dB change is necessary for noise increases to be noticeable to humans (Bies and Hansen, 1988). Sound measurement is further refined by using an A-weighted decibel (dBA) scale that emphasizes the range of sound frequencies most audible to the human ear (between 1,000 and 8,000 cycles per second). Sound frequency is measured in terms of hertz (hz), and the normal human ear can detect sounds ranging from about 20 to 15,000 hz. However, the human ear is most sensitive to frequencies in the 1,000 to 4,000 hz, so the very high and very low frequencies are adjusted to approximate the human ear's lower sensitivity to those frequencies. This is called "A-weighting" and is commonly used in the measurement of community environmental noise. Unless otherwise noted, all decibel measurements presented in the following noise analysis are dBA.

Table B-1 identifies noise levels associated with some common indoor and outdoor activities and settings. It also indicates the subjective human judgments of noise levels, specifically the perception of noise levels doubling or being halved. For reference purposes, a baseline noise level of 70 dB is described as moderately loud. In the logarithmic dB scale, humans perceive an increase of 10 dB as a doubling of loudness while an increase of 30 dB corresponds with an eight-fold increase in perceived loudness (Branch and Beland, 1970).

How is noise measured?

A-Weighted Day-Night Average Sound Level

A-weighted day-night average sound level (DNL) is the preferred noise metric for aircraft operations in a community surrounding an airfield, in which noise is generally continuous or patterned. DNL averages A-weighted sound levels during a 24-hour period, with an additional 10 dB penalty added to noise events occurring between 10:00 PM and 7:00 AM This penalty is intended to account for generally lower background noise levels at night and the additional annoyance of nighttime noise events. The Federal government adopted DNL in the early 1980s because it is considered the best single system of noise measurement that can be uniformly applied to measure noise in communities around civilian airports and military facilities for which there is a relationship between projected noise and surveyed reaction of people to the noise. DNL is the preferred noise metric of the U.S. Department of Housing and Urban Development, DOT, FAA, U.S. Environmental Protection Agency (USEPA), Veterans Administration, and DoD.

Table B-1 Sound levels of typical noise sources and noise environments

	Over-all Level (Noise level, dB(A))		**Community** (Outdoor)	**Home or Industry** (Indoor)	**Loudness** (Human Judgement of Different Sound Levels)
	120-130	Uncomfortably Loud	Military Jet Aircraft Take-Off With After-Burner From Aircraft Carrier @ 50 ft. (130)	Oxygen Torch (121)	32 times as loud as 70 dB(A)
	110-119		Turbo Fan Aircraft @ Take-Off Power @ 200 ft. (118)	Riveting Machine (110) Rock and Roll Band (108-114)	16 times as loud as 70 dB(A)
	100-109		Boeing 707, DC-8 @ 6080 ft. Before Landing (106), Jet Flyover @ 1000 ft. (103), Bell J-2A Helicopter @ 100 ft. (100)		8 times as loud as 70 dB(A)
	90-99	Very Loud	Power Mower (96) Boeing 707, CD-8 @ 6080 ft. Before Landing (97) Motorcycle @ 25 ft. (90)	Newspaper Press (97)	4 times as loud as 70 dB(A)
	80-89		Car Wash @ 20 ft. (89) Propellor Plane Flyover @ 1000 ft. (88) Diesel Truck, 40 mph @ 50 ft. (84) Diesel Train, 45 mph @ 100 ft. (83)	Food Blender (88) Milling Machine (85) Garbage Disposal (80)	2 times as loud as 70 dB(A)
	70-79	Moderately Loud	High Urban Ambient Sound (80) Passenger Car, 65 mph @ 25 ft. (77) Freeway @ 50 ft. From Pavement Edge @ 10 a.m. (76 +/- 6)	Living Room Music (76) TV-Audio, Vacuum Cleaner (70)	
	60-69		Air Conditioning Unit @ 100 ft. (60)	Cash Register @ 10 ft. (65-70)	1/2 as loud as 70 dB(A)
	50-59	Quiet	Large Transformers @ 100 ft. (50)		1/4 as loud as 70 dB(A)
	40-49		Bird Calls (44) Lower Limit of Urban Ambient Sound in daytime (40)		1/8 as loud as 70 dB(A)
		Just Audible	**dB(A) Scale Interrupted**		
	0-10	Threshold of Hearing			

Source: Branch and Beland 1970.

Onset Rate-Adjusted Monthly Day-Night Average

Military aircraft using special use airspace – such as MOAs, RAs, and MTRs – generate a noise environment that is somewhat different from that associated with airfield operations. As opposed to daily patterned or continuous noise environments associated with airfields, flight activity within special use airspace is highly sporadic and often seasonal. Individual military overflight events also differ from typical community noise events because a low-altitude, high-airspeed flyover can have a rather sudden onset, exhibiting a rapid rate of increase and rapid rate of decrease in sound level (up to 150 dB per second).

Onset rate-adjusted monthly day-night average, A-weighted sound level (Ld_{nmr}) is a noise metric that has been developed specifically for aircraft operations in special use airspace, including MOAs and MTRs. The Ld_{nmr} is similar to the DNL in that it is an average metric with a 10 dB penalty for events occurring between 10:00 PM and 7:00 AM However, because the tempo of operations is so variable, Ld_{nmr} is calculated using the average number of operations per day in the busiest month of the year. Ld_{nmr} represents an average for an entire month using the highest monthly sortie activity (the busiest month), and includes an additional penalty up to 11 dB to compensate for the "startle" effect of a low-altitude overflight. For aircraft exhibiting a rate of increase in sound level (onset rate) from 15 to 150 dB per second, an adjustment or penalty ranging from 0 to 11 dB is added. Onset rates above 150 dB per second require an 11 dB penalty while onset rates below 15 dB per second require no adjustment. Because of this penalty, Ld_{nmr} always equals or exceeds DNL. Consequently, Ld_{nmr} can be conservatively compared to DNL noise thresholds. Further, because it is a conservative measure of average noise exposure over time with built-in penalties for rapid onset of noise, Ld_{nmr} closely correlates with the probability of "highly annoying" a noise receptor and is appropriate to use in areas where receptors would be highly sensitive to potential noise impacts.

Measurements of Short-Term Noise Events

Ld_{nmr}, which is an average metric, is the accepted metric for land use compatibility guidelines beneath special use airspace; however, other important concerns regarding aircraft operations within special use airspace include the number, intensity, and duration of individual noise events that contribute to the Ld_{nmr}. Consequently, Ld_{nmr} is generally supplemented with metrics describing instances of unpredictable, discrete short-term noise events that produce long-term average Ld_{nmr}.

Appendix C
Chaff Characteristics

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CHARACTERISTICS OF CHAFF

The proposed action would employ RR-188 training chaff. When released from an aircraft, chaff initially forms a sphere, then disperses in the air. The chaff effectively reflects radar signals in various bands (depending on the length of the chaff fibers) and forms a very large image or electronic "cloud" of reflected signals on a radar screen. The aircraft is obscured from radar detection by the cloud, which allows the aircraft to safely maneuver or to leave an area. Since chaff can obstruct radar, its use is coordinated with the Federal Aviation Administration (FAA). RR-188 training chaff has D and E band dipoles removed to avoid interference with FAA radar.

Chaff Composition

The RR-188 chaff used during training consists of extremely small strands (or dipoles) of an aluminum-coated crystalline silica core. The chaff components (silica, aluminum, and stearic acid) are generally prevalent in the environment. Silica (silicon dioxide) belongs to the most common mineral group, silicate minerals. Silica is inert in the environment and does not present an environmental concern with respect to soil chemistry. Aluminum is the third most abundant element in the earth's crust, forming some of the most common minerals, such as feldspars, micas, and clays. Natural soil concentrations of aluminum ranging from 10,000 to 300,000 parts per million have been documented (Lindsay 1979). These levels vary depending on numerous environmental factors, including climate, parent rock materials from which the soils were formed, vegetation, and soil moisture alkalinity/acidity. The solubility of aluminum is greater in acidic and highly alkaline soils than in neutral pH conditions. Aluminum eventually oxidizes to Al2O3 (aluminum oxide) over time, depending on its size and form and the environmental conditions. Stearic acid is an animal fat that degrades when exposed to light and air.

The chaff fibers have an anti-clumping agent (Neofat – 90 percent stearic acid and 10 percent palmitic acid) to assist with rapid dispersal of the fibers during deployment (Air Force 1997). Chaff is made as small and light as possible so that it will remain in the air long enough to confuse enemy radar. The chaff fibers are approximately the thickness of a human hair (i.e., generally 25.4 microns in diameter), and range in length from 0.3 to over 1 inch. The weight of chaff material in the RR- 188 cartridge is 95 grams (Air Force 1997).

A single bundle of chaff consists of the filaments in an 8-inch long rectangular tube or cartridge, a plastic piston, a cushioned spacer and a 1-inch by 1-inch plastic end cap that falls to the ground when chaff is dispensed. The spacer is a spongy material (felt) designed to absorb the force of release. Figure 1 illustrates the components of a chaff cartridge. Table 1 lists the components of the silica core and the aluminum coating. Table 2 presents the characteristics of RR-188 chaff.

Chaff Ejection

Chaff is ejected from aircraft pyrotechnically using a BBU-35/B impulse cartridge. Pyrotechnic ejection uses hot gases generated by an explosive impulse charge. The gases push the small piston down the chaff-filled tube. A small plastic end cap is ejected, followed by the chaff fibers. The plastic tube remains within the aircraft. Debris from the ejection consists of two small, square pieces of plastic 1/8-inch thick (i.e., the piston and the end cap) and the felt spacer. Table 3 lists the characteristics of BBU-35/B impulse cartridges used to pyrotechnically eject chaff.

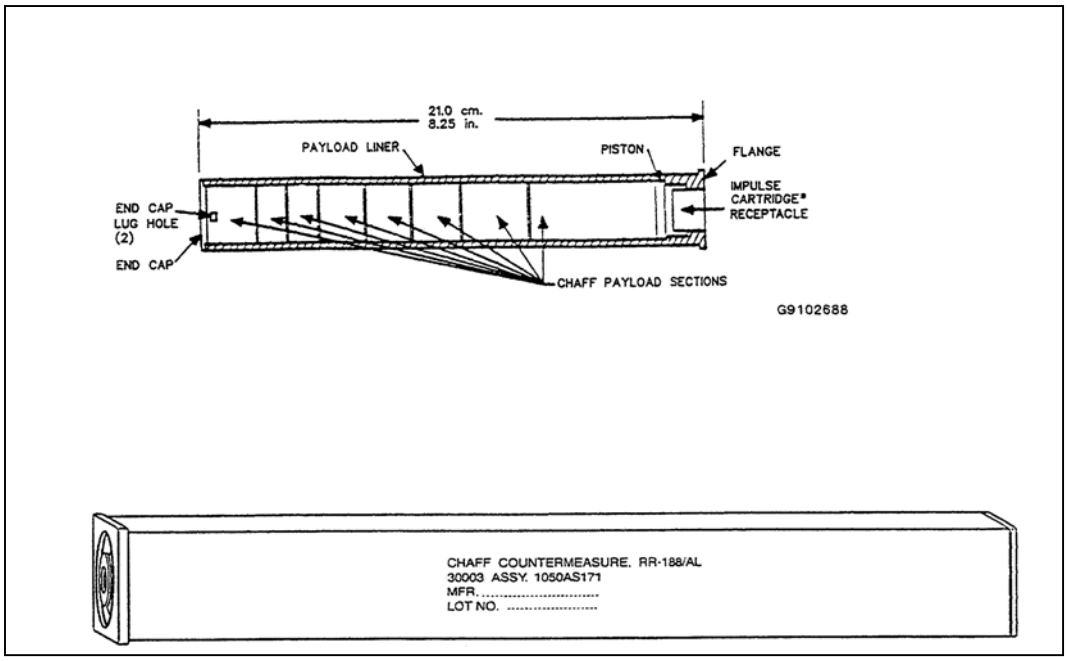

Figure C-1 RR-188/AL Chaff Cartridge (Source: Air Force 1999)

Table C-1 Components of RR-188 Chaff

Element	Chemical Symbol	Percent (by weight)
Silicon dioxide	SiO2	52-56
Alumina	Al2O3	12-16
Calcium Oxide and Magnesium Oxide	CaO and MgO	16-25
Boron Oxide	B2O3	8-13
Sodium Oxide and Potassium Oxide	Na2O and K2O	1-4
Iron Oxide	Fe2O3	1 or less
Aluminum Coating (Typically Alloy 1145)		
Aluminum	Al	99.45 minimum
Silicon and Iron	Si and Fe	0.55 maximum

Element	Chemical Symbol	Percent (by weight)
Copper	Cu	0.05 maximum
Manganese	Mn	0.05 maximum
Magnesium	Mg	0.05 maximum
Zinc	Zn	0.05 maximum
Vanadium	V	0.05 maximum
Titanium	Ti	0.03 maximum
Others		0.03 maximum

Source: Air Force 1997

Table C-2 Characteristics of RR-188 Chaff

Attribute	RR-188
Aircraft	A-10, F-15, F-16
Composition	Aluminum coated glass
Ejection Mode	Pyrotechnic
Configuration	Rectangular tube cartridge
Size	8 x 1 x 1 inches (8 cubic inches)
Number. of Dipoles	5.46 million
Dipole Size (cross- section)	1 mil (diameter)
Impulse Cartridge	BBU-35/B
Other Comments	Cartridge stays in aircraft; less interference with FAA radar (no D and E bands)

Source: Air Force 1997

Table C-3 BBU-35/B Impulse Charges Used to Eject Chaff

Component	BBU-35/B
Overall Size Overall Volume Total Explosive Volume	0.625 inches x 0.530 inches 0.163 inches3 0.034 inches3
Bridgewire	Trophet A 0.0025 inches x 0.15 inches
Initiation Charge	0.008 cubic inches 130 mg 7,650 psi boron 20% potassium perchlorate 80% *
Booster Charge	0.008 cubic inches 105 mg 7030 psi boron 18% potassium nitrate 82%

Component	BBU-35/B
Main Charge	0.017 cubic inches 250 mg Loose fill RDX ** pellets 38.2% potassium perchlorate 30.5% boron 3.9% potassium nitrate 15.3% super floss 4.6% Viton A 7.6%

Source: Air Force 1997

Upon release from an aircraft, chaff forms a cloud approximately 30 meters in diameter in less than one second under normal conditions. Quality standards for chaff cartridges require that they demonstrate ejection of 98 percent of the chaff in undamaged condition, with a reliability of 95 percent at a 95 percent confidence level. They must also be able to withstand a variety of environmental conditions that might be encountered during storage, shipment, and operation. Table 4 lists performance requirements for chaff.

Table 4. Performance Requirements for Chaff

Condition	Performance Requirement
High Temperature	Up to +165 degrees Fahrenheit (oF)
Low Temperature	Down to –65 oF
Temperature Shock	Shock from –70 oF to +165 oF
Temperature Altitude	Combined temperature altitude conditions up to 70,000 feet
Humidity	Up to 95 percent relative humidity
Sand and Dust	Sand and dust encountered in desert regions subject to high sand dust conditions and blowing sand and dust particles
Accelerations/Axis Transverse-Left (X) Transverse-Right (-X) Transverse (Z) Transverse (-Z) Lateral-Aft (-Y) Lateral-Forward (Y)	G-Level / Time (minute) 9.0 / 1 3.0 / 1 4.5 / 1 13.5 / 1 6.0 / 1 6.0 / 1
Shock (Transmit)	Shock encountered during aircraft flight
Vibration	Vibration encountered during aircraft flight
Free Fall Drop	Shock encountered during unpackaged item drop
Vibration (Repetitive)	Vibration encountered during rough handling of packaged item
Three Foot Drop	Shock encountered during rough handling of packaged item

Note: Cartridge must be capable of total ejection of chaff from the cartridge liner under these conditions.
Source: Air Force 1997

Policies and Regulations on Chaff Use

Current Air Force policy on use of chaff and flares was established by the Airspace Subgroup of Headquarter (HQ) Air Force Flight Standards Agency (AFFSA) in 1993 (Memorandum from John R. Williams, 28 June 1993). It requires units to obtain frequency clearance from the Air Force Frequency Management Center and the FAA prior to using chaff to ensure that training with chaff is conducted on a non-interference basis. This ensures electromagnetic compatibility between the FAA, the Federal Communications Commission (FCC), and Department of Defense (DoD) agencies. The Air Force does not place any restrictions on the use of chaff provided those conditions are met (Air Force 1997).

AFI 13-201, U.S. Air Force Airspace Management, July 1994. This guidance establishes practices to decrease disturbance from flight operations that might cause adverse public reaction. It emphasizes the Air Force's responsibility to ensure that the public is protected to the maximum extent practicable from hazards and effects associated with flight operations.

AFI 11-214 Aircrew and Weapons Director and Terminal Attack Controller Procedures for Air Operations, July 1994. This instruction delineates procedures for chaff and flare use. It prohibits use unless in an approved area.

References

Air Force, 1997. *Environmental Effects of Self-Protection Chaff and Flares.* Prepared for Headquarters Air Combat Command, Langley Air Force Base, Virginia.

Air Force, 1999. *Description of the Proposed Action and Alternatives (DOPAA) for the Expansion of the Use of Self-Protection Chaff and Flares at the Utah Test and Training Range, Hill Air Force Base, Utah.* Prepared for Headquarters Air Force Reserve Command Environmental Division, Robins AFB, Georgia.

Air Force, 2000. Additional Information and Analysis of Proposed Use of Defensive Chaff in the Airspace Known as the Carrabelle and Compass Lake Work Areas (Military Operations Areas). Prepared for the U.S. Air Force Air Education and Training Command (AETC). Tyndall Air Force Base, Florida.

Appendix D

Land Use, Visual and Recreational Resources

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Land Use, Visual and Recreational Resources

Jornada Del Muerto

The name "Jornada del Muerto" translates from Spanish as the "Journey of the Dead Man". The Jornada is a part of the Camino Real that led northward from central Spanish colonial New Spain in present-day Mexico, to the farthest reaches of the Viceroyalty in northern Nuevo México. The Jornada is about 100 miles (160 kilometers) of particularly dry terrain that the Camino Real crossed between leaving the Rio Grande valley near present day Las Cruces and rejoining the Rio Grande near Socorro, NM. This connected El Paso del Norte (now Ciudad Juarez, Mexico) and Santa Fe, New Mexico.

The early settlers, missionaries, military and traders that travelled the Camino Real report stopping at Ojo del Muerto (Deadman Spring, a very reliable water source) on the west side of the Jornada uplands, east of where Elephant Butte dam is today. Some historians now think the term Jornada del Muerto originated as "al Muerto" (journey to the spring), and that "del Muerto" was popularized by overly dramatic wild west stories. Other historians credit the name to the death of a German trader who took the route in flight from the Holy Office of the Inquisition in 1670. His sun dried corpse was found at a place subsequently called El Aleman (the German) or Paraje del Aleman (place of the German), roughly halfway across the Jornada del Muerto.

Spanish records show that experienced travelers planned their expeditions through this often dry stretch of the Camino Real to coincide with seasonal rain patterns that provided flow in drainages and filled ephemeral lakes. These water sources were critical to preventing draft animals, livestock and travelers from perishing.

Currently the public land portions of the Jornada del Muerto have been incorporated into El Camino Real de la Tierra Adentro National Historic Trail administered by the BLM and National Park Service. The western side of the Jornada Del Muerto valley is under the Proposed Action Area (Figure 3-4) and the eastern side is under the previously assessed R-5111 A/B airspace.

El Camino Real de la Tierra Adentro National Historic Trail

El Camino Real de la Tierra Adentro National Historic Trail, Spanish for "The Royal Road of the Interior Land," was a 1,600-mile (2,560-kilometer) trade route between Mexico City and San Juan Pueblo, New Mexico, from 1598 to 1882. (Snyder, 2004).

The 404-mile (646-kilometer) section of the route within the United States was proclaimed part of the U.S. National Historic Trail System on October 13, 2000. The trail is overseen by the National Park Service and the BLM with aid from El Camino Real de la Tierra Adentro Trail Association (CARTA).

Various sites and cities along the Mexican section of the trail were declared a World Heritage Site by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 2010 (UNESCO, 2017).

Those sites include Ojuelos de Jalisco, the place where the first fortification was built in 1569, and Zacatecas, the city in which a rich silver mineral mine triggered the original construction of the "El Camino Real de la Tierra Adentro."

A portion of the trail near San Acacia, New Mexico, was listed on the National Register of Historic Places in 2014. (National Park Service, retrieved November 23, 2014).

Approximately 45 miles of the El Camino Real traverses under and near the Proposed Action area. BLM manages visual resources according to its designated management class. BLM guidance for visual resource management is available in *BLM Manual 8400 Visual Resource Management* (1984). The El Camino Real de la Tierra Adentro National Historic Trail has specific guidance for visual resource management (see the trail's comprehensive management plan for specifics).

Fra Cristobal Range

The Fra Cristobal Range (Fra Cristóbal Range) is a 17-mile (27-kilometer) long, mountain range in central-north Sierra County, New Mexico. The range borders the eastern shore of Elephant Butte Reservoir on the Rio Grande and is northwest of Jornada del Muerto, the desert region east of the river. A large portion of Fra Cristobal Range occurs under the Proposed Action area.

Caballo Mountains

The Caballo Mountains (Spanish for horse) are a mountain range in Sierra and Doña Ana counties, New Mexico. This mountain range is east of the Rio Grande and Caballo Lake and west of the Jornada del Muerto; the south range extends into northwest Doña Ana County. The nearest towns are Truth or Consequences and Hatch.

Most of the Caballo Mountains are on land owned by BLM. The mountains are unusual, and perhaps unique in New Mexico, for the relatively complete geologic history revealed by their rocks. The range can be accessed by Interstate 25 from the west, New Mexico State Road 51 from the north, and several dirt roads from the east. The eastern portion of these mountains is located under the Proposed Action area.

Point of Rocks

The large basalt outcropping known as Point of Rocks is at the southern end of the Proposed Action area along the western edge of the Perrillo Hills. The Point of Rocks ridge looks over a section of El Camino Real between the escarpment and the eastern edge of the floodplain beyond. A ½-mile loop trail ends at the top of a rock outcrop that was a landmark for travelers on El Camino Real. Reaching Point of Rocks indicated to travelers that water was only 10 miles away.

Yost Draw

Visitors can see the wonders of the middle of the Jornada del Muerto (the Journey of the Dead Man) from the meandering 1 ½-mile interpretive path that follows parts of El Camino Real de la Tierra Adentro to

Yost Draw. The Yost Draw traverses nearly 3.8 miles of the Jornada del Muerto section of El Camino Real, which is one of the best-preserved portions of the trail. A short climb east on the interpretive trail brings hikers to an overlook from where the trail's south-north path comes into view. Giant yucca and overgrown mesquite mark a dark stripe of trail as it emerges from the south. As the eye moves northwest toward the Yost Escarpment, dense vegetation gives way to subtle swales and clear stretches of roadway. The musky smells of mesquite, tarbush and creosote fill the air as one steps gently down the sandy path of the escarpment where countless thousands of footsteps, horse hooves and wagon wheels have passed (National Parks Service, 2016).

Elephant Butte Reservoir and Elephant Butte Lake State Park

Elephant Butte Reservoir is on the Rio Grande in New Mexico, 5 miles (8 kilometers) north of Truth or Consequences. This reservoir is the 84th largest manmade lake in the United States and the largest in New Mexico by total surface area. It is the only place in New Mexico where one can find pelicans perched on or alongside the lake. Temporary U.S. Coast Guard bases are also at Elephant Butte. It is impounded by Elephant Butte Dam and is the largest reservoir in New Mexico by peak volume. The reservoir is also part of the largest state park in New Mexico. Elephant Butte Lake can accommodate kayaks, jet skis, pontoons, sailboats, ski boats, cruisers, and houseboats. The park contains sandy beaches, restrooms, picnic areas, playgrounds, and developed sites with electric and water hookups for RVs. Most of these recreational and aesthetic resources are on the west side of the lake out of the Proposed Action area; however, Dam Site Marina, Winding Roads Picnic Area, and Elephant Butte Island are within the Proposed Action area.

The hundreds of birds that frequent the habitats around Elephant Butte Lake and the surrounding deserts, mesas, and mountains rich with big game provide opportunities for sightings and photographs. Buffalo are frequently seen along Highway 51 leading to Spaceport America, and deer, pronghorns, elk, javelina, coyote, lizards, eagles, and hawks are commonly seen throughout the greater Elephant Butte area.

Appendix E
Biological Resources

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Biological Resources

Vegetation

Chihuahuan Desert Scrub is confined to alluvial terrace sites in the southern portion of the Middle Rio Grande Valley. The northernmost extent of this plant community is near Isleta Pueblo, Bernalillo County, New Mexico. Chihuahuan Desert Scrub occupies regions that receive 200 to 300 millimeters (about 7 to 12 inches) of rainfall annually, most of which comes from highly variable summer thunderstorms (Brown, 1994). The dominant indicator species in this region of the Chihuahuan Desert Scrub is creosote bush (*Larrea tridentata*).

Plains-Mesa Sand Scrub is a shrub-dominated community that occupies deep, sandy soils throughout the basin. Dominant shrubs include sand sage (*Artemisia filifolia*), broom pea (*Dalea scoparia*), and honey mesquite (*Prosopis glandulosa*). Chihuahuan Desert Scrub grades into Desert Grassland or Semidesert Grassland, which occupies an elevational range of approximately 1,100 to 1,600 meters (Brown, 1982).

Desert Grassland receives an average of 250 to 450 millimeters (about 10 to 18 inches) of rainfall annually, again mostly in summer and fall. Both Brown (1982) and Dick Peddie (1993) describe Desert Grassland as a plant community between Chihuahuan Desert Scrub and Plains-Mesa Grassland (out of range to the north in Figure 3-5), but with a distinct vegetation assemblage. Desert Grassland generally has a greater shrub component than Plains-Mesa Grassland. Dominant shrub species in this region include the small soapweed (*Yucca glauca*), soaptree yucca (*Yucca elata*), tree cholla *(Opuntia imbricata*), and broom snakeweed (*Gutierrezia sarothrae*). The dominant grasses include black grama (*Bouteloua eriopoda*), galleta (*Hilaria jamesii*), three awn (*Aristida spp*.), burrograss (*Scleropogon brevifolius*), and sacaton/ drop seed (*Sporobolus spp*.).

Many mammals, birds, reptiles, and amphibians use the grassland and shrubland habitat of the Middle Rio Grande Basin and Jornada del Muerto. Although the number and distribution of larger mammals (carnivores and hoofed mammals) are not great nor unique to the desert grassland/ shrub land habitat, a rich community of small mammals unique to these habitats is supported (Grant et al., 1982). Because of the periodic but explosive production of seeds by arid-adapted plants in the Southwest, granivorous pocket mice and kangaroo rats (family Heteromyidae) represent a large component of the small mammal fauna (Findley, 1987). Antelope squirrels, spotted ground squirrel, pocket gophers, harvest mice, several species of Peromyscus, grasshopper mice, cotton rats, and wood rats eat seeds, grasses, and other vegetative, animal, or insect matter in grasslands and shrub lands. Populations of blacktailed prairie dog are lower than historic levels because of pest control measures. Also common are the jackrabbit and the desert cottontail (USDA, 1995).

Coniferous and Mixed Woodlands comprise the higher elevation mountainous areas, generally above 5,000 or 6,000 feet. Two areas underneath the Proposed Action area are comprised of this community type: one is on the Fra Cristobal Range, and the other is on the Caballo Mountains. Other areas outside the Proposed Action area include the nearby San Andres Mountains. Increased precipitation in the mountains supports woodland areas except on sunny, exposed slopes that may have grass and chaparral only. Oaks, junipers, and pinyon pines predominate on all these mountain ranges. At lower elevations they occur in canyons and shaded hollows; with increasing elevation and moisture levels, they form more dense woodlands. Coniferous forests are limited in extent; some ponderosa pine, southwestern white pine, and relict Douglas-fir grow at the highest elevations in a few areas. In these higher ranges, trees sometimes grow with a grassy understory, or with a brush cover of bigtooth maple, madrone, little walnut, oak chaparral, and grapevines. The higher mountainous areas are a major refuge for larger ungulates, such as mule deer and desert bighorn sheep.

The Rio Grande Floodplain (Urban) once contained a perennially flowing, meandering, braided river. This ecoregion has undergone many human alterations to its landscape and hydrology during the past 400 years. The once-shifting Rio Grande had mosaics of riparian woodlands and shrublands along with a variety of wetland meadows, ponds, and marshes. The gallery forest, or bosque, of cottonwood and willow with understories of coyote willow, New Mexico olive, false indigo, and seepwillow depended on this dynamic system. Irrigation and drainage canals, levees and jetty jacks, and upstream dams have altered river flows and narrowed and straightened the stream channel. Conversion to cropland, orchards, small rural farms and ranchos, and urban and suburban uses have also altered the region. Cottonwood and willow, dependent on spring flooding, have been widely replaced by invasive salt cedar and Russian olive. A portion of the Rio Grande floodplain was dammed in 1900 as part of the Rio Grande valley irrigation project, now known as Elephant Butte Reservoir. The eastern portion of the reservoir is under the Proposed Action area (USEPA, 2017).

Cottonwood Gallery Conservation

In an effort to reestablish the native cottonwood gallery along the Rio Grande, the Armendaris Biodiversity Program has worked closely with the ranch on exotic salt cedar control through mechanical removal (240 acres), herbicide application (more than 1,000 acres), and native vegetation reestablishment. Early attempts (2003-04) to procure water rights for flood riparian management on areas cleared of salt cedar along the Rio Grande were abandoned because of the economic climate. Subsequently, Armendaris Biodiversity has partnered with the ranch, the Bosque del Apache National Wildlife Refuge, the USFWS, and the Natural Resources Conservation Service to research and develop ways to revegetate the salt cedar-controlled areas without traditional water management techniques. Efforts have included dry land planting of native shrubs, forbs, and grasses; cottonwood poling; and innovative water wicking (from groundwater to shallow plant

roots) techniques. These ongoing efforts have been supported by more than $750,000 in federal grants. This project represents a real opportunity to expand a conservation effort on the Armendaris Ranch.

Wildlife

Aplomado Falcon

The aplomado falcon once inhabited a vast historical range, extending from the Southwestern United States to Argentina. In the United States, this included southeastern Arizona, the Trans-Pecos, and southern portions of New Mexico.

Populations of aplomado falcons began to decline in 1890, and by 1950 the bird was largely extirpated from its range north of the Mexican border (Turner Endangered Species Fund, 2017). The reasons for this are unclear, but likely factors include habitat loss, pesticides, collection of voucher specimens, and disease.

In 1986, the falcon was listed as endangered under the ESA[28]. In 1987, The Peregrine Fund (TPF), the Mexican government, and the USFWS launched a cooperative program to restore the falcon to the U.S. and northern Mexico, with the primary goal of establishing a self-sustaining population of 60 breeding pairs in the U.S. TPF, known for its expertise in restoring endangered birds, established a captive breeding program for the falcon. In 1987 and 1988, TPF researchers surveyed suitable habitat in Mexico. The researchers found 25 territories and located 15 active nests. Nestlings were taken during both years to establish the captive breeding program (Turner Endangered Species Fund, 2017).

The first reintroduction took place in New Mexico in 1993. Since 1985 there have been more than 1,500 releases resulting in 50 known breeding pairs. In 2006, there were 56 wild young fledged from 33 nests (TPF Operation Report). From 2006 to 2008, TPF, the USFWS, and private and public land owners (including Turner Enterprises, Inc., on the Armendaris Ranch) released 120 falcons in southern New Mexico under provisions of Section 10(j) of the ESA. Section 10(j) allows the USFWS to release a nonessential, experimental population into the species' historical range without restricting current or future land management activities.

Hacking (falconry) is a training method that helps young falcons reach their hunting potential by giving them exercise and experience. This technique is used to prepare the falcon to become an independent hunter.

After TPF finished hacking the releases in 2006 on the Armendaris Ranch, the ranch manager employed by Turner Enterprises, Inc., continued to provide quail to the released individuals throughout the fall and winter and into the spring. By late December only two falcons were arriving to feed every day. In early spring 2007, these falcons nested successfully in an abandoned raven's nest, fledging two chicks.

[28] Federal Register 51 (37), February 1986

This was the first record of falcons released the previous summer (less than 9 months old) nesting successfully.

Following this success, the TESF established an Aplomado Falcon Restoration Project on the Armendaris Ranch to assist the recovery effort's goal of down-listing the species from endangered to threatened.

Bolson Tortoise

The Bolson tortoise (*Gopherus flavomarginatus*) is the largest of the four North American tortoise species and was first described as a distinct species in 1959 (Legler, 1959). Evidence suggests that this species was distributed throughout the Chihuahuan Desert until the late Pleistocene (Donlan et al., 2006). Through anthropogenic factors and habitat loss, Bolson tortoises experienced severe population declines and range contraction, with relict populations today restricted to a small area (approximately 10 square kilometers) in north central Mexico. Population surveys conducted in the 1980s estimated fewer than 8,000 surviving individuals.

In 2004, Drs. Jane and Carl Bock of the University of Colorado inquired whether TESF might accept a group of captive Bolson tortoises for the conservation. These captives (the "Appleton tortoises") lived outdoors at the Appleton Research Ranch in southeastern Arizona. In 2006, 30 captive bolson tortoise adults were transferred to the northernmost portion of the tortoise's prehistoric range. Of these adults, 26 adults were taken to the Armendaris Ranch, and the remaining four were housed at the Living Desert Zoo in Carlsbad, New Mexico. Under the auspices of TESF, a plan was developed to establish a breeding program and determine whether a self-sustaining population of Bolson tortoises could be successfully reintroduced to the New Mexico landscape in an effort to contribute to the conservation of this species.

Since beginning the Bolson tortoise restoration effort in 2006, TESF and its collaborators have grown the original captive population of 30 adults (and seven hatchlings in 2006) to 176 tortoises in 2010. This increase in the captive population corresponds to strong annual population growth rates. In 2009-2010, the Armendaris captive population grew by 55%.

Bats

TESF is finalizing a field plan to collect data that will improve understanding of

- the emerging epizootic disease, white-nose syndrome, that is reducing hibernatory bat species across North America;
- the use of Jornada Bat Caves by up to eight species of bats (including five that have a "special concern" conservation status); and
- the threat posed by white-nose syndrome to bat populations inhabiting the Jornada bat caves.

The results will be presented in management recommendations to the Armendaris manager.

The Jornada Bat Caves in southern New Mexico on Armendaris Ranch are home to a large population of Mexican free-tailed bats. Approximately five cave complexes across the United States host larger populations of this bat species; the largest is in New Mexico at Carlsbad Cavern. The Mexican free-tail bats occupy the Jornada caves from March through October and have a maternal colony of more than 100,000. Additionally, seven other species of bats have been identified at the Jornada site, including Allen's big-eared bat and the spotted bat. Adding to these bats, millions of migratory bats use the cave as a stopover site during the warm season. Despite these staggering numbers, bat populations around the world are experiencing dramatic declines. For example, it has been estimated that the population of Mexican free-tailed bats in Carlsbad Caverns once numbered in the millions; today those numbers are less than 500,000.

Bats are essential to the health of the natural world. Losing them would have devastating consequences for nature and the economy. They especially benefit the agriculture industry along the Rio Grande corridor south of Elephant Butte reservoir.

- They help control pests. Bats can consume vast amounts of insects, including disease-carrying mosquitoes and damaging agricultural pests. A favorite target of the Mexican free-tail bat is the corn earworm moth, which attacks commercial plants, such as artichokes and watermelons.
- They are vital pollinators. Bats ensure the production of fruits that support local economies, as well as diverse animal populations (seed dispersal and predator-prey interaction).
- Additionally, bat droppings (called guano) are valuable as a rich natural fertilizer, and they disperse seeds for countless plants.

In addition to habitat loss, a primary threat to all U.S. bat species is White-nose syndrome, a devastating condition that causes bats to awaken from hibernation early, using up their fat reserves and dying by freezing or starvation. The disease has killed more than 1 million bats since it was discovered in New York in 2006, creating what biologists have said is "the most precipitous wildlife decline in the past century in North America."

Nine bat species in more than 20 states across the eastern United States have been affected, and the disease continues to spread west. Scientists are researching White-nose syndrome in the hopes of finding a way to stop its advance and mitigate its impact.

The Nature Conservancy recognized decades ago the significance of the Jornada Bat Caves and the site's importance to the survival of bats. The Conservancy has worked to find a way to end the major threats: unregulated cave activity and guano mining. Bat guano was mined from the Jornada Bat Caves in the late 19th century, and guano was still being removed from the site well into the 1980s for use as fertilizer. Miners blasted holes in the ceiling of the cave to remove the guano, which limited roosting habitat for bats by creating light shafts into the lava tubes.

In the late 1980s, the Conservancy approached Tenneco, a Houston-based industrial corporation that owned the mineral rights in the area, about protecting the site. In 1993, the company donated the mineral rights associated with 5,175 acres, including the Jornada Bat Caves, to the Conservancy. Shortly thereafter, Ted Turner acquired the property as part of his purchase of the 362,885-acre Armendaris Ranch. With his help and with assistance from the University of New Mexico, the Conservancy restored the Jornada Caves for the bats.

A "river of bats" emerge to feed from the Jornada caves daily at dusk from June to September. The average number of bats using the caves regularly varies from 200,000 to 500,000, but as many as 5 million to 8 million visit it during migration and in years of high insect population. These bats go toward the Rio Grande corridor and fly to the irrigated farm fields, where swarms of insects gather. Overhead, groups of raptors, particularly Swanson'a hawks, keep watch and circle the bats and then dive down to grab their prey (Las Cruces, 2017).

Ranch staff has taken important steps to limit access and protect the cave site from disturbance, and the Conservancy continues to work with Ted Turner on other efforts to ensure the health of bat populations into the future.

Desert Bighorn Sheep (Ovis canadensi mexicana)

The TESF project to restore desert bighorn sheep with the release of 34 animals (27 in 2005 and seven in 2007) officially ended on June 30, 2011, with the successful establishment of a population of more than 250 sheep that inhabit the Fra Cristobal and the Caballo Mountains (just south of the Fra Cristobal). This is the largest population of desert bighorn sheep in New Mexico and probably the largest population on private land in the country. The Armendaris Ranch has an operating agreement with NMDGF for future management of sheep.

The current list of wildlife species designated as threatened and endangered under the New Mexico WCA can be found on at http:/www.bison-m.org/reports.aspx?rtype=2.

Table E-1 provides a list of special status species in Sierra and Doña Ana Counties compiled from information obtained through the BISON-M and USFWS IPaC websites. The USFWS IPaC letter and species list along with BISON-M species list are provided following Table E-1.

Table E-1 Special Status Species and Birds of Conservation Concern with Potential to Occur in the Proposed Action Area

Common Name	Scientific Name	Status
Mammals		
Allen's Big-eared Bat	*Idionycteris phyllotis*	FSOC, SS
Big Free-tailed Bat	*Nyctinomops macrotis*	SS
Black-tailed Prairie Dog	*Cynomys ludovicianus ludovicianus*	FSOC, SS
Common Hog-nosed Skunk	*Conepatus leuconotus*	SS
Desert Pocket Gopher	*Geomys arenarius arenarius*	FSOC, SS
Fringed Myotis	*Myotis thysanodes*	SS
Gray Wolf	*Canis lupus*	FE
Gunnison's prairie dog (prairie subspecies)	*Cynomys gunnisoni zuniensis*	SS
Long-legged Myotis	*Myotis volans*	SS
Mexican Gray Wolf	*Canis lupus baileyi*	FE, SE
New Mexico Meadow Jumping Mouse	*Zapus hudsonius luteus*	FE, SE
Organ Mountains Colorado Chipmunk	*Tamias quadrivittatus australis*	FSOC, ST
Pale Townsend's Big-eared Bat	*Corynorhinus townsendii*	FSOC, SS
Pecos River Muskrat	*Ondatra zibethicus ripensis*	FSOC, SS
Red Fox	*Vulpes vulpes*	SS
Ringtail	*Bassariscus astutus*	SS
Southwestern Little Brown Myotis	*Myotis occultus*	SS
Spotted Bat	*Euderma maculatum*	ST
Yuma Myotis	*Myotis yumanensis*	SS
Western Red Bat	*Lasiurus blossevillii*	FSOC, SS
Western Small-footed Myotis	*Myotis ciliolabrum*	SS
Western Spotted Skunk	*Spilogale gracilis*	SS
White-nosed Coati	*Nasua narica*	SS
Birds		
Arctic Peregrine Falcon	*Falco peregrinus tundrius*	FSOC, ST
Baird's Sparrow	*Ammodramus bairdii*	FSOC, ST
Bald Eagle	*Haliaeetus leucocephalus*	ST, BCC
Bell's Vireo	*Vireo bellii*	FSOC, BCC, ST
Bendire’s Thrasher	*Toxostoma bendirei*	BCC
Burrowing Owl	*Athene cunicularia*	FSOC, BCC
Common Black Hawk	*Buteogallus anthracinus*	FSOC, ST
Common Ground-dove	*Columbina passerina*	SE
Black Tern	*Chlidonias niger*	FSOC
Black-chinned Sparrow	*Spizella atrogularis*	BCC
Brewer’s Sparrow	*Spizella breweri*	BCC
Broad-billed Hummingbird	*Cynanthus latirostris*	ST
Brown Pelican	*Pelecanus occidentalis*	SE
Buff-collared Nightjar	*Antrostomus ridgwayi*	SE
Calliope Hummingbird	*Stellula calliope*	BCC

Common Name	Scientific Name	Status
Cassin's Sparrow	*Aimophila cassinii*	BCC
Chestnut-collared Longspur	*Calcarius ornatus*	BCC
Costa's Hummingbird	*Calypte costae*	ST
Elegant Trogon	*Trogon elegans*	SE
Elf Owl	*Micrathene whitneyi*	BCC
Flammulated Owl	*Otus flammeolus*	BCC
Fox Sparrow	*Passerina iliaca*	BCC
Golden Eagle	*Aquila chrysaetos*	BCC
Grace's Warbler	*Dendroica graciae*	BCC
Gray Vireo	*Vireo vicinior*	ST, BCC
Headwater Chub	*Gila nigra*	SE
Least Tern	*Sternula antillarum*	FE, SE
Lewis's Woodpecker	*Melenerpes lewis*	BCC
Loggerhead Shrike	*Lanius ludovicianus*	SS, BCC
Long-billed Curlew	*Numenius americanus*	BCC
Lucifer Hummingbird	*Calothorax lucifer*	ST
Lucy's Warbler	*Vermivora luciae*	BCC
McCown's Longspur	*Calcarius mccownii*	BCC
Mexican Spotted Owl	*Strix occidentalis lucida*	Federal: Critical Habitat Designated (NM), FT, SS
Peregrine Falcon	*Falco peregrinus*	FSOC, ST, BCC
Pinyon Jay	*Gymnorhinus cyanocephalus*	BCC
Piping Plover	*Charadrius melodus*	FT
Reddish Egret	*Egretta rufescens*	FSOC
Mountain Plover	*Charadrius montanus*	SS
Neotropic Cormorant	*Phalacrocorax brasilianus*	ST
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	Federal: Experimental Population, SE
Northern Goshawk	*Accipiter gentilis*	FSOC, SS
Olive-sided Flycatcher	*Contopus cooperi*	BCC
Rufous Hummingbird	*Selasphorus rufus*	BCC
Rufous-crowned Sparrow	*Aimophila ruficeps*	BCC
Short-eared Owl	*Asio flammeus*	BCC
Snowy Plover	*Charadrius alexandrinus*	BCC
Sonoran Yellow Warbler	*Dendroica petechial ssp. sonorana*	BCC
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	Federal: Critical Habitat Designated (NM), FE, SE
Sprague's Pipit	*Anthus spragueii*	FC
Swainson's Hawk	*Buteo swainsoni*	BCC
Thick-billed Kingbird	*Tyrannus crassirostris*	SE
Varied Bunting	*Passerina versicolor*	ST
Violet-crowned Hummingbird	*Amazilia violiceps*	ST
Virginia's Warbler	*Vermivora virginiae*	BCC

Common Name	Scientific Name	Status
Willamson's Sapsucker	*Sphyrapicus thyroideus*	BCC
Willow Flycather	*Empidonax traillii*	BCC
Yellow-billed Cuckoo (western pop)	*Coccyzus americanus occidentalis*	FT, SS
Fish		
Gila Trout	*Oncorhynchus gilae*	FT, ST
Lawrence's Goldfinch	*Carduelis lawrencei*	BCC
Rio Grande Chub	*Gila pandora*	SS
Rio Grande Cutthroat Trout	*Oncorhynchus clarkii virginalis*	SS
Rio Grande Silvery Minnow	*Hybognathus amarus*	FE
White Sands Pupfish	*Cyprinodon tularosa*	FSOC, ST
Reptiles		
Big Bend Slider	*Trachemys gaigeae*	SS
Bleached Earless Lizard	*Holbrookia maculata ruthveni*	SS
Little White Whiptail	*Aspidoscelis inornata gypsi*	SS
Narrow-headed Gartersnake	*Thamnophis rufipunctatus*	FT
Reticulate Gila Monster	*Heloderma suspectum suspectum*	SE
Southwestern Fence Lizard	*Sceloporus cowlesi*	SS
Amphibians		
Arizona Toad	*Anaxyrus microscaphus*	SS
Chiricahua Leopard Frog	*Lithobates chiricahuensis*	Federal: Critical Habitat Designated (NM), FT, SS
Invertebrates		
Alamosa Springsnail	*Tyronia alamosae*	FE
Chupadera Springsnail	*Pyrgulosis chupaderae*	FE
Doña Ana Talussnail	*Sonorella todseni*	FSOC, ST
Mineral Creek Mountainsnail	*Oreohelix pilsbryi*	FSOC, ST
Moore's Fairy Shrimp	*Streptocephalus moorei*	SS
Socorro Isopod	*Thermosphaeroma thermophilus*	FE
Socorro Springsnail	*Pyrgulopsis neomexicana*	FE
Plants		
Pecos Sunflower	*Helianthus paradoxus*	FT
Sneed Pincushion Cactus	*Coryphantha sneedii var. sneedii*	FE
Todsen's Pennyroyal	*Hedeoma todsenii*	FE
Wright's Marsh Thistle	*Cirsium wrightii*	FC

Sources: BISON-M 2017, USFWS 2017

BCC = Birds of Conservation Concern
FC = Federal Candidate
FE = Federal Endangered
FSOC= Federal Species of Concern (no longer maintained)
FT = Federal Threatened
SE = State Endangered
SS = State Sensitive taxa (informal)
ST = State Threatened

SPECIAL STATUS SPECIES REVIEW DOCUMENTS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Mexico Ecological Services Field Office
2105 Osuna Road Ne
Albuquerque, NM 87113-1001
Phone: (505) 346-2525 Fax: (505) 346-2542
http://www.fws.gov/southwest/es/NewMexico/
http://www.fws.gov/southwest/es/ES_Lists_Main2.html

In Reply Refer To: May 19, 2017
Consultation Code: 02ENNM00-2017-SLI-0611
Event Code: 02ENNM00-2017-E-01187
Project Name: Holloman AFB EA for F-16 Use in WSMR R-5111 C/D Airspace

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

Thank you for your recent request for information on federally listed species and important wildlife habitats that may occur in your project area. The U.S. Fish and Wildlife Service (Service) has responsibility for certain species of New Mexico wildlife under the Endangered Species Act (ESA) of 1973 as amended (16 USC 1531 et seq.), the Migratory Bird Treaty Act (MBTA) as amended (16 USC 701-715), and the Bald and Golden Eagle Protection Act (BGEPA) as amended (16 USC 668-668c). We are providing the following guidance to assist you in determining which federally imperiled species may or may not occur within your project area and to recommend some conservation measures that can be included in your project design.

FEDERALLY-LISTED SPECIES AND DESIGNATED CRITICAL HABITAT

Attached is a list of endangered, threatened, and proposed species that may occur in your project area. Your project area may not necessarily include all or any of these species. Under the ESA, 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 the Service further. Similarly, it is the responsibility of the Federal action agency or project proponent, not the Service, to make "no effect" determinations. If you determine that your proposed action will have "no effect" on threatened or endangered species or their respective critical habitat, you do not need to seek concurrence with the Service. Nevertheless, it is a violation of Federal law to harm or harass any federally-listed threatened or endangered fish or wildlife species without the appropriate permit.

If you determine that your proposed action may affect federally-listed species, consultation with the Service will be necessary. Through the consultation process, we will analyze information contained in a biological assessment that you provide. If your proposed action is associated with

Federal funding or permitting, consultation will occur with the Federal agency under section 7(a)(2) of the ESA. Otherwise, an incidental take permit pursuant to section 10(a)(1)(B) of the ESA (also known as a habitat conservation plan) is necessary to harm or harass federally listed threatened or endangered fish or wildlife species. In either case, there is no mechanism for authorizing incidental take "after-the-fact." For more information regarding formal consultation and HCPs, please see the Service's Consultation Handbook and Habitat Conservation Plans at www.fws.gov/endangered/esa-library/index.html#consultations.

The scope of federally listed species compliance not only includes direct effects, but also any interrelated or interdependent project activities (e.g., equipment staging areas, offsite borrow material areas, or utility relocations) and any indirect or cumulative effects that may occur in the action area. The action area includes all areas to be affected, not merely the immediate area involved in the action. Large projects may have effects outside the immediate area to species not listed here that should be addressed. If your action area has suitable habitat for any of the attached 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.

Candidate Species and Other Sensitive Species

A list of candidate and other sensitive species in your area is also attached. Candidate species and other sensitive species are species that have no legal protection under the ESA, although we recommend that candidate and other sensitive species be included in your surveys and considered for planning purposes. The Service monitors the status of these species. If significant declines occur, these species could potentially be listed. Therefore, actions that may contribute to their decline should be avoided.

Lists of sensitive species including State-listed endangered and threatened species are compiled by New Mexico state agencies. These lists, along with species information, can be found at the following websites:

Biota Information System of New Mexico (BISON-M): www.bison-m.org

New Mexico State Forestry. The New Mexico Endangered Plant Program: www.emnrd.state.nm.us/SFD/ForestMgt/Endangered.html

New Mexico Rare Plant Technical Council, New Mexico Rare Plants: nmrareplants.unm.edu

Natural Heritage New Mexico, online species database: nhnm.unm.edu

WETLANDS AND FLOODPLAINS

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. These habitats should be conserved through avoidance, or mitigated to ensure that there would be no net loss of wetlands function and value.

We encourage you to use the National Wetland Inventory (NWI) maps in conjunction with ground-truthing to identify wetlands occurring in your project area. The Service's NWI program website, www.fws.gov/wetlands/Data/Mapper.html integrates digital map data with other resource information. We also 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.

MIGRATORY BIRDS

The MBTA prohibits the taking of migratory birds, nests, and eggs, except as permitted by the Service's Migratory Bird Office. To minimize the likelihood of adverse impacts to migratory birds, we recommend construction activities occur outside the general bird nesting season from March through August, or that areas proposed for construction during the nesting season be surveyed, and when occupied, avoided until the young have fledged.

We recommend review of Birds of Conservation Concern at website www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BCC.html to fully evaluate the effects to the birds at your site. This list identifies birds that are potentially threatened by disturbance and construction.

BALD AND GOLDEN EAGLES

The bald eagle (Haliaeetus leucocephalus) was delisted under the ESA on August 9, 2007. Both the bald eagle and golden eagle (Aquila chrysaetos) are still protected under the MBTA and BGEPA. The BGEPA affords both eagles protection in addition to that provided by the MBTA, in particular, by making it unlawful to "disturb" eagles. Under the BGEPA, the Service may issue limited permits to incidentally "take" eagles (e.g., injury, interfering with normal breeding, feeding, or sheltering behavior nest abandonment). For information on bald and golden eagle management guidelines, we recommend you review information provided at www.fws.gov/midwest/eagle/guidelines/bgepa.html.

On our web site www.fws.gov/southwest/es/NewMexico/SBC_intro.cfm, we have included conservation measures that can minimize impacts to federally listed and other sensitive species. These include measures for communication towers, power line safety for raptors, road and highway improvements, spring developments and livestock watering facilities, wastewater facilities, and trenching operations.

We also 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 State fish, wildlife, and plants.

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. For further consultation on your proposed activity, please call 505-346-2525 or email nmesfo@fws.gov and reference your Service Consultation Tracking Number.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New Mexico Ecological Services Field Office
2105 Osuna Road Ne
Albuquerque, NM 87113-1001
(505) 346-2525

Project Summary

Consultation Code: 02ENNM00-2017-SLI-0611

Event Code: 02ENNM00-2017-E-01187

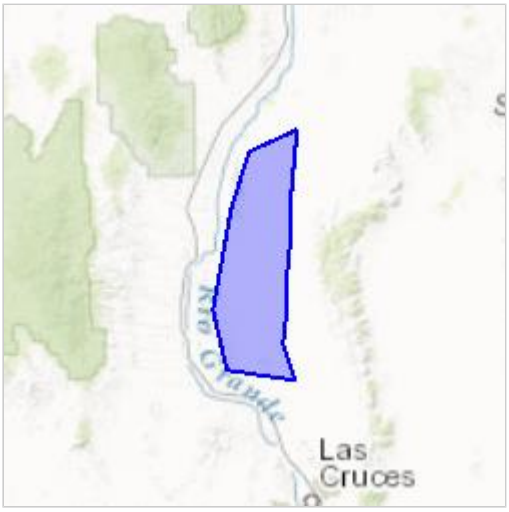
Project Name: Holloman AFB EA for F-16 Use in WSMR R-5111 C/D Airspace

Project Type: MILITARY OPERATIONS / MANEUVERS

Project Description: Airspace proposed to be used is located west of WSMR monument, in New Mexico, and just east of Truth or Consequences, comprised of approximately 500 square miles. This project is projected to start in one year.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/33.16293602174902N107.012170611707W



Counties: Doña Ana, NM | Sierra, NM | Socorro, NM

Endangered Species Act Species

There is a total of 20 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area. Please contact the designated FWS office if you have questions.

Mammals

NAME	STATUS
Gray Wolf *(Canis lupus)* Population: U.S.A.: All of AL, AR, CA, CO, CT, DE, FL, GA, IA, IN, IL, KS, KY, LA, MA, MD, ME, MI, MO, MS, NC, ND, NE, NH, NJ, NV, NY, OH, OK, PA, RI, SC, SD, TN, TX, VA, VT, WI, and WV; and portions of AZ, NM, OR, UT, and WA. Mexico. No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4488	Endangered
New Mexico Meadow Jumping Mouse *(Zapus hudsonius luteus)* There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7965	Endangered

Birds

NAME	STATUS
Least Tern *(Sterna antillarum)* Population: interior pop. No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8505	Endangered
Mexican Spotted Owl *(Strix occidentalis lucida)* There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8196	Threatened
Piping Plover *(Charadrius melodus)* Population: except Great Lakes watershed There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Southwestern Willow Flycatcher *(Empidonax traillii extimus)* There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6749	Endangered
Yellow-billed Cuckoo *(Coccyzus americanus)* Population: Western U.S. DPS There is a **proposed** critical habitat for this species. Your location is outside the proposed critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened
Northern Aplomado Falcon *(Falco femoralis septentrionalis)* Population: U.S.A (AZ, NM) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1923	Experimental Population, Non-Essential

Reptiles

NAME	STATUS
Narrow-headed Gartersnake *(Thamnophis rufipunctatus)* There is a **proposed** critical habitat for this species. Your location is outside the proposed critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2204	Threatened

Amphibians

NAME	STATUS
Chiricahua Leopard Frog *(Rana chiricahuensis)* There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1516	Threatened

Fishes

NAME	STATUS
Gila Trout *(Oncorhynchus gilae)* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/781	Threatened
Rio Grande Silvery Minnow *(Hybognathus amarus)* Population: Wherever found, except where listed as an experimental population There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1391	Endangered

Snails

NAME	STATUS
Alamosa Springsnail *(Tryonia alamosae)* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4371	Endangered
Chupadera Springsnail *(Pyrgulopsis chupaderae)* There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6644	Endangered
Socorro Springsnail *(Pyrgulopsis neomexicana)* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2806	Endangered

Crustaceans

NAME	STATUS
Socorro Isopod *(Thermosphaeroma thermophilus)* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2470	Endangered

Flowering Plants

NAME	STATUS
Pecos (=puzzle, =paradox) Sunflower *(Helianthus paradoxus)* There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7211	Threatened
Sneed Pincushion Cactus *(Coryphantha sneedii var. sneedii)* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4706	Endangered
Todsen's Pennyroyal *(Hedeoma todsenii)* There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1081	Endangered
Wright's Marsh Thistle *(Cirsium wrightii)* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8963	Candidate

Critical habitats

There are no critical habitats within your project area.

Species determinations

For listed species

[1] not covered by determination keys, an impact analysis should be performed to reach a conclusion about how this project will impact the species. These conclusions will result in *determinations* for each species, which will be used in consultation with the U.S. Fish and Wildlife Service.

Mammals

Gray Wolf Canis lupus	None
New Mexico Meadow Jumping Mouse Zapus hudsonius luteus	None

Birds

Least Tern Sterna antillarum	None
Mexican Spotted Owl Strix occidentalis lucida	None
Northern Aplomado Falcon Falco femoralis septentrionalis	None
Piping Plover Charadrius melodus	None

Southwestern Willow Flycatcher Empidonax traillii extimus	None
Yellow-billed Cuckoo Coccyzus americanus	None

Reptiles

Narrow-headed Gartersnake Thamnophis rufipunctatus	None

Amphibians

Chiricahua Leopard Frog Rana chiricahuensis	None

Fishes

Gila Trout Oncorhynchus gilae	None
Rio Grande Silvery Minnow Hybognathus amarus	None

Snails

Alamosa Springsnail Tryonia alamosae	None
Chupadera Springsnail Pyrgulopsis chupaderae	None
Socorro Springsnail Pyrgulopsis neomexicana	None

Crustaceans

Socorro Isopod Thermosphaeroma thermophilus	None

Flowering Plants

Pecos (=puzzle, =paradox) Sunflower Helianthus paradoxus	None
Sneed Pincushion Cactus Coryphantha sneedii var. sneedii	None
Todsen's Pennyroyal Hedeoma todsenii	None
Wright's Marsh Thistle Cirsium wrightii	None No determination required

Critical habitats

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.

Appendix F
Cultural Resources

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Cultural Resources Background

Cultural History of Properties within and Near the Proposed Action Area

During the colonial years, New Mexico was tied to the outside world by a single thoroughfare that descended the Rio Grande valley from north of Santa Fe, dropped through the natural gate at El Paso, and wound its way through the provinces of the old Viceroyalty of New Spain to Mexico City, about 1,200 miles south.

This artery of commerce and travel was known as El Camino Real, which meant Royal Road or King's Highway. Of the great highways leading north, this was the oldest, having been extended by segments throughout the 16th century. For a time, it also enjoyed the distinction of being the longest road in North America. Some of El Camino Real had its earliest beginnings as Indian trails. Later, sections of the route were traversed by Spanish conquistadors and colonizers. Finally, with the coming of Juan de Onate's expedition in 1598, the full length of the trail was defined. During the subsequent 300 years, traffic increased as quantities of trade goods and representatives of different cultures traveled it, bringing with them currents of change that would forever alter the face of this land. Largely forgotten in modern times, New Mexico's El Camino Real is recognized and valued as a richly informative cultural and historic resource (National Parks Service [NPS], 2016b).

El Camino Real de la Tierra Adentro was designated a National Historic Trail in 2000, and 11 segments of the trail within New Mexico are listed in the NRHP as part of a multiple property listing. Several of these segments are within the Jornada del Muerto; those in the vicinity of the R-5111 C/D airspace include the Jornada Lake, Yost Draw, Point of Rocks, as well as Rincon Arroy which is south of the Proposed Action Area.

Other important resources dating to the Historic period lie along the Southern CR A013 (Upham Road) route, including sites related to El Camino Real and the AT&SF Railroad. With the coming of the railroad in 1881, stations were established within the Jornada del Muerto at Engle, Aleman, Upham, and Alivio. Settlement in the Aleman area, adjacent to the Spaceport America facility, resulted from its establishment as the first permanent water source along the Camino Real, with the digging of a well in 1867 for the ranch named "El Aleman." Ranching flourished as more wells were dug in the basin. The stations at Engle, on the north end of the CR A013 route and at Upham and Alivio are recorded as historic archaeological sites (BLM, 2017) and served as shipping points for cattle bound for the beef markets of the Midwest. Cattle ranching dominated the economy of south-central New Mexico by the late 19th and early 20th centuries, and much of the region has been cattle rangeland since the 1880s.

The next major development in the region came with the construction of Elephant Butte Reservoir. The dam was built from 1912 to 1916, with additional construction on the irrigation system extending through at least 1942. Settlements in the area experienced a short-lived period of rapid growth and prosperity as a result of the construction of the Elephant Butte dam. The majority of settlements of the Jornada del Muerto followed a similar pattern of fitful growth that was finally stunted by the creation of White Sands Proving Grounds (now known as White Sands Missile Range) in 1945. Today, the region surrounding the Action Area remains remote and sparsely populated, with an economy dominated by small-scale ranching, the missile range, the railroad, and recreation related to Elephant Butte Reservoir.

El Camino Real De Tierra Adentro – National Historic Trail

On February 17, 2012, 10 contributing properties were listed on the NRHP as part of the multiple property documentation form for El Camino Real de Tierra Adentro, the international historic trail linking Mexico City with northern New Mexico. Nearly 20 miles of the best-preserved ruts and swales marking the ancient Camino Real de Tierra Adentro had previously been added to the New Mexico State Register of Cultural Properties on December 10, 2010. The nominations were part of a package of 11 individual trail segments and a historic context for the trail.

El Camino Real de Tierra Adentro is recognized throughout the United States and Mexico as a timeless route of trade and cultural exchange and interaction among Spaniards and other Europeans, Native Americans, Mexicans, and Americans. Trade and travel on this trail shaped individual lives and communities and affected settlement and development in the greater Southwest. Recognition of this route as an international historic trail commemorates a shared cultural heritage and contributes in a meaningful way to eliminating cultural barriers and enriching the lives of people along El Camino Real de Tierra Adentro.

Jornada Lakes - National Register ID 11000167 Listed 4/8/2011

Jornada Lakes were one of the few significant water resources available to the travelers on the 100-mile stretch of Camino Real through the Jornada del Muerto used by Indians, the Spanish, and later by settlers. These lakes are comprised of 126 acres within the Jornada Draw approximately 6.5 miles south of Engle (NPS, 2017b).

Yost Draw – National Register ID 11000163 Listed 4/8/2011

Traversing nearly 3.8 miles of the Jornada del Muerto, the Yost Draw section of El Camino Real today is one of the best-preserved portions of the trail. It is clearly defined pathways, deep arroyos and variations in vegetation convey a uniquely unchanged picture of the trail through time. Parallel roadways reveal where

new paths were developed as others on the steep slope overlooking Yost Draw eroded. Cobblestone ramps, battered after centuries of heavy traffic, demonstrate innovative road improvement methods that provided livestock and wagons better footing through steep climbs and descents. Occurrences of artifacts, from Spanish colonial ceramics to grinding stones to U.S. Army-issued tin cans, point to Yost Draw campsites and resting points used by centuries of trekkers (NPS, 2017b).

Point of Rocks – National Register ID 11000171 Listed 4/8/2011

The large basalt outcropping known as Point of Rocks at the southern end of the Proposed Action area is among the landmarks that travelers depended on to keep their bearings as they made their way through the desert. Situated along the western edge of the Perrillo Hills, the Point of Rocks ridge looks over a section of El Camino Real between the escarpment and the eastern edge of the floodplain beyond. The site was a day away from the San Diego paraje (rest stop), where voyagers watered their animals and collected what they hoped would be enough to carry themselves through the dry days ahead. By the time northbound travelers reached Point of Rocks, often after traveling through the cool of night, they were ready for a good rest. The base of the ridge provided a sheltered camping spot. For southbound travelers, it offered a welcome sign that water was only 13 miles away (NPS, 2017).

Ft. McRae – State Listed -National Register ID 05000258

Fort Rae, also known as LA 4983, was listed in the NRHP in 2005. The receding waters of Elephant Butte Reservoir have exposed Fort McRae, a unique Civil War-era military installation strategically situated between the Camino Real's Jornada del Muerto and a river crossing to the west on the Rio Grande.

While the location of Fort McRae was common knowledge when Elephant Butte Dam was built and the reservoir filled, no government regulations existed requiring the identification and documentation of cultural resources. Signa Larralde, staff archeologist for the Albuquerque Area Office, initiated this process now because the unusually low water levels in the reservoir revealed the site.

The fort had been recorded as an archaeological site in the 1980s, but no good, measured maps existed that showed its current condition, nor were there any accurate descriptions that compared it to historic maps and descriptions. Fort McRae was last partially exposed in the early 1990s but has probably not been completely exposed since the early 1980s; it has been inundated by the waters of Elephant Butte Reservoir for most of the past 20 years.

In November 2000, the Bureau of Reclamation contacted Statistical Research, Inc., of Tucson, Arizona, to produce an accurate map of the structures at Fort McRae as they appear at present and to produce a State

of New Mexico Archaeological Records Management System site form for the fort. Dr. Carla Van West is the principal investigator for Reclamation's projects in the Albuquerque area, and she oversees the work of other archeologists working on this project.

Fort McCrae was named after Captain Alexander McRae, who died in the Battle of Valverde; this fort was built in 1863 and thrived for about 13 years along the Jornada del Muerto. It protected travelers and supplies from the raids of nearby Apaches and from remnants of rebel activity from the Civil War. Nestled in the Champagne Hills near Ojo del Muerto (Spring of the Dead), Fort McRae housed about 80 soldiers, some of whom were Buffalo soldiers. Soldiers from other forts used Fort McRae as a rest stop and place of burial. After the military abandoned the fort in 1876, travelers used it for several years.

From the excavations and historical maps, archeologists determined that Fort McRae included officers' quarters, barracks, a guardhouse, a hospital, a cemetery, a blacksmith shop, quartermaster's quarters, parade grounds, and stables.

Based on historical maps, archeologists know where the cemetery is supposed to be situated; however, its location has not been determined with any certainty. Another complication is three burial records exist indicating that the deceased may have been buried, exhumed, and reinterred one or more times. Common practice was to exhume bodies when a fort closed and reinter them in a cemetery of an active fort. Burial records indicate that the Fort McRae cemetery contains graves for soldiers, including Buffalo soldiers, and civilians, including women, children and Native Americans. At the time, Buffalo soldiers' remains were not a priority for removal when a fort closed, so the graves may have never been moved. Causes of death listed on the burial records for Fort McRae included drowning, mortal battle wounds, and disease. Corporal Frank Bratling is a Medal of Honor recipient thought to have been buried at the cemetery in Fort McCrae. He suffered a mortal wound in July 1873 during a fierce battle with Native Americans who had stolen cattle from a nearby ranch. He served as a Corporal in Company C, 8th United States Cavalry. Attempts by archeologists to uncover the cemetery at Fort McCrae to find his remains have been unsuccessful. However, in November 2001, the archeological investigating group found documents indicating that the cemetery was moved to Fort Leavenworth, Kansas, in 1886 by presidential order of Ulysses Grant. Frank Bratling had been moved to that cemetery, and after 130 years his remains can now receive the honors he has been awaiting (U.S. Bureau of Reclamation [USBR], 2017).

Elephant Butte Dam – State Listed -National Register ID - 79001556 Listed 1979

Elephant Butte Dam was added to the State Register of Historic Places in 1979. The Proposed Action rea is 3,600 feet east of the dam. Geographically the dam is northwest of Elephant Butte off New Mexico 51.

This dam has historical significance in terms of engineering and public works records and its period of construction dates are 1900-1924. Areas of significance are conservation, agriculture, and engineering; it is owned and managed by the federal government (NPS, 2017).

Elephant Butte Irrigation District - National Register ID 97000822 Listed 8/08/1997

This district is along the Rio Grande River between Caballo Dam in Doña Ana and Sierra Counties, New Mexico, and El Paso, New Mexico. The Elephant Butte Irrigation District includes 217 contributing features spread over a vast discontinuous area. The features are all associated with the Bureau of Reclamation's Rio Grande Project along the Rio Grande River of south-central New Mexico and westernmost New Mexico. Authorized in 1905, the Rio Grande Project consolidated and reconstructed small privately built water diversion and conveyance structures in the Rincon and Mesilla Valleys. For the first time, the supply of irrigation water became both predictable and dependable; as a consequence, the amount of irrigated farmland in the Rincon and Mesilla Valleys tripled to more than 100,000 acres. The principal engineering features of the Rio Grande Project include Elephant Butte and Caballo storage dams, six diversion dams (Percha, Percha Arroyo, Leasburg, American, Mesilla, and Riverside), 141 miles of canals, 462 miles of laterals, 457 miles of drains, and one hydroelectric plant.

The Elephant Butte Irrigation District listed in the NRHP is one of three irrigation systems served by the complex Rio Grande Project. The district contains three project diversion dams (Percha, Leasburg, and Mesilla) and more than 200 miles of canals, laterals, and drains. Other contributing features include the Leasburg Dam Tender's Residence and four siphons.

In 1996, ownership of a majority of the Elephant Butte Irrigation District was transferred from the Bureau of Reclamation to the Elephant Butte Irrigation District operating entity. The Bureau of Reclamation retains ownership of four contributing features: Leasburg Diversion Dam, Leasburg Dam Tender's Residence, Mesilla Diversion Dam, and Percha Diversion Dam. The latter is also individually listed in the NRHP (USBR, 2017).

The Reclamation Act (also known as the Lowlands Reclamation Act or National Reclamation Act) of 1902 (Pub.L. 57–161) is a federal law that ultimately funded irrigation projects for the arid lands of 20 states in the West. Elephant Butte Irrigation District and the Rio Grande were part of the Reclamation Act.

The act at first covered only 13 states because New Mexico had no federal lands. New Mexico was added later by a special act passed in 1906. The act set aside money from sales of semi-arid public lands for the construction and maintenance of irrigation projects. The newly irrigated land would be sold, and money

would be put into a revolving fund that supported more such projects. This led to the eventual damming of nearly every major western river. Under the act, the Secretary of the Interior created the United States Reclamation Service within the United States Geological Survey to administer the program. In 1907, the Service became a separate organization within the Department of the Interior and was renamed the United States Bureau of Reclamation.

The Act was authored by Democratic Congressional Representative Francis G. Newlands of Nevada. It is considered by some to be one of the largest welfare programs in American history and led to tremendous graft and speculation, not to mention the building of what appeared to be gratuitous dams. Many of the loans made to farmers, loans funded by the sale of federal land, were never repaid. Amendments made by the Reclamation Project Act of 1939 gave the Department of the Interior, among other things, the authority to amend repayment contracts and to extend repayment for not more than 40 years. Amendments made by the Reclamation Reform Act of 1982 (P.L. 97-293) eliminated the residency requirement provisions of the reclamation law, raised the acreage limitation on lands irrigated with water supplied by the Bureau of Reclamation, and established and required full-cost rates for land receiving water above the acreage limit.

Elephant Butte Historic District – National Registry ID 96001616 Listed 2/10/1997

The Elephant Butte Historic District, south and east of the dam, is where the community sprang up as construction began. The community, often referred to as the Dam Site, was once a thriving city of more than 3,000 residents. A smaller community survived here into the early 1960s. The Elephant Butte Historic District is listed on the NRHP and is undergoing a multiyear expansion and rehabilitation to bring honor to its history and ensure the achievements of the people who toiled to create this unique place remain for future generations. The district provides a tangible experience of early 20th century life. Authentic buildings dating back as far as 1907 stand guardian to the thousands of visitors who come every year to stay in the historic lodgings, hike the many unspoiled trails, picnic among the intricate stone-lined garden terraces, use the facilities of the state's largest marina, fish, camp, and enjoy the many wonderful recreation opportunities at adjacent Elephant Butte Lake.

Kettle Top Butte – National Register ID 88000477 Listed 5/16/1988

Kettle Top Butte, also known as LA48995, contains significant prehistoric native American information pertaining to the Jornada Mogollon or Mibres Mogollon. The period of significance is 499-0 AD and 1000-500AD.

Historic Significance: Information Potential
Area of Significance: Prehistoric

Cultural Affiliation:	Jornada Mogollon, or, Mimbres Mogollon
Period of Significance:	499-0 AD, 1000-500 AD
Owner: Federal	
Historic Function:	Defense, Domestic
Historic Sub-function:	Fortification, Village Site
Current Function:	Agriculture/Subsistence, Landscape
Current Sub-function:	Park